LIBRO DE RESÚMENES

XI REUNIÓN CIENTÍFICA DE LA SOCIEDAD ESPAÑOLA DE ASTRONOMÍA

SEA

TERUEL 8 - 12 SEPTIEMBRE 2014

Diseño cubierta y mapa: Carlos Escriche - Escuela de Arte de Teruel
Agradecimientos imagen cubierta: ESO/VISTA/J. Emerson. - Cambridge Astronomical Survey Unit

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Comités

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Patrocinadores

La Sociedad Española de Astronomía (SEA) desea agradecer el apoyo de los siguientes patrocinadores:

Programa Científico General

Lunes, 8 de Septiembre 2014

9:00 – 9:40	Apertura y Bienvenida
9:40 – 10:00	Silvia Torres-Peimbert, Presidenta electa de la IAU
10:00-10:20	Ramón García-López, gestor del Plan Estatal de Investigación: Área de Ciencias del Espacio
10:20–10:40	Rafael Bachiller, gestor del Plan Estatal de Investigación: Área de Astronomía y Astrofísica
10:40–11:10	Pausa Café
11:10 – 11:35	*Structural evolution of massive galaxies in the last 11 Gyr* por Fernando Buitrago (premio ex-equo SEA a la mejor tesis doctoral en Astrofísica del año 2012)
11:35 – 12:00	*Structure and nature of gamma-ray binaries by means of VLBI observations* por Javier Moldón (premio ex-equo SEA a la mejor tesis doctoral en Astrofísica del año 2012)
12:00 – 12:25	*Magnetic Fields in Neutron Stars* por Daniele Viganó (premio SEA a la mejor tesis doctoral en Astrofísica del año 2013)
12:25 – 12:40	Presentación de los Premios SEA-SF2A a cargo de Céline Reylé, presidenta de la Sociedad Francesa SF2A
12:40 – 13:00	*Caracterización de objetos trans-neptunianos a partir de radiometría térmica y ocultaciones estelares* por Pablo Santos-Sanz, premio SEA-SF2A del 2013
13:00 – 13:20	ASAI, Astrochemical Surveys At IRAM <<Chemical Surveys of Sun-Like Star Forming Regions>> por Rafael Bachiller, premio SEA-SF2A del 2014
13:20 – 15:30	Pausa comida
15:30 – 17:20	Sesiones paralelas
17:20 – 17:50	Pausa café
17:50 – 19:40	Sesiones paralelas

Martes, 9 de Septiembre 2014

9:00 – 11:00	Sesiones paralelas
11:00 – 11:30	Pausa café
11:30 – 13:30 11:30 – 11:45 11:45 – 12:20 12:20 – 12:55 12:55 – 13:30	Sesión Especial: España-México Silvia Torres-Peimbert *La colaboración entre España y México* Jesús González *A la frontera de la Instrumentación Astronómica* Martín A. Guerrero *Multi-wavelength observations of planetary nebulae* José Alberto López *FRIDA: Espectroscopía Integral de Campo e Imágenes limitadas por difracción para GTC*
13:30 – 15:30	Pausa Comida
15:30 – 17:30 15:30 – 16:05 16:05 – 16:40 16:40 – 17:15	Sesión Plenaria Enrique Solano *X Aniversario del Observatorio Virtual Español* Wouter Vlemmings *Science with ALMA* Roland Bacon *Highlights from the Multi Unit Spectroscopic Explorer (MUSE)*
17:20 – 19:40	Pausa café
17:50 – 19:40	Sesiones Paralelas

Miércoles, 10 de Septiembre 2014

9:00 – 11:00	Sesiones paralelas
11:00 – 11:30	Pausa café
11:30 – 13:30 11:30 – 11:45 11:45 – 12:20 12:20 – 12:55 12:55 – 13:30	Sesión Plenaria Pheneas Nkundabakura *Status of the Astronomy in East Africa* Rita Schulz *Comet composition and chemistry: what can we expect from Rosetta?* Eduard Salvador-Solé *Constraints on Reionization from the Observed Cosmic Properties at High-z* Viggo Hansteen *IRIS observations and 3D 'realistic' MHD models of the solar chromosphere*
13:30 – 15:30	Pausa comida
15:30 – 17:20	Sesión Plenaria: Astronomía e Industria Mesa redonda y debate
17:20 – 17:50	Pausa café
17:50 – 19:40	Sesiones paralelas

Jueves, 11 de Septiembre 2014

9:00 – 11:00	Sesiones Paralelas
11:00 – 11:30	Pausa café
11:30 – 13:30 11:30 – 11:45 11:45 – 12:20 12:20 – 12:55 12:55 – 13:30	Sesión Plenaria Miguel Marañón *La SEA en el Cervantes* Claudia Mendes de Oliveira *Galaxy formation and evolution in compact groups of galaxies at $z = 0$* Enrique Martínez González *The Planck Cosmological Results* Andrés Asensio-Ramos *Bayesian Inference Techniques in Astronomy & Astrophysics*
13:30 – 15:30	Pausa comida
15:30 – 17:20	XXII Asamblea General de la SEA
17:20 – 17:50	Pausa café
17:50 – 19:40	Sesión Plenaria: Red Española de Infraestructuras en Astronomía *Presentación del Estudio de Prospectiva*

Viernes, 12 de Septiembre 2014

9:00 – 11:00	Sesiones Paralelas
11:00 – 11:30	Pausa café
11:30 – 13:30 11:30 – 11:45 11:45 – 12:00 12:00 – 12:35 12:35 – 13:10 13:10 – 13:45	Sesión Plenaria Mariano Moles *Calar Alto Legacy Survey I: ALHAMBRA* José M. Vílchez *Calar Alto Legacy Survey II: CALIFA* Licia Verde *Cosmology: taming astrophysics to learn about fundamental phyisics. Some examples* Rashid Sunyaev *Two important moments in the history of the Universe: last scattering surface and black body photosphere of the Universe* Charles Telesco *An overview of first science results with CanariCam at the GTC*
13:45 – 15:30	Pausa comida
15:30 – 17:20	Sesiones Paralelas
17:20 – 17:50	Pausa café
17:50 – 19:40	Sesiones Paralelas

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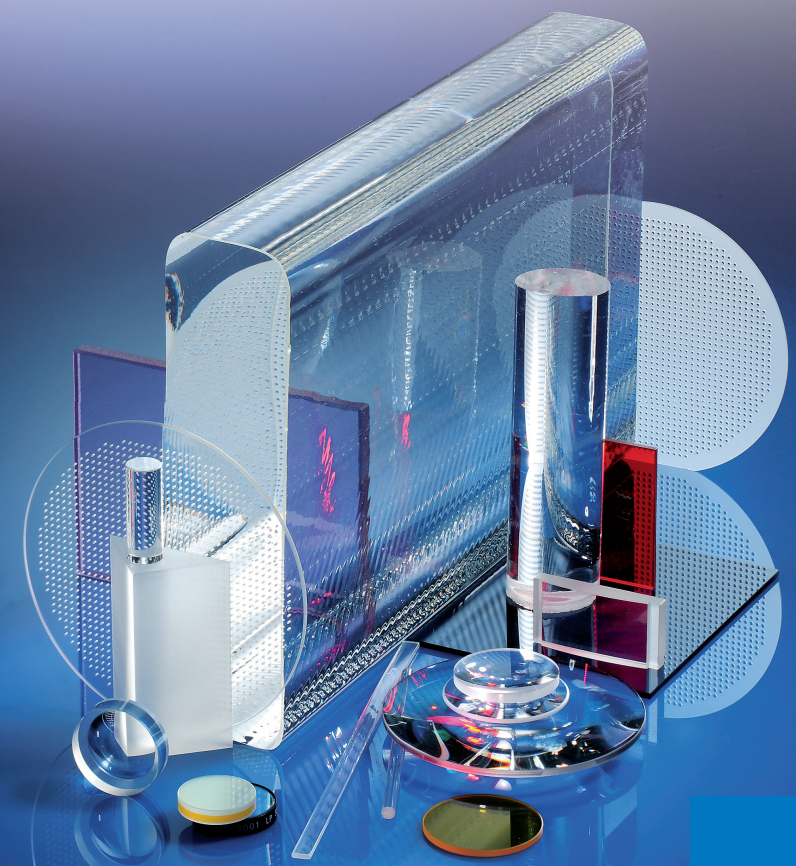

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Conferencias Plenarias

Bayesian Inference Techniques in Astronomy & Astrophysics

Andrés Asensio-Ramos
Instituto de Astrofísica de Canarias

Learning from the comparison of models and observations is, in general, an ill-posed problem. The presence of noise, uncertainties and model parameter degeneracies forces us to consider the inference as a probabilistic problem. Bayesian inference gives us a robust theoretical framework to cope with such complications. I will present a description of the fundamentals, going from the basic techniques to the most advanced ones, showing applications in several fields of Astronomy & Astrophysics

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Highlights from the Multi Unit Spectroscopic Explorer (MUSE)

Roland Bacon
CRAL - Observatoire de Lyon

The Multi Unit Spectroscopic Explorer (MUSE) is a second-generation VLT panoramic integral-field spectrograph. MUSE has a field of 1×1 arcmin^2 sampled at 0.2×0.2 arcsec^2 and a simultaneous spectral range of 0.465 - 0.93 μm, at a resolution of R$\sim$3000. The instrument has been designed to take advantage of the VLT ground layer adaptive optics ESO facility using four laser guide stars. MUSE couples the discovery potential of a large imaging device to the measuring capabilities of a high-quality spectrograph, while taking advantage of the increased spatial resolution provided by adaptive optics. After a successful preliminary acceptance in Europe in fall 2013, MUSE has been dismounted, shipped to Chile and re-integrated in the Paranal new integration hall and finally installed on the Nasmyth platform of UT4 late January this year. During the 2 commissioning runs, millions of spectra have been obtained in order to validate the instrument and measured its achieved performance. To demonstrate its power, a number of show-case and spectacular observations have also been obtained. Preliminary results demonstrate that MUSE is likely to become a new reference in the field of integral field spectroscopy thanks to its large field of view, very high throughput, excellent image quality, good spectral resolution, wide simultaneous spectral range and state-of-the-art control and data reduction software.

IRIS observations and 3D 'realistic' MHD models of the solar chromosphere

Viggo Hansteen
Institute of theoretical astrophysics, University of Oslo

The Interface Region Imaging Spectrograph (IRIS) is a NASA "Small Explorer" mission was launched in late June 2013 and since then has obtained spectra and images from the outer solar atmosphere at unprecedented spatial and temporal resolution. It's primary goal is to probe the photosphere-corona interface: the source region of outer atmosphere heating and dynamics, and a region that has an extremely complicated interplay between plasma, radiation and magnetic field. The scientific justification for IRIS hinges on the capabilities of 3D radiative magnetohydrodynamic models to allow the confident interpretation of observed data. In this talk we will discuss the interplay between observations and modeling illustrated with examples from recent IRIS observations.

FRIDA: Espectroscopía Integral de Campo e Imágenes limitadas por difracción para GTC

José Alberto López
UNAM (México) en representación del equipo de FRIDA

FRIDA es una cámara y espectrómetro integral de campo que operará en combinación con GTCAO para explotar el límite de difracción del Gran Telescopio Canarias. FRIDA ha sido diseñado y está siendo construido como una colaboración entre instituciones de México, España y USA. En modo imagen FRIDA proveerá escalas de 0.010, 0.020 y 0.040 arcsec/píxel, correspondiendo a campos de visión de 20.48 x 20.48 arcsec and 40.96 x 40.96 arcsec, respectivamente. Un rebanador de campo monolítico con 30 rebanadas proveerá espectroscopía integral de campo con resoluciones espectrales R $\sim$ 1000, 4,500 and 30,000. Cada rebanada se proyecta en dos pixeles en la dirección espectral. Los campos de visión correspondientes en modo IFS son 0.65 x 0.60 arcsec, 1.30 x 1.20 arcsec and 2.60 x 2.40 arcsec. FRIDA está iniciando integración de sistemas y está programado para completar ensamblar e integración de todo el instrumento hacia finales de 2015, y ser posteriormente entregado a GTC. En esta contribución presentamos un resumen de su diseño, fabricación y aplicaciones científicas potenciales.

Multi - wavelength observations of planetary nebulae

Martín A. Guerrero
Instituto de Astrofísica de Andalucía

Planetary nebulae (PNe), the short-lived descendants of low- and intermediate-mass stars in their way toward white dwarf dom, are classical laboratories for nebular astrophysics and late stellar evolution. Photoionization, wind-wind interactions, dust production, chemical enrichment of the inters tellar medium and other processes are routinely investigated in PNe. Observations at different wavelengths have offered a multi-faceted view of PNe, allowing us to probe cold neutral or molecular material at the outermost shells, photoionized gas in the main nebulae, and shock-heated plasma at X-ray-emitting temperatures in their interiors. In this talk I will describe how recent multi-wavelength observations of PNe keep changing our understanding of their structure, formation and evolution.

The Planck cosmological results

Enrique Martínez
Instituto de Física de Cantabria

In this review we describe the main science data products and update the cosmological results published on March 2013 by the Planck mission. Launched on May 14th 2009, it has recently provided the most precise confirmation of the standard six parameter LCDM model. It has also revised the value of some of these parameters and improved the accuracy in their determination, reaching a precision of around 1 % or better. Another relevant result from Planck is the measurement with a high significance the gravitational lensing potential affecting the CMB photons. In addition, several large scale anomalies in the CMB temperature distribution detected previously in WMAP data have been confirmed. All these first cosmological results will be revised in the light of the final Planck products based on the full data set, including polarization, that are planned to be released in October this year.

Galaxy formation and evolution in compact groups of galaxies at z=0

Claudia Mendes de Oliveira
Instituto de Astronomía, USP, Brasil

The main topic of this talk is the study of galaxy formation and evolution in different environments of dense and loose groups based on the analysis of a large sample of compact groups and field galaxies observed with Fabry-Perot instruments. We have derived velocity maps, monochromatic and velocity dispersion maps for more than one hundred galaxies in compact groups to determine their evolutionary stages and these have been compared to data for galaxies in less dense environments, from the GHASP sample, for determination of the Tully-Fisher relation, search for tidal dwarf galaxy and young clusters, formed due to interactions, and to determine the mass profiles of galaxies and study of the cusp/core problem. Our main results will be discussed in this talk.

Constraints on Reionization from the Observed Cosmic Properties at High - z

Eduard Salvador - Solé
Institut de Ciències del Cosmos – Universitat de Barcelona

Reionization plays a central role in the process of galaxy formation. In this talk I review the present status of our knowledge on this elusive process and the observational techniques currently employed or in progress to try to determine it. Special atten tion is paid on a new, very simple approach, developed by our group, making use of all the observed properties of the Universe at very high-redshift ($z > 2$) in order to constraint its evolution and, in particular, the reionization history. A self-consistent model of galaxy formation, specifically designed to monitor the coupled evolution of galaxies and intergalactic medium (IGM) since the dark ages, is used that includes Population III stars, normal galaxies, and massive black holes (MBHs) seeded by the remnants of massive metal-free stars. The best solution we obtain yields excellent fits to all the data, namely galaxy sizes, cold gas, stellar, and MBH mass densities, star formation rate densities, ionizing emissivities, IGM temperatures and metallicities, and galaxy and MBH mass functions. The reionization implied is extended and complex, with two full HI ionization events. This double reionization is consistent with the recent limits drawn from the small -scale polarization CMB anisotropies. As a byproduct, we unveil several interesting features in the observed cosmic properties at high-z.

Comet composition and chemistry: what can we expect from Rosetta?

Rita Schulz
ESA Scientific Support Office, ESTEC, Noordwijk, The Netherlands

The composition of a comet nucleus cannot be directly determined by remote sensing observations, but is usually inferred from coma observations, assuming certain conditions in the near-nucleus environment. The development of cometary activity is undoubtedly related to most complex, yet unknown, physico-chemical processes in the surface layer of the nucleus and the inner coma. Hence, it is presently not possible to unambiguously extract the true composition of a comet nucleus from its coma composition. Key information on these processes is expected from the Rosetta mission to comet 67P/Churyumov-Gerasimenko. Rosetta monitors the evolution of the nucleus surface and the coma composition as a function of increasing and decreasing solar flux input along the comet's pre- and post-perihelion orbit. Different instrumentations are used in parallel, from multi-wavelength spectrometry to in-situ measurements of coma and nucleus composition and physical properties. This provides the opportunity to cross-correlate the values obtained by the different measurement techniques on board, and in addition link the inner coma chemistry uncovered by the space mission to the abundance of coma species observed from Earth or Earth orbit. Thus, the Rosetta target comet can serve as a reference for interpretation and modelling of the physical and chemical processes relevant for the formation of a comet's coma. If this knowledge is properly transferred to other comets, it will provide new means to distinguish whether differences between comets, observed in their comae, reflect differences of their nuclei or are related to different environmental conditions of the comets at the time of observation. This in turn has important implications to the question of how and where comets were formed in the early solar system.

X Aniversario del Observatorio Virtual Español

Enrique Solano
Centro de Astrobiología (INTA - CSIC).

El objetivo principal del Observatorio Virtual es el de proporcionar un mecanismo de acceso y análisis fácil y eficiente de la información existente en los archivos astronómicos. El Observatorio Virtual Español es un proyecto que nace en 2004 para coordinar las actividades VO a nivel nacional. El proyecto se encuentra liderado desde sus orígenes por el Centro de Astrobiología (INTA-CSIC). Las principales líneas de trabajo desarrolladas durante estos 10 años han sido las siguientes: 1) desarrollo y gestión de archivos astronómicos adaptados a los estándares del Observatorio Virtual; 2) colaboración con grupos de investigación en proyectos de ciencia-VO, 3) desarrollo de herramientas de análisis VO y minería de datos; 4) difusión de resultados: Organización de escuelas para el uso de herramientas VO, organización de redes de trabajo para la publicación de datos en VO, participación en cursos de Máster; 5) actividades educativas y de divulgación. A lo largo de esta presentación se describirán algunos de los resultados más importantes obtenidos hasta la fecha así como las líneas de trabajo futuras.

An overview of first science results with CanariCam at the GTC

Charles M. Telesco
Department of Astronomy, University of Florida

CanariCam is the facility mid-IR (8 - 25 microns) camera on the Gran Telescopio Canarias (GTC). With 0.08 arcsec pixels, CanariCam is diffraction-limited (0.3 arcsec at 10 microns) across a 19 $\times$ 26 arcsec field of view. The available science modes are: 1. imaging across the full field of view; 2. slit spectroscopy with R = 100 at 10 and 20 microns; 3. imaging polarimetry at 10 microns. In addition, spectropolarimetry in the 10-micron region has just been commissioned and will soon be available. Since early 2012, CanariCam has been obtaining exciting and groundbreaking science on AGNs, YSOs, circumstellar disks and their environments, sub-stellar objects, and other astronomical sources of broad interest. After a brief description of CanariCam, I will provide an overview of CanariCam science accomplishments with special emphasis on polarimetry, a mode that is completely unique to CanariCam and holds great promise for scientific breakthroughs. I wish to acknowledge support for this research from the US National Science Foundation through grants AST-0903672 and AST-0908624.

Two important moments in the history of the Universe: last scattering surface and black body photosphere of the Universe

Rashid Sunyaev
MPIA, Garching, Germany

Last scattering surface and black body photosphere of the Universe are two very important milestones in the history of our Universe. Hydrogen recombination at redshifts z $\sim$ 1100 - 1300 leads to rapid decrease of the optical depth of the Universe due to Thomson scattering. As a result the acoustic peaks in the observed CMB angular distribution are formed in the vicinity of the last scattering surface. The question remains how and at which redshifts the observed practically ideal black body spectrum of CMB was formed. Why we dream that proposed space missions like PIXIE will be able to detect traces of any significant energy release in our Universe at redshifts smaller than 2 million? Why spectral distortions can not originate behind black body photosphere or at redshifts higher that 2 million?

Cosmology: taming astrophysics to learn about fundamental physics. Some examples.

Licia Verde
ICREA & ICC UB - IEEC & ITA University of Oslo

Cosmology, is often repeated, has become a precision science, now it will have to make the transition to accurate science. To achieve this there are several challenges to overcome. I will discuss some selected examples drawn from the experience with cosmic microwave background observations and large-scale structure. In particular, cosmic microwave background observations have been the key to establish the current cosmological paradigm and in offering renewed support to the theory of inflation. Given that the energy scale of inflation is many orders of magnitude larger than any of the energies that can be reached by terrestrial experiments, the cosmos offers, in principle, a wonderful laboratory to learn about fundamental physics, if the primordial signal can be extracted in a robust and reliable way. Closer to home, more local observations of large scale structure also offer a window into e.g. the physics of dark energy or of neutrino if complicated astrophysical processes such as star formation and galaxy formation can be tamed.

Science with ALMA

Wouter Vlemmings
Onsala Space Observatory, Sweden

ALMA has been operational for nearly three years and has already produced many stunning science results in nearly all areas of astronomy. In this talk I will present the latest status of ALMA and some of the highlights from the first observing cycles. I will in mostly, but not only, focus on Galactic astronomy and in particular the ALMA observations of the early and late stages of stellar evolution. As ALMA is still growing and will continue developing, I will end with promises of things to come.

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Ciencias planetarias

Sesión P1

Nubes en los planetas del Sistema Solar

[Conferencia Invitada]

Santiago Pérez Hoyos

Todos los planetas del Sistema Solar con atmósferas densas poseen nubes. Desde las gruesas nubes de ácido sulfúrico de Venus hasta las tenues y dispersas nubes de dióxido de carbono en Marte, pasando por las nieblas de origen fotoquímico en Saturno, todas ellas exhiben un conjunto de similitudes y de diferencias que nos permiten comprender mejor la física relacionada con estos fenómenos, aplicable también a la Tierra e incluso a los planetas alrededor de otras estrellas. En esta charla revisaremos nuestro conocimiento actual acerca de las nubes del Sistema Solar, incluyendo los planetas terrestres (Tierra, Venus y Marte), gigantes gaseosos (Júpiter y Saturno), gigantes helados (Urano y Neptuno) y el satélite Titán. En particular nos centraremos en el efecto que las diferentes coberturas nubosas producen sobre la radiación observada, ya sea a través de la reflexión y transmisión de la luz solar, como de la modulación que producen sobre la emisión térmica de las capas atmosféricas más profundas. Veremos cómo el efecto de las partículas sobre la radiación, combinado con otros fenómenos atmosféricos relevantes, nos permite, a través de la observación remota, adquirir una cantidad enorme de información acerca estos cuerpos que abarca la física atmosférica, composición y química, estructura vertical, dinámica y balance energético, por citar algunos ejemplos. Para finalizar esta revisión resumiremos las cuestiones más candentes que aún permanecen a la espera de ser respondidas y analizaremos las diferentes misiones espaciales en curso o planeadas que próximamente pueden aportar información significativa acerca de las nubes en los planetas de nuestro Sistema Solar.

Variación rotacional de Quirón observada desde distintos telescopios

Estela del Mar Fernández Valenzuela

Quirón es un pequeño cuerpo del Sistema Solar que presenta actividad cometaria y pertenece a la familia de los Centauros. Estos objetos tienen órbitas comprendidas entre las de los planetas Júpiter y Neptuno. Hemos obtenido curvas de luz rotacionales (variación de la magnitud frente al tiempo debida a la rotación de un cuerpo elongado) de Quirón en los meses de septiembre y octubre de 2013 con los telescopios de 1.23 m del Centro Astronómico Hispano Alemán (CAHA), 1.5 m del Observatorio de Sierra Nevada (OSN) y 80 cm del Observatorio Astronómico de La Hita. Además, se han analizado observaciones del telescopio de 2.15 m del Complejo Astronómico El Leoncito (CASLEO) en Argentina realizadas en agosto de 2000. Los resultados muestran una disminución de la amplitud de la curva de luz obtenida en 2013 con respecto a los publicados por Bus et al. (1989), mientras que en los datos de 2000 la amplitud es similar a la de estos autores. En este trabajo se interpretan estas variaciones de amplitud y se dan constricciones a la orientación del eje de rotación, así como una estimación de la razón de ejes de Quirón.

Estudios de cometas de corto periodo en la era de Rosetta

Francisco José Pozuelos Romero

La llegada de la misión Rosetta a su destino, el cometa 67P/Churyumov-Gerasimenko, ha levantado gran expectación en la comunidad científica. Este cometa pertenece a la familia de cometas de corto periodo, o también llamados, cometas de la familia de Júpiter, y representan un grupo de cuerpos que, debido a perturbaciones planetarias han sido inyectados en las regiones más internas del Sistema Solar, quedando atrapados en una órbita cuyo afelio es aproximadamente la órbita de Júpiter, y cuyos periodos de revolución ronda los 7 años. Nuestro estudio se centra en la caracterización de cometas de esta clase. Dicho estudio es llevado a cabo en dos fases: (1) Una caracterización precisa en términos del polvo ambiental que rodea a los cometas conforme éstos se activan al entrar en las zonas próximas al perihelio. Dicho polvo ambiental está caracterizado por los parámetros de polvo: Producción de polvo [kg/s]; Velocidad de eyección de las partículas [m/s]; Distribución de tamaños de las partículas (i.e., radios máximos, mínimos, e índice de la ley de potencias que rige la población de partículas); Y patrón de emisión (que puede ser isótropo o anisótropo). Todos estos parámetros son obtenidos como función de la distancia heliocéntrica.(2) Un estudio dinámico que nos permite determinar qué regiones han sido visitadas en los últimos 15 millones de años por estos cometas, donde además derivamos el tiempo que estos cometas llevan orbitando en la región de la familia de Júpiter. Los resultados parecen mostrar que existe ciertamente una relación entre el tiempo que llevan estos cuerpos orbitando en la región de Júpiter y la cantidad de polvo que emiten. Los cometas estudiados han sido: 22P/Kopff, 30P/Reinmuth 1, 78P/Gehrels, 81P/Wild 2, 103P/Hartley 2, 115P/Maury, 118P/Shoemaker-Levy 4, 123P/West-Hartley, 157P/Tritton, 185P/Petriew, and P/2011 W2 (Rinner).

Caracterización del canal visible de la cámara PlanetCam-UPV/EHU para observaciones del Sistema Solar

Iñigo Mendikoa Alonso

PlanetCam-UPV/EHU es una nueva cámara astronómica concebida fundamentalmente para la observación de las atmósferas planetarias del Sistema Solar a alta resolución espacial y temporal mediante la técnica "lucky imaging". Consta de dos canales para la toma simultánea de imágenes que corresponden respectivamente a la parte visible (0.38-1 micras) y SWIR (1-1.7 micras) del espectro planetario. El canal visible de la cámara está operativo y ha sido utilizado en el estudio de la estructura de nubes y de la dinámica atmosférica de los planetas del Sistema Solar acoplada a los telescopios de 1.23 m y 2.2 m del Observatorio de Calar Alto. El canal visible de PlanetCam ha demostrado también ser adecuado para la observación de otros objetos astronómicos tales como GRBs, impactos, cúmulos globulares o planetas extrasolares. En este artículo se describe el brazo visible de PlanetCam y sus componentes actuales que incluyen el detector sCMOS, juego de 16 filtros y lentes Barlow. También se describen las características funcionales de la cámara basándose en las diversas pruebas de laboratorio realizadas para la caracterización precisa de su funcionamiento radiométrico y astronómico. Se presenta la metodología empleada para la caracterización de la PSF y la calibración en reflectividad absoluta I/F de las imágenes. Finalmente se muestran algunas de las imágenes de mayor resolución espacial obtenidas con PlanetCam con una breve descripción de los procedimientos de captura y postprocesado empleados.

Función de fase de las partículas atmosféricas en el hemisferio norte de Saturno mediante imágenes Cassini/ISS

José Francisco Sanz Requena

La función de fase permite caracterizar los aerosoles atmosféricos, ya que toma diferentes valores en función del tamaño medio, forma, propiedades ópticas y otras características similares según el ángulo de scattering o dispersión. Por ejemplo, a medida que el radio de la partícula se aproxima al de la longitud de onda incidente o la supera, la probabilidad de dispersión de la radiación en la dirección del haz incidente aumenta notablemente, mientras que la retrodispersión disminuye. En este trabajo estudiamos la función de fase de las partículas que se pueden encontrar en la troposfera del hemisferio norte de Saturno usando una función de fase sintética doble de Henyey-Greenstein. Para ello, utilizamos imágenes de Cassini/ISS calibradas en reflectividad absoluta y adquiridas a lo largo del año 2011 con ángulos de fase comprendidos entre 20.55° y 113.27° utilizando los filtros MT2, CB2 y MT3 (727, 752 y 890 nm respectivamente) que cubren dos bandas de absorción del metano y un continuo intermedio. En este trabajo presentamos el análisis realizado a lo largo de una época dominada por la erupción la última GWS en diciembre de 2010 pero para dos latitudes del planeta (10° N y 50° N) en una zona apartada de la perturbación atmosférica. Los resultados de las observaciones fotométricas son consistentes con un modelo de dos capas de nieblas y una nube semi-infinita cuyas propiedades se ajustan. Ambas regiones son zonas brillantes del planeta, pero con diferente dinámica. Los resultados señalan distintas alturas de las nubes y propiedades microfísicas de las partículas. Presentamos los parámetros de la función de fase para ambos casos.

Estructura térmica tridimensional del Vórtice Polar Sur de Venus

Itziar Garate López

En el polo sur de Venus existe un vórtice atmosférico de morfología altamente variable y cuyo comportamiento dinámico tiene características impredecibles. Usando imágenes multi-espectrales infrarrojas del instrumento VIRTIS-M hemos obtenido mapas de temperatura a alta resolución espacial entre los 55 y 85km de altura para tres configuraciones morfológicas distintas del vórtice. En estos mapas el vórtice se muestra como una región cálida, extensa en altura, que está comprimida por una corriente de aire más frío entre los 55 y 67km de altura que rodea al vórtice permanentemente, y que se expande hacia el ecuador una vez superados los 74km de altura. La parte alta de la atmósfera (67– 85km) es más homogénea y tiene diferencias de temperatura de 25K en un mismo nivel de altura entre las regiones más calientes del vórtice y el aire más frío que lo rodea. La parte baja del vórtice (55– 67km), en cambio, muestra una estructura fina que se corresponde con la morfología del vórtice, y con diferencias de temperatura de hasta 50K. A partir de la estructura térmica hemos analizado la estabilidad estática de diferentes capas verticales. Hemos visto que la estabilidad es siempre positiva ($S>0$) dentro de la región polar sur para el rango de alturas considerado. La corriente fría es la estructura que mayor estabilidad presenta, mientras que las latitudes sub-polares y el vórtice en sí muestran valores inferiores de estabilidad. Nuestro método de obtención de temperaturas no es sensible a alturas donde la estabilidad estática es baja (45– 55km). Sin embargo, el análisis realizado por encima de los 55km concuerda bien con estudios previos basados en perfiles térmicos obtenidos por radio-ocultación (Tellmann et al., 2009), y postulamos que las regiones convectivas ($S<0$) que ellos encuentran constituyen un punto clave para la comprensión de la dinámica del vórtice.

Sesión P2

PLATO 2.0

[Conferencia Invitada]

Juan Cabrera Pérez

PLATO 2.0 has recently been selected for ESA's M3 launch opportunity (2022/24). Providing accurate key planet parameters (radius, mass, density and age) in statistical numbers, it addresses fundamental questions such as: How do planetary systems form and evolve? Are there other systems with planets ours, including potentially habitable planets? The PLATO 2.0 instrument consists of 34 small aperture telescopes (32 with 25 sec readout cadence and 2 with 2.5 sec candence) providing a wide field-of-view (2232 deg^2) and a large photometric magnitude range (4-16 mag). It focusses on bright (4-11 mag) stars in wide fields to detect and characterize planets down to Earth-size by photometric transits, whose masses can then be determined by ground-based radial-velocity follow-up measurements. Asteroseismology will be performed for these bright stars to obtain highly accurate stellar parameters, including masses and ages. The combination of bright targets and asteroseismology results in high accuracy for the bulk planet parameters: 2 %, 4-10 % and 10 % for planet radii, masses and ages, respectively. In our talk we will present an overview of the mission and its scientific objectives.

The potential of solar-like pulsators: from planetary systems to the structure of the Milky Way

[Conferencia Invitada]

Josefina Montalbán Iglesias

The detection by the space missions CoRoT and Kepler of solar-like oscillations in several hundred dwarfs and subgiants, and in more than ten thousand G-K giants has revealed the enormous potential of this kind of pulsators in very different astrophysical domains. In this talk I will present first the properties of the oscillation spectra of these pulsators, as well as their link with the global stellar properties (mass, radius and age). Secondly I will show some examples of the impact of asteroseismology of solar-like pulsators on other fields such as, stellar evolution, planetary science, spectroscopy, and stellar population studies.

¿Pequeños asteroides con "atmósferas" de polvo?

Adriano Campo Bagatin

An increasing number of Near Earth Asteroids (NEAs) in the range of a few hundred meters to a few kilometers in size are found to have relatively high spin rates (less than 4 hr, down to ∼2.3 hr, depending on taxonomic type). Due to their high spin rate local acceleration near their equator may in some case be directed outwards so that lift off of near-equatorial material is possible. What are the effects of that phenomenon on surface material at low asteroid latitudes?

Internal structures of small asteroids by N-body numerical simulations of non-spherical shapes

Rafael Andrés Alemañ Berenguer

The internal structure of asteroids and comets is fundamentally unknown due to difficulties in sounding their interiors. The measurements carried on by space probes and the observations of binary asteroids (optical and radar) allowed acceptable estimates of the masses of a bunch of asteroids. From their sizes and shape models estimates of their bulk densities are derived. Such bulk densities are usually smaller than the values corresponding to typical densities of meteorites with compositions matching spectroscopical observations of the surfaces of those asteroids, rising doubts about the actual composition of their interiors. Similar arguments – but with much larger uncertainties – hold for comets. The interpretation of such low bulk densities is that part of the volume inside some of those objects is occupied by voids in between the coherent components forming their global structures, qualifying them as gravitational aggregates (also, "rubble-piles"). The origin of such bodies is clearly related to former catastrophic or gradual disruptions. Moreover, numerical simulations of the collisional evolution of the asteroid belt predict that most of the bodies between some hundreds of meters and about 100 km should be gravitational aggregates. The situation is a little fuzzier in the case of comets.

Sesión P3

Exo-earth searches: prospects with HARPS (North and South) and ESPRESSO.

[Conferencia Invitada]

Rafael Andrés Rebolo López

I will review our research program for exo-earth detection using both HARPS instruments at TNG (ORM) and the 3.6 m (La Silla). The status of ESPRESSO (VLT) and the prospects for this search will also be discussed. HARPS-N is providing data of precission around 1 m/s for M-dwarfs. These data enable the search for terrestrial planets in short orbital periods. I will describe observations obtained with HARPS-S and the new laser comb system enabling calibration precision better than 10 cm/s. A combined observing program on late G and K dwarfs is planned with this instrument in order to explore the presence of terrestrial planets. ESPRESSO entered the construction phase and shall be deployed at VLT in late 2016, with even higher precisions it will facilitate the extension of these searches for terrestrial planets in the habitable zone of G to M stars.

Water vapor in the Earth's middle and upper atmosphere

[Conferencia Invitada]

Maya García Comas

Water vapour is a key species in the Earth's middle and upper atmosphere (MUA). It is involved in the radiative balance; it is the source of hydrogen radicals, affecting the ozone chemistry; it is the source of polar mesospheric clouds (PMCs), thought to be indicators of climate change; and, it is an excellent dynamical tracer, due to is long lifetime. Methane oxidation, global-scale transport and photolysis determine the water vapour distributions in this atmospheric region. In this talk, we will run our eyes over global observations of MUA water vapour to understand its seasonal variation, its peculiarities during the PMC season, its hemispheric asymmetries and its response during very active dynamical events. For this purpose, we will examine MUA H2O abundances retrieved from seven years of MIPAS measurements using the unique IMK/IAA retrieval processor.

Brown dwarfs and free-floating planets in young star clusters.

[Conferencia Invitada]

Mª Rosa Zapatero Osorio

The characterization of the smallest brown dwarfs and free-floating planets (those that do not orbit any star) as a function of age has become one exciting objective/challenge in modern Astrophysics. Because their light is directly seen, these objects can be studied employing moderate efforts, which makes them highly valuable benchmark sources for a proper comparison with planets around stars. The analysis of planets orbiting stars is quite complex due to the contamination of the parental stellar brightness. Last but not least, the understanding of the substellar mass function of free-floating bodies is of major importance since it is the direct result of the mechanisms giving rise to stars and planetary systems. In this talk, we will summarize the current status of the latest works on brown dwarfs and free-floating planets populating young star cluster of the Galaxy, particularly sigma Orionis and the Pleiades. With an age of 3 and 120 Myr, these two clusters are among the best well-known star associations to date. We will present the photometric, astrometric, and spectroscopic properties of young, very low-mass sigma Orionis and Pleiades members, which provide evidence of a large number of planets "without parent stars" in these two regions of the sky.

Exoplanet Science with the PLATO mission

Hans Deeg

This presentation will focus on the exoplanet science of the recently selected PLATO space mission. PLATO will observe up to one million stars and detect and characterize hundreds of small planets, and thousands of planets in the Neptune to gas giant regime out to the Habitable Zone. Its catalogue will also be unique for containing statistical numbers of terrestrial planets at intermediate orbital distances, where surface temperatures are moderate. Planets detected by PLATO will orbit bright stars (4-11mag) and will thus become ideal targets for ground-based observations such as transit spectroscopy to explore their atmospheres. The targets' brightness will also facilitate planet-mass determinations from radial velocities. PLATO will therefore enable the first large-scale catalogue of bulk-characterized planets with accurate radii, masses, mean densities and ages. This full set of exoplanetary parameters will be supplemented by detailed characteristics of the host stars from spectroscopic and asteroseismic analysis. PLATO's results will thus complete our knowledge of planet diversity for low-mass objects, will permit the study of planets and planetary systems at different evolutionary phases and will constrain planet formation theories. They will also specify how planet and system parameters change with host star characteristics, such as type, metallicity and age. Furthermore, the mission has the potential to detect exomoons, planetary rings, binary and Trojan planets as well as planets orbiting around binary stars.

Perfil de vientos en la región polar norte de Saturno y de su Hexágono

Arrate Antuñano Martín

Estudiamos la estructura de los vientos (mapa de sus componentes horizontales) en la región polar norte de Saturno y de su Hexágono, en un período de 7 meses comprendidos entre noviembre 2012 y julio 2013. Para ello, se han seleccionado y medido imágenes obtenidas con el instrumento Cassini Imaging Science (ISS) en los filtros CB2 y CB3 (longitudes de onda de 752nm y 939nm respectivamente). Las imágenes se han navegado y se han realizado las diferentes proyecciones polares mediante el software PLIA y, posteriormente, se han creado pares de imágenes separadas entre sí entre 1 y 2.5 horas para medir la componente zonal y meridional del viento mediante el uso de un algoritmo de correlación bidimensional para la distribución de nubes. Por otro lado hemos trazado mapas de vorticidad y turbulencia en toda la región polar. Este estudio muestra que el jet asociado al hexágono tiene su máximo de velocidad hacia el Este de 120m/s a 75.5° N y que alrededor del polo, a 88° N fluye una corriente en chorro que encierra el vórtice polar con velocidad de 150m/s. Por otro lado, la componente meridional del viento varía entre -20m/s y 20m/s en el jet asociado al hexágono. En otras regiones la velocidad meridional media está por debajo del nivel del ruido de las medidas (5 m/s).

Sesión P4

Estudio de la atmósfera de Marte combinando observaciones y modelos físicos

[Conferencia Invitada]

Francisco González Galindo

El clima marciano presenta características, como la sucesión de estaciones o el patrón dominante de vientos, que convierten la atmósfera de Marte en la más parecida a la terrestre en el Sistema Solar. Por otra parte, otras propiedades de la atmósfera marciana, como las tormentas globales de polvo o el ciclo de condensación/sublimación de su componente mayoritario, CO2, son verdaderamente únicas. Nuestra comprensión de Marte en general, y de su atmósfera en particular, se basa en dos pilares: las observaciones y los modelos teóricos. En lo que respecta a las observaciones, la inserción en órbita marciana de la sonda Mars Global Surveyor de la NASA, en 1999, marcó el inicio de 15 años de observación ininterrumpida del planeta rojo por diversas sondas. La sonda Mars Express de la Agencia Espacial Europea, en particular, nos ha proporcionado durante más de 10 años (y continúa proporcionándonos) valiosos datos que han revolucionado nuestra visión del clima actual de Marte, y también del que tenía en el pasado. Por su parte, los modelos teóricos han gozado de un extraordinario desarrollo en los últimos lustros de la mano de las observaciones y del aumento de la potencia de cálculo. Este desarrollo ha permitido logros como la creación de la Mars Climate Database, una herramienta utilizada por científicos e ingenieros de todo el mundo. En esta charla revisaremos brevemente nuestra compresión actual de la atmósfera marciana, y mostraremos cómo la utilización conjunta de datos y modelos teóricos constituye la herramienta más poderosa para una mejor comprensión de los procesos físicos y químicos que modelan la atmósfera marciana. Esta combinación de datos observacionales y modelos ha permitido, por ejemplo, explicar por qué las nubes mesosféricas de CO2 sólo aparecen en determinadas estaciones y en determinados lugares, o dar sentido a observaciones de restos geológicos de procesos glaciares.

Ice processes and organic matter in space: observations and laboratory simulations

[Conferencia Invitada]

Guillermo Manuel Muñoz Caro

The formation of ice mantles on interstellar and circumstellar dust grains is governed by the accretion and desorption processes. Thermal processing of astrophysical ices takes place in circumstellar environments, near protostars, or already formed stars (comets and other icy bodies). Temperature-programmed desorption experiments of ice composed of various molecular components (H_2O, CO, CO_2, CH_3OH, and NH_3) were dedicated to reproduce the heating of circumstellar ices in hot cores, and will serve to interpret the measurement of volatiles that mass spectrometers on board the ESA-Rosetta cometary mission will perform on comet 67P/Churyumov-Gerasimenko. But the presence of gas-phase molecules in the coldest regions, such as dark interstellar clouds, remains unexplained. UV-photodesorption is a plausible non-thermal desorption process. The UV-absorption cross-section and the photo-desorption rate of these species were measured to estimate the effect of photo-processing of ice in interstellar clouds and the solar nebula. Certain species detected in the gas were probably formed in dust grains. The synthesis of UV, X-ray and ion irradiation products in pre-cometary ice was studied experimentally. The organic matter of prebiotic interest formed by irradiation and heating of ice mantles might be preserved to some degree in Halley-like comets and some asteroids. Indeed, organic matter accounts for about 20 % of Halleys mass and, more recently, the infrared features of organic compounds were detected in asteroids. The Rosetta mission will attempt to characterize this elusive material in a comet nucleus.

New experimental sublimation energy measurements for some relevant astrophysical ices

Miguel Ángel Satorre Aznar

The knowledge of the sublimation energy of ices allows us to better understand the dynamics between surfaces and atmospheres of different environments of astrophysical interest where ices are present. This work is intended to provide sublimation energy values for a set of pure ices (CO, CH_4, CO_2, N_2, and NH_3) using a new experimental procedure. The results were compared to some values obtained by other authors under different conditions and/or methods, to check the reliability of this new method. We used the frequency variation obtained from a quartz crystal microbalance to calculate the sublimation energy from the Polany-Wigner equation for the first time. The results obtained are relevant since there are few previous values of sublimation energy reported on these molecules in these conditions of pressure and temperature, which are representative of astrophysical regions. These values are needed in models used to interpret dynamics of icy surfaces. In general, our results compare well to other ones obtained by different methods and complement those previously available.

From Gaia to NEAT: synergies and participation in the NEAT double-blind test

Holger Voss

The Near-Earth Astrometric Telescope (NEAT) is a new mission concept to achieve sub- micro-arcsesond precision astrometry using pointed observations. This mission will be proposed as a candidate for the M4 call of ESA later this year. It will be a natural continuation of ESA's leadership in space astrometry by continuing and extending the work of the very successful HIPPARCOS and the recently launched Gaia mission. The science top-level requirements for NEAT are set by the ability to detect potentially habitable Earth-mass planets around all G and K dwarfs within 10pc. Given the versatility of the concept, many other science cases can be addressed by obtaining ultra-precise pointed astrometric observations of exotic objects detected by Gaia and other on-going projects. Although Gaia is a mission that is not designed to search for exoplanets per se, it will make a major contribution to the field and to the NEAT mission in several aspects. The Gaia mission will produce an enormous wealth of data to mine and explore, so experience must be acquired to identify the simple traps of the analysis methods, design validation strategies and prepare scientists across the ESA community and beyond to exploit such wealth of data. In fact, the experience in astrometry precision and simulations acquired for Gaia, laid the foundation for the creation of the NEAT simulator. This simulator has been created in order to build a double-blind test program for astrometric planet detection, with the goal to demonstrate the exo-Earth planet finding capabilities of a pointed astrometric mission. Results are presented from our participation in this double-blind test showing our capabilities in the detection of Earth-like planets orbiting nearby Sun-like stars based on the MLE method.

The fitting of radial velocity curves using Adaptive Simulated Annealing

Ramón Iglesias Marzoa

The precise fitting of keplerian radial velocity curves to a set of observations is a common step in the process of obtaining the physical parameters of binary stars and exoplanets. Assuming gaussian uncertainties in the radial velocity measurements, the chi-squared function of the fit can be minimized simultaneously in a multidimensional parameters space to obtain the parameters of the radial velocity curves that best represents the observations. We present a new detailed technique to fit radial velocity curves using Adaptive Simulated Annealing (ASA). ASA provides the full set of parameters (gamma, P, Tp, K1, K2, e, omega) from which one can compute the physical parameters of the system. The Simulated Annealing technique resembles the way in which a solid melts to its fusion point, where the temperature is very high, and then cools very slowly to a state of low temperature and minimum energy (the cost function). States of different energy are generated exploring the parameters space at each temperature, accepting all new states of less energy, but only allowing some acceptances of higher energy to avoid local minima of the cost function. This algorithm has several advantages: fast convergence, it doesn't rely in the previous determination of the orbital period, it only needs function evaluations, and it doesn't need to evaluate derivatives. After convergence, the parameter values can be used to estimate the uncertainties using a Markov Chain Monte-Carlo technique, as we have done, or another suitable technique. As a performance example, we show our results with ASA versus published solutions for several binary stars and exoplanets. The agreement is good, within the uncertainties.

Ultra-short period transiting planets: new discoveries and future prospects

Roberto Sanchís Ojeda

In this contribution we will describe multiple efforts to discover and characterize small transiting planets with orbital periods shorter than 1 day (USP planets). The Kepler telescope has been monitoring 150,000 stars for about 4 years, allowing the detection of thousands of transits of each USP planet, which in turn increases the sensitivity towards Earth-size planets for a large fraction of those stars. We have identified a sample of 106 USP planet candidates, through our own Fourier analysis of the Kepler data as well as a critical evaluation of previously reported candidates. Statistical considerations suggest that most of these candidates are true planets. One remarkable member of this population is Kepler-78b, an Earth-sized planet with a period of 8.5 hours, which has a host star bright enough to enable robust detections of the planetary occultations and illumination phase variations. We discuss the special characteristics of the radial velocity campaign that lead to the measurement of its mass, setting the record for the smallest planet with mass measurement. We will also present an estimate of the occurrence rate of ultra-short period planets. We find that among this population, planets smaller than 2 Earth radius are more common than planets between 2-3 Earth radius, the opposite of what has been observed among longer-period planets. This might be because gaseous atmospheres are impossible to retain under such strong irradiation. We also find that cooler stars are more likely than hot stars to host ultra-short period planets, in agreement with the previously noted trend for longer period planets. We will also give an update on several open follow-up programs from which we intend to draw more definite conclusions about the composition of these planets, and the characteristics of their planetary systems.

Pósters

The Planetary System to Kepler-90: A Compact Analogue to the Solar System

Juan Cabrera Perez

Since exoplanets were first recognized, interpretations have concentrated on dynamics, since the most precise data come from radial velocity (RV) measurements. It is, recently, transit observations, obtained from space (CoRoT and Kepler) that have begun to acquire planetary radii with good precision. Mated to the RV data one can determine the average density of exoplanets and do planetology. We announce the discovery of a planetary system with 7 transiting planets around a Kepler target, a current record for transiting systems. Planets b, c, e and f are reported for the first time by our team. Planets d, g and h were previously reported in the literature, although here we revise their orbital parameters and validate their planetary nature. Planets h and g are gas giants and show strong dynamical interactions. The orbit of planet g is perturbed in such way that its orbital period changes by 25.7h between two consecutive transits during the length of the observations, which is the largest such perturbation found so far. The rest of the planets also show mutual interactions: planets d, e, and f are super-Earths close to a mean motion resonance chain (2:3:4), and planets b and c, with sizes below 2 Earth radii, are within 0.5 % of the 4:5 mean motion resonance. This complex system presents some similarities to our Solar System, with small planets in inner orbits and gas giants in outer orbits. It is, however, more compact. The outer planet has an orbital distance around 1 AU, and the relative position of the gas giants is opposite to that of Jupiter and Saturn, which is closer to the expected result of planet formation theories. The dynamical interactions between planets are also much richer.

Posible onda de Kelvin en la atmósfera ecuatorial de Júpiter

Jon Legarreta Etxagibel

En el presente trabajo presentamos la observación de una estructura única y de gran escala en la atmosfera ecuatorial de Júpiter, que con forma de “Y” alineada en la dirección Este-Oeste, recuerda a las ondas ecuatoriales de Kelvin que se dan en Venus y la Tierra. Este estudio está basado principalmente en el análisis de más de medio centenar de imágenes enviadas por la red de observadores del International Outer Planet Watch –Planetary virtual Observatory database (IOPW-PVOL http://www.pvol.ehu.es/pvol/). Las imágenes analizadas se extienden entre Septiembre y Diciembre de 2012, y en ese período se han medido las propiedades fundamentales de la estructura Y (escala espacial, movimientos, interacciones). Se han detectado dos formaciones Y, que se desplazan con mayor velocidad que la que le correspondería de acuerdo con los vientos medios ecuatoriales de Júpiter (unos 20-30 m/s por encima del valor medio y hacia el Este). De sus propiedades deducimos que podría tratarse de un fenómeno ondulatorio, en concreto de una onda de Kelvin de número de onda 2. En la actualidad estamos realizando simulaciones numéricas del fenómeno con la intención de intentar confirmar su naturaleza.

The earthshine network: an update 1998-2013

Cristina Martínez Lombilla

The earthshine observations on the dark side of the Moon provide us with the opportunity to study the light reflected to space by the Earth in a globally-integrated manner. Accurate measurements of this relected light and its variability in time and space have been very useful for the study of the readiative balance of the planet and its implications for global climate change. Here, we present an update of our albedo time series up to December 2013. Both the original albedo series from BBSO (California) from 1998 to present, and the new station at Izaña (Tenerife) are updated and compared.

UCM Meteor and Fireball Research group: Results 2012-2014

Francisco Ocaña González

Most of the activity of the group is based on the Fireball Detection Station located at the Observatorio UCM, a system consisting of 6 high-sensitivity videocameras covering the whole sky with wide-angle lenses during nighttime. It works as a node in the SPanish Meteor and Fireball Network (SPMN), a network of similar stations covering the atmosphere over Spain. This continuous monitoring during the last 2 years has resulted in the detection from the Observatorio UCM of 4 superbolides that occurred over Iberian Peninsula [Icarus 233 (2014): 27-35; MNRAS 436.4 (2013): 656-3662; LPI (2013) No. 1719, p.1055]. Besides, the group has worked on the recording and analysis of some meteor showers. Most of the attention was focused on the Draconids 2011 campaign at Observatorio de Sierra Nevada [MNRAS 433.1 (2013): 560-570; IMC Proc. (2012): 70-73], and the 2012 Geminids balloon-borne mission over Spain [LPI (2013) No. 1719, p.2202]. The group also contributed with observations of the Draconids 2012 unexpected storm from Madrid and Izaña [MNRAS 437.4 (2014): 3812-3823.]. The products of the station have been used for undergraduate thesis projects at the Physics Faculty (e-prints UCM 13292) and other undergraduate projects. In 2013 the station received new equipment thanks to the Certamen Arquímedes award, complementing the detection with spectroscopic and frame-integrating devices. Future work includes spectroscopic characterization of the fireballs and special campaigns for on-coming meteor outbursts (e.g., 209-ids from North America).

Estudios del Cometa Siding Spring previos a su encuentro con Marte

Francisco José Pozuelos Romero

El cometa C/2013 A1 (Siding Spring) pertenece a la familia de cometas hiperbólicos, que provienen de las regiones más externas del Sistema Solar, la Nube de Oort, la cual es una burbuja esférica de millones de objetos helados que rodea las orbitas planetarias. Conforme estos objetos se van acercando a regiones más internas, van desarrollando una brillante cola de polvo, cuyo estudio nos permite obtener información sobre el tamaño del núcleo, periodos de rotación, regiones activas en la superficie y composición química del material volátil, el cual es considerado el material primigenio existente en la nebulosa pre-solar. En raras ocasiones, estos cuerpos llevan una trayectoria tal que a su paso por las regiones más internas, tienen un fuerte acercamiento a algún planeta. En este contexto, podemos destacar el caso del cometa Shoemaker-Levy 9, el cual, tras un paso muy cercano a Júpiter, quedó atrapado en una órbita en torno a éste, y cuyo núcleo se fragmentó en 23 sub-núcleos que iban desde los cientos de metros al par de kilómetros. Estos sub-núcleos fueron chocando con la superficie del planeta entre el 16 y el 22 de julio de 1994 y levantó una gran expectación sobre la comunidad astrónoma dado que era la primera vez que se pudo contemplar un suceso como éste. El cometa Siding Spring, tendrá una pronunciada aproximación a Marte el 18 de octubre de 2014, pasando entre 41300 km y 25700 km de su centro, lo que provocará que sobre el planeta rojo caigan toneladas de polvo cometario, contaminando así su atmósfera. Numerosos estudios hay ya puestos en marcha para poder monitorizar y cuantificar el efecto que esto tendrá sobre Marte. Este evento es una oportunidad única para poder cuantificar el efecto que estos cuerpos y sus fuertes aproximaciones pueden originar en planetas tipo Tierra.

Superbólidos históricos

Alejandro Sánchez de Miguel

La cantidad de impactos de grandes y medianos asteroides contra la tierra es un tema de actualidad y controversia. Las explosiones en alta atmósfera y los impactos lunares parecen indicar que puden haber más impactos de lo que esta actualmente aceptado. Una "nueva" fuente de información pueden ser los datos de bólidos aparecidos en prensa histórica. Algunos de estas noticias indican la presencia de ondas de presión o daños que pueden ayudar a estimar la energía del evento. Se han analizado más de 50 años de la hemeroteca del periódico New York Times y se ha encontrado una cantidad de eventos anormalmente concentrados que no pueden ser explicados por una distribución de Poisson.

Nuevo procedimiento experimental para la determinación del índice de refracción de hielos de interés astrofísico mediante el desfase inicial sustrato-hielo

Miguel Ángel Satorre Aznar

En esta comunicación se presenta un método no empleado hasta el momento en la determinación del índice de refracción de hielos de interés astrofísico. Este método permite obtener índice de refracción de películas delgadas de forma más sencilla y rápida que los métodos empleados tradicionalmente. El procedimiento consiste básicamente en medir la reflectancia de un haz láser incidente en un determinado ángulo sobre la película mientra ésta se está formando. Tradicionalmente la obtención de dicho índice implica experimentos largos en los que se hace necesario la obtención de muchos curvas de interferencia. Esto implica el crecimiento de películas en las que, debido al bajo coeficiente de transmisión térmica, las propiedades de las películas formadas pueden variar de las partes en contacto con el sustrato frío con las más alejadas de él. Esto supone un inconveniente en la obtención del índice, especialmente en temperaturas cercanas a un cambio de fase en la estructura del hielo. El método descrito en el trabajo permite obtener el índice a partir del desfase inicial que aparece en las curvas de interferencia, necesitando solamente una curva de interferencia que permita medir dicho desfase inicial. Para ello es necesario conocer el índice de refracción complejo del sustrato sobre el que se crece la película de hielo.

Innovate, Accelerate, Succeed

High Performance Computing

Enseñanza y divulgación de la Astronomía

Sesión E1

Presentación del punto de contacto nacional de la Unión Astronómica Internacional para la divulgación de la Astronomía

[Conferencia Invitada]

Benjamín Montesinos Comino

La Unión Astronómica Internacional (IAU), a través de la Oficina de divulgación de la Astronomía (Office for Astronomy Outreach, OAO) solicitó el año pasado a todos los países el nombramiento de un punto de contacto nacional cuya misión es dar a conocer a la comunidad internacional a través de la IAU-OAO las actividades de divulgación que se hacen -en nuestro caso en España- y en la medida de lo posible potenciarlas.

La Comisión Nacional de Astronomía (interlocutora oficial con la IAU) nombró a José Antonio Belmonte (IAC) como punto de contacto, y Benjamín Montesinos (CAB) tomará el relevo en 2015. La SEA colabora activamente en las tareas asignadas a la persona de contacto con la creación de una página web y una coordinación activa con las Comisiones de Enseñanza y Pro-Am.

NIXNOX: Cielos oscuros de España

[Conferencia Invitada]

Jaime Zamorano Calvo

NIXNOX es un proyecto propuesto y apoyado por la Sociedad Española de Astronomía (SEA) con el fin de localizar lugares en España donde se pueda disfrutar del cielo nocturno oscuro y estrellado. Se pretende crear una plataforma que anime a la sociedad a contemplar el cielo nocturno y a las administraciones locales a cuidarlo. La recopilación de los datos de brillo de fondo de cielo y otra información relevante se está realizando con la colaboración de las asociaciones de astrónomos aficionados. Como ya se dispone de información de unas decenas de lugares, se están elaborando las fichas informativas de cada uno de ellos. Presentamos además algunos estudios sobre las lecciones aprendidas, la calibración del método empleado y su validación científica.

Contaminación lumínica en el entorno de Valencia. Factores antrópicos y naturales

Enric Marco Soler

Aunque la conservación de un cielo oscuro al principio solo preocupó a los astrónomos, pronto los biólogos y conservacionistas se dieron cuenta de los efectos que ejerce la contaminación lumínica sobre los ecosistemas naturales. Esta degradación aumenta con la cobertura nubosa, por lo que, como algunos estudios recientes han destacado, se hace necesario evaluar también la influencia de las nubes sobre el aumento del brillo del cielo nocturno. Además, el efecto del ciclo lunar sobre la flora y la fauna nocturna puede verse afectado debido al exceso de iluminación. La variación del fondo de brillo del cielo se ha medido en diversas localizaciones de la ciudad de Valencia y su entorno, especialmente en el Parc Natural del Túria, donde se han estudiado estas influencias. Por otra parte se evalúa cómo afecta la iluminación de las fiestas de las Fallas al incremento de la contaminación lumínica.

Monitoring Light Pollution on the Starlight Reserve of Montsec

Salvador José Ribas Rubio

Montsec Mountains are a special protected place in Catalonia (NE of Iberian Peninsula). This area has been selected for years as the best place for amateur and professional observatories in Catalonia. Since 2013 the site has been declared Starlight Reserve and Touristic Destination. In the last three years different projects took place in Montsec to evaluate the quality of night sky and the effects of Light Pollution of nearby (and not so nearby) municipalities.

Using SQM techniques in RoadRunner configuration (installed on a car) we have evaluated all the region (1.600 square km) and we determined the distribution of night sky brightness detecting some excellent areas with values around 21.5-22.0 mags. In addition we have evaluated the effects of the closest big city (Lleida with close to 200,000 inhabitants) and we have estimated the effects of this city on the natural sky, the effect of Lleida is detected on zenith up to 25 km away from the city. These data show the critical problem of the long-distance effects of LP on protected areas.

To complete the monitoring of the region, a new SQM network is ongoing in cooperation with Parc Astronomic Montsec and Catalan Service against Light Pollution. During 2014 five SQM permanent detectors and two portable are starting their measurements around the area of Montsec and major cities that affects this protected area. This data could be combined with meteorological data (clouds, humidity, etc) in some of the evaluation sites and some preliminary results are available.

Actividades Educativas y de Divulgación en el marco del Observatorio Virtual Español

Enrique Solano Márquez

En esta presentación se describirán las principales actividades educativas y de divulgación que se llevan a cabo en el marco del Observatorio Virtual. En particular se describirán los proyectos Pro-Am para la identificación y caracterización de sistemas binarios, el desarrollo de un archivo de datos para uso por parte de la comunidad amateur y el proyecto de ciencia ciudadana orientado a la identificación de asteroides cercanos a la Tierra en imágenes de archivo.

El Universo en un Minuto

Alberto Fernández Soto

"El Universo en un Minuto" es una colección de 10 breves vídeos enfocados a presentar conceptos básicos de Astronomía al público general. En cada uno de ellos, de poco más de un minuto / dos minutos de duración, se responde de modo conciso a la vez que preciso a una pregunta concreta. Los vídeos son conducidos por actores o presentadores profesionales que graban sobre croma. El director de arte, Javier Díez, añade en la producción imágenes, vídeos o animaciones digitales (en muchos casos de diseño original) que acompañan el tema. El destino inmediato de estos vídeos es la difusión por internet, a través tanto de redes sociales, de la página web de la SEA, o de la página de CONEC (http://www.conec.es), portal de divulgación científica de la Confederación de Sociedades Científicas Españolas (COSCE). En el futuro cercano los ofreceremos también a televisiones de ámbito regional o nacional, que puedan hacer uso de ellos como miniespacios de divulgación. Los vídeos se han realizado con la colaboración de científicos del Observatori Astronòmic de la Universitat de València y del Instituto de Física de Cantabria (CSIC-UC), y han sido parcialmente financiados por la Sociedad Española de Astronomía.

Sesión E2

La aventura HOU-España: una década en la comunidad educativa global

[Conferencia Invitada]

Ana Inés Gómez de Castro

HOU-España es un colectivo de investigadores, astrónomos amateurs, divulgadores y educadores con un objetivo: contribuir a la introducción de la investigación en el tejido de educación secundaria y bachillerato. El grupo trabaja en una red internacional ligada a los programas Global-HOU y Galileo Teacher Training Program, en las que profesores de todo el mundo comparten recursos y actividades. En esta contribución se presentarán: los recursos educativos puestos en marcha por HOU-España y sus colaboradores, la instalaciones científicas que pueden ser utilizadas por los colegios y los resultados principales del Consorcio a lo largo de esta década.

Un Universo para que todos lo descubran

Amelia Ortiz Gil

Parafraseando el lema del Año Internacional de la Astronomía, "Un Universo para que lo descubras", el título de esta ponencia quiere poner de relieve la necesidad que existe de pensar en públicos más "amplios" cuando proyectamos actividades de enseñanza y divulgación de la astronomía. Esta estrategia, basada en los principios del Diseño Universal de Aprendizaje (DUA), nos permite no sólo llegar a públicos que puedan ser considerados "especiales" por el hecho de tener alguna discapacidad, sino también llegar mejor a todo el público general. Se ha demostrado que cada persona tiene un modo preferencial de aprendizaje: algunos recuerdan mejor lo que ven, otros lo que oyen o lo que tocan. La premisa fundamental es, pues, estimular tantos sentidos como sea posible a través de los materiales y actividades. En esta charla presento brevemente algunos principios para el diseño de actividades y materiales para enseñanza y divulgación de la astronomía teniendo en cuenta los principios del DUA, así como un ejemplo práctico: el proyecto "A Touch of the Universe" (http://astrokit.uv.es).

GLORIA: Astrofísica Robótica al alcance de todos

Alberto Javier Castro Tirado

GLORIA es un proyecto FP7 financiado por la UE y apoyado por 14 instituciones (varios OPIs y Universidades españolas) basado en una web colaborativa 2.0 que va a permitir el acceso (en una primera fase) a 17 telescopios robóticos de hasta 60 cm distribuidos por toda la superficie de la Tierra. El objetivo es permitir a la comunidad de usuarios de GLORIA (desde ciudadanos de a pie y alumnos de colegios hasta astrónomos no profesionales) hacer Ciencia Ciudadana. Para ello se han diseñado tanto experimentos "en tiempo real" (observación del Sol, observación nocturna) como experimentos "en diferido" (observación por colas, análisis de datos para obtener curvas de luz, etc.) y aplicaciones a caballo entre la Ciencia y el Arte ("Personal Space").

Determinación de los parámetros orbitales de los Satélites Galileanos usando telescopios de tamaño medio.

Iñaki Ordóñez Etxeberria

Los parámetros orbitales de las lunas Galileanas de Júpiter pueden determinarse usando telescopios de tamaño medio, habituales en escuelas y facultades. En este trabajo se propone un método que permite deducir estos parámetros usando un número pequeño de observaciones, obtenidas con telescopios sencillos y en momentos bien programados. El método puede ser utilizado en una práctica que permite al alumnado realizar tanto la toma de imágenes en una única sesión de observación, como el procesado y posterior análisis de éstas. Mediante el método que describimos es posible determinar la distancia a Júpiter, velocidad y período orbital de Ío, Europa, Ganímedes y Calixto. Para ello se analizan las imágenes tomadas estudiando las posiciones relativas a Júpiter de los satélites en momentos de tránsitos y eclipses sobre el planeta. Así se pueden obtener lecturas de paralaje que permiten determinar la distancia de cada una de las lunas a Júpiter. Posteriormente es posible calcular la velocidad y el periodo orbital con sencillos cálculos geométricos, obteniendo resultados tanto para la distancia como para el período y velocidad orbital para cada una de las cuatro lunas, muy cercanos a los datos aportados por las agencias espaciales.

Sesión E3

Actividades de divulgación financiadas por la Sociedad Española de Astronomía

[Conferencia Invitada]

Javier Gorgas

Como consecuencia de una consulta electrónica realizada a los miembros de la Sociedad Española de Astronomía (SEA), en el último año la SEA ha implantado un sistema de ayudas para actividades de divulgación de la astronomía en España. En el marco de este programa hasta la fecha se han financiado 15 actividades diferentes de muy diferentes tipos, como proyectos dirigidos a escolares (ej: participación en Ciencia en Acción y en campamentos de ESO) ciclos de conferencias y escuelas, publicación de material, realización de vídeos, exposiciones, etc. En esta comunicación se hará un breve resumen de los logros alcanzados con este programa.

Ciencia en el Cervantes: Astronomía y Humanidades

[Conferencia Invitada]

Emilio J. Alfaro Navarro

"Haz tú la cuenta que yo soy de letras" es cada vez más un chiste manido que una realidad cotidiana. Nadie con una propensión al conocimiento, nadie con una actitud curiosa ante la vida puede considerar que las leyes de Newton y la vida de Newton son hechos disjuntos sin ningún nexo de unión, y que un hecho solo puede ser tratado por la Física y el otro por la Historia. Las leyes de Newton no están inmersas en la historia, son la historia, han construido la historia y su influencia sobre el devenir del pensamiento humano puede y debe considerarse tan fundamental, como, por citar un ejemplo, la obra de Kant. El Instituto Cervantes es plenamente consciente de que esta dicotomía representa un lastre para el desarrollo de la Cultura con mayúsculas y que su labor como embajador y difusor del idioma y la cultura española debe incorporar cualquier forma del pensamiento humano. El Cervantes Virtual ha incluido una sección de Ciencia en el Cervantes, desde donde se pretende difundir la obra científica desarrollada en nuestro país y en nuestro idioma. La Astronomía ha sido la primera rama científica en aparecer en estas páginas.

ENCIENDE: Ciencia en la escuela primaria

José Miguel Rodríguez Espinosa

La Confederación de Sociedades Científicas de España (COSCE) agrupa 65 sociedades científicas, que representan a la gran mayoría (>85 %) de los científicos españoles. La COSCE, preocupada por la falta de interés de la juventud actual por la ciencia y la tecnología, ha puesto en marcha el Proyecto ENCIENDE, cuya misión es llevar la ciencia a la escuela primaria. En esta charla mostraré lo realizado hasta ahora en este proyecto y las perspectivas futuras.

Actividades de divulgación de la misión Gaia en España

Eduard Masana Fresno

La misión Gaia de la Agencia Espacial Europea fue lanzada con éxito el 19 de diciembre del pasado año. Con motivo del lanzamiento, varios grupos implicados en el proyecto desarrollaron una amplia variedad de actividades de divulgación para dar a conocer tanto al público general como a los medios de comunicación los detalles de la misión. Con la intención de hacer llegar nuestro mensaje a un público amplio y variado se elaboró material en diferentes soportes: desde folletos y calendarios describiendo la misión, a una aplicación para dispositivos móviles que resume los aspectos técnicos y los objetivos científicos de Gaia, pasando por una maqueta del satélite que mostraba su configuración óptica. Todo ello se complementó con varias charlas en escuelas y asociaciones astronómicas, numerosas apariciones en medios de comunicación, la exposición itinerante "Gaia: mil millones de ojos para mil millones de estrellas" y el vídeo "La misión Gaia. Participación española". Estas actividades contribuyeron a dar relevancia y visibilidad a la misión Gaia y al trabajo que diferentes institutos y empresas españolas han realizado para su consecución.

UC3: "Desafío Extremo". La aventura de gestionar la Unidad de Comunicación y Cultura Científica del IAC

Carmen Del Puerto Varela

Podría tratarse de la última aventura de Jesús Calleja en la Cuatro, una ascensión emocionante y dura al Everest o un viaje al interior de la sima más profunda del planeta. Según se mire. Pero lo cierto es que hablamos de apuestas a veces difíciles y arriesgadas. El Instituto de Astrofísica de Canarias (IAC) siempre ha tenido como compromiso fundamental la comunicación y la divulgación de la Ciencia, y así se recoge en sus Estatutos. La recién creada Unidad de Comunicación y Cultura Científica (UC3), dependiente directamente de la Dirección del IAC, es hoy por hoy la unidad organizativa responsable, como su nombre indica, de estas funciones. Su objetivo se centra en explotar la potencia inspiradora de la Astronomía como herramienta para alcanzar todas las zonas de influencia posibles y convertir al IAC y a la astronomía española en mediadores para que la ciencia forme parte de la cultura general de la ciudadanía. En esta comunicación se presentan los retos a los que se enfrentan los miembros de la UC3, protagonistas de esta "aventura".

Sesión E4

Observaciones remotas docentes con los telescopios de Aras de los Olmos

[Conferencia Invitada]

Fernando Ballesteros Roselló

El Observatorio de Aras de los Olmos (OAO) es la estación de observación del Observatorio Astronómico de la Universidad de Valencia. Está situada en la localidad de Aras de los Olmos, sobre la muela de Santa Catalina, uno de los pocos lugares oscuros que quedan en la Comunitat Valenciana. El OAO cuenta con tres telescopios manejables remotamente, de tamaños 40, 50 y 60 cm. Por ser un observatorio de propósito general, ofrece una gran flexibilidad en las observaciones que realiza. Entre otras actividades, los telescopios del Observatorio de Aras de los Olmos constituyen un recurso docente de primer orden. En esta contribución presentamos el sistema de observación remoto dispuesto en los telescopios del Observatorio de Aras de los Olmos. Este sistema permite la interacción directa de un gran número de estudiantes con los telescopios, desde el aula o bien desde su domicilio, al tiempo que facilita la interacción con el profesor. La experiencia durante el pasado año académico ha sido satisfactoria. El Observatorio se plantea ahora ofrecer este servicio a otras universidades.

Astronomía accesible: acercando el estudio del universo a las personas con discapacidad visual

Enrique Pérez Montero

La enseñanza y divulgación de la astronomía y la astrofísica están muy basadas en la concepción de que toda la información de que se dispone y su comprensión debe hacerse a través de contenidos visuales. Esto implica que el colectivo de personas invidentes y de baja visión tenga poca o ninguna accesibilidad a un conocimiento pleno y satisfactorio de estas ramas de la ciencia. Motivado por mi doble condición de astrónomo profesional y persona que pertenece al colectivo de personas con discapacidad visual severa, he emprendido un programa para divulgar en distintas sedes de la ONCE la astronomía sin la necesidad de usar imágenes, sino simplemente con la descripción auditiva y el uso de material adaptado. Los resultados preliminares de este programa son muy satisfactorios y demuestran que es posible la divulgación a todo tipo de colectivos, los cuales, además, presentan otra serie de ventajas que incluso facilita más la labor de divulgación.

SolarLab, un proyecto divulgativo del Instituto de Astrofísica de Canarias desde el Programa Severo Ochoa

Alfred Rosenberg González

SolarLab es un proyecto divulgativo del Instituto de Astrofísica de Canarias dentro del programa Severo Ochoa en el que han colaborado varias entidades regionales, tales como el Museo Elder de la Ciencia y la Tecnología de Las Palmas de Gran Canaria, el cabildo de La Palma, la compañía aérea Binter, la Consejería de Educación del Gobierno de Canarias, el Museo de la Ciencia y del Cosmos de Museos de Tenerife, SolarNet ... (véase http://www.iac.es/solarlab para una descripción detallada). Mediante el uso de tres telescopios solares especializados, hemos conseguido llegar a 65 centros educativos de las 7 Islas Canarias, habiendo dado formación a 140 profesores y consiguiendo que 38.500 alumnos miransen nuestra estrella de una forma diferente. Los objetivos han sido tres: (1) que todos los alumnos de 12 a 18 años miren al Sol y reciban una charla (ofrecida por el proyecto desde su web) (2) formar a profesores de forma que puedan atender todas las dudas de sus alumnos, así como ser capaces de manejar un telescopio y sacar fotos con él, y (3) los alumnos que quieran realizar un trabajo de investigación, puedan hacerlo, participando adicionalmente en un concurso. Para todo ello ha sido necesario dar cursos de formación a los profesores en cada isla, para lo que se ha involucrado a Físicos Solares del IAC y a un astrofotógrafo. Una de las principales herramientas de este proyecto ha sido su página web, en contínua actualización, donde se puede obtener todo tipo de información, manuales, presentaciones, consultas, preguntas frecuentes, etc. ¡¡Anímate a visitarla!! En este charla mostraremos el proyecto, nuestra experiencia y resultados, así como objetivos futuros.

"ASTROMOL: moles de ciencia y divulgación"

Natalia Ruiz Zelmanovitch

ASTROMOL is the nickname of the project "Consolider-Ingenio 2010 ASTROMOL, Molecular Astrophysics: the era of Herschel and ALMA", a program that comes to an end soon and in which we have obtained important results and both scientific and technological advances. In this presentation we will discuss these results and what tools were used to spread them to the society.

Diez años (ya) de radioastronomía educativa con PARTNeR

Juan Ángel Vaquerizo Gallego

En el año 2014 se cumple el décimo aniversario del proyecto PARTNeR de radioastronomía educativa. En enero de 2004 tuvo lugar el primer curso anual de formación PARTNeR en el que un grupo de 13 profesores de España y Portugal aprendieron el manejo del radiotelescopio de 34 metros que utiliza el proyecto para realizar observaciones remotas con estudiantes desde el aula. Desde entonces hasta la actualidad se han realizado un total de once cursos de formación, con 155 profesores participantes. En estos diez años de andadura, más de 4000 estudiantes de ESO, Bachillerato y universidad han realizado observaciones remotas con el radiotelescopio de PARTNeR. La presente ponencia pretende mostrar los logros alcanzados, los retos futuros y servir de homenaje a todas aquellas personas que durante la andadura del proyecto han aportado su grano de arena para alcanzar este aniversario.

"Universo fascinante", una exposición con imágenes de ESO y actividades asociadas

Ana María Marín Farrona

Del 23 de Septiembre al 18 de Octubre de 2013, en la Biblioteca Central de Cantabria (Calle Ruiz de Alda, 19, Santander), el Instituto de Física de Cantabria (IFCA, CSIC-UC), en colaboración con el Observatorio Europeo Austral (ESO), trajo hasta Santander la muestra "Universo Fascinante –El cosmos a través de los ojos del observatorio europeo austral". Contó para ello con el patrocinio de la Sociedad Española de Astronomía y de la Real Sociedad Española de Física. Entorno a la misma, se organizaron multitud de actividades: visitas guiadas, ciclo de conferencias, concurso de dibujos... A pesar de que Santander es una ciudad pequeña y que sus habitantes no están habitualmente expuestos a este tipo de propuestas, la iniciativa fue un éxito rotundo, con más de 2000 visitantes. Con esta contribución se pretenden aportar ideas que ayuden a sacar el mayor provecho a las exposiciones temporales como actividades de divulgación científica. Así, el número de participantes en este tipo de acciones puede llegar a incrementarse enormemente, haciendo posible acercar la ciencia a un público muy numeroso y variado.

Pósters

Instituto de Astrofísica de Madrid: science fiction or top science?

José A. Caballero

In Spain, there is an Instituto de Astrofísica de Canarias in Tenerife, an Instituto de Astrofísica de Andalucía in Granada and an Institut d'Estudis Espacials de Catalunya in Barcelona. However, there is not an Instituto de Astrofísica de Madrid (IAM). Actually, Matritian astronomers are spread over a number of institutions of quite different origin, size and funding source. The IAM, if it existed, would be a catalyser of ideas and collaborations, an international meeting point, an engine for high-technology industry in the region, and an excellence centre. Furthermore, the IAM would maximise the efficiency in the use of resources, offer a place for finding synergies between research groups and, especially, have a critical mass for embarking in very large projects in the ground and space. I will expose how, in a smooth and democratic way, an IAM might be built step by step. The process may take decades and, thus, young Matritian astronomers shall play a role on it.

Proyecto CESAR educación en Europa desde España

David Cabezas Jimeno

En los últimos tiempos se ha consolidado el uso de observatorios remotos y robóticos para la enseñanza y divulgación de la astronomía. Los estudiantes pueden acceder a estos recursos desde sus centros educativos utilizando Internet, sin importar la ubicación geográfica de unos y otros. Los profesores disponen de una variada oferta de proyectos educativos y divulgativos que pueden ser implementados en el aula. Un ejemplo de esto es el nuevo proyecto CESAR. CESAR es un proyecto de colaboración entre la Agencia Europea del Espacio (ESA), el Instituto Nacional de Técnica Aeroespacial (INTA) y la empresa pública Ingeniería de Sistemas para la Defensa de España (ISDEFE). Su objetivo principal es educativo: proporcionar a los estudiantes europeos experiencia práctica en investigación astronómica, en particular en los campos de las ciencias del espacio, la radioastronomía y la astronomía óptica. Pero también tiene un objetivo científico, permitiendo la realización de investigaciones científicas adaptadas a la calidad del cielo y a las prestaciones de la instrumentación disponible.

Viaje Interplanetario: Una aventura espacial

David Cabezas Jimeno

Existe una necesidad general de dar a conocer cada vez más los nuevos descubrimientos y conocimientos astronómicos para el público en general y especialmente a estudiantes de infantil y primaria que se inician en conocimientos básicos. Los proyectos basados en audiovisuales ayudan a comprender al público en general conceptos sencillos. Viaje Interplanetario es una actividad interactiva en la que los niños y sus padres aprenden con la ayuda de la proyección de un vídeo, creado específicamente para esta actividad, que simula una nave espacial. Una actriz-divulgadora que interpreta a una astronauta, la comandante Lili, explica las principales características del Sistema Solar a medida que viajan, mostrando a los niños diferentes objetos recogidos durante el viaje, para despertar la memoria sensorial de los niños y asentar mejor los conocimientos, con el máximo rigor científico posible. Gracias al material sensorial e interactivo y la imaginación, nos introduciremos en la nave espacial y viajaremos por el Sistema Solar para descubrir sus maravillas y secretos. También podremos ver las misiones activas en cada planeta y que observan el universo, tanto de la ESA (Agencia Espacial Europea) como de la NASA y de los nuevos descubrimientos hechos en España.

Red de recursos multimedia en Astronomía

David Cabezas Jimeno

En la actualidad muchas instituciones, fundaciones y asociaciones no poseen este recurso multimedia del cual sí disponen instituciones como la NASA, ESA, ESO, IAC, etc.. El objetivo es ofrecer un nuevo servicio que se basa en dos principios fundamentales: 1) apoyar a los investigadores de astrofísica con recursos multimedia gratuitos y personalizados y, 2) dar mayor visibilidad a la astronomía española con artículos y descubrimientos que cuenten con apoyo audiovisual que después se mostrarán en diarios de internet y televisiones. Se ofrece una web completa con recursos multimedia de astronomía de creación propia y de descarga gratuita. Los vídeos estarán disponibles en diferentes formatos y con imágenes de alta resolución. También se pone a disposición de los usuarios un sistema de petición y creación de nuevos vídeos/animaciones.

Las XIII Jornadas de divulgación de la Astronomía en Alicante

Adriano Campo Bagatin

Gracias a la ayuda económica de la Sociedad Española de Astronomía, se han podido realizar, en la Sede de la Universidad en Alicante, las XIII Jornadas de Divulgación de la Astronomía. Tradicionalmente, las jornadas las organizan los astrónomos del Departamento de Física, Ingeniería de Sistemas y Teoría de la Señal de la Universidad de Alicante (UA). La programación de este año de las jornadas ha contado con 6 conferencias, 4 de las cuales impartidas por investigadores externos a la UA, de reconocido prestigio, además de una jornada de observación en un pueblo de la provincia de Alicante, con charla informal incluida en la que han participado parte de los autores. La asistencia de público ha sido, como siempre, muy satisfactoria.

ATACHI: Actividades y Talleres de Astronomía en Centros Hospitalarios Infantiles

Miriam Cortés Contreras

ATACHI es un proyecto cuyo objetivo es la divulgación de la Astronomía entre los niños hospitalizados durante largos y cortos periodos en los hospitales “Niño Jesús” y “12 de Octubre” de Madrid, cuyas edades se comprenden entre los 3 y los 16 años. Con el apoyo financiero de la Sociedad Española de Astronomía (SEA) y la ayuda de estos centros, a lo largo del último año hemos introducido la Astronomía entre sus actividades mediante talleres adaptados a las edades y capacidades de los niños hospitalizados. Los más pequeños han aprendido acerca del Sistema Solar y sobre las estrellas cercanas mediante la construcción de sistemas planetarios y constelaciones, haciendo uso de bolas de porexpán y pinturas de colores, y también gracias a la proyección de vídeos de divulgación astronómica. Los más mayores han realizado diversas actividades que les han permitido familiarizarse con conceptos más complejos como los movimientos y fases de la Luna, los impactos de meteoritos, la formación de eclipses, el comportamiento de los agujeros negros en las galaxias o la descomposición de la luz para la obtención de espectros. En todos los casos, los talleres han tenido gran acogida tanto por parte del personal del centro como por parte de los padres, que también se han interesado y participado en las actividades. Pero sobre todo, por parte de los niños, que, dejando a un lado su enfermedad, han mostrado gran interés y curiosidad por la Astronomía, que les ha ayudado a potenciar su imaginación y a aprender más sobre nuestro Sistema Solar, la Vía Láctea y el Universo. Por otro lado, este proyecto ha resultado en una publicación en la revista Astronomía, lo que ha demostrado el gran interés divulgativo de este proyecto, que se corresponde la experiencia positiva que ha resultado para nosotros.

Un Centro abierto al exterior

Luis Cuesta Crespo

La visión hacia el exterior de un centro de investigación depende, por supuesto, de la calidad de su actividad científica pero también, y en una gran medida, de la comunicación de sus resultados y de la divulgación desde el propio centro. El Centro de Astrobiología (CAB, CSIC-INTA) viene manteniendo desde hace unos años un hueco entre los centros científicos punteros españoles y prueba de ello es su continua aparición en los medios de comunicación. En esta comunicación se dará un repaso a las actividades de la Unidad de Cultura Científica del CAB para conseguir ese objetivo

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The ING Studentship, INT Support and Research Programme

Lilian Domínguez Palmero

For more than a decade, the ING studentship programme has offered European astronomy students an opportunity to train as observers on a medium-sized ground-based optical telescope, namely the renowned 2.5-m Isaac Newton Telescope (INT) run by the Isaac Newton Group (ING, a UK-SP-NL institution) on the beautiful Spanish island of La Palma in the Canary Islands. Practical training of the European students and hopefully future astronomers is essential in the era of very large telescopes and their queue-scheduled observing, which limits direct access to the observatories by young astronomers. Each year the ING therefore offers 4-5 talented astronomy students the opportunity to spend one year working as support astronomers at the INT (setting up the instruments, helping visiting observers and observing few INT discretionary nights) and working with ING staff on technical and science projects. High above the clouds at 2400 m, on the edge of the gorgeous Caldera de Taburiente of La Palma, stands the "Roque de Los Muchachos" Observatory (ORM) of the Instituto de Astrofísica de Canarias (IAC), part of the European Northern Observatory (ENO). Year after year, our studentship programme contributes to a better prepared future generation of astronomers. In this poster we present some recent technical and science achievements of our past ING students, encouraging talented students to apply next years.

BEGIRA: Basque Educational Gate for Interactive and Remote Astronomy

Javier Gorosabel

The BEGIRA project consists in making the 1.23m Calar Alto (CAHA) telescope remotely available to students of the University of the Basque Country (UPV/EHU). The project is designed in such a way that undergraduate and graduate students from the "Máster Oficial en Ciencia y Tecnología Espacial" at UPV/EHU control the 1.23m CAHA telescope for a whole night each time. The observations are conducted from the Aula Espazio Gela located at the Faculty of Engineering at Bilbao. The instrument used is the DLR camera, which based on its large field of view and high sensitivity, allows observations ranging from nearby solar system bodies to remote gamma-ray bursts. The students are also responsible of reducing and analyzing the resultant DLR data. This opens a number of educational resources for the students, starting from practice work for astronomy related subjects (Astronomy & Astrophysics, Physics of the Solar System, Space Physics and so on) in which, for example, they are supposed to perform photometry of stellar objects, thus constructing their own Hertzsprung-Russell diagrams for stellar clusters. Advanced students can also work on more engineering related aspects for the Master Thesis works, such as the automation and mechanical tests of the telescope pointing model. This facility makes possible to put the students in direct touch with real astronomy observational work thus providing a substantial improvement for their scientific and technical curricula.

Esos astrónomos locos por el cielo o la historia de la observación de las estrellas dobles

Josefina F. Ling

Esos astrónomos locos por el cielo son personas que han consagrado su vida, y a menudo su fortuna, a la investigación y al estudio de las estrellas dobles; unos enigmáticos sistemas estelares que se dedican a jugar al escondite mientras danzan un vals misterioso. Muchos han sido los esfuerzos realizados para poder recoger esa maravillosa cosecha de oro que nos ofrecen los campos celestes. Desde Sir William Herschel, organista y genial astrónomo, que evidenció sus movimientos orbitales, pasando por la saga de los Struve quienes emprendieron los primeros censos, o el pastor anglicano descubridor de auténticas alhajas celestes, hasta los actuales equipos internacionales de investigación dotados de los mayores telescopios; todos, han buscado con la misma pasión y más allá del mero espectáculo que constituye la eternidad de estos pares, la Piedra Filosofal, el secreto de la alquimia estelar y los medios para derribar el muro que aprisiona nuestro conocimiento. El presente libro corresponde a la traducción española de la obra original francesa escrita por Paul Couteau, una de las máximas autoridades en la materia. Nadie mejor que él para sumergirnos en el conocimiento de estos objetos, tanto desde el punto de vista científico como histórico. A pesar de los 25 años transcurridos, el texto no ha perdido su vigencia, ya que la historia nunca muere, y la atracción que todavía suscita ha sido una de las razones para ofrecer a los lectores de habla hispana su transcripción. Sin embargo, se ha incluido un capítulo de actualización escrito por Josefina F. Ling. Esta versión, editada por el Servicio de Publicaciones e Intercambio Científico de la Universidad de Santiago de Compostela y parcialmente financiada por la SEA, tiene una tirada inicial de 500 ejemplares. Se encuentra a la venta en las librerías y a través de la siguiente dirección electrónica http://www.usc.es/libros/index.php/spic/catalog/book/639

Contaminación lumínica en Valencia: concienciación ciudadana

Enric Marco Soler

La contaminación lumínica es la emisión de luz directa o indirecta hacia la atmósfera, procedente de fuentes artificiales nocturnas. El efecto más determinante es el aumento del brillo del fondo del cielo que impide la observación de las estrellas. El factor fundamental para la resolución del problema es la concienciación ciudadana. Por ello, en contacto con las autoridades de los parques naturales valencianos, de los ayuntamientos y de los institutos de educación secundaria estamos realizado una serie de conferencias explicativas del problema a la ciudadanía, no sólo por lo que afecta a la pérdida del cielo nocturno y su incidencia en la astronomía, sino también al despilfarro de energía y su incidencia en los ecosistemas nocturnos y en la salud humana. Además, para poner en valor el cielo oscuro, se realizan observaciones astronómicas populares, donde previamente se apaga el alumbrado público de la zona. Asimismo se ha realizado un tríptico de información sobre el problema de la contaminación lumínica, con casos reales que afectan a los parques naturales, a la ciudad de Valencia y a su área metropolitana. Este trabajo ha estado financiado en parte por la Sociedad Española de Astronomía dentro del programa de actividades de divulgación de la astronomía.

Astronomía para ingenier@s: el observatorio como herramienta de aprendizaje

Santiago Pérez Hoyos

En el Aula EspaZio Gela de la Universidad del País Vasco llevamos varios años impartiendo un Máster en Ciencia y Tecnología Espacial con vocación dual: por un lado pretende dar formación científica a alumnos de perfil técnico y por otro lado complementar desde un punto de visto tecnológico la formación de alumnos de carreras científicas. Una de las infraestructuras principales del Aula EspaZio es el Observatorio Astronómico, conformado por varios módulos que incluyen un observatorio solar, varios telescopios móviles y un observatorio nocturno tradicional (T50). En este póster nos centraremos en el trabajo desarrollado en el observatorio T50 para la realización de diferentes Proyectos Fin de Máster y Fin de Carrera con alumnos cuyo perfil original pertenece eminentemente a las ingenierías. El T50, ubicado en un emplazamiento urbano, es un telescopio de 20" dotado con tres instrumentos principales: (1) una cámara CCD de gran formato, apta para estudios fotométricos e imagen del cielo nocturno; (2) una cámara CCD de pequeño formato pero rápida lectura, ideal para técnicas de Lucky Imaging con objetos brillantes como la Luna o planetas; y (3) un espectrógrafo Littrow con diferentes redes de difracción que permiten trabajar a resoluciones R = 700 –17.000. Esta instalación ha sido utilizada para abarcar temas tan dispares como la operación remota y automatización del observatorio, diseño y desarrollo de un pipe-line de reducción y procesado, fotometría de objetos planetarios, espectroscopía de diferentes tipos de objetos o imagen astronómica. Incidiremos en particular en cómo estudiantes que han completado sus grados en Ingeniería pueden beneficiarse de un Observatorio Astronómico para su aprendizaje en los temas relacionados con el sector espacial y, al mismo tiempo, cómo un observatorio puede enriquecerse a través de las aportaciones de los alumnos de otros campos.

Outreach talk at the Madrid Astonomical Association

Miguel Pérez Torres

I gave an outreach talk at the headquaartes of the Madrid Astronomical Association, on Luminous Infrared galaxies seen with radio eyes, which was funded by the Spanish Astronomical Society (SEA). I'll give a very short account on this talk, and take the opportunity to recall researchers about the importance of public outreach. I will also make the point that, strictly speaking, MICINN research projects do not allow for money to be spent on outreach activities, and will advocate for a change on this situation.

La SEA en el Campamento de Astronomía de ESO

Natalia Ruiz Zelmanovitch

El pasado mes de diciembre tenía lugar en el Observatorio Astronómico del Valle de Aosta (Italia) el primer "Campamento astronómico de ESO", el Observatorio Europeo Austral. La Sociedad Española de Astronomía (SEA) participó financiando el viaje y la estancia de varios estudiantes españoles. La Comisión de Enseñanza de la SEA fue la encargada de promocionar el campamento, con un gran éxito de participación. En este póster resumimos la actividad y sus resultados.

Resultados del XXI Congreso Estatal de Astronomía

Blanca Troughton Luque

El XXI Congreso Estatal de Astronomía constituye un encuentro fundamental para los astrónomos aficionados de toda España. De forma ininterrumpida se vienen desarrollando cada dos años desde 1976. La edición vigésimo primera se ha desarrollado en el Parque de las Ciencias de Granada del 1 al 4 de mayo de 2014, organizado por la Federación de Asociaciones Astronómicas "Red Andaluza de Astronomía" (RAdA) fundada en 2011 que reúne a 19 entidades astronómicas de Andalucía. La participación y colaboración de astrofísicos, principalmente del Instituto de Astrofísica de Andalucía, ha sido fundamental para redimensionar el programa del congreso ofreciendo los últimos avances en astronomía en España y la importante participación de España en proyectos de investigación astronómica de ámbito internacional. El congreso estaba organizado en varias sesiones técnicas: Investigación amateur en colaboración con los profesionales en campos estelares, sistema solar, instrumentación y software; Contaminación lumínica y turismo astronómico que englobaba tanto a aficionados como astrofísicos, empresarios y divulgadores científicos relacionados con el astroturismo; Asociacionismo, divulgación, aplicaciones didácticas e historia de la astronomía. Uno de los temas más trabajados en el congreso ha sido la promoción de la colaboración en red en astronomía entre astrónomos aficionados que derivó en un compromiso por parte de varias agrupaciones astronómicas españolas relevantes a organizar una colaboración más formal, lo que generará una nueva visión de la astronomía amateur española. Todo ello unido a un completo programa que innovaba en cuanto a modo de presentación tipo programas de radio, monólogos de ciencia y visitas de interés astronómico a las instalaciones del Observatorio Astronómico del Torcal de Antequera, los Dólmenes de Antequera o las vistas de los Observatorios de Sierra Nevada, junto a las instalaciones del Parque de las Ciencias, han hecho de éste un encuentro muy especial.

III Escuela de Astronomía: el mundo de las estrellas

Luisa Valdivielso Casas

En esta comunicación se presenta la actividad desarrollada bajo el nombre de "III Escuela de Astronomía: el mundo de las estrellas", organizada por el CEFCA en octubre de 2013 y que ha sido financiada por la SEA. Se trata de un curso de carácter teórico-práctico de tres días que tiene el objetivo de acercar la Astronomía y la Astrofísica de manera divulgativa y formativa de la mano de los propios investigadores, estando los contenidos especialmente adaptados para quienes toman contacto por primera vez con la Astronomía e iniciando a los participantes en la observación del cielo mediante el uso de prismáticos y telescopios a través de sesiones prácticas. Durante el curso, se organiza además una salida para visitar las instalaciones del Observatorio Astrofísico de Javalambre, donde los participantes pueden disfrutar de una toma de contacto directa con un observatorio de carácter profesional. Casi 60 personas, entre participantes, monitores y ponentes de diferentes universidades y centros de investigación estuvieron presentes en la actividad. La acogida y el éxito de la misma puede medirse comparando las más de cien inscripciones que el CEFCA ha recibido frente a las 35 plazas que ofertadas para participar y que quedaron cubiertas en un plazo de 48 h. El buen ambiente de las propias jornadas y la valoración altamente positiva que tanto ponentes, monitores y participantes manifestaron a lo largo de la Escuela y los resultados de la encuesta aportada por los propios participantes, con un 100 % de satisfacción de los asistentes que realizaron la valoración, son también un fiel reflejo del buen desarrollo de la misma, la organización y la calidad de las ponencias realizadas.

Física Solar

Sesión S1

Release Timescales of Solar Energetic Particles in the Low Corona

[Conferencia Invitada]

Neus Agueda

We present a systematic study of the timing and duration of the release processes of near-relativistic (NR; >50 keV) electrons into interplanetary space occurring during solar eruptive events. We analyse seven well-observed events using in-situ measurements by both the ACE and Wind spacecraft, and context electromagnetic observations in soft X-rays, radio, hard X-rays and white light. We make use of data analysis methods to estimate the release time of the first arriving electrons, and compare the results obtained using a simulation-based approach, taking interplanetary transport effects into account to unfold the NR electron release time history from in-situ measurements. NR electrons observed in interplanetary space appear to be released during either short (2 h) periods. Short release episodes appear to originate in solar flares, in coincidence with the timing of the observed type III radio bursts. Magnetic connectivity plays an important role. Only type III radio bursts reaching the local plasma line measured at 1 AU are found to be related to an associated release episode in the low corona. Other type III bursts may also have a release of NR electrons associated with them, but these electrons do not reach L1. Long release episodes appear associated with signatures of long acceleration processes in the low corona (long decay of the soft X-ray emission, type IV radio bursts and time-extended microwave emission). Type II radio bursts are reported for most of the events, and do not provide a clear basis for discrimination between short and long release episodes.

Space Weather: forecasting the Sun-Earth interaction

[Conferencia Invitada]

Consuelo Cid Tortuero

Geomagnetic storms are considered as one of the natural hazards for modern society. Forecasting space weather is therefore a priority. However, scientific community is far to be able to provide accurate predictions from solar observations or even from interplanetary measurements. Even more, the quantification of the severity of the disturbance at the terrestrial surface by scientific community using global indices as Dst cannot be considered as the best proxy to give account of the damage in utilities, and local disturbances appear as the relevant proxy. Detailed studies of individual events show that one of the main reasons for the poor prediction capability is the lack of understanding of the complete event in all of the stages of its Sun-to-Earth passage. Using some examples, this presentation will evidence that a multi-disciplinary approach with interplanetary medium as a key-point is a fast track for truthful space weather forecasts.

Campos Magnéticos Polares

Adur Pastor Yabar

Las propiedades magnéticas del Sol en Calma han sido estudiadas de forma intensa (Keller et al. 1994, Grossmann-Doerth et al. 1996, Sigwarth et al. 1999, Lin & Rimmele 1999, Sánchez Almeida & Lites 2000, Socas-Navarro & Sánchez Almeida 2002, Domínguez Cerdeña et al. 2003, Khomenko et al. 2003, Socas-Navarro et al. 2004, Martínez González et al. 2007). De todos estos trabajos se concluye que toda la superficie solar está llena de estructuras magnéticas, incluso, en el Sol en Calma. Como consecuencia, es de esperar que éste ha de tener un papel relevante en la energética de la atmósfera solar. A diferencia del Sol en Calma a bajas latitudes, a latitudes altas ha sido muy poco estudiado (Okunev & Kneer 2004, Blanco Rodríguez et al. 2007, Tsuneta et al. 2008, Ito et al. 2010 and Shiota et al. 2012). Actualmente se considera para estas regiones un escenario con dos componentes diferenciadas. Una formada por campos magnéticos del orden de hG e independientes del Ciclo Solar y otra que depende de la fase de éste y está compuesta por estructuras magnéticas del orden de los kG. Al haber sido 2013 un máximo de actividad solar, las regiones polares están cambiando su polaridad y en los próximos años se espera que la segunda componente adquiera mayor relevancia. En esta comunicación se presenta la comparativa de los resultados magnéticos obtenidos a partir de inversiones con el código SIR (Ruiz Cobo, del Toro Iniesta 1992) de dos campos observados con TIP-II (Collados et al. 2007) en el telescopio VTT del OT. Estas observaciones se realizaron en septiembre de 2013 en las líneas de FeI 15648.5Å, 15650.8Å y 15652.0Å y consisten en un barrido en el Polo Norte Solar, mientras que el otro barrido está centrado en el Sol en Calma del centro del disco.

Formación y evolución de un elemento magnético del Sol en calma

Iker Sánchez Requerey

Los tubos de flujo son considerados estructuras magnéticas elementales de la fotosfera solar. Su formación se suele atribuir a la concentración de campo magnético a través del mecanismo de colapso convectivo. Sin embargo, debido a su pequeño tamaño, este escenario no ha sido estudiado en estructuras resueltas. En esta charla presentaremos el estudio detallado de la evolución de un elemento magnético observado con el instrumento IMaX (siglas de Imaging Magnetograph eXperiment) durante el primer vuelo de la misión Sunrise. La alta resolución espacial (0”.15 - 0”.18) y temporal (33 s) de IMaX dejará en evidencia la naturaleza compleja de los elementos magnéticos en el Sol en calma, y su necesidad para las observaciones Solares.

Beyond MHD: modeling of partially ionized solar plasma processes

[Conferencia Invitada]

Elena Khomenko

The temperature and density conditions in the magnetized photosphere and chromosphere of the Sun lead to a very small degree of atomic ionization. In addition, at particular height, the magnetic field may be strong enough to give rise to a cyclotron frequency larger than the collisional frequency for some species, while for others the opposite may happen. These circumstances influence the collective behavior of the particles and some of the hypotheses of magnetohydrodynamics may be relaxed, giving rise to non-ideal MHD effects. In this talk I will discuss our recent developments in the modeling of the non-ideal plasma effects derived from the presence of a large amount of neutrals in the solar photosphere and the chromosphere, as well as observational consequences of these effects.

Sesión S2

Chromospheric diagnostics in active regions

[Conferencia Invitada]

Jaime de la Cruz Rodríguez

We analyze the fundamental physical properties of the solar chromosphere in active regions. In particular, we make use of state-of-the-art 3D MHD simulations and non-LTE inversions to study observations in the Ca II infrared triplet lines, acquired with the Swedish 1m Solar Telescope. In our analysis, a numerical simulation is used to study the formation of spectral lines in flux-emerging regions and network, whereas non-LTE inversions provide estimates of temperature, line-of-sight velocities and magnetic-field vector from spectropolarimetric observations.

Magnetic bright point dynamics and evolutions observed by IMaX/Sunrise and other instruments

[Conferencia Invitada]

Dominik Utz

In this invited talk we will speak about recent observations and results regarding the dynamics and evolution of so-called magnetic bright points (MBPs). Magnetic Bright Points are manifestations of kG strong mangetic flux concentrations seen in the solar photosphere. They belong to the class of small-scale solar magnetic features with diameters starting from low values around the current observational resolution limit - about 100 km - up to a few hundred km. They might play an important role in several key research questions like the total solar irradiance variation (TSI variation) as well as the solar atmospheric heating problem. Especially their dynamic behaviour is of interest for the heating problem as they might trigger all kinds of MHD waves which travel up to the higher solar atmospheric layers, where they can get damped leading to a heating of the plasma. Furthermore they might engage in magnetic field reconnection processes leading consequently also to a heating. Due to these reasons, and also for the sake of a better understanding of the physical processes involved on small-scales, detailed investigations on the dynamical behaviour and evolution of such magnetic field proxies like MBPs is in order.

Estudiando el efecto del dinamismo solar en la polarización por scattering.

Edgar Carlin Ramírez

El modelado de señales de polarización producidas por fenómenos de scattering en regimen Hanle ofrece una vía excepcional para acceder a los débiles campos magnéticos del Sol en calma y de la cromosfera mediante la descripción cuántica precisa del sistema atómico y de la interacción materia-radiación. La complejidad y la gran dimensionalidad que presenta la resolución del transporte radiativo NLTE con polarización atómica ha llevado a que el tratamiento teórico en este contexto se haya limitado típicamente a casos sin velocidades macroscópicas. Pero justamente en la cromosfera el dinamismo solar es especialmente relevante e investigaciones recientes apuntan a que puede modificar las señales de polarización lineal que dan cuenta del efecto Hanle en torno al centro de líneas espectrales cromosféricas. En esta contribución se presenta un estudio preliminar sobre la necesidad y viabilidad de incorporar el efecto de las velocidades macroscópicas en la polarización por scattering de líneas resonantes (con foco en la línea 4227 A del CaI), donde los efectos de redistribución parcial son cruciales. El objetivo final es desarrollar métodos avanzados de diagnóstico de la cromosfera solar basados en los cambios relativos de polarización producidos entre el centro de la línea (dominado por efecto Hanle y alteraciones en la anisotropía del campo de radiación) y las alas cercanas (dominadas por la redistribución en frecuencias que produce el scattering y presuntamente alteradas por el efecto de los gradientes de velocidad en dicha redistribución). Detallaremos las particularidades del problema y exploraremos las principales vías teóricas para resolverlo así como las dificultades a la hora de modelar la redistribución en frecuencia producida por la acción conjunta de la velocidad, las colisiones y el campo magnético.

Multi-level Modeling of Scattering Line Polarization with the Weak Anisotropy Approximation

Tanausú del Pino Alemán

The spectral line polarization produced by anisotropic radiation pumping in the solar atmosphere is a powerfull diagnostic tool of its physical properties. However, in order to take advantage of this observable, it is necessary to model correctly the interaction between radiation and matter in the presence of magnetic fields. Although there are spectral lines that can be modeled with two-level atomic models, the interpretation of most of the spectral lines of the solar spectrum requires the consideration of realistic multilevel atomic models. This radiative transfer problem has been already solved in its general formulation, taking into account the generation and transfer of atomic polarization in multi-level systems. In this work, we make use of the fact that in solar-like atmospheres the anisotropy of the radiation is weak and we apply an ensuing approximation that improves the numerical stability and the computational memory requirements (very importatnt for its application to 3D radiation transfer problems). We demonstrate the goodness of this approximation and apply it to the modeling of some interesting spectral lines whose observed polarization was considered enigmatic.

Emergence of internetwork magnetic fields and their contribution to the quiet Sun network

Milan Gosic

Network and internetwork magnetic fields are believed to contribute to the flux budget of the solar atmosphere in a very significant way. However, the origin of these fields, their maintenance on the solar surface, and their exact contributions are not well understood yet. Here we use high resolution magnetograms acquired by the Hinode NFI to shed light on these issues. Applying a feature tracking code to time sequences of up to 37 hours we analyze how magnetic patches appear and evolve in the solar photosphere. We find that internetwork fields emerge in the interior of supergranular cells either as unipolar features or as small-scale bipolar loops. We use potential field extrapolations and magnetofrictional simulations, as well as other criteria, to identify loops in the data. The flux emergence rate of internetwork fields is 40 Mx cm^{-2} day^{-1}. They supply the network with magnetic flux at a rate of 20-30 Mx cm^{-2} day^{-1}. In only 10-20 hours, internetwork elements can generate and transfer as much flux as is observed in network regions, establishing them as the main source of flux for the network.

Evolución Temporal de Regiones Activas Solares

Ana Belén Griñón Marín

Aprovechando el momento actual en el que nos encontramos, un máximo del ciclo solar, y con el lanzamiento del satélite Solar Dynamics Observatory que nos permite obtener datos del disco solar las 24 horas del día, pretendemos hacer un estudio de la evolución temporal de algunas regiones activas seleccionadas. Lo que se ha realizado hasta ahora ha sido una base de datos de algunos targets interesantes con los que poder estudiar cómo emergen las regiones activas e intentar medir oscilaciones torsionales en las mismas. Para ello, se ha comenzado con la realización de diferentes movies con las que buscar estos objetivos propuestos, las cuales se mostrarán en la presentación.

Sesión S3

Theory of MHD waves in magnetic flux tubes

[Conferencia Invitada]

Ramón Oliver

In this talk I will review the present theoretical knowledge of magnetohydrodynamic waves in magnetic tubes of the solar atmosphere.

Shock-Wave propagation in quiet sun arcaded-shaped magnetic field structure with a null point

Irantzu Calvo Santamaria

Observational detections of MHD waves are frequent, but the complexity of the quiet Sun magnetic fields requires sophisticated modeling to reach the full understanding of how MHD waves interact with these fields at different atmospheric layers. We present two-dimensional numerical simulations of shock-wave propagation in the solar atmosphere from sub-photospheric layers up to the corona. Waves are driven by a pressure pulse located below the photosphere. The magnetic field structure consist on vertical flux tubes separated by an arcade-shaped magnetic field. This configuration leads to a null point located in the corona that significantly modifies the behavior of the waves as the pass near it. The waves undergo several changes as they propagate upwards in the atmosphere, such as, transformations, reflections and refraction as they reach obstacles like the equipartition layer, where the gas and magnetic pressures are balanced, the TR and the null point, where the magnetic field strength is zero. The waves also steepen into shocks dissipating energy. The aims of this work are to study the MHD wave interaction with the magnetic field structure described, and to quantify how much energy is transported into the corona at different magnetic field inclinations in the domain.

High cadence spectroscopy of prominence dynamics (partial ionization effects).

Antonio Jesús Díaz Medina

We present the preliminary results of one series obtained during the september 2012 observational campaign in the VTT, in which high-cadence spectroscopy of a prominence was carried out using simultaneously the HeI 10830 and CaII 8425 lines. After applying simple reduction and fitting techniques we obtain simultaneous measurements of the spectral characteristics of both lines with a temporal cadence of 15s in this particular series. Both lines are very well correlated, but at some time instants and positions differences in Doppler velocity appear which may be caused by partial ionization effects if we assume the Doppler dispacements are proxies for ion and neutral species, marking a a direct detection of deviations from MHD theory. Many features of prominence dynamics are also present, such as apparently running waves, brightenings and dimmings, overall motions and surges.

Convección en la penumbra de las manchas solares y su evolución temporal

Sara Esteban Pozuelo

El objetivo de este trabajo es estudiar la evolución de los movimientos de masa en los filamentos penumbrales de una mancha próxima al centro del disco solar. Para ello utilizamos datos espectro-polarimétricos de muy alta resolución espacial tomados con el instrumento CRISP en la Torre Solar Sueca. Estas medidas nos permiten calcular Dopplergramas en capas profundas de la fotosfera y filtrar las oscilaciones acústicas de 5 minutos. Las observaciones revelan la existencia de pequeños parches desplazados hacia el rojo junto al borde de los filamentos penumbrales. En la penumbra que mira al observador, estos parches son especialmente prominentes ya que los filamentos muestran desplazamientos Doppler hacia el azul. Los parches solo pueden ser debidos a movimientos verticales descendentes. Tienen una vida media de 6 minutos, una velocidad LOS media de 220 m/s y un tamaño efectivo de 0.2". Por comparación, los filamentos azules están presentes durante toda la secuencia (40 minutos), su velocidad LOS suele superar 1 km/s y tienen una anchura típica de 0.4". Un parche rojo puede fragmentarse o unirse a otros parches adyacentes a lo largo de su vida, lo que quizás sea una característica real de los downflows laterales o un problema de detección. Los parches siguen el mismo movimiento que los filamentos a los que están asociados. Además, estos últimos parecen dictar la aparición y desaparición de los parches. Nuestros resultados permiten identificar los filamentos penumbrales como celdas convectivas alargadas donde hay un flujo radial predominante hacia el exterior (es vertical a lo largo del filamento y desciende al final) junto a un movimiento de masa descendente mucho mas pequeño en los bordes. En películas hechas con los Dopplergramas obtenidos, los campos de velocidad penumbrales recuerdan poderosamente los observados en el Sol en calma, excepto por la diferente forma de las celdas convectivas.

3D MHD simulations of Rayleigh-Taylor instability in partially ionized solar prominences

Manuel Luna

We perform 3D non-linear numerical simulations of the Rayleigh-Taylor instability (RTI) at a prominence-corona transition region. This work is a continuation of our initial 2.5D results with an aim to study the influence of neutral atoms on the instability growth rate, and on the evolution of velocity, magnetic field vector and thermodynamic parameters of the prominence plasma. We perform 3D numerical simulations of the instability initiated by a multi-mode perturbation at the corona-prominence interface using a single-fluid MHD approach including a generalized Ohm's law

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Simulaciones numéricas de la inestabilidad de Kelvin-Helmholtz en plasmas parcialmente ionizados

David Martínez Gómez

La inestabilidad de Kelvin-Helmholtz está presente en diversos plasmas astrofísicos. En particular ha sido observada en la atmósfera solar y se ha confirmado su presencia en protuberancias solares, que son estructuras magnéticas de la corona solar. El plasma de estas regiones no se encuentra completamente ionizado, sino que también está compuesto de partículas neutras cuyas colisiones con los iones pueden alterar los ritmos de crecimiento y la evolución de las inestabilidades. En este trabajo, para estudiar el efecto de la ionización parcial del plasma utilizamos la aproximación de dos fluidos (iones + neutros) en las ecuaciones que gobiernan el plasma. En esta comunicación se presentan resultados del estudio del régimen lineal de la inestabilidad de Kelvin-Helmholtz obtenidos mediante simulaciones numéricas y se comparan con las predicciones teóricas analíticas.

Pósters

Synthesis of Stokes Profiles in a 3D MHD chromospheric model.

Edgar Carlin Ramírez

We have solved the multilevel, non-LTE problem of the generation and transfer of polarized radiation for a snapshot of a 3D MHD simulation using the 1.5D approximation in a disk-center observation. We consider the action of the vertical velocity fields on the anisotropy of the radiation field and on the atomic level polarization. The study is focused in the scattering polarization signals of the Ca II IR triplet lines (at 8498, 8542 and 8662 Å) which, in our forward scattering case, are physically allowed due to the (variable) inclination of the magnetic field (Hanle effect). We show here the main results of the calculations: a tomographic view of the dynamic model chromosphere composed of maps of linear polarization produced by Hanle effect and of circular polarization dominated by Zeeman effect. We also comment some interesting features in the polarization maps. They are proposed as possible proxies for diagnosing the spatial variation of the chromospheric magnetic field and for confronting the level of chromospheric dynamism in the models with the one in the observations.

Galaxias y Cosmología

Sesión C1

Propiedades y origen de los vientos ionizados en quásares oscurecidos

[Conferencia Invitada]

Montserrat Villar Martin

El estudio de los supervientos ("outflows") galácticos ha cobrado una gran relevancia en los últimos años. Se trata de un mecanismo que de acuerdo con las predicciones teóricas podría resolver algunos de los problemas acuciantes de la astrofísica extragaláctica. En particular, los vientos originados en el núcleo de los cuásares podrían tener la potencia y alcance suficientes para provocar un impacto dramático en la evolución de las galaxias. En la última década se han descubierto miles de quásares oscurecidos. Presentaré los resultados de nuestro trabajo que muestran que los supervientos son un fenómeno totalmente común en estos sistemas. Hablaré de sus propiedades, del mecanismo de disparo y de las incertidumbres que afrontamos a la hora de evaluar el impacto que tienen en el medio circundante y sus consecuencias en la evolución galáctica.

J-PAS: The Javalambre-Physics of the Accelerated Universe Astrophysical Survey

Txitxo Benitez

The Javalambre-Physics of the Accelerated Universe Astrophysical Survey is a narrow band, very wide field Cosmological Survey to be carried out from the Javalambre Observatory in Spain with a purpose-built, dedicated 2.5m telescope and a 4.7sq.deg camera with 1.2Gpix. Starting in 2015, J-PAS will observe 8,500 deg of Northern Sky and measure 0.003(1+z) precision photometric redshifts for 91M LRG and ELG galaxies plus several million QSOs, about 50 times more than the largest current spectroscopic survey, sampling an effective volume of $\sim$ 14 Gpc^3 up to z = 1.3 and making J-PAS the first radial BAO Stage IV experiment. J-PAS will also detect and measure the mass of 700,000 galaxy clusters and groups, setting constrains on Dark Energy which rival those obtained from BAO measurements. Thanks to the superb characteristics of the Javalambre site, J-PAS is expected to obtain a deep, sub-arcsec imaging of 8,500 sq.deg., which combined with its unique photo-z precision will produce one of the most powerful cosmological lensing surveys before the arrival of Euclid. In addition, J-PAS unprecedented spectral time domain information will enable a self-contained SN survey that, without the need for external spectroscopic follow-up, will detect, classify and measure dz 0.5 % redshifts for $\sim$ 4,000 SNeIa and $\sim$ 900 core-collapse SNe. The key to the J-PAS potential is its innovative approach: the combination of 54 145Å filters, placed 100Å apart, and a multi-degree field of view (FOV) is a powerful "redshift machine", with the survey speed of a 4,000 multiplexing low resolution spectrograph, but many times cheaper and much faster to build. Moreover, since the J-PAS camera is equivalent to a very large, 4.7 sq.deg. "IFU", it will produce a time-resolved, 3D image of the Northern Sky with a very wide range of astrophysical applications in Galaxy Evolution, the nearby Universe and the study of resolved stellar populations.

La escalera inversa de distancias: oscilaciones acústicas de bariones y supernovas de tipo Ia

Antonio Jose Cuesta Vazquez

Recientes mediciones del fondo cósmico de microondas a cargo del satélite Planck, extrapoladas en el contexto del modelo cosmológico LambdaCDM, predicen un valor de la constante de Hubble que parece estar en conflicto con medidas locales de la velocidad de expansión. Esta discrepancia ha abierto numerosos debates sobre la estimación de errores sistemáticos en uno y otro lado, así como de la existencia de nueva física que pueda reconciliar ambas medidas, en particular invocando una modificación en el sector de los neutrinos. Afortunadamente disponemos de fuentes de información cosmológica complementarias que pueden aportar mucho a este debate puesto que trazan la expansión del Universo a valores del corrimiento al rojo intermedios. En esta charla expondré el valor de combinar las medidas de la relación entre distancia y redshift ofrecidas por las oscilaciones acústicas de bariones, junto con las determinadas por supernovas de tipo Ia a diversos redshifts. En particular, veremos la importancia de la precisión de las medidas del catálogo espectroscópico de oscilaciones de bariones (BOSS-DR11) en nuestros resultados.

The Dark Energy Survey (DES) : status and first science results

Martin Crocce

The Dark Energy Survey (DES) is a next-generation large galaxy survey designed to unravel the mystery of the nature of the dark energy that powers the current accelerated expansion of the universe. During the northern fall of 2012 the DES collaboration installed and commissioned DECam, a 570 mega-pixel optical and near-infrared camera with a large 3 sq. deg. field of view, set at the prime focus of the Víctor M. Blanco 4-meter telescope in CTIO, Chile. A "Science Verification" (SV) period of observations, lasting until late February 2013, followed the DECam commissioning phase, and provided science-quality images for almost 200 sq. deg. at the nominal depth of the survey. The first of five observing seasons then went on from August 2013 to February 2014. At the end of the five seasons, DES will have mapped an entire octant of the southern sky to unprecedented depth, measuring the position on the sky, redshift and shape of almost 300 million galaxies, together with thousands of galaxy clusters and supernovae. With this data set, DES will study the properties of dark energy using four main probes: galaxy clustering on large scales, weak gravitational lensing, galaxy-cluster abundance, and supernova distances. The talk will present the current status of the project, the first scientific results of the survey, based on the SV observations, and the plans and goals for the coming years.

Revealing dark matter in the Frontiers Fields cluster

Jose M. Diego

We present our latest results on the dark matter distribution of galaxy clusters observed under the Frontier Fields program. The collection of clusters in this program represent the most spectacular example of gravitational lenses where hundreds of arcs can be identified in a single image. Such large number of strongly lensed images allows for a detailed reconstruction of the dark matter distribution that reveals interesting associations with the baryonic matter. Special attention will be paid to the cluster A2744, also known as the "Pandora Box cluster" whose rich structure emerges as a result of the collision of at least 3 clusters

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The physics behind the lives of double-barred galaxies: different approaches and global results

Adriana de Lorenzo-Cáceres Rodríguez

Double-barred galaxies are structurally complex objects, as the two bars show random orientations and independent pattern speeds. This fact has greatly hampered the study of these objects, even though inner bars are considered a main driver of gas inflow to the central regions of galaxies, where it may feed the AGN and/or promote the secular formation of bulges. Over the past years our group has faced the problem of the observational study of double bars from different standpoints, which I will present in this talk. Thus, we have studied in detail the stellar and gas content of double bars, their particular properties with respect to single- and non-barred galaxies, and even how to identify new double-barred systems previously unknown. We have also analysed the nature of the structural components of these systems and their star formation histories, and the role that inner bars might play in the AGN fueling. Once put together, all the previous results allow us to recover the possible evolutionary paths that double-barred galaxies have followed to reach the state they present nowadays.

Sesión C2

Primordial pseudobulges in Isolated Galaxies?

Mirian Fernández Lorenzo

Valuable clues about spiral galaxy formation lie in the nature of their central bulges. In this context, properties of bulges in isolated galaxies best reflect their origin because they have likely been less affected by environment. We present structural parameters and (g-i) bulge/disk colors for a sample of 189 isolated AMIGA (Analysis of the interstellar Medium of Isolated GAlaxies; http://www.amiga.iaa.es) galaxies. 2D bulge/disk/bar decompositions were carried out using SDSS i-band images in order to identify pseudobulges in our sample. We derived (g-i) bulge colors using aperture photometry. Pseudobulges in isolated galaxies show median colors (g-i)$\sim$1.06, while their associated disks are much bluer, (g-i)$\sim$0.77. Moreover, 64 % (113/177) of pseudobulges follow the red sequence of early-type galaxies. The bluer pseudobulges in our sample tend to be located in those galaxies more affected by the tidal interactions. The red bulge colors and low B/T values for AMIGA isolated galaxies are consistent with an early formation epoch. The results found here suggest that environment could be playing a role in rejuvenating the pseudobulges.

CALIFA across the Hubble type: The spatially resolved properties of the stellar populations

Rosa González Delgado

We present the spatially resolve star formation history (SFH) of galaxies for a sample of 300 galaxies from the CALIFA survey. We applied the fossil record method based on spectral synthesis techniques to recover SFH, resolved in space and time, in spheroidal and disk dominated galaxies with masses from 10^9 to 10^{12} $M_\odot$. We derived the radial structure of the properties of the stellar populations such as age, metallicity, stellar extinction, and stellar mass surface density. We discuss the results as a function of the galaxy stellar mass, and morphology. We also compare the SFH of a few mergers that are included in the CALIFA sample with that of isolated galaxies.

The O_3N_2 and N_2 abundance indicators revisited: improved calibrations based on CALIFA and Te-based literature data

Raffaella Anna Marino

The use of integral field spectroscopy is since recently allowing to measure the emission line fluxes of an increasingly large number of star-forming galaxies both locally and at high redshift. Many studies have used these fluxes to derive gas-phase metallicity of the galaxies by applying the so-called strong-line methods. However, the metallicity indicators that these datasets use were empirically calibrated using few direct abundance data points (Te-based measurements). Such limitations might lead to systematic errors in determining the gas-phase metallicity, which might have a strong impact on our understanding of the chemical evolution of the Universe. The main goal of this study is to review the most widely used empirical oxygen calibrations, O3N2 and N2, by using new direct abundance measurements. We pay special attention to the expected uncertainty of these calibrations as a function of the index value or abundance derived and the presence of possible systematic offsets. This is possible thanks to the analysis of the most ambitious compilation of Te-based HII regions to date. This new dataset compiles the Te-based abundances of 603 HII regions extracted from the literature but also includes new measurements from the CALIFA survey. Besides providing new and improved empirical calibrations for the gas abundance, we also present a comparison between our revisited calibrations with a total of 3423 additional CALIFA HII complexes with abundances derived using the ONS calibration from the literature. The combined analysis of Te-based and ONS abundances allows us to derive their most accurate calibration to date for both the O3N2 and N2 single-ratio indicators, in terms of all statistical significance, quality, and coverage of the parameters space. In particular, we infer that these indicators show shallower abundance dependencies and statistically significant offsets compared to others.

Galaxias con formación estelar activa a z=0.61

Carlos Gómez Guijarro

Este estudio pretende inferir la historia de formación estelar, propiedades físicas y globales de una muestra de galaxias con formación estelar activa a z=0.61 seleccionadas en el campo cosmológico GOODS-S por su emisión Halpha en imágenes ultra-profundas (32 horas de tiempo de exposición) tomadas con un filtro estrecho en el infrarrojo cercano con el instrumento Hawk-I del telescopio VLT.

Galaxies on FIRE (Feedback in Realistic Environments): The Role of Stellar Feedback in Dwarf Galaxy Formation

Jose Oñorbe Bernis

I will present hydrodynamical simulations of the formation of galaxies starting from cosmological initial conditions at high redshift. In these simulations, a novel numerical implementation of stellar feedback resulting from momentum imparted to the ISM by radiation, supernovae, and stellar winds has been used (Hopkins et al. 2011). I will focus my talk on the properties of the dwarf galaxies halos in the FIRE sample. Our final objects have structure and stellar populations consistent with observed dwarf galaxies. First results indicate that feedback from massive stars plays a critical role in shaping the galaxy mass function, the structure of the interstellar medium (ISM), and the low efficiency of star formation.

Sesión C3

Measuring Large-Scale Structure at high redshift with quasar absorption spectra: Results from the Baryon Oscillation Spectroscopic Survey

[Conferencia Invitada]

Jordi Miralda Escudé

The Baryon Oscillation Spectroscopic Survey has measured correlations and cross-correlations of several tracers of large-scale structure: quasars, the Lyman alpha forest, damped Lyman alpha systems, and metal lines. Redshift distortions and baryon acoustic oscillations have been detected, yielding extremely precise measurements of the expansion rate and angular diameter distance at a redshift 2.4. Implications of the results for galaxy formation and quasar properties will also be discussed.

Cosmology fron the SDSS-III Baryon Oscillation Spectroscopic Survey

[Conferencia Invitada]

Chia-Hsu Chuang

Baryon Oscillation Spectroscopic Survey (BOSS) is part of the Sloan Digital Sky Survey III. It is the largest ongoing spectroscopic survey up to date. The measurements of galaxy clustering provide very powerful and robust constraints on cosmological parameters. In this talk, I will talk about the progress and the results of this project as well as its impact to the future surveys.

The Cross-correlation of MgII Absorption and Galaxies in BOSS

Ignasi Pérez Ráfols

We present a measurement of the cross-correlation of MgII absorption and massive galaxies, using the DR11 galaxy sample of the Baryon Oscillation Spectroscopic Survey of SDSS-III, and the DR7 quasar spectra of SDSS-II. The cross-correlation is measured by stacking quasar absorption spectra shifted to the redshift of galaxies that are within a certain impact parameter bin of the quasar, after dividing by a quasar continuum model. This results in an average MgII equivalent width as a function of impact parameter from a galaxy, ranging from 50 kpc to more than 10 Mpc in proper units, which includes all MgII absorbers. We show that special care needs to be taken to use an unbiased quasar continuum estimator, to avoid systematic errors in the measurement of the mean stacked MgII equivalent width. The measured cross-correlation follows the expected shape of the galaxy correlation function, although measurement errors are large. We use the cross-correlation amplitude to derive the bias factor of MgII absorbers, finding $b_{MgII} = 1{,}50 \pm 0{,}19$, where the error accounts only for the statistical uncertainty in measuring the mean equivalent width. This result indicates that MgII absorbers at redshift $z \simeq 0{,}5$ are spatially distributed on large scales similarly to galaxies with $L \simeq L_*$.

Herschel PEP/HerMES: Dust properties of a large sample Lyman Break Galaxies at z $\sim$ 3 in the COSMOS field

Javier Álvarez Márquez

We present the results of a study of the far-infrared (rest-frame) properties of a very large sample (∼15,600 objects) of z ∼ 3 Lyman break galaxies (LBGs), based on Herschel (PACS and SPIRE) and AzTEC observations of the Cosmic evolution survey (COSMOS). Only ∼100 of them are individually detected, so we have used a stacking analysis to characterize the properties of our LBGs. We have selected the LBGs using the U-dropoust techniques. We have determined the dust properties of our sample from the stacked flux densities as a function of the Far-UV luminosity, stellar mass and UV slope. We have been able to measure the infrared luminosity, Star formation rate (SFR), specific star formation rate (sSFR), dust attenuation, IR to UV luminosity ratios, dust temperature and dust masses, and to characterize these properties as a function of the three parameters previously mentioned. Our methodology and this first analysis of a large sample provide significant results and we will present the prospects of using them in the context of the next generation of large telescopes and more specifically JWST and the ELTs to study the earliest phases of star formation

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The Planck Catalogue of Compact Sources

Marcos López-Caniego Alcarria

The Planck Catalogue of Compact Sources (PCCS) is the catalogue of sources detected in the first 15 months of Planck operations, the "nominal" mission. It consists of nine single-frequency catalogues of compact sources, both Galactic and extragalactic, detected over the entire sky. The PCCS covers the frequency range 30–857 GHz with higher sensitivity and better angular resolution than previous all-sky surveys in the microwave band. It is 90 % complete at 180 mJy in the best channel, and the resolution ranges from 32.88 to 4.33 arc minutes. By construction its reliability is $> 80\,\%$, and more than 65 % of the sources have been detected at least in two contiguous Planck channels. Many of the Planck PCCS sources can be associated with stars with dust shells, stellar cores, radio galaxies, blazars, infrared luminous galaxies and Galactic interstellar medium features. In this presentation I will summarize the construction and validation of the PCCS, its contents and its statistic al characterization.

Impact of nebular emission in broadband photometry of high-redshift galaxies

Esther Marmol Queralto

The evolution of the physical properties of galaxies such as the stellar mass and the star formation rate (SFR) have been (and are) extensively analysed using photometric data in a wide range of redshifts. However, these results rely on fitting their spectral energy distributions where rest-frame optical nebular emission lines (e.g., [OII], [OIII], Halpha) may contaminate the broad-band fluxes and bias the results inferred. Actually, recent works have showed that the specific SFR seems to evolve far less rapidly than expected in most theoretical models, and the challenge now is to understand this discrepancy. With this aim, we combine broad-band photometry with new near-infrared spectroscopy taken from the 3D-HST survey for a sample of star forming galaxies at intermediate redshifts (z∼1.3 and z∼2) to quantify, for first time, the contribution of the nebular emission lines to broad-band fluxes and analyse their impact in the inferred physical properties of the galaxies. With this new information, we revisit the photometric data available for galaxies at higher redshift to trace the evolution of the equivalent width of nebular emission lines, in particular Halpha, and the specific SFR with redshift. These new estimates then provide more robust physical measurements to finally compare with the theoretical expectations and understand the current discrepancies.

The QUIJOTE experiment: first results and future plans

Ricardo Génova Santos

The QUIJOTE (Q-U-I JOint TEnerife) experiment is a new polarimeter to characterize the polarization of the CMB in the frequency range 10-40 GHz. Its main goal is to characterize the primordial B-mode anisotropy of the CMB down to a sensitivity in the tensor-to-scalar ratio of r$\sim$0.05, and to measure the level of the polarization of low-frequency Galactic foregrounds (the synchrotron and the anomalous dust emissions). The project consists of two telescopes and three instruments which will explore a large sky area (10,000 sq deg) from the Teide Observatory (Tenerife) to provide Q and U maps of high sensitivy (1-3 microK/beam). The first telescope and the Multi-Frequency Instrument (MFI) are operative since November 2012 in the frequency range 10-20 GHz. The second telescope and two additional instruments, respectively at 30 and 40 GHz, are currently under construction. These two experiments will provide Q and U maps with a sensitivity better than 1 muK/beam. In this talk I will discuss the status of this project, its future goals, and will present the first maps obtained with the MFI, with emphasis on the derived limits on the polarization fraction of the anomalous dust emission.

Sesión C4

The ALHAMBRA survey: Accurate photometric merger fractions from PDF analysis

Carlos López San Juan

The estimation of the merger fraction in photometric surveys is limited by the large uncertainty in the photometric redshift compared with the velocity difference in kinematical close pairs (less than 500 km/s). Several efforts have conducted to deal with this limitation and we present the latest improvements. Our new method (i) provides a robust estimation of the merger fraction by using full probability distribution functions (PDFs) instead of Gaussian distributions, as in previous work; (ii) takes into account the dependence of the luminosity and the stellar mass on redshift in both the selection of the samples and the definition of major/minor mergers; and (iii) deals with partial PDFs to define red"(E/S0 templates) and "blue"(spiral/starburst templates) samples without apply any colour selection. We highlight our new method with the estimation of the merger fraction at z<1 in the ALHAMBRA photometric survey. We find that our merger fractions and rates nicely agree with those from previous spectroscopic work. This new method will be capital for current and future large photometric surveys such as DES, SHARDS, J-PAS, or LSST.

The formation epochs and size effects of red-sequence galaxies up to z∼1

Luis Alberto Díaz García

Making use of multi-filter photometric data from the ALHAMBRA survey and a novel SED fitting technique specifically developed by our team to determine the stellar populations of this type of galaxy data (see Poster by Díaz-García et al. in this meeting), we present, for the first time, a detailed study of the stellar content (ages, metallicities, and extinctions) of red-sequence (RS) galaxies, allowing us to shed light on their evolution since redshift z∼1.2 down to the present day, as well as on the role of their sizes in this picture. Our main sample is composed by more than 20,000 RS galaxies in the ∼3 deg2 sky coverage of ALHAMBRA, being complete up to magnitude F814W∼23.5, and taken from the ALHAMBRA Gold catalogue (Molino et al. 2014; 20 optical bands plus 3 NIR bands J, H, and Ks). On the basis of this sample, we will present the formation epochs of RS massive galaxies (M>∼10^{11}Msun) as a function of mass, deriving empirical evidences for downsizing scenarios in the observed ranges of mass and redshift. The overall metallicity and the extinction determinations for the galaxy sample will be also discussed. In addition, for a subsample of ∼2,500 RS galaxies in common with ACS/HST surveys (AEGIS, GOODS, COSMOS, and GEMS), reliable sizes have been compiled from the literature to address the impact of size in their evolution. With the aim of setting observational constrains on the mechanism driving the growth in size of the most massive galaxies (e.g. Trujillo 2007), for the first time we present a detailed analysis of the stellar populations of these galaxies in the size - stellar mass plane up to redshift z∼1.2. The main results and potential evolution mechanisms will be discussed in this talk.

The sizes of the galaxies and their environment

María Cebrián Renau

The different evolutionary paths followed by the galaxies along their lives are expected to leave an imprint in their sizes. Nevertheless, the role that the environment plays on shaping the galaxies is still unclear. Taking advantage of the great statistics provided by SDSS data, we address this question using a mass-complete sample of 232,000 objects. We study the stellar mass-size relation of galaxies in the field and in clusters in the nearby Universe. Our results show that galaxies are smaller in high-density regions at a fixed stellar mass. Moreover, the scatter of the relation is also smaller in clusters than in the field. These results point towards an earlier formation of the galaxies in high-density environments as well as to an evolution from a more homogeneous family of progenitors than those inhabiting less dense environments.

Evolución de discos y bulbos a alto z en el sondeo CANDELS

Berta Margalef Bentabol

En el universo cercano, las galaxias presentan gran variedad de caracterísicas morfológicas, pudiendo distinguirse entre aquellas dominadas por disco y las dominadas por bulbo, con diversas subcategorías en cada clase. Sin embargo, el origen de ambos tipos de galaxias, y su conexión evolutiva es todavía una cuestión abierta. Este trabajo pretende investigar la historia de la formación de estas estructuras dominantes (discos y bulbos) y trazar su evolución hasta el universo local. Para abordar esta cuestión hemos realizado una descomposición en dos dimensiones de los perfiles de luz de galaxias del sondeo CANDELS. La muestra utilizada está formada por galaxias con masas mayores que 10^{10} masas solares y desplazamientos al rojo de entre 1 y 3. Mediante inspección visual de todas las galaxias y el test estadístico de Fisher, hemos determinado qué galaxias son discos o esferoides puros y cuáles son una combinación de disco y bulbo. Asimismo, hemos investigado la relación tamaño-masa de los bulbos y los discos, y comparado con las relaciones locales. Presentaremos cómo algunas propriedades como B/T, densidades o color evolucionan con el desplazamiento al rojo, y mostraremos cómo varían entre discos y bulbos.

El proyecto OTELO: presente y futuro

Marina Ramón Pérez

El proyecto OTELO es un ambicioso cartografiado extragaláctico que, mediante el uso de los filtros sintonizables del instrumento OSIRIS del GTC, aspira a detectar un gran número de objetos en emisión, de los cuales se estudiarán con especial interés los AGN (Núcleos Activos de Galaxias) así como los objetos a alto desplazamiento al rojo. Con dos tercios de las observaciones del primer apuntado completadas, presentamos aquí el estado actual de OTELO: el proceso de reducción de los datos así como los primeros resultados parciales que se pueden derivar de ellos. También se expondrán las perspectivas científicas de OTELO a corto y largo plazo.

Estudio de la formación estelar en el multi-cúmulo A901/902 utilizando OSIRIS en el GTC

Bruno Rodríguez Del Pino

En mi charla presentaré resultados del ya completado ESO Programa de Larga Duración llevado a cabo utilizando el instrumento OSIRIS en el GTC. Estamos observando un gran número de galaxias en la región del sistema multi-cumular A901/902 (z=0.165) que ya ha sido extensivamente estudiado como parte del proyecto STAGES. De nuestras observaciones hemos obtenido mapas en emisión de H-alpha y N[II] resueltos espacial y espectroscópicamente, para un gran número de objetos en zonas con una amplia variedad en densidad. Estas dos líneas nos proporcionan información sobre la formación estelar en las galaxias y la posibilidad de contener un Núcleo Activo (AGN). Para estudiar el papel que juegan tanto el entorno en el que estas galaxias viven como algunas de sus propiedades como luminosidad, masa o tipo morfológico también hacemos uso de las observaciones en multitud de longitudes de onda ya realizadas, incluyendo HST, COMBO-17, Spitzer, Galex y XMM-Newton. Utilizando la información de la luz integrada en las dos regiones más densas del sistema hemos obtenido tasas de formación estelar que muestran niveles más bajos en comparación con valores previamente encontrados en galaxias en zonas menos densas. Estos resultados están de acuerdo con la supresión de la formación estelar en entornos más densos. El análisis del resto de datos correspondientes al sistema completo nos permitirá estudiar globalmente la dependencia de las formación estelar con el entorno. Para terminar, también mostraré los resultados preliminares obtenidos en la estimación de la concentración de la formación estelar, que nos proporcionará información sobre qué mecanismos son responsables de la supresión de la formación estelar.

Sesión C5

Spatially resolved star formation histories in nearby galaxies. The 3D view.

[Conferencia Invitada]

Patricia Sánchez Blazquez

One of the most fundamental challenges in astrophysics is to understand the origin for the observed diversity of galaxies, and the physical mechanisms that are responsible for the differences as well as similarities between them. There is a modern agreement among astronomers that a variety of processes play a role in shaping galaxies, for example gas accretion, feedback, in-situ star formation, mergers, and dynamical processes such as diffusion and migration of stars. The detailed manner in which these processes proceed ultimately determines the kinematics, star formation history (SFH) and chemical structure of galaxies. The technical possibilities of Integral Field Spectroscopy (IFS) have the potential to provide a tremendous boost in the field as we will be able to obtain information on the whole galaxy, not just of their central parts. Several ongoing and projected IFS surveys are studying the star formation histories in nearby galaxies. In this talk, I will provide an overview over the state of the art in the field.

Constraining the initial mass function of unresolved stellar populations

[Conferencia Invitada]

Ignacio Ferreras

The initial mass function represents the distribution of stellar masses at birth. Although it is often considered a universal function, based on studies of nearby resolved populations, the physical conditions of the environment of star forming regions can vary widely from the inefficient, self-regulated star formation in dwarf galaxies to intense runaway bursts in the most massive systems. Over the past few years, the concept of a non-universal IMF has gained support thanks to spectroscopic evidence targeting line strengths that are specially sensitive to the presence of low-mass, main sequence stars. Following a similar trend as other fundamental stellar population properties such as age, metallicity or alpha-enhancement, the IMF of early-type galaxies appears to depend on the central velocity dispersion of the galaxy, towards an excess of low-mass stars in the cores of the most massive systems. I will present a review of the methods used to derive the trends, the uncertainties and systematics behind the modelling, and the consequences of such a scenario to our understanding of galaxy formation and star formation in extreme environments.

Halo shapes, starbursts, and stellar populations: first results from the DAGAL network

Johan Knapen

DAGAL (Detailed Anatomy of GALaxies, www.dagalnetwork.eu) is an EU-funded ITN aimed at studying the structure and evolution of nearby galaxies through a combination of observations at different wavelengths and numerical simulations. It is a collaboration between research groups at the IAC in Tenerife (coordinator), Heidelberg, Marseille, Groningen, Madrid, and Oulu, channelling the efforts of up to 40 researchers. I will give an overview of the main scientific advances made to date within DAGAL, with an emphasis on (1) constraining stellar populations in galaxies using images from the UV to the mid-IR, (2) dynamical constraints on halo shapes, and (3) the influence of interactions on the star formation rate in galaxies.

Towards a new cosmological Milky Way like galaxy simulation in the Gaia Era

Santi Roca-Fábrega

We present a new cosmological Milky Way (MW) like galaxy formation simulation including N-body + hydrodynamics using the adaptive mesh refinement (AMR) code ART (Kravtsov, Klypin & Khokhlov 1997, Kravtsov 2003). The system has been evolved inside a 28 Mpc cosmological box with a spatial resolution of 109 pc. At z=0 the system has an Mvir = 7.33×10^{11} solar masses. A well defined disk is formed inside the dark matter halo and the overall amount of gas and stars is comparable with MW observations. Several non-axisymmetric structures arise out of the disk (spirals, bars and warp) and also a thick disk component. Two missaligned bars that have different origin but rotate at a similar speed are observed. Furthermore, a huge reservoir of hot gas is present at large distances from the disk, embedded in the dark matter halo. Hot gas column densities at different directions have been computed from inside the simulated disk at R=8 kpc. Our preliminar results reveal that the hot gas has a clearly anisotropic distribution and can be a part of the missing baryons in galaxies (Gupta et al. 2012, 2013, Nuza et al. 2014).

Kinematical decomposition of stellar populations in disc galaxies.

Raúl Cacho Martínez

Understanding how different stellar populations evolve in different regions is a key to understand the evolution of galaxies. Traditionally the kinematics and stellar populations in galaxies have been obtained separately and unrelatedly, sometimes ignoring the other one. In this pilot study we simultaneously disentangle the stellar populations (characterizing their age and metallicity) and associate them with the stellar kinematics (velocity and velocity dispersion) in the bulge of three very different disc galaxies using high resolution IFS data. We will show how this technique is a big a step forward toward the understanding of the role of disks and bars in the evolution of galactic bulges, including their build-up, the redistribution of the stellar components, and the evolution of the orbital structure coupled with the star- formation history

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¿Pueden calcularse abundancias químicas basadas en modelos que sean consistentes con las observaciones en regiones HII?

Enrique Pérez Montero

Los espectros de líneas de emisión producidos por el gas ionizado por estrellas calientes suele usarse para la determinación de propiedades físicas y abundancias químicas en objetos que albergan formación estelar hasta un desplazamiento al rojo muy elevado. La precisión de los métodos usados para derivar estas propiedades está limitada por la cantidad de líneas observadas y su señal-ruido, así que cuando ambas son limitadas se recurre a calibraciones establecidas o bien con objetos bien conocidos del Universo Local o bien con modelos de fotoionización. Tradicionalmente, suele encontrarse un desacuerdo entre ambas técnicas. En esta contribución se presenta y describe el método "HII-CHI-mistry" (Pérez-Montero 2014), que utiliza un amplio cubo de modelos que cubre el espacio de parámetros en metalicidad, cociente de oxígeno a nitrógeno y parámetro de ionización y conduce a determinaciones de las mismas completamente consistentes con los medios observacionales basados en la determinación de la temperatura electrónica en objetos suficientemente cercanos o brillantes.

Sesión C6

Reconstructing the formation of galaxies from their SHARDS

[Conferencia Invitada]

Pablo G. Pérez González

I will present the latest results from the SHARDS survey, including: (1) the detailed analysis of the Star Formation History of massive quiescent galaxies at 1.0<z<1.5 and z∼2; (2) the analysis of [OII] selected star-forming galaxies beyond the spectroscopic limit (m=24-27); (3) the characterization of the stellar population in type 2 AGN at intermediate redhifts; and (4) the detection and analysis of Lyman Alpha Emitters at z>4.

Radial gradients in the stellar initial mass function

Ignacio Martín-Navarro

The stellar initial mass function is a fundamental piece in the formation and evolution processes of galaxies, having also deep implications on how we interpret our observations However, whereas resolved stellar systems suggest that it is universal, the integrated light of early-type galaxies shows a tight correlation between the IMF slope and galaxy mass. By studying IMF-sensitive spectral indices we find for the first time that the IMF changes radially within massive early-type galaxies, with an enhanced fraction of low-mass dwarf stars in the central regions but decreasing towards Kroupa-like values at the effective radius. Our finding naturally explains the observed IMF-slope vs galaxy mass correlation, but calls for fundamental revisions of current theories of star formation and galaxy formation models.

A of interacting Lyman alpha sources at z∼5.1 in the ESO/GTC SHARDS Survey

Jose Miguel Rodríguez Espinosa

A search for Lyman-alpha sources in the GTC/SHARDS survey has provided about 70 candidates. Two of these candidates have been confirmed spectroscopically, with the GTC, to be a pair of Lyman alpha emitters, very close redshifts and being very close in the plane of the sky. They form, therefore, part of an interacting of galaxies at z= 5.07. Furthermore, one of the objects is itself interacting/merging with yet another galaxy. Fits to the SEDs of these sources have provided masses, star formation rates, extinction values and ages of their stellar populations. Two different populations have been required, namely, an old population that underwent a burst of star formation about 100 million years ago, and a younger population that is currently undergoing another burst. The younger population is responsible for the Lyman alpha emission that is currently observed. In turn, the respective older populations do ac for the bulk of the masses of those galaxies, which were in fact assembled during those older episodes of star formation. We have therefore found two Lyman alpha emitting sources that are undergoing episodic star formation.

On the formation redshift of low-mass star-forming galaxies at z < 1

Lucía Rodríguez Muñoz

Whether low-mass star-forming galaxies (LMSFGs) are intrinsically young is still nowadays an open question in modern astrophysics. While some models predict an early epoch of formation, previous to the reionization, others predict a gradual formation along the age of the Universe. These discrepancies are linked to our still poor knowledge about the Star Formation Histories (SFHs) of such systems. We present constraints on the formation redshifts of a sample of LMSFGs based on the analysis of their spectral energy distributions, including equivalent widths of emission lines. The sample includes 34 spectroscopically confirmed LMSFGs ($10^{6,5} < M*/MSun < 10^8$), at 0,1 < z spec < 0,8, in the E-CDF-S. Among them, 29 were selected by their photometric stellar mass < 10^8 MSun , 0,3 < zphot < 1,0, and mNB816,AB < 26 mag; the remaining 5 were ed as Blue Compact Dwarfs (BCDs) within the same photometric redshift and magnitude limitations. Admitting that we cannot conclude that these objects did not experiment star formation in the early universe, we predict that LMSFGs form the bulk of their stellar mass in the ∼1 Gyr prior to their observation. Thus, we do not find a common epoch of formation.

Gas accretion from the cosmic web in the local Universe

Jorge Sánchez Almeida

Numerical simulations predict that gas accretion from the cosmic web drives star formation in disks galaxies (e.g., Silk & Mamon 2012, Combes 2013). The process is more important in low mass haloes ($< 10^{12}$ $M_\odot$), therefore, in the early universe when galaxies were low mass, but also in dwarf galaxies of the local universe. The central role played by cosmic gas infall is as clear from numerical simulations as it is obscure to observations. The gas that falls in is predicted to be tenuous, patchy, partly ionized, multi-temperature, and large-scale; therefore, hard to show in a single observation (see, e.g., Sanchez Almeida et al. 2014b). One of the most compelling cases for gas accretion at work in the local universe comes from the extremely metal poor (XMP) galaxies. They show metallicity inhomogeneities associated with star-forming regions, so that large starbursts have lower metallicity that then underlying galaxy (Elmegreen et al. 2012, Sanchez Almeida et al. 2013,2014b). This and other evidence suggest that local XMP are primitive disks sustained by cosmic web gas accretion. In the contribution we will put forward the case posed by XMP galaxies and the constraints that they impose on the mechanisms of cosmological gas accretion. Combes 2013arXiv1309.1603C Elmegreen et al. 2012ApJ...750...95E Sanchez Almeida et al. 2013ApJ...767...74S Sanchez Almeida et al. 2014ApJ...783...45S Sanchez Almeida et al. 2014b, A & ARev, in press Silk & Mamon 2012RAA....12..917S

XQ-100: Perfilando la evolución del hidrógeno neutro a alto z

Rubén Sánchez Ramírez

XQ-100 es una muestra de cien espectros de QSOs con $z_{\rm em} > 3.5$ observados con el espectrógrafo de resolución intermedia X-Shooter (VLT, ESO), cuyas observaciones fueron completadas en febrero de 2014 y serán públicas a finales de dicho año. Usando dichos datos, y con el objetivo de clarificar si hubo una evolución significativa en la densidad de HI en el intervalo de z = [3.5, 4.5], hemos llevado a cabo una búsqueda sistemática de objetos en absorción en el bosque de Lyman con log[N(HI)] >= 19.0 (DLAs y subDLAs) en cada una de las lineas de visión. En esta charla describiré las técnicas usadas para la identificación y el ajuste de perfiles de Voigt a dichos sistemas y discutiré nuestros resultados en el contexto de aquellos derivados mediante otras muestras.

Large-area surveys with the LMT AzTEC/TolTEC

Itziar Aretxaga Méndez

TOlTEC, a multiwavelength millimiter imaging camera that will be in operation in the 50m Large Millimeter Telescope, will open a new parameter space to study the formation and evolution of galaxies and Large Scale Structure, particularly using the population of high-redshift dust-obscured star-forming submillimeter galaxies. We will describe the planned surveys that will be accomplished with this new facility and the comparative advantage over the present surveys we are carrying out with the AzTEC camera coupled to the LMT nowadays.

Sesión C7

Herschel and Planck: surprises in the sub-mm band

[Conferencia Invitada]

Joaquin González-Nuevo Gonzalez

I will review some of the "unexpected" results found by the ESA satellites missions Herschel and Planck by observing the sub-mm band: strong gravitational lensing, weak lensing or magnification bias and proto-clusters. I will discuss the importance of these findings, and prospective developments, at an astrophysical and cosmological level.

Chorros relativistas extragalácticos. Observaciones de alta resolución con Radioastron.

[Conferencia Invitada]

Manel Perucho

In my talk, I will review recent results obtained from ground-based VLBI observations of the jet in the quasar 0836+710. We found evidence to claim that the observed helical structure of the jet responds to a pattern motion, possibly related to a pressure maximum within the jet cross-section driving the helical motion. This result has served as a trigger to observe this jet and others that may show similar effects, e.g., 3C 273, using the space radiotelescope Radioastron combined with ground antennas to achieve unprecedented resolution. With these ongoing observations we expect to test our conclusions regarding the observed structures in extragalactic jets. This is important to understand their propagation to large scales, which is relevant to the evolution of the host galactic and cluster.

Selection of AGN candidates in the GOODS-South Field through SPITZER/MIPS 24 microns variability.

Judit García González

We present a study of galaxies showing mid-infrared variability in data taken in the deepest Spitzer/MIPS 24 μm surveys in the GOODS-South field. We divide the dataset in epochs and subepochs to study the long-term (months-years) and the short-term (days) variability. We use a χ^2-statistics method to select AGN candidates with a probability $> 1\,\%$ that the observed variability is due to statistical errors alone. We find 39 (1.7 % of the parent sample) sources that show long-term variability and 55 (2.2 % of the parent sample) showing short-term variability. We compare our candidates with AGN selected in the X-ray and radio bands, and AGN candidates selected by their IR emission. Approximately, 50 % of the 24 μm variable sources would be identified as AGN with these other methods. Therefore, MIPS 24 μm variability is a new method to identify AGN candidates that allows to detect dust obscured and possibly low luminosity AGN that might be missed by other methods. However, the contribution of the 24 μm variable identified AGN to the general AGN population is small ($<$3 %) in GOODS-South.

Discordant optical and X-ray classification of AGN

Ignacio Ordovás Pascual

According to the standard unified model of Active Galactic Nuclei (AGN), the X-ray and optical classifications of AGN should agree, in the sense that objects without detected broad emission lines in their optical spectra should be obscured in X-rays. However, it is well known that there is a significant fraction of puzzling AGN with discordant optical and X-ray classifications. The physical origin behind these discrepancies remains unclear as well as the validity of the unified model for such AGN.

The main goal of this study has been to determine the properties of these problematic AGN to unveil the origin of the mismatch of their optical and X-ray classifications. In order to provide insight into these issues we have conducted a detailed study of two AGN unabsorbed in X-rays but classified as type 2 (obscured) in the optical band for which a rich set of high quality multiwavelength data is available.

In addition to high quality X-ray spectroscopic observations, that we used to determine both the AGN intrinsic luminosities and absorption, we have a VLT/XSHOOTER UV-to-near-IR high resolution spectrum for each object. We have used the XSHOOTER observations to extract both, the spectra of the AGN and their host galaxies. With these spectra, it is possible to measure both the relative contribution of the AGN and their hosts at UV, optical and near-IR wavelengths as well as the reddening of the central engines. Thanks to the high quality data available for these two intriguing sources, the preliminary results for one of them appears to be that the AGN UV/optical emission is completely diluted by the starlight of the host galaxy.

The link between nuclear star formation and the prevalence of optical nuclear activity

José Sabater Montes

In the last SEA meeting, we used a sample of more that 250,000 galaxies drawn from the Sloan Digital Sky Survey to show what was the effect of the environment and the interactions on the triggering of different types of nuclear activity. We found how these environmental parameters affect in distinct ways the AGN depending on the type of accretion mode. Although the mass is confirmed to be the main driving factor for the triggering of an AGN, especially for radio AGN, the presence of a plentiful supply of gas seems to be a requirement to observe an optical AGN and one-of-one interactions increase the prevalence of all types of AGN. In this talk we present a new study that takes into account the link between the star formation in the nuclear region of a galaxy and the prevalence of high excitation nuclear activity (traced by optical spectra). Our preliminary results show that, while the environment of a galaxy and one-on-one interactions play a fundamental role on the fueling of gas into the central region of the galaxy, once the gas is there (traced by the central specific star formation) they do not seem to play any additional role on the triggering of nuclear activity.

The dependence of the observed dual-AGN fraction on the orbital parameters and halo spin of galaxy mergers

José María Solanes Majúa

massive set of near 400 high-resolution collisionless major-merger simulations is being analyzed to investigate the dependence of several important properties of these systems on both the initial orbital configuration of the interacting galaxies and the spin of their dark halos. Our simulations follow the evolution of binary galaxy mergers in bound orbits using self-consistent N-body models of late- and early-type galaxies, composed of dark matter and stars, with mass ratios of 1:1 and 1:3, different initial orientations, and with values of the orbital and spin parameters consistent with the predictions of the currently favored cosmological model. Here we present results concerning the triggering of AGN activity by the dynamics of mergers. By including constraints that mimic observational limitations in the simultaneous detection of two AGNs, we have determined when dual AGN activity is expected to occur in merging galaxies. Preliminary calculations indicate that while the duration of the mergers in general depends strongly on the moduli and relative orientations of the orbital and internal angular momenta of the progenitor galaxies, the fraction of the merger-time in which strong dual AGN activity can be detected through imaging and spectroscopy is relatively insensitive, and always limited to a few percent in agreement with observational samples.

The star formation history of X-ray selected AGN in SHARDS

Pilar Esquej Alonso

The similarity in the anti-hierarchical evolution of both star formation rate and active galactic nuclei (AGN) activity at z<2 reveals that the assembly and evolution of galaxies and those of the supermassive black holes (SMBHs) at their centres are intimately connected. In that cosmological context, accretion onto SMBHs is believed to play an important role, where models of the origin and evolution of galaxies must act for black hole growth and feedback in a fully self-consistent manner. Indeed, AGN are the main suspects for the (early) suppression (quenching) of the star formation (SF) in the most massive galaxies. We have analysed the X-ray ed AGN from the Survey for High-z Absorption Red and Dead Sources (SHARDS) using multiwavelength broad-band photometry (from FUV to FIR). This allows us to derive and fit their SEDs using several stellar population models, and to characterise their star formation histories (SFHs) with unprecedented accuracy. Our detailed study of the stellar populations in X-ray ed AGN hosts will shed new light into the processes governing the star formation quenching. In addition, we used HST/WFC3 grism spectra in the NIR (G141 and G102) to measure their emission lines, and to test the effectiveness of several diagnostics for identifying AGN up to redshift ∼2.

Sesión C8

Molecular Outflows and Feedback in Active Galaxies

[Conferencia Invitada]

Santiago García Burillo

Molecular outflows are being discovered in a growing number of nearby active galaxies including ultra luminous infrared galaxies (ULIRGs), radio galaxies and Seyferts. Radiative and mechanical feedback is often invoked as a mechanism of self-regulation in galaxy evolution. Observations of nearby AGNs, where the distribution and kinematics of molecular gas can be spatially resolved, are thus instrumental if we are to understand if and how gas accretion can self-regulate in galaxies. We have investigated the fueling and the feedback of star formation and nuclear activity in NGC 1068, a nearby (D = 14 Mpc) Seyfert 2 barred galaxy, by analyzing the distribution and kinematics of the molecular gas in the disk derived from the observation of a set of dense gas tracers using the ALMA interferometer. These observations have revealed a massive (Mmol=2.7x10^7 Msun) outflow in all molecular tracers. The molecular outflow is likely launched when the ionization cone of the narrow line region sweeps the nuclear disk. The outflow rate estimated in the CND, dM/dt=63Msun/yr, is an order of magnitude higher than the star formation rate at these radii, confirming that the outflow is AGN-driven. The power of the AGN is able to account for the estimated momentum and kinetic luminosity of the outflow. The CND mass load rate of the CND outflow implies a very short gas depletion time scale of only 1 Myr. These results will be discussed in the context of the current understanding of the AGN fueling/feedback cycle in galaxies.

Testing the AGN Unification Model in the Infrared

[Conferencia Invitada]

Cristina Ramos Almeida

Unification schemes of AGN account for a variety of observational differences in terms of viewing geometry only. However, from the fitting of high spatial resolution infrared data with clumpy torus models, it has been hinted that the immediate dusty surroundings of Type-1 and 2 Seyfert nuclei might be intrinsically different in terms of covering factor (torus width and number of clouds). Indeed, these torus covering factors also vary among objects belonging to the same group, in contradiction with simplest unification. Interestingly, these intrinsic differences in Seyfert tori could explain, for example, the lack of broad optical lines in the polarized spectra of about half of the brightest Seyfert 2 galaxies. On the other hand, recent interferometry studies have revealed that in at least two Type-2 Seyfert galaxies, the mid-infrared emission is elongated in the polar direction. These results are difficult to reconcile with unified models, which claim that the bulk of the mid-infrared emission comes from the torus. In this review talk I will summarize the latest results on high angular resolution infrared studies of AGN, which constitute a crucial test for AGN unification.

The Core+ mission

José Alberto Rubiño Martín

CORE+ will be proposed to ESA during 2014 as a medium-class mission for investigating within the framework of the ESA Cosmic Vision program a set of important scientific questions that require high sensitivity, full-sky observations of the sky emission at wavelengths ranging from millimeter-wave to the far-infrared. CORE+'s main objective is to explore the distant universe, probing cosmic history from very early times until now as well as the structures, distribution of matter, and velocity flows throughout our Hubble volume. CORE+ will survey the full sky in a large number of frequency bands in both intensity and polarization.

The hidden Universe

Ignacio Trujillo Cabrera

There is a huge amount of astrophysical phenomena that remain still barely studied due to the lack of large, multiwavelength and deep (μ_V>28 mag/arcsec^2) optical surveys. These unexplored astrophysical events are those which are very subtle and extent over large areas of the sky. For instance, little is known about the connection of the so-called "optical cirrus" or diffuse galactic light of our Galaxy and the dust filamentary structure observed in the far infrared full sky surveys. Also, only a small number of nearby galaxies have been probed with enough depth to explore the cosmological predictions about the formation of the faint stellar haloes, tidal streams and ultra-faint satellites surrounding these objects. Similarly, only a handful of nearby galaxy clusters have been observed with enough depth to start understanding the Intra-Cluster Light (ICL) expected from a hierarchical assembly of these cosmic structures. All these astrophysical events are about to be unveiled by new astronomical facilities. I will discuss what is the current situation and the important role that surveys the Stripe 82 Legacy Survey and the GTC telescope can play in this fascinating adventure.

High redshift galaxies in the ALHAMBRA data

Kerttu Viironen

We present the selection methodology and number counts of high redshift (z∼2-5) galaxies in the Advanced Large, Homogeneous Area Medium Band Redshift Astronomical Survey (ALHAMBRA) data. ALHAMBRA has mapped 4 deg^2 of the Northern sky with a filter system which covers the optical range from 3,500 A to 9,700 A with 20 contiguous, equal width medium band filters, plus the three standard broad bands, JHK, in the NIR. The photometric system has been specifically designed to optimize photometric redshift depth and accuracy, and the photometric redshift information is offered for each ALHAMBRA object.

Traditionally the most effective way of pinpointing high redshift galaxies at the optical domain has been the so called Lyman Break Galaxy (LBG) selection, where these galaxies are identified based on their broad-band colors measuring the drop in brightness due to the Lyman break and/or Lyman forest, completed with the Lyman-a emitter selection capable of detecting objects too faint in their continuum to be selected as LBGs.

We use directly the redshift probability distribution functions (PDFs) to select a sample of ALHAMBRA high-redshift galaxies. We compare our selected sample with traditional LBG color-color selections and uncover biases in the latter. We derive the galaxy UV number counts at various redshift bins from z∼2 to z∼5 based on the PDF selected sample. Finally, we discuss that for this purpose actually a sample selection is not needed, but the number counts can be derived directly from the PDF analysis.

The techniques developed here will be directly applied in the future to analyze the data from the shallower, but huge area (8,500 deg^2), Javalambre Photometric Local Universe Survey (J-PLUS) and Javalambre-PAU Astrophysical Survey (J-PAS) data.

GLACE: freezing the environment of line-emitting cluster galaxies

Irene Pintos Castro

GLACE is performing a survey of emission-line galaxies in clusters with the main aim of studying the effect of the environment in the star formation activity. The innovation of this work is the use of tunable filters in scan mode to obtain low resolution spectra of the desired emission lines. The main advantages of this method are that: (i) it is not necessary to previously know the position and membership of the galaxies; (ii) the flux calibration is reasonably simple and trustful; and (iii) the exposure time to reach faint line fluxes (around $2 \times 10^{-}17$ erg/s/cm^2) is very sensible, specially compared with MOS exposure times. Although the survey is in its initial stage, we have analysed two line datasets in two different clusters: Halpha in Cl0024 at z=0.4 and [OII] in RXJ1257 at z=0.9. The first is a well known intermediate redshift cluster that has been used to test the observational strategy. We reached the planned SFRs and we could deblend the [NII] component, thus being able to discriminate the AGN population from the star-forming (SF) galaxies. Also the spectral resolution is allowing us to exploit the data for dynamical analysis. The second target is a recently discovered cluster (Ulmer+09), that we have studied regarding its FIR emission (Pintos-Castro+13). The [OII] observations are revealing a fainter and less massive sample, when compared with the FIR emitters, showing two different populations of SF galaxies. The SF cluster members have shown that no evident correlation exist between the SFR (or sSFR) and the environment. Nevertheless, we have found that both samples, FIR- and [OII]-emitters, are concentrated in the areas of intermediate density. We are further exploring the morphological properties of the cluster galaxies using the galSVM code. This work is part of a PhD thesis that will be defended this year.

Deconstructing galaxy bulges using CALIFA

Jairo Mendez Abreu

In this talk I will present the first results of an ambitious project aimed to accurately determine the demography of bulges in the nearby Universe using the CALIFA survey. It is now well settled that two types of bulges can be distinguished based on their formation histories: classical and disk-like. From an observational standpoint, this classification is often not so clear and the actual contribution of each bulge type to the global mass budget of the galaxies is still not clear. Here I will present a comprehensive study attempting to quantify the demography of bulges in the nearby Universe improving previous classifications in two major points: i) we have made use of the Integral Field Spectroscopic data-set provided by the CALIFA survey, the largest and most comprehensive IFS survey of galaxies to date. CALIFA is aimed at obtaining spatially resolved spectra for 600 local ($0.005 < z < 0.03$) galaxies using two different resolutions (R$\sim$850 and R$\sim$1650). The combination of both setups allows us to measure reliable stellar (and gas) kinematic maps together with spatially resolved stellar populations for each bulge. ii) Based on this unprecedented wealth of data, we have used a multidisciplinary approach to characterise the photometric, kinematic and stellar population properties of the CALIFA bulges to safely determine their corresponding type. The first results of this project will be presented and their implication discussed in the framework of bulge formation and evolution.

Sesión C9

Carbon abundances and radial gradients in nearby spiral galaxies

Laura Toribio San Cipriano

HII regions are indicators of the current chemical composition of the interstellar medium. This information is essential to understand the nuclear processes in stellar interiors and the chemical evolution of galaxies. In this work, we present results of the study of HII regions in several nearby spiral galaxies: M31, M33, NGC300 and M101, in to explore their C/H and C/O radial abundance gradients. Carbon (C) is the second most abundant heavy-element in the Universe after oxygen. It is an important source of opacity and energy production in stars as well as major constituent of interstellar dust and organic molecules. The main sources of C-enrichment in galaxies are still a matter of debate and this makes necessary to obtain precise C abundance determinations from HII regions – combined with chemical evolution models– to disentangle the origin and evolution of C in the disk of spiral galaxies. There are few studies about its content in extragalactic HII regions where C abundances are mainly derived from UV collisionally excited lines (CELs) of CIII] 1907+09A, which intensity is strongly affected by interstellar reddening and uncertainties in the electron temperature. Our has been pioneer measuring C abundances with an alternative method based on the faint CII 4267 recombination line (RL). From very deep spectra taken with VLT, GTC, KECK and SUBARU telescopes, we have obtained C/H, O/H and C/O ratios from RLs in several HII regions of each galaxy. Our main aim is to investigate the slope of the C/H radial gradient compared with that of O/H to check previous results found by our for the Milky Way and explore possible slope changes across the galactic disks and its dependence with the average metallicity and the mass of the galaxy.

Non-homology and mass discrepancies in massive compact galaxies

Luis Peralta de Arriba

We address the problem that dynamical masses of high-redshift massive galaxies, derived using virial scaling, often come out lower than stellar masses inferred from population fitting to multi-band photometry. We compare dynamical and stellar masses for various samples spanning ranges of mass, compactness and redshift, including the SDSS. The discrepancy between dynamical and stellar masses occurs both at low and high redshifts, and systematically increases with galaxy compactness. Because it is unlikely that stellar masses show systematic errors with galaxy compactness, the correlation of mass discrepancy with compactness points to errors in the dynamical mass estimates which assume homology with massive, nearby ellipticals. We quantify the deviations from homology and propose specific non-virial scaling of dynamical mass with effective radius and velocity dispersion.

X-ray spectral variability of LINERs selected from the Palomar sample

Lorena Hernández García

Although variability is a general property of active galactic nuclei (AGN), it is not yet clear for low luminosity AGN, and in particular for low ionisation nuclear emission line region (LINER) nuclei. Variations have been found for some objects, but the main driver of these changes is still an open question. The main purpose of this work is to investigate the X-ray variability in LINERs, including the main driver of such variations, and to search for eventual differences between type 1 and 2 objects. We use the 18 LINERs in the Palomar sample with data retrieved from Chandra and/or XMM-Newton archives corresponding to observations gathered at different epochs. All the spectra for the same object are simultaneously fitted to study long term variations. The nature of the variability patterns are studied allowing different parameters to vary during the spectral fit. Whenever possible, short term variations and UV variability are studied. Short term variations ($\sim$days) are not reported in X-rays. Long term X-ray variations ($\sim$months) are found in about half of the LINERs. At UV frequencies, most of the AGN candidates with available data are variable. The percentage of variable objects at UV and/or X-ray frequencies amounts to 77 %. Therefore, long timescale variability is very common in LINERs. The main driver of the X-ray variations is related to changes in the nuclear power, while changes on absorptions are found only in one case. We do not find any difference between type 1 and 2 LINERs, nor in the number of variable cases nor in the nature of the variability pattern. According to their BH masses, accretion rates and variability timescales, LINERs behave as more powerful AGN at X-rays. Eventual UV variations of some type 2 LINERs may be in agreement with the torus dissapearence at low luminosities.

Trazas de coevolución en QSOs a alto redshift seleccionados en rayos X y brillantes en submilimetricas

Anuar Khan Ali Franco

We present a detailed study of a selected sample of 5 X -ray bright QSOs and submillimeter their environments at z$\sim$2, where the highest rates of star formation and further growth of black holes to occur. In addition they reside in overdensities submillimeter galaxies, at least in one case, seem to be associated to the central QSO. Therefore, this sample is a wonderful laboratory to investigate the co-evolution of star formation and AGN. We present here the analysis of the spectral energy distributions (SED) of the 5 QSOs, including new data from Herschel PACS and SPIRE. Both AGN components (direct and reprocessed) and like Star Formation (SF) are needed to model its SED. From the SED and their UV-optical spectra we have estimated the mass of the black hole (BH , MBH = 10^9 - 10^{10} $M_\odot$) and bolometric luminosities of AGN (Lbol = (0.8-20) * 10^{13} $L_\odot$). Their BH masses are very close to the maximum mass observed locally, so it can not grow much more. These objects show very high luminosities in the far infrared range (at the H / ULIRG) and very high rates of SF (SFR = 400-1400 $M_\odot$ / yr). Known their current SFR and their BH masses, we deduce that their host galaxies must be already very massive, or would not have time to get to the local relation between BH mass and bulge. Finally, we found evidence of a possible correlation between the column density of ionized gas detected in X -rays (NHion) and SFR, which would provide a link between AGN and SF processes. We also present preliminary results on the properties of the sources in their environments and their relationship with the QSOs.

Tracing the neutral gas outflows in [U]LIRGs via optical IFS of the NaDI feature

Sara Cazzoli

This work is aimed at extending the census of the 2D mapping of neutral winds in local [U]LIRGs, with special emphasis in the less explored LIRGs range. We used high-resolution optical VLT VIMOS-IFU observations, to obtain the kinematics and the spatial distribution of the absorbing neutral gas via NaD 5890, 5896Å. In the first part of this presentation we describe the results recently obtained for IRAS F11506-3851 (Cazzoli et al. 2014), for which we have detected the presence for a strong neutral gas outflow. The analysis of the geometry of the outflow and the 2D ongoing SF, indicates a large mass loading factor associated to the nuclear region, and suggests that we are witnessing quenching due to SNe feedback in IRAS F11506-3851. The second part is devoted to comment on preliminary results for the whole sample analyzed (38 local [U]LIRGs, Cazzoli et al. in prep.). These in general indicate complex velocity fields and velocity dispersion maps associated to the ISM neutral gas, some of them indicating outflow features. Their main properties are discussed and compared with their ionized gas counterparts.

Pósters

Red galaxies only detected by IRAC: a new population of massive galaxies at z>3

Belén Alcalde

We present our analysis of the deepest near-infrared (F160W/H-band from CANDELS) and mid-infrared (IRAC from GOODS) data taken by HST and Spitzer (in the GOODS fields) to select sources only detected by IRAC and with no CANDELS counterpart (i.e., H>27, [3.6]<∼25). These IRAC-only sources (IOS) constitute a previously unknown population of dust-enshrouded and/or quiescent massive red galaxies at z>3. Using the wealth of data available in the GOODS field, especially the SHARDS data, we characterize the properties of this population of IOS and discuss on its relevance for previous estimations of the stellar mass function at z=3-5, and the evolution of massive galaxies in the early Universe.

An IFS survey of local luminous star forming galaxies: Ionized gas outflows and global ISM kinematics

Santiago Arribas

We study the kinematics of ionized gas outflows and ambient ISM of a large and representative sample of local U/LIRGs (59 systems, 75 individual galaxies), on the basis of IFS observations obtained with VIMOS/VLT and INTEGRAL/WHT. The sample covers a wide range in SFR and SF density, encompasses the different interaction/merger phases, and it includes a significant fraction of AGNs. Therefore, it allows us to discuss how the kinematics of the ISM and outflows relate to different physical processes, as well as to analyze the observed trends in the context of recently published detailed simulations. The kinematic properties of local U/LIRGs are also compared in detail with those inferred from IFS-based studies for high-z galaxies of similar SFRs. Finally we analyse the potential of the IFS capabilities of NIRSpec/JWST and HARMONI/E-ELT for this type of studies.

Differences in central (gaseous and stellar) metallicities between barred and unbarred galaxies.

Raúl Cacho Martínez

The contribution of secular processes to galaxy evolution is a hot topic under an intense debate. Numerical simulations predict that bars are main drivers of gas inflows, which enhance central star formation and change the gaseous-phase and stellar-phase metallicities. This mechanism is crucial to understand galaxy evolution and how metals distribute in our own Galaxy. Currently only a few studies compare the central gaseous metallicities, with contradictory results. Even less studies have been done on the stellar metallicities, and none of them compares the gaseous and stellar metallicities simultaneously. In this work we present a comparison between gas-phase and stellar-phase central metallicities in a sample of barred and unbarred galaxies from SDSS. These results are helping us to understand the role of bars in galaxy evolution.

A spectroscopy study of young massive stars in metal-poor galaxies: beyond the SMC limit

Inés Camacho Iñesta

Massive stars are crucial to understand the chemical and dynamical evolution of the Universe, but our knowledge of their physics at sub-SMC metallicities, dominant in the early Universe, is still in its infancy, due to the lack of proper observations and analyses.

We have started a programme to observe stars in nearby galaxies with metallicities below that of the SMC. For this purpose, we have developed photometric criteria which allowed us to set a list of blue massive candidates in Sextans A, a galaxy with a metallicity of [Fe/H]= -1.85. We have secured OSIRIS@GTC spectra of these candidates and have discovered six O-type and seven early-B stars, which constitutes the first atlas of blue massive stars in this galaxy. Using FASTWIND model atmospheres, we have obtained the main physical parameters of the O-type stars (effective temperature, gravity, wind strength and He content).This is the lowest metallicity for which an observational temperature scale of O-stars has been stablished.

This work is part of the PhD of I. Camacho aimed at the identification, classification and analysis of massive OB stars in low metallicity galaxies.

SFR at multiple physical scales using CALIFA and TYPHOON data

Cristina Catalán Torrecilla

The measurement of the star formation rate (SFR) is crucial for understanding the birth and evolution of the galaxies (Kennicutt 1998) as it provides information on the amount of gas in galaxies and the efficient in the formation of stars inside them. In the first part of this work, we make use of a large and well-characterized sample of 380 nearby galaxies from the CALIFA survey that span the entire color-magnitude diagram. We derived integrated extinction-corrected Halpha-based SFRs from the analysis of CALIFA IFS in order to compare them with single and hybrids tracers at other wavelengths found in the literature (Calzetti 2012), namely the integrated UV-observed + 22um, UV-observed + TIR, Halpha-observed + 22um, or Halpha-observed + TIR. Then, we provide updates SFRs tracers using our integrated extinction-corrected Halpha SFR as a reference, thanks to the quality of our attenuation correction via Balmer decrement. Only once these effects are properly accounted for we can explore the spatial distribution of the star formation. We obtain preliminary results from the spatially-resolved analysis of the contribution of disks to the total SFR in the Local Universe, as a local benchmark for future studies of disks at high redshift. The use of the 2D spectroscopic data is critical to properly determine the Halpha luminosity function and SFR density in the Local Universe per galaxy components, the ultimate goal of this project. To analyze the role that bigger structures such as bars, nuclei or rings, play in the spatial distribution and amount of star formation we use TYPHOON observations, a new methodology for producing highly resolved spectrophotometric data cubes in the optical range. Specifically, we are working with the nearby galaxy M83 (PSF=25 pc compared with a mean PSF of 1kpc for the CALIFA galaxies).

A search of neutral gas outflows in nearby [U]LIRGs via optical IFS of the NaD feature

Sara Cazzoli

This work is aimed at extending the census of the 2D mapping of neutral winds in local [U]LIRGs, with special emphasis in the less explored LIRGs range. We used high-resolution optical VLT VIMOS-IFU observations, to obtain the kinematics and the spatial distribution of the absorbing neutral gas via NaD 5890, 5896Å. In the first part of this presentation we describe the results recently obtained for IRAS F11506-3851 (Cazzoli et al. 2014), for which we have detected the presence for a strong neutral gas outflow. The analysis of the geometry of the outflow and the 2D ongoing SF, indicates a large mass loading factor associated to the nuclear region, and suggests that we are witnessing quenching due to SNe feedback in IRAS F11506-3851. The second part is devoted to comment on preliminary results for the whole sample analyzed (38 local [U]LIRGs, Cazzoli et al. in prep.). These in general indicate complex velocity fields and velocity dispersion maps associated to the ISM neutral gas, some of them indicating outflow features. Their main properties are discussed and compared with their ionized gas counterparts.

The ALHAMBRA quasar catalog

Julio Jonás Chaves Montero

We present the construction and properties of a quasar catalogue from the ALHAMBRA photometric survey. The ALHAMBRA (Advance Large Homogeneous Area Medium Band Redshift Astronomical) survey has observed 3 deg^2 using 20 contiguous medium-band filters covering the optical range and 3 filters (J, H and Ks) covering the infrared range. We display the technical steps that lead to the identification and characterization of the quasar sample: quasars are defined to be point-sources, and are identified using the public photo-z code LePhare. The code had been tested and its parameters tuned using a sample of spectroscopically identified quasars in the ALHAMBRA fields, for which we achieved an accuracy of sigma(NMAD)=0.012 and a 12.5 % of outliers. We further tested the code using a galaxy sample with known spectroscopic redshifts and ALHAMBRA photometry to study the contamination of galaxies in our quasar catalogue. Our work shows that the medium band photometry of the ALHAMBRA survey allows an accurate quasar identification without additional information X-ray emission or variability. We expect future surveys J-PAS (54 narrow-band optical filters) to further improve the accuracy of the photo-z and significantly reduce the number of outliers.

A new code to explore the stellar content of galaxies in multi-filter photometric surveys

Luis Alberto Díaz García

In the last years, a growing number of multi-filter surveys have been defined worldwide with the goal of advancing our knowledge in many subjects of Astrophysics and Cosmology (e.g. ALHAMBRA, SHARDS, J-PLUS, J-PAS, PAU, COMBO-17, or COSMOS). These surveys, in most cases composed by tenths of contiguous bands that provide low-resolution spectral energy distributions (SED), are half way between photometry and spectroscopy, with the advantage of reaching typically several magnitudes deeper than classical spectroscopic surveys and providing a non-biased sample selection. In addition, these photo-spectra, despite their low-resolution, contain meaningful information on the stellar content of galaxies since, by construction, have a very reliable flux calibration that is not affected by typical systematics of classical spectroscopy. Therefore, this kind of surveys open a new and unprecedented path to study the evolution and formation of galaxies at higher redshifts than any previous spectroscopic study. Unfortunately, even though there are several tools designed to analyse the stellar content of galaxies out from spectroscopic datasets, there is no code specifically devoted to analyse the data of these kind of multi-filter surveys, taking into account the many particularities that photometry has in contrast with spectroscopy. In this poster we present a specific code devoted to study the stellar content of quiescent galaxies in multi-filter surveys. The code is based on photo-spectral fitting techniques using a mixture of SSP models as templates, deriving luminosity/mass weighted ages and metallicities, extinctions, masses and redshifts. The code has been tested with a sample of ALHAMBRA galaxies in common with other surveys (SDSS and COSMOS), allowing us to confront the stellar population parameters obtained from our code and the results obtained from similar spectroscopic studies. Our results are in very good agreement with the mentioned spectroscopic results, showing the reliability and capabilities of our technique.

Building an unbiased sample of dead galaxies based on the MG(UV) absorption index

Helena Domínguez Sánchez

Samples of 'red & dead' galaxies selected through traditional techniques usually suffer from contamination by strongly dust-extincted sources. We have used GTC/OSIRIS data from the SHARDS project on GOODS-N to define an unbiased sample of 'red & dead' massive galaxies on the basis of the Mg(UV) absorption index, known to be a robust proxy of the characteristic age of stellar populations. We have compared this method with other selection procedures to characterize it, such as traditional color-color or color-magnitude diagrams. We analyse whether the method can be extended towards low mass systems through stacking techniques.

The SFH of read and dead galaxies at z=1-1.5

Helena Domínguez Sánchez

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Espectroscopía Multiobjeto con OSIRIS a Multiplex=250

Alberto Fernández Soto

Combining one of OSIRIS grisms, an order sorter filter, and sky subtraction techniques similar to those used in nod-and-shuffle modes at other facilities, we have been able to fit ∼250 microslits on a single OSIRIS MOS mask to observe objects in a z∼0.25 massive galaxy cluster. We performed a target preselection based on multicolour data and chose two wavelength windows, one including the CaII (H,K) doublet, and the other one including the [OIII] (4959,5007) emission doublet, in order to maximize the redshift identification rate. We present the preliminary results of this observing mode, tried at GTC for the first time.

Physical properties of low-mass star-forming galaxies at intermediate redshifts

Jesus Gallego Maestro

Whether low-mass star-forming galaxies (LMSFGs) are intrinsically young is still nowadays an open question in modern astrophysics. Some models predict an early epoch of formation, previous to the reionization. Others predict a gradual formation along the age of the Universe. We present the physical properties of 37 spectroscopically confirmed LMSFGs with stellar masses $10^{6,5} < M/M_{\odot} < 10^{8}$ located at $0.1 <$ zspec < 1 in the E-CDF-S. Among them, 29 were ed for presenting photometric stellar mass $< 10^{8} M_{\odot}$ and 8 were ed as Blue Compact Dwarfs (BCDs). We only considered galaxies also qualifying $0.1 <$ zphot < 1.0 and mNB816,AB < 26 mag. For comparison, we use 53 more massive spectroscopically confirmed galaxies ($10^{8} < M/M_{\odot} < 10^{9,5}$) ed with the same criteria in a similar redshift range. A summary of the spectroscopic and mophological behavior of this sample is presented.

The nuclear and extended infrared emission of the Seyfert galaxy NGC 2992

Ismael García Bernete

We present subarcsecond resolution infrared (IR) imaging and mid-IR (MIR) spectroscopic observations of the Seyfert 1.9 galaxy NGC 2992. The data were obtained using the Hubble Space Telescope, the Gemini North Observatory and the Gran Telescopio Canarias (GTC). In the N-band, the galaxy was observed with a spatial resolution of 0.32 arcsec (55 pc) and the imaging data reveal extended faint emission extending out to about 3 kpc, with a surface brightness of 4.8 mJy/arcsec^2. In addition, we report arcsecond resolution MIR and far-IR (FIR) imaging of the complete ARP 245 interacting system (constituted by NGC 2992, NGC 2993 and ARP 245 North), obtained with the Spitzer Space Telescope and the Herschel Space Observatory. For NGC 2992, we extracted Spitzer MIR and Herschel FIR nuclear fluxes using different methods and compared them with the subarcsecond resolution data. We find that we can only recover the high angular resolution information at 20-25 micron, where emission from the active galactic nucleus (AGN) dominates. We studied in detail the properties of the innermost 100 pc of NGC 2992, by comparing the 7.5-13 microns GTC/CanariCam nuclear spectrum and the 5-30 microns Spitzer/IRS spectrum. We fitted the nuclear IR spectral energy distribution (SED) and the GTC/Canaricam nuclear spectrum of NGC 2992 with clumpy torus models and we use the best-fitting torus model to decompose the Spitzer/IRS spectrum in AGN and starburst (SB) components, using different SB templates. We find that, while at shorter wavelengths the SB component dominates the MIR emission, with 75 % contribution at 6 microns, the AGN component reaches 90 % at 20 microns. Finally, we reproduced the dust emission of the ARP 245 system using modified black bodies, from which we derived dust temperatures, star formation rates and dust masses.

A multi-wavelength view of the central kiloparsec region in NGC1614

Rubén Herrero Illana

The Luminous Infrared Galaxy NGC 1614 hosts a prominent circumnuclear ring of star formation. However, the nature of the dominant emitting mechanism in its central ∼100 pc is still under debate. We present sub-arcsecond angular resolution radio, mid-infrared, Paα, optical, and X-ray observations of NGC 1614, aimed at studying in detail both the circumnuclear ring and the nuclear region. The 8.4 GHz continuum emission traced by the Very Large Array (VLA) and the Gemini/T-ReCS 8.7 micron emission, as well as the Paα line emission, show remarkable morphological similarities within the star-forming ring, suggesting that the underlying emission mechanisms are tightly related. We used an HST/NICMOS Paα map of similar resolution to our radio maps to disentangle the thermal free- free and non-thermal synchrotron radio emission, from which we obtained the intrinsic synchrotron power-law for each individual region within the central kpc of NGC 1614. The radio ring surrounds a relatively faint, steep-spectrum source at the very center of the galaxy, suggesting that the central source is not powered by an AGN, but rather by a compact (r $<$ 90 pc) starburst. Chandra X-ray data also show that the central kpc region is dominated by starburst activity, without requiring the existence of an AGN. We also used publicly available infrared data to model-fit the spectral energy distribution of both the starburst ring and a putative AGN in NGC 1614. In summary, we conclude that there is no need to invoke an AGN to explain the observed bolometric properties of the galaxy.

Evolución de discos y bulbos a alto z en el sondeo CANDELS

Berta Margalef Bentabol

En el universo cercano, las galaxias presentan gran variedad de características morfológicas, pudiendo distinguirse entre aquellas dominadas por disco y las dominadas por bulbo, con diversas subcategorías en cada clase. Sin embargo, el origen de ambos tipos de galaxias y su conexión evolutiva es todavía una cuestión abierta. Este trabajo pretende investigar la historia de la formación de estas estructuras dominantes (discos y bulbos) y trazar su evolución hasta el universo local. Para abordar esta cuestión hemos realizado una descomposición en dos dimensiones de los perfiles de luz de galaxias del sondeo CANDELS. La muestra utilizada está formada por galaxias con masas mayores que 10^{10} masas solares y desplazamientos al rojo de entre 1 y 3. Mediante inspección visual de todas las galaxias y el test estadístico F de Fisher, hemos determinado qué galaxias son discos o esferoides puros y cuáles son una combinación de disco y bulbo. Asimismo, hemos investigado la relación tamaño-masa de los bulbos y los discos, y comparado con las relaciones locales. Presentaremos cómo algunas propiedades como B/T, densidades o color evolucionan con el desplazamiento al rojo, y mostraremos cómo varían entre discos y bulbos.

Combing PPAk Integral Field Spectroscopy and PACS-SPIRE Herschel data: a multi-wavelength study of dust properties in spiral disks.

Raffaella Anna Marino

The study of the distribution and physical properties (e.g. temperature and composition) of interstellar dust in galaxies and its relation with the chemical composition of the ionized gas can provide important clues on the chemical evolution of the ISM in galaxies. Here we present the study of the 2D-dust extinction pattern of the galaxies NGC5668, NGC3395 and NGC3396 obtained from the combined analysis of the optical bidimensional spectroscopy data of the CAHA 3.5m telescope PPak Integral Field Unit with the far-infrared imaging data from the SPIRE instrument Herschel Galaxy Reference Survey.

Star Formation History of the Magellanic Clouds: a survey program with DECam@4mCTIO

Lara Monteagudo Narvión

Various recent discoveries have drastically altered our view of the Magellanic Clouds (MCs), the nearest interacting galaxy system formed by a low mass spiral and a dwarf irregular galaxy. The best evidence is now that they are on first infall into the Milky Way, that their stellar populations extend much further than previously thought, and that they display important galactocentric gradients. Several facts indicate that low mass spirals may not fit in the general framework of massive spiral galaxy formation. Thus, understanding the process of their formation and evolution is fundamental to understand the general process of galaxy formation. Because the MCs are so close, they are key to study the formation and evolution of galaxies because they offer us the opportunity to derive their evolutionary histories, including the characteristics of the first events of star formation. This is thanks to the fact that, for them, we can obtain photometry and spectroscopy of individual stars, and use the theory of stellar evolution to calculate ages that will allow us to obtain the star formation and chemical enrichment histories in great detail. We are involved in a large survey of the MCs, called SMASH (Survey Magellanic Stellar History). It is a NOAO community DECam survey of the Clouds mapping 480 deg2 (distributed over $\sim$ 2400 deg2 at $\sim$ 20 % filling factor) to 24th mag griz (and u$\sim$23). SMASH will: (1) map the stellar periphery of the Clouds with old main sequence turnoff stars to a surface brightness limit of 35mag/arcsec^2,(2) identify the stellar component of the Magellanic Stream and Leading Arm for the first time, if they exist, and (3) derive spatially-resolved star formation histories covering all ages out to large radius from the Cloud centers. Our group at the IAC is the main responsible for objective (3).

Luminosity calibration in the Large Magellanic Cloud with Gaia

Max Palmer

We explore the capabilities of Gaia in determining a precise and unbiased estimate of the distance and structure of the LMC. Although the relative precision of Gaia parallaxes in the LMC will be poor, the quantity of stars allows estimation of the global distance to the LMC through the use of statistical methods. We present a Bayesian method for distance determination utilising Gaia parallax information, tested using detailed simulations of Gaia observations from the Gaia Object Generator. The method is extended to calibration of the period-luminosity relation of the LMC Cepheid population.

Discos estelares antitruncados en galaxias S0 formadas mediante fusiones mayores

Pablo G. Pérez González

Estudios recientes muestran que las galaxias lenticulares (S0s) muestran una mayor frecuencia de discos estelares antitruncados (perfiles de brillo superficial Tipo-III) que las galaxias de otros tipos morfológicos. Las fusiones mayores han sido usualmente consideradas como procesos demasiado violentos para explicar la formación de estas estructuras en el disco de las galaxias, e incluso para la propia generación de galaxias S0s. Mediante el análisis de simulaciones hidrodinámicas de N-cuerpos, demostramos que las fusiones mayores de galaxias pueden dar lugar a remanentes S0 con discos antitruncados totalmente realistas.

Iniciando el Catálogo Fotométrico de Sierra Nevada de Galaxias con Anillo Polar con Formación Estelar

Enrique Pérez Montero

En este póster se presentan los resultados preliminares de un programa destinado a la observación fotométrica de una muestra de galaxias con anillo polar (PRGs) con datos obtenidos con el telescopio de 1.5m del Observatorio de Sierra Nevada (OSN). El análisis consta de imágenes en banda ancha (BVR) de cada galaxia, una caracterización bibliográfica y fotométrica Halfa, que es utilizada para identificar aquellos objetos que presentan formación estelar en el anillo. La fotometría de los anillos y de las galaxias anfitrionas permite, entre otros aspectos, un análisis de los posibles escenarios de formación de los anillos, definir los tipos morfológicos de las galaxias, analizar las características generales de las poblaciones estelares allí presentes o realizar un cartografiado de las regiones HII. La finalidad última del trabajo es la elaboración de un catálogo de PRGs con formación estelar que permita complementar su estudio mediante espectroscopía de campo integral.

Microvariability of Type 2 Quasars

Jana Polednikova

We are presenting the results from observations carried out at La Palma with the Nordic Optical Telescope, focused on studying the microvariability of obscured type 2 quasars. We investigate the connection between the microvariable events and the morphology of the studied targets. We also present a the detailed study of the techniques concerning the data reduction and the statistical analysis. Both of them play a crucial role in detecting the microvariable events in the light curves, since such detection requires a very precise measurements to be considered reliable. This data set extends the data from a similar campaign carried out in San Pedro Martir observatory in Mexico.

A Catalogue of XMM-Newton BL Lacs

Elena Racero Perez

A catalogue of XMM-Newton BL Lac is presented based on a cross-correlation with the 1374 BL Lac objects listed in the 13th edition of the Veron-Cetty and Veron (2010) catalogue. X-ray counterparts were searched for in the field of view of more than 10,000 pointed observations available in the XMM-Newton Archive (XSA) that were public before June 2012. The cross-correlation yielded around 250 XMM-Newton observations, which correspond to 162 different sources. X-ray data from the three EPIC cameras and Optical Monitor data were uniformly analyzed using the latest XMM-Newton Science Analysis System (SAS) version. The catalogue collects X-ray spectral properties, including flux variability, of the sample in the 0.2 - 10 keV energy band.

VLBI observations of local luminous infrared galaxies.

Naím Ramírez Olivencia

We present milliarcsecond angular resolution radio observation of 22 of the most luminous and ultraluminous infrared galaxies (U/LIRGs) in the local universe ($\mathrm{Log}(L_{ir}/L_{\odot})>=11.4$), obtained with the European VLBI network at wavelengths of 6 and 18 cm. We aim at studying in spatial detail (few parsec) the central few hundred pc of these sources, and more specifically at tackling the following relevant questions: 1) Discern whether the dust in the central kpc is heated by a starburst, or by an AGN, or both, 2) Unveil the dust-obscured core-collapse supernova population, and 3) Study the relation between the supernova remnant luminosity function and the SFR.

Galaxias 'K+A' como conexión entre Espirales y Lenticulares (S0s) en cúmulos.

Bruno Rodriguez Del Pino

Las galaxias 'k+a' dejaron de formar estrellas hace alrededor de 0.5 - 1.5 Gyr. Por tanto, las galaxias 'k+a' tipo disco podrían representar un fase intermedia en la transformación de galaxias espirales en lenticulares (S0s) en cúmulos de galaxias, manteniendo el disco de sus progenitores pero con la formación estelar suprimida. Con el objetivo de entender en más detalle esta transformación, hacemos uso de espectroscopía de campo integral (IFS) con el instrumento FLAMES/GIRAFFE en el VLT para analizar espectros resueltos espacialmente de un conjunto de galaxias 'k+a' tipo disco en un cúmulo a redshift z = 0.3. Estudiando la distribución espacial y las cinemática de las poblaciones estelares joven y vieja obtenemos información sobre los posible procesos responsbales de la eliminación de la formación estelar y de las transformaciones morfológicas. De nuestros análisis, encontramos que aquellas galaxias que se encuentran muy cerca o interaccionando tienden a tener la población más joven en las regiones centrales de la galaxia, mientras que esta población se encuentra distribuida a lo largo del disco en aquellas galaxias más aisladas. En mi charla presentaré estos y otros resultados obtenidos en nuestro estudio y discutiré sus implicaciones en nuestro entendimiento de las transformación de espirales en cúmulos.

The J-PLUS Survey: Understanding the Formation and Evolution of M33

Izaskun San Roman

It is widely accepted that large disk galaxies derive from the merger and accretion of many smaller subsystems. However, it is less clear how low-mass spiral galaxies fit into this picture. The best way to answer this question is to study the nearest example of a dwarf spiral galaxy, M33. We propose to perform a detailed photometric analysis of the resolved and unresolved stellar population of M33 using data from the Javalambre Photometric Local Universe Survey (J-PLUS).

Using a set of 12 broad-, intermediate- and narrow-band filters, J-PLUS will cover a wavelength range between 330-1,000 nm, reaching magnitudes of r $\sim$ 22. We will take advantage of the IFU-like capabilities of the survey to determine the properties of the spatially resolved and unresolved components of the galaxy. In particular, we will perform a 2-D analysis of the underlying population as well as a detailed study of M33 star cluster system. At the distance of M33, J-PLUS will be able to cover the entire luminosity function of the cluster system, studying not only the bright objects but also reaching the faint tail of the function. Spectral fitting diagnostics of the resolved and unresolved populations will allow us to determine ages, metallicities and masses of the galactic disks, spheroidal components and cluster system. We will analyze two regions covering a total area of 3.2 squared degrees. One field will be centered on M33 covering the disk and the outskirts. A second field will cover the line connecting M33 with M31 to map the stellar substructure surrounding M33. This study will provide key insights into the star formation history and composition of low-mass galaxies as well as place M33 within the context of galaxy formation process.

Warp evidences in precessing bar galactic models

Patricia Sánchez Martín

Most galaxies have a warped shape when they are seen from an edge-on point of view. The reason for this curious form is unknown so far. In this work, the authors apply dynamical system tools to explain it. Starting from a simple but realistic model formed by a bar and a disc, we study the effect produced by a small misalignment between the angular momentum of the system and its angular velocity. For this, a precession is applied to the bar, assuming that it behaves like a rigid body.

After checking that the periodic orbits inside the bar remain essentially the same in the precessing model, we compute the invariant manifolds of the unstable periodic orbits of the equilibrium points in the ends of the bar.

These invariant manifolds form the arms and rings in barred galaxies, and we want to find out what happens to the spiral arms and rings when the bar is tilted. Seeing them from an edge-on viewpoint, we can observe that these manifolds present warped shapes as those recognized in observations. Lastly, test particle simulations have been done to determine how the stars are affected by the applied precession, confirming the theoretical results obtained.

GRB130606A a través de un sub-DLA a z=5.91

Rubén Sánchez Ramírez

GRB130606A iluminó su linea de visión proporcionándonos una oportunidad única para estudiar las características del medio interestelar de su galaxia anfitriona, un subDLA con log[N(HI)=19.85 a z=5.91, además de las del medio intergaláctico hasta dicha distancia. El seguimiento llevado a cabo para el estudio de este inusual evento va desde frecuencias de radio a la de rayos gamma e incluyen observaciones fotométricas y espectroscópicas tomadas con GTC(+OSIRIS). En esta charla discutiré los resultados obtenidos para el segundo GRB más lejano del que se dispone de medidas de su metalicidad (primero si restringimos la clasificación a subDLAs) y su impacto en la comprensión del Universo a muy alto redshift.

Dynamics of galaxies in clusters from narrow-band TF optical observations: the case of ZwCl 0024.0+1652

Miguel Sánchez-Portal

In the framework of the GLACE project, we have performed a narrow-band survey of the intermediate redshift cluster ZwCl 0024.0+1652 (z ∼0.4) using the tunable filters (TF) at the OSIRIS instrument of the 10.4 m GTC telescope (La Palma). The Halpha/[NII], Hbeta and [OIII] emission lines are targeted. While the main purpose of the observations is the study of the star formation and AGN activity within dense environments (see presentation from Pintos-Castro in this conference) one of the byproducts is a wealth of accurate radial velocities of emission line galaxies (ELG) belonging to the cluster (some 200). In this work, we explore the possibility of studying the cluster dynamics, and in particular performing mass estimations using the caustic technique of Diaferio (1999) with ELGs. Our results are compared with mass estimations performed with quiescent galaxies and also by means of weak-lensing analysis.

J-PLUS and the Emission Line Galaxies

Gonzalo Vilella Rojo

J-PLUS (Javalambre Photometric Local Universe Survey) is a large survey that will be carried out with the JAST/T-80 telescope from the OAJ (Observatorio Astrofísico de Javalambre). Its purpose and survey strategy is twofold: on the one hand it will carry out the photometric calibration of the J-PAS (Javalambre Physics of the accelerated survey Astrophysical Survey) photometric system. On the other hand it is designed for purely scientific aims, which are mainly focused on the study of Emission Line Galaxies (ELGs) in the Local Universe. To accomplish both targets the T-80 telescope is equipped with a set of 5 broad filters and 7 narrow ones. Here we present the status of the ELGs survey with J-PLUS. A narrow filter has been centered in the H_α rest-frame position to recover the emission flux of this line up to z$\sim$0.015 (F660 filter). This emission can be related with the massive new born stars, allowing us to infer the Star Formation Rate (SFR) from the H_α Luminosity Function and an assumed Initial Mass Function. Apart from that we will also be able to study the [OII] emission at z$\sim$0.75, which can also be used as a SFR tracer. To this purpose, we are developing a SED fitting tool that fits the continuum and lets us subtract the H_α flux inside F660 filter. This tool has been tested with convolved SDSS real spectra to check its validity and tests its limits. After two years, J-PLUS will have observed an area of $\sim$8,000 deg^2 and gathered multi-filter information of several thousands of ELGs in the local Universe, anchoring the SFR value at very low redshifts with a large and homogeneous sample. Also, with a pixel scale of 0.5"/pixel, J-PLUS will allow us to carry out analysis of stellar populations in the spatially well-resolved galaxies.

Observations of the Einstein Cross with CanariCam

Héctor Vives Arias

We present observations in the mid-IR with the imager CanariCam in Gran Telescopio Canarias of the quadruply lensed quasar QSO2237+0305. We have obtained flux ratios between the four images that, unlike optical, near-IR and, to a lesser extent, radio emission, are unaffected by the ISM (extinction/scattering) or stellar microlensing. We have used these flux ratios to obtain a mass model for the lensing galaxy and test for the presence of CDM substructure. We also compare these "true" ratios to the (stellar) microlensed flux ratios observed in the optical/near-IR to constrain the structure of the quasar accretion disk and the fraction of the lens mass in stars as compared to dark matter.

Instrumentación y Computación

Sesión I1

Herschel Space Observatory: Science Highlights

Pedro Garcia-Lario

Successfully launched together with Planck on 14 May 2009, Herschel reached the end of its operational lifetime on 29 April 2013, after the exhaustion of its supply of liquid helium coolant, completing almost 4 years of pioneering observations of the cool Universe. Indeed, Herschel has made over 37 000 scientific observations, amassing more than 23 000 hoursẃorth of science data from about 600 observing programmes, all of which is already publicly available from the Herschel Science Archive. Although Herschel observing is now finished, the data collected by this wonderful mission will enable a vast amount of exciting science to be done for many years to come. We expect that it will provide even more discoveries that have been made during the lifetime of the Herschel mission. Our task is now to make the treasure trove of Herschel data as valuable as possible. In this presentation I will review a few of the major science highlights derived from the Herschel mission, covering results obtained on nearby Solar System Objects to the more distant galaxies in the Universe, including observing the structure formation in the early universe, resolving the far infrared cosmic background, revealing cosmologically evolving AGN/starburst symbiosis and galaxy evolution at the epochs when most stars in the universe were formed, unveiling the physics and chemistry of the interstellar medium and its molecular clouds, the wombs of the stars, and unravelling the mechanisms governing the formation of and evolution of stars and their planetary systems, including our own solar system, putting it into context. In short, Herschel is opening a new window to study how the universe has evolved to become the universe we see today, and how our star the Sun, our planet the Earth, and we ourselves fit in.

Athena: the mission to study the Hot and Energetic Universe

Xavier Barcons

Hot gas pervades the Universe: about half of the baryonic content in the Universe is expected to be at $T>10^5$ K, and there are as many baryons at $T>10^7$ trapped in galaxy clusters as there are locked into stars. There is an intimate relation between this hot gas, which delineates the large-scale structure of the Universe, and the most energetic phenomena occurring in the immediate vicinity of super massive black holes, through a poorly known process called Cosmic Feedback. Studying The Hot and Energetic Universe requires X-ray observatories in space, whose capabilities largely exceed those of the current workhorse observatories: NASA's Chandra and ESA's XMM-Newton. ESA's L2 mission due for launch in 2028 will be a large X-ray observatory capable of addressing the above topics, and many more fundamental questions in contemporary astrophysics. Athena (Advanced Telescope for High Energy Astrophysics) is the mission being put forward to meet these objectives. In this presentation, I will describe the Athena science objectives, the mission concept and its payload, including the X-ray telescope and its two baseline instruments: a Wide Field Imager (WFI) and an X-ray Integral Field Unit (X-IFU).

Calibration of radio-astronomical data on the cloud. LOFAR, the pathway to SKA.

José Sabater Montes

The radio interferometer LOFAR (LOw Frequency ARray) is fully operational now. This Square Kilometre Array (SKA) pathfinder allows the observation of the sky at frequencies between 10 and 250 MHz, a relatively unexplored region of the spectrum. LOFAR is a software defined telescope: the data is not processed using specific hardware (correlator) but specialized software running in common computing facilities. That means that the capabilities of the telescope are virtually defined by software and mainly limited by the available computing power. However, the quantity of data produced can quickly reach huge volumes (several Petabytes per day). After the pre-processing of the data in a dedicated cluster, the final dataset is handled to the user (several Terabytes). The calibration of these data requires a powerful computing facility in which the specific state of the art software under heavy continuous development can be easily installed and updated. That makes this case a perfect candidate for a cloud infrastructure which adds the advantages of an on demand, flexible solution. In this talk we present our approach to the calibration of LOFAR data using Ibercloud, the cloud infrastructure provided by Ibergrid. With the calibration workflow adapted to the cloud, we can explore calibration strategies for the SKA and show how private or commercial cloud infrastructures (Ibercloud, Amazon EC2, Google Compute Engine, etc.) can help to solve the problems with big datasets that will be prevalent in the future of astronomy.

CARMENES: searching for exoplanets and much more

[Conferencia Invitada]

Pedro Amado González

CARMENES is a next-generation radial-velocity instrument designed and built to search for exo-Earths around M dwarf stars. But it also is an instrument with two separate échelle spectrographs covering the wavelength range from 550 to 1700 nm at a spectral resolution of R = 82,000. In this presentation, a brief review of the current status of the project and its main science case will be provided together with a description of the potential of this instrument for other science cases like asteroseismology, magnetic activity, GRBs or Solar system astronomy.

Sesión I2

The Tenerife Infrared Polarimeter: 15 years of successful spectropolarimetry

Manuel Collados Vera

TIP (Tenerife Infrared Polarimeter) was installed at the German VTT of the Observatorio del Teide in 1999 and made available to all observers. After 15 years of operation, it is still continously used as one of the most demanded instruments at the telescope. TIP is the only common use near-infrared solar spectropolarimeter operating in the world and has made possible the systematic study of the solar photospheric and chromospheric magnetism. Phenomena like quiet sun, sunspots, prominences, filaments, spicules have been analyzed all over these years and these studies have resulted in a large number of results and publications. In this contribution, the main characteristics of the instrument will be revised, as well as the main results obtained with it. In 2014, the instrument has been installed at the recentkly inaugurated 1.5 m GREGOR telescope. Some preliminary results obtained at this telescope will also be shown, which demonstrate its capabilities to become the best high-resolution near-infrared solar polarimeter in operation.

Radiative Transfer Simulations of the Spectral Line Polarization Produced by Anisotropic Radiation Pumping and the Hanle Effect in the Chromosphere-Corona Transition Region

Javier Trujillo Bueno

Many of the physical challenges of solar and stellar physics arise from magnetic processes taking place in the outer atmospheric regions (chromosphere, transition region and corona). In particular, the chromosphere-corona transition region is a key interface region where the density drops by 6 orders of magnitude, the temperature suddenly rises from less than 10,000 K to more than 1,000,000 K and the plasma changes from partially to practically fully ionized. In order to explore its magnetic structure we need to measure and interpret the polarization caused by scattering processes and the Hanle effect in strong UV resonance lines, such as the hydrogen Ly-alpha line, the Mg II h & k lines and the Lyman-alpha line of He II. Their interpretation requires solving a very complex non-equilibrium radiative transfer problem, taking into account frequency correlations between the incoming and outgoing photons in the scattering events, quantum-mechanical interference between different J-levels and the generation and transfer of polarized radiation in realistic three-dimensional models of the solar atmosphere. Here we solve this complex radiative transfer problem and show predictions on the polarization and magnetic sensitivity of such UV resonance lines, some of which we have obtained through numerical simulations with the MareNostrum supercomputer. The results of this theoretical investigation has motivated the development of the Chromospheric Lyman-alpha Spectropolarimeter (CLASP), a sounding rocket experiment accepted for funding by NASA for probing the magnetism of the upper solar chromosphere.

Results of the verification of the NIR MOS EMIR

[Conferencia Invitada]

Francisco Garzón

EMIR is one of the first common user instruments for the GTC, the 10 meter telescope operating at the Roque de los Muchachos Observatory (La Palma, Canary Islands, Spain). EMIR is being built by a Consortium of Spanish and French institutes led by the Instituto de Astrofísica de Canarias (IAC). EMIR is primarily designed to be operated as a MOS in the K band, but offers a wide range of observing modes, including imaging and spectroscopy, both long slit and multiobject, in the wavelength range 0.9 to 2.5 μm. In this contribution we report on the results achieved so far during the verification phase at the IAC prior to its shipment to the GTC. The development and fabrication of EMIR is funded by GRANTECAN and the Plan Nacional de Astronomía y Astrofísica (National Plan for Astronomy and Astrophysics, Spain). After a long period of design and fabrication, EMIR finally entered into its integration phase by mid 2013. Soon after this, the verification phase at the IAC was initiated aimed at configuring and tuning the EMIR functions, mostly the instrument control system, which includes a sophisticated on line data reduction pipeline (DPR), and demonstrating the fulfillment of the top level requirements. We have designed an ambitious verification plan structured along the three kind of detectors at hand: the MUX and the engineering and scientific grade arrays. The EMIR subsystem are being integrated as they are needed for the purposes of the verification plan.

Towards an Autonomous Telescope System: The Test-Bed Telescope Project

Elena Racero Perez

Within the Space Situational Awareness (SSA) programme of ESA, it is foreseen to deploy several robotic telescopes to provide surveillance and tracking services for man-made as well as natural near-Earth objects (NEOs). The Test-Bed Telescope (TBT) project will procure a validation platform for an autonomous optical observing system in a realistic scenario, collecting representative test data for precursor SSA services. The system will consist of two telescopes located in Spain and Australia, whose first light is foreseen for Spring 2015. The telescope was designed following two main drivers, the ability of detecting fast-moving objects as faint as V = 18 in 2-second time combined with a large fully-corrected FoV of 2.5°x2.5°, while ensuring enough image quality (plate scale of the 2.2arsec/pixel) for astrometry purposes. The CCD is a back-illuminated 15micron 4kx4k pixel chip, with fast image acquisition capabilities and a high-precision shutter. NEOs and Space Debris in high orbits (GEOs and upper-MEOs) are the two main target population of this telescope network. The main goal of this telescope network is the follow-up of these objects although blind surveys will be also implemented. Nominal exposures will be in the range of 2 to 30 seconds, comprising hundreds of exposures each night and slewing rate up to 10 deg/s thanks to direct drive motors. Both telescopes will work in an unattended mode, selecting targets and reporting astrometry completely automatically. The short-term planning will be carried out by an external scheduler developed by Isdefe based on fixed pre-configured rules and parameters for the night in combination with a queue-based system implemented inside the Robotic Telescope System 2 (RTS2). Thus the external scheduler defines the global approach for the network and relies on the RTS2 internal scheduler for the real-time response and final distribution of tasks at each sensor.

La Instrumentación óptica para las futuras misiones espaciales: Retos de diseño y nuevas capacidades para la integración de intsrumentos ópticos

Tomás Belenguer

El INTA participa intensamente en la instrumentación óptica de las futuras misiones espaciales de la ESA tales como Raman, SPICA, PHI y ECHO entre otras, y también en el desarrollo de misiones propias del INTA como son OPTOS y CINCLUS. En todas ellas el ambiente espacial y el rango en el que instrumento debe estar operativo ha supuesto un extraordinario reto para el diseño e integración óptica del instrumento, obligando a la calificación de componentes y dispositivos ópticos de uso habitual en instrumentos astronómicos. Además la participación del INTA en el programa SEOSAT/INGENIO ha aumentado considerablemente las capacidades del INTA para la integración y caracterización de instrumentos de gran apertura, lo cual es de gran interés para la instrumentación astronómica en tierra.

Sesión I3

Cosmological simulations of the formation and evolution of structure in the Universe.

[Conferencia Invitada]

Raúl Angulo

Cosmological simulations have a prime role in modern cosmology. In this talk I will discuss the fundamental ideas behind them, review the state-of-the-art in the field, and discuss their importance in our understanding of the dark universe. Then, I will put these simulations in the context of the next generation of wide-field galaxy surveys and dark matter searches, and I will discuss recent promising developments in solving the N-body problem. I finish with an outlook for advances foreseen for the near future.

Asteroseismology in PLATO. A necessary tool for characterising planetary systems

Juan Carlos Suárez Yanes

Asteroseismology is to date, the only technique able to probe the stellar interiors, allowing to better understand and characterize the stars through the analysis of their pulsations. Thanks to previous space missions like MOST, CoRoT, and Kepler, the current knowledge about the internal structure and evolution of stars as significantly grown, providing new challenges and unsolved questions, though. Likewise, the precision reached in determining stellar parameters like mass, radii, or ages, has allowed, with the help of spectroscopic measurements, to better characterise the discovered exoplanets.

In this talk, I introduce asteroseismology in the context of the next ESA M3 mission PLATO, whose main goal is the characterization of exoplanetary systems using this technique as the main way of characterising the host star with unprecedented accuracy. Furthermore, I give an overview of the main challenges and problems on which the scientific preparation of the mission is currently focusing.

TOUCAN, a VO tool for asteroseismology. Scientific preparation and exploitation of the PLATO mission

Carlos Rodrigo Blanco

In the last decades space missions like SOHO, MOST, CoRoT, Kepler and SDO have caused a dramatic increase of the asteroseismic and related data. A proper understanding and full exploitation of this huge amount of information requires a similar leap forward on the theoretical side. Analysis of all space and ground-based associated data requires theoretical models developed by different groups, with different codes, numerical approximations, physical definitions, etc. This lack of homogeneity makes it difficult to design automatic tools to simultaneously work with different models and/or applications able to use the models on the fly. Here we present "TOUCAN: The VO gateway for stellar models", which is a distributed tool conceived to work with VO-compliant models. In the Virtual Observatory, models are described according the same data model and accessed using the same access protocol which solves all the issues regarding data discovery, data access and data representation present in non-VO tools. This tool represents a significant technical leap forward for the the preparation and future exploitation of the PLATO mission which will increase in orders of magnitude the asteroseismic data to be analysed. In this sense, we give a glance on the future developments of TOUCAN within distributed computing environments like Grid and Cloud.

Selection of stars to calibrate Gaia

Josep Manel Carrasco Martínez

Gaia is an all-sky survey satellite, launched by ESA in 19th December 2013, to obtain parallaxes and proper motions to microarcsecond level precision, radial velocities and astrophysical parameters for about one billion objects down to a limiting magnitude of 20 mag. The chosen strategy to perform the photometric calibration is to split the process into two steps (internal and external calibration). The internal calibration will combine all different transits of a given source to a common reference internal system producing a 'mean' Gaia observation. To perform this internal calibration the differential instrumental effects (in sensitivity, aperture, PSF, ...) need to be accounted for. These instrumental effects depend on the colour and type of the observed source. For this reason, a selection of calibration sources ensuring a good representation of all kind of observed sources is needed. The entire magnitude and colour range of the sources have to be covered by these calibration stars and for all calibration intervals. It is a challenge to obtain a suitable colour distribution for the standards, especially for bright sources and the daily large scale calibration intervals. Several approaches will be presented and compared based on our experiments. Once the mean Gaia observations are produced by the internal calibration, a final step, the external calibration, is needed to transform them to absolute fluxes and wavelengths. In principle few calibration sources are needed (about 200 spectrophotometric standard stars, SPSS, are currently being considered). They need to be very well known in absolute fluxes and their non-variability need to be ensured below 1 % precision. For this purpose, a big international observational effort has been done (using telescopes as 2.2m@CAHA, TNG@LaPalma, NTT@LaSilla, LaRuca@SPM, and others). During this observational effort some cases of non-expected variability of the SPSS candidates have been discovered.

A likelihood ratio test to assess the significance of source detections in imaging observations.

Miguel Nievas Rosillo

Very High Energy gamma-ray observations usually contain low levels of signal over a substantial background. Valuating the statistical significance of a given observation remains as one of its major problems. It often sets the limits when we want to claim the discovery of a new source, establish an spectral point or carry out a flux measurement within a given time window. In this work, we present a new method to estimate the significance of point source observations carried out by Imaging Atmospheric Cherenkov Telescopes (IACTs). It is based in a likelihood ratio test procedure under the assumption of a known PSF. It provides the significance of the detection together with estimates of the background and signal recorded. We have tested the method extensively with Monte Carlo simulations based on real observations to check its statistical robustness. Its sensitivity is compared, for different scenarios, against the standard methods widely used in IACT Astronomy, which do not incorporate PSF information. The method can be easily generalized to many other kind of imaging observations which include background estimation.

MIARMA: un método de relleno de huecos que preserva el contenido en frecuencias de la señal

Javier Pascual Granado

En la actualidad la mayoría de los análisis de series temporales de estrellas pulsantes se hacen bajo la hipótesis de que la función subyacente es analítica, justificando así el uso de este tipo de funciones para rellenar los huecos encontrados. En esta contribución presentamos un método de relleno de huecos basado en modelos ARMA. Este método parte de una expresión que no tiene que ser necesariamente analítica y, por tanto, es más general. El resultado fundamental que se presenta en esta contribución es que MIARMA puede reconstruir señal en series temporales que no se recupera con ningún método de interpolación basado en funciones analíticas. Este método ha sido adoptado por el Comité Científico de CoRoT para sustituir los datos cualificados como no válidos.

Sesión I4

Spanish contribution to the design and prototyping of the CTA observatory

[Conferencia Invitada]

Juan Abel Barrio Uña

The Cherenkov Telescope Array (CTA) project is an initiative to build the next generation ground-based Very High Energy (VHE) gamma-ray instrument. It will serve as an open observatory to a wide astrophysics community and will provide a deep insight into the non-thermal high-energy universe. To achieve such goals, it will offer full-sky coverage (with Northern and Southern Hemisphere sites), an improvement in sensitivity by about an order of magnitude, an enlarged span in energy (from a few tens of GeV to above 100 TeV), and enhanced angular and energy resolutions over existing VHE gamma-ray observatories. An international collaboration has formed with more than 1,000 members from 27 countries all over the world. The Spanish High Energy Astrophysics community is deeply committed to CTA, with more than 70 scientists and technicians from 9 research groups currently involved in building prototypes for several CTA subsystems. This participation covers a wide list of items, both hardware- and software-related. The former includes telescope-level (camera electronics and mechanics and telescope undercarriage) and observatory-level (array optical calibration and atmospheric monitoring) elements. And the latter includes the design of the data pipelines and the scheduling for observational proposals. In this talk, the status of the CTA project and the contribution of the Spanish community will be presented.

El Grupo Isaac Newton en la próxima década

Marc Balcells Comas

Repasaremos los desarrollos instrumentales en los telescopios WHT e INT, con énfasis en las novedades del espectrógrafo multi-fibra WEAVE para el WHT. El modelo de uso de los telescopios en los próximos 10 años va a variar y daremos un repaso somero a las prestaciones que se van a ofrecer en la próxima década.

WEAVE: un espectrógrafo de nueva generación para el telescopio Willian Herschel

J. Alfonso López Aguerri

The 4.2m William Herschel Telescope (WHT) has been a keystone for the spectacular rise of Spanish astronomy over the last 25 years. With access to the Spanish community to 8-10 m telescopes, the WHT is specializing in offering what larger telescopes cannot: large field-of-view instrumentation. For this, an European consortium is designing a new multi-object spectrograph called WEAVE. This new instrument will have a field of view of 2 degrees and the ability to position up to 1,000 fibres in that field of view. In addition, a small number of integral field units and a large integral field unit will be available. These fibres feed a high-throughput spectrograph that delivers full optical spectral coverage in a single exposure at a spectral resolution of 5,000. There will also be a resolution 20,000 under certain wavelength windows. WEAVE is being developed by a European consortium formed by the three partners involved in the ING group (UK, the Netherlands and Spain) as well as France and Italy. The instrument is now in its final design phase and is expected to be commissioned at the telescope in late 2017. During the period 2018-2022, WEAVE will conduct a number of surveys to provide about 15 million high-quality spectra of astronomical objects which would serve to answer questions such as: How does our galaxy formed? how does the structure in the Universe formed and evolved? what is the amount of matter and dark energy in the universe? In this talk, we will give a scientific and technical overview of the project, highlighting the Spanish contribution. This is a unique opportunity for the Spanish astronomical community to learn about this project, and be prepare for a fast and efficient scientific exploitation of the data produced by the WEAVE surveys.

Daily processing of Gaia data

Jordi Portell de Mora

Gaia was successfully launched on 2013 December 20th. Since then, a vast amount of data has already been received by the on-ground data processing systems running at the European Space Astronomy Centre near Madrid. In this presentation we will describe the mentioned systems, focusing on the Initial Data Treatment system which is coordinated by the Gaia group at the University of Barcelona. We will present the diagnostics and results obtained during the Commissioning phase and the first months of Nominal operations.

First cycle of Gaia data processing

Javier Castañeda Pons

After six months from the end of the commissioning, the first release of the Gaia catalogue will be published. For this release, several cyclic processes will be run over all the accumulated data. This cyclic processes will consolidate the available data providing a first solution of the basic astrometric parameters.

Laboratorio de polvo cósmico del IAA

[Conferencia Invitada]

Olga Muñoz Gómez

El Laboratorio de polvo cósmico del IAA (IAA Cosmic Dust Laboratory) se ha diseñado para medir experimentalmente la dependencia angular de las radiación dispersada incluyendo polarización (lo que se conoce como matriz de scattering) de muestras de polvo que sean de interés en el campo de la astrofísica. Estamos especialmente interesados en partículas de polvo mineral presentes en las atmósferas planetarias y cometarias del Sistema Solar. Otro de nuestros objetivos es el estudio de los aerosoles (partículas sólidas en suspensión) que puedan afectar el balance radiativo de la atmósfera de la Tierra como polvo desértico, cenizas volcánicas y carbón. Los datos experimentales están disponibles en la Amsterdam-Granada Light Scattering Database (www.iaa.es/scattering). En la base de datos puede encontrarse asímismo una detallada descripción del instrumento y un resumen de los principales fundamentos teóricos.

Sesión I5

El observatorio espacial PLATO: búsqueda y caracterización de otros sistemas planetarios

[Conferencia Invitada]

Jose Miguel Mas Hesse

Tras muchos años de estudios, que comenzaron en 2001 con la misión Eddington, ESA acaba de seleccionar PLATO como la próxima misión M3, que será lanzada en 2024. Los objetivos de PLATO se resumen en una sola idea: avanzar un paso más en nuestro conocimiento de las propiedades de los sistemas exoplanetarios. No se trata por lo tanto de aumentar la lista de exoplanetas conocidos (aunque PLATO la ampliará en varios miles), sino sobre todo de caracterizar las propiedades de los sistemas exoplanetarios individuales: edad, y por lo tanto su estado evolutivo, algo básico a la hora de determinar las probabilidades de que hayan desarrollado vida; volumen y masa, y por lo tanto su densidad, con el objetivo de separar planetas rocosos de objetos gaseosos; presencia de lunas masivas, generadoras de turbulencia vía mareas; presencia y características básicas de sus atmósferas, como son la existencia de nubes,... Todo ello optimizado para planetas de tipo terrestre en órbitas dentro de la zona de habitabilidad de estrellas similares al Sol. La estrategia para lograr este objetivo combina diversas técnicas, desde el Espacio y desde Tierra, y requerirá de un esfuerzo ingente por parte de la comunidad astronómica mundial durante la próxima década: + La detección de tránsitos planetarios, de la forma y variaciones que tengan los eclipses, permitirá la primera fase de caracterización. + El estudio de la oscilación de las estrellas (astrosismología) desvelará su estructura interna, y sus propiedades (tamaño, densidad) y estado evolutivo. + Estudios desde Tierra de las curvas de velocidad radial de las estrellas proporcionarán la clave definitiva para determinar la masa absoluta de cada planeta, y de esta manera su densidad y propiedades básicas. Para ello monitorizaremos durante periodos continuos de hasta 3 años una muestra muy amplia de estrellas brillantes ($\sim$250.000) con una precisión fotométrica de hasta 35 ppm.

Spanish participation in the development of HARMONI, a first light instrument for the European Extremely Large telescope (Invited review talk)

María Begoña García Lorenzo

HARMONI is the first light high angular resolution visible and near infrared integral field spectrograph (IFS) for the European Extremely Large Telescope (E-ELT). The Centro de Astrobiología (CAB-CSIC) and the Instituto de Astrofísica de Canarias (IAC) have actively participated during its conceptual design phases (i.e. Phase-A and pre-phase-B) as part of an international consortium led by the University of Oxford (PI), and also formed by UKATC-Edinburgh, CRAL-Lyon and ONERA. HARMONI represents a unique scientific opportunity for the Spanish astronomical community, allowing the access to the E-ELT as soon as it were operative via the guaranteed time. This talk will describe the Spanish contribution to HARMONI.

ACTIVIDADES DE SENER EN INSTRUMENTACIÓN ESPACIAL Y TERRESTRE

Joan-Manel Casalta Escuder

SENER es una empresa de ingeniería y construcción con más de 50 años de experiencia. Dentro del campo de la astronomía SENER diseña, integra y valida soluciones a medida para equipos electromecánicos e instrumentos científicos. Las actividades cubren desde estudios conceptuales hasta la implementación de equipos de altas prestaciones para grandes instalaciones científicas y misiones espaciales. En espacio, SENER es reconocida por la calidad y fiabilidad de sus equipos con más de 250 equipos de vuelo en el ámbito de mecanismos, sistemas de actuación, despliegue de estructuras, equipos para experimentos en microgravedad, sistemas de control de altitud y guiado (AOCS y GNC) e instrumentación óptica. Para telescopios terrestres las actividades se centran en sistemas de posicionado y sistemas de instrumentación. Las principales referencias y proyectos relativos a astronomía son: Sistemas espaciales: - SOLAR ORBITER. Subsistema de antenas de comunicaciones; mecanismos de Feed-Throughs; participación en instrumentos científicos embarcados EPD (Energetic and Suprathermal Particle Detector Analyzer) y PHI (Polarimetric and Helioseismic Imager - WSO-UV: Imaging and Slitless Spectroscopy Instrument for Surveys (ISSIS). - GAIA: Mecanismo de apunte del espejo secundario y parasol desplegable. Sistemas de Instrumentación para telescopios terrestres: - JPCAM. Sistema de actuación. - OSIRIS. Subsistema de selección de longitud de onda. - EMIR. Electrónica para la Unidad de traslación del detector y Unidad de rendijas configurables. - VLT. Unidad principal de GRAAL. - ALMA. Brazo robótico con equipo de calibración de amplitud. Sistemas de posicionamiento de espejos para telescopios terrestres: - E-ELT. Unidad de estabilización de campo del quinto espejo. - EST. Sistema de posicionamiento del espejo secundario. - VISTA. Sistema de posicionamiento del espejo secundario. - IRAIT. Sistemas de posicionamiento de los espejos secundario y terciario. - GTC. Sistema de posicionamiento del espejo secundario.

IDOM en Astronomía

Gaizka Murga Llano

IDOM es una empresa internacional especializada en Ingeniería, Arquitectura y Consultoría. IDOM opera de forma global en áreas como la generación de energía, oil & gas, fuentes de energía renovables y alternativas, industria de fabricación, infraestructuras civiles, grandes instalaciones científicas y tecnológicas, arquitectura y proyectos de ingeniería únicos e innovadores. IDOM está presente en 34 oficinas distribuidas en 16 países en cinco continentes. La experiencia de IDOM en Astronomía incluye domos de telescopios (como los de E-ELT y ATST), sistemas de telescopio (como los Folded Cassegrain Sets del GTC, los Telescopios del proyecto QUIJOTE CMB) e instrumentación (como PlanetCam, FastCam, QUIJOTE CMB Instrument).

SCHOTT Advanced Optics: optical glass, Zerodur, components and coatings for astronomy and space applications

Juan José Sánchez

SCHOTT has been developing and manufacturing optical glasses and special materials, such as ZERODUR®, since 1884. Today the division Advanced Optics of SCHOTT offers not only optical glasses and materials but also components, coatings and filters for space and astronomy applications. A short overview about SCHOTT Advanced Optics will be given with special emphasis on products for astronomy and space applications:(i) ZERODUR®(low expansion glass ceramic) is used for mirror substrates. SCHOTT manufactured the largest monolithic mirror substrate with an 8.2m diameter for the ESO VLT in Chile and also the 2m edge-to-edge mirror blanks for the Gran Telescopio de Canarias. ZERODUR®is also used in space applications, for example as special cylindrical mirrors in the Chandra X-ray observatory from NASA. (ii) Newest developments such as ZERODUR®TAILORED, with a coefficient of thermal expansion tuned according to customers' requirement, will be shown. (iii) Optical interference filters and coatings for satellite and astronomy applications are also manufactured by SCHOTT. Example will be shown of the so called "butcher filters" for an ESA satellite and also the J-PLUS filters and the 70 JPAS filter project for the Observatorio Astrofisico de Javalambre, Spain. (iv) High end substrates with low wavefront error and prisms for demanding optical instruments currently in operation in several satellites. (v) SCHOTT produces high homogeneity optical glasses for imaging optics, available up to about 1m in diameter such as N-BK7 and N-FK5 and also, cerium stabilized radiation resistant glasses for satellite optics, such as BK7G18 and F2G12.

Cámara infrarroja del proyecto EUSO–BALLOON

Luis Ramírez

El Observatorio Espacial del Universo Extremo (EUSO) es un instrumento de gran tamaño diseñado para observar los rayos cósmicos de extremadamente alta energía desde el Espacio. El instrumento será alojado en la Estación Espacial Internacional (ISS). Su objetivo será usar la atmósfera terrestre como un gran detector calorimétrico con el que observar trazas de fotones producidos en la atmósfera por rayos cósmicos de ultra alta energía.

Con el objeto de validar la misión espacial el consorcio internacional lanzó el proyecto EUSO-Balloon, donde un instrumento prototipo con equivalencias al que se está diseñando para la Estación Espacial Internacional ha sido desarrollado para volar en la Estratosfera (40 km) por medio de un globo del CNES. La contribución industrial española en el globo, así como en la misión espacial, es el desarrollo de una cámara infrarroja que determina la presencia de nubes y estima la altura de las mismas.

La Cámara infrarroja IRCam es un instrumento que integra requisitos del prototipado de la misión espacial así como requisitos ambientales extremas para volar a la estratosfera en globo y poder ser recuperada para su uso durante toda la campaña de vuelos programados. Los datos obtenidos por esta cámara son claves tanto para el avance de los algoritmos de procesado necesarios para la explotación de los datos finales de la misión EUSO como para el afianzamiento en el diseño y selección de componentes claves para la IRCam espacial.

Sesión I6

El Telescopio Espacial James Webb. Participación española y perspectivas

[Conferencia Invitada]

Luis Colina

En esta charla se presentará el estado actual del proyecto, un breve resumen sobre los distintos instrumentos y la participación española en los mismos. Se comentará brevemente las perspectivas científicas que se abrirán en distintos campos de la astrofísica y los planes actuales de cara a la primera llamada de propuestas.

The GTC: Future capabilities

Pedro Álvarez Martín

The current plans of development of the Gran Telescopio Canarias (GTC) will be presented. The new science instrumentation and the telescope upgrades are currently scheduled accordingly to the expected funding level for the facility. New and challenging science capabilities will be available in a short future at the GTC.

MEGARA, the new IFU & MOS for the GTC

Armando Gil de Paz

MEGARA is a new generation intermediate-resolution optical spectrograph for the GTC. It provides both Integral-Field (IFU) and Multi-Object Spectroscopy (MOS) capabilities in the entire optical window with resolutions in the range R=6000-20,000 and superb efficiency thanks to the use of the state-of-the-art optical fibers and VPHs as disperser elements. The instrument successfully passed its Optics Critical Design Review (CDR) in May 2013 and the Full CDR is scheduled for June 2014. Close to 90 % of the funds for the construction, AIV and commissioning of the instrument are secured thanks to a contract with GRANTECAN signed on May 2014. The delivery of the instrument to GTC is planned for December 2016 with first light in the first half of 2017.

MIRADAS for the Gran Telescopio Canarias: Science and Design Overview

Stephen Eikenberry

The Mid-resolution InfRAreD Astronomical Spectrograph (MIRADAS), a near-infrared multi-object echelle spectrograph operating at spectral resolution R=20,000 over the 1-2.5μm bandpass was selected by the Gran Telescopio Canarias (GTC) partnership as the next-generation near-infrared spectrograph for the world's largest optical/infrared telescope, and is being developed by an international consortium. The MIRADAS consortium includes the University of Florida, Universidad de Barcelona, Universidad Complutense de Madrid, Instituto de Astrofísica de Canarias, Institut de Física d'Altes Energies, Institut d'Estudis Espacials de Catalunya and Universidad Nacional Autonoma de Mexico, as well as a Spanish probe arm industrial partner. In this paper, we review the overall scientific performance and system design for MIRADAS as it progresses towards its Advanced Design Review in early 2015.

GTC Science Operation Status

Antonio Cabrera Lavers

GTC enters in its fifth year of operation. In the present talk I'll detail the improvements and progresses achieved along this period in the telescope operation, as well as future expectations in this topic.

The Imaging and Slitless Spectroscopy Instrument for Surveys (ISSIS) for the World Space Observatory-Ultraviolet (WSO-UV)

Gracia Belén Perea Abarca

The WSO-UV is an international project developed to guarantee access to the ultraviolet (UV) range in the post Hubble Space Telescope era. This 170 cm space telescope has been conceived as a multipurpose observatory carrying instrumentation for astronomical imaging and spectroscopy. The WSO-UV spectrographs consist of three different instruments: two high resolution (R∼55,000) echelle spectrographs and a long slit spectrograph for low resolution (R∼1,000) spectroscopy. The camera unit of the WSO-UV is named ISSIS: the Imaging and Slitless Spectroscopy Instrument for Surveys. The baseline for ISSIS design approved in May 2012 consists of two acquisition channels, both of them provided with photon ing detectors with Micro-Channel Plates (MCP). These two channels are: the Far Ultraviolet (FUV) Channel covering the 1,150-1,750Å wavelength range and the Near Ultraviolet (NUV) Channel in the 1850-3200Å range. The optical design and expected performance for the Imaging and Slitless Spectroscopy Instrument for Surveys (ISSIS) on board the World Space Observatory– Ultraviolet (WSO-UV) after Preliminary Design Review (PDR) are shown.

Acelerando el desarrollo de la Sociedad y la Ingeniería a través de la Supercomputación y el Big Data

Adriano Galano Diez

La continua evolución de la sociedad y la tecnología ha provocado el crecimiento exponencial de los datos en modo digital, el gran número de dispositivos móviles, las redes sociales, los múltiples sensores, la digitalización de elementos que hasta ahora eran analógicos o mecánicos, la Internet de las Cosas. Todo ello nos ha llevado a un Universo Digital en constante expansión. Y estos gran explosión de datos, a través de su análisis y comprensión, podemos tomar decisiones y generar nuevos Servicios de Valor añadido en diferentes campos de la industria y la sociedad. A través de las técnicas desarrolladas en el mundo de la Supercomputación somos capaces de diseñar infraestructuras para Colectar, Analizar, Reaccionar y Tomar Decisiones sobre datos que hasta ahora era muy difícil poder tratarlos.

También en esta ponencia compartiremos con la audiencia un conjunto de casos prácticos de cómo a través de la Simulación y el Análisis Predictivo se pueden diseñar soluciones sociales a problemáticas tan importantes como: la mitigación de desastres, el diseño de estructuras adaptadas a contingencias naturales o humanas, la construcción de ciudades más Eco-responsables, el control de factores como la polución o los niveles de radiación que impactan directamente en la calidad de vida de los seres humanos.

Por último resaltaremos el por qué necesitamos Supercomputadores con potencia Exascale para ser más precisos o poder analizar problemáticas más complejas, con la consiguiente mejora de productos, servicios y soluciones de ingeniería con impacto en la construcción una sociedad más prospera para los seres humanos.

Sesión I7

Hydrodynamical simulations of galaxy clusters: exploring the thermodynamics of the hot intra-cluster medium

[Conferencia Invitada]

Susana Planelles Mira

Modern cosmological simulations represent a powerful means to analyze and interpret the formation and evolution of cosmic structures. The first attempts to perform such simulations, dated back to 1960-1970, consisted in N-body collisionless computations with few point masses. Since then, cosmological simulations have experienced a great progress and have increased significantly in scale and complexity. A relevant effort has been done to properly model the hydrodynamical mechanisms shaping the observational properties of galaxies and galaxy clusters. Despite the significant improvements of the last years, results from current simulations still show important deviations from observations, specially within the core regions of galaxy clusters and within the framework of galaxy formation. In this talk, I will briefly explain the current numerical methods employed in large-scale cosmological simulations. A special emphasis will be put on the effects that the inclusion of different baryonic processes, such as radiative cooling, star formation or AGN feedback, has on the physical properties of the hot intra-cluster medium of massive galaxy clusters. In addition, some of the technical and computational challenges that numerical cosmology has to overcome in the near future will be outlined.

First light instrumentation for the Observatorio Astrofísico de Javalambre

[Conferencia Invitada]

Antonio Marín Franch

The Observatorio Astrofsico de Javalambre (OAJ) is a new astronomical facility located at the Sierra de Javalambre (Teruel, Spain) whose primary role will be to conduct all-sky astronomical surveys. The main OAJ facilities are two wide-field telescopes: the JST/T250; a 2.55-m telescope with a 3 degree diameter FoV, and the JAST/T80; a 0.83- m telescope with a 2 degree diameter FoV. These telescopes will be equipped with panoramic cameras that have been designed to to exploit the survey capabilities of the OAJ telescopes. T80Cam is will be mounted at the JAST/T80 and its large format CCD covers a large fraction of the JAST/T80 FoV with a pixel scale of 0.55¨/pixel. The JST/T250 will be equipped with JPCam, is a 14-CCD mosaic camera using the new e2v 9k-by-9k 10 μm pixel detectors, providing a pixel scale of 0.2"/pixel. It is designed to perform the J-PAS, a BAO survey of the northern sky. The J-PAS survey will use 59 filters, 56 narrow-band filters (14.5nm) equi-spaced between 350 and 1,000nm plus 3 broad-band filters to achieve unprecedented photometric redshift accuracies for faint galaxies over 8,500 square degrees of sky. In this talk, the status of the first light instrumentation for the OAJ is presented.

Hardware and software facilities for J-PAS and J-PLUS surveys archiving, processing and data publication

David Cristóbal Hornillos

The Observatorio Astrofísico de Javalambre consists of two main telescopes: JST/T250, a 2.5m telescope with a FoV of 3 deg, and JAST/T80, a 80cm with a 2 deg FoV. JST/T250 will be devoted to complete the Javalambre-PAU Astronomical Survey (J-PAS). It is a photometric survey with a system of 54 filters of 14nm width (from ∼350nm to ∼900nm) plus several broadband filters covering an area of 8,500 sqdeg. The JAST/T80 will perform the J-PLUS survey, covering the same area in a system of 12 filters. Both surveys will produce ∼1PB of raw data. The archive and processing will be done in a datacenter (UPAD) sited in Teruel. This contribution presents the software and hardware architecture designed to store, process and publish the data. The processing pipeline has three main stages: Generation of master calibration frames for each observing block. The second part perform the instrumental correction, astrometric and photometric calibration, and extraction of individual image catalogs. Finally, combination of the mosaics per sky position and computation of final catalogs. The data processing will be executed in a cluster under a batch queuing system. The pipelines use database to store persistent information about the operations on the images. The information in the final catalogs used by the community will be ingested in a clustered SQL database. When J-PAS survey is finished the information in database will be ∼20TB. The data (images and catalogs) will be published following the VO standard. A initial implementation of the publication services is operative with ALHAMBRA data. The storage and processing hardware for J-PLUS containing all the subsystems is in configuration phase. Regarding the hardware for J-PAS, it is expected to be deployed during October 2014. The hardware arquitecture for J-PLUS and J-PAS data processing will be presented in the contribution.

Narrow bandpass steep edge optical filters for the JAST/T80 telescope instrumentation

Steffen Reichel

The Observatorio Astrofisico de Javalambre in Spain observes with its JAST/T80 telescope galaxies in the Local Universe in a systematic study. This is accomplished with a multi-band photometric all sky survey called Javalambre Photometric Local Universe Survey (J-PLUS). A wide field camera receives the signals from universe via optical filters. In this presentation the development and design of some narrow bandpass steep edge filters with wide suppression will be shown. All developed and manufactured filters have a physical size of 106.6mm x 106.6mm and 8.0mm thickness. This thickness of the filter assembly had to be tightly controlled since the instrument works under fast convergence (f/# = 4.5). The required center wavelength uniformity was less than 0.4 % over the whole clear aperture. This requires to push the coating design and technology to its technological limit. In addition the demanding image quality needed a strict requirement for the transmitted wavefront to be less than $\lambda/2$ over the whole clear aperture at 633nm wavelength. The central wavelength (cwl) of the bandpass filters are in the range between 350nm and 860nm with an average transmission larger than 85 % (cwl > 400nm) and 70 % (cwl < 400nm) in the passband. The out of band blocking, i.e. signals beyond the passband (blocking range), have to be suppressed down to 250nm and up to 1050nm (spectral regime). The required blocking was Tmax*10-5 on average. Furthermore the spectral edges have to be steep for a small transition width from 5 % to 80 %. The designed and manufactured filters shown in this presentation consist of a coated substrate (typically > 100 layers) and an optical filter glass in order to reach the spectral requirements. Results of some steep edge narrow bandpass filters will be shown fulfilling all demanding requirements for operation temperature between -20°C and + 20°C.

Robotic operation of the Observatorio Astrofísico de Javalambre

Jorge Axel Yanes Díaz

The Observatorio Astrofísico de Javalambre (OAJ) is a new astronomical facility located at the Sierra de Javalambre (Teruel, Spain) whose primary role will be to conduct all-sky astronomical surveys. The OAJ control system has been designed under a global point of view including not only astronomical subsystems but also infrastructure and other facilities. Three main factors have been considered in the design of a global control system for the robotic OAJ: quality, reliability and efficiency. We propose CIA (Control Integrated Architecture) design and OEE (Overall Equipment Effectiveness) as a key performance indicator in order to improve operation processes, minimizing resources and obtain high cost reduction maintaining quality requirements. The OAJ subsystems considered for the control integrated architecture are the following: two wide-field telescopes and their instrumentation, active optics subsystems, facilities for sky quality monitoring (seeing, extinction, sky background, sky brightness, clouds distribution, meteorological station), domes and several infrastructure facilities such as water supply, glycol water, water treatment plant, air conditioning, compressed air, LN2 plant, illumination, surveillance, access control, fire suppression, electrical generators, electrical distribution, electrical consumption, communication network, Uninterruptible Power Supply and two main control rooms, one at the OAJ and other remotely located in Teruel at 40km from the observatory, connected through a microwave radiolink. Here we present the OAJ robotic control strategy to achieve maximum quality efficiency for the observatory surveys, processes and operations, giving practical examples of our approach.

Adaptive Optics and Lucky Imager (AOLI): presentation and first light.

Sergio Velasco Muñoz

On this talk, we present the Adaptive Optics Lucky Imager (AOLI) and report first light results obtained in September 2013 at the 4.2m William Herschel Telescope. This new instrument combines two well proved techniques for high spatial resolution: Lucky Imaging and Adaptive Optics. On AOLI, both techniques merge providing a versatile and inexpensive complement to space telescopes on the visible range. This is possible thanks to its four 1,024x1,024 EMCCDs array featuring a 120x120 arcsec down to 12x12 arcseconds field of view depending on selected magnification.

As part of the commissioning run we obtained I-band photometry for the four components of the T-Tauri neighbours LkHa 262 and 263 in the MBM 12 system. The scientific interest of this multiple system lies on the presence of proto-planetary discs in at least two of the four components previously reported. We resolve for the first-time, from the ground, in the optical the pair LkHa 263AB (0.42 arcsec separation) and detected orbital motion in it by comparison with previous AO observations in the infrared at larger telescopes.

Pósters

OAJ's Control System

Juan Luis Antón Bravo

The Observatorio Astrofísico de Javalambre (OAJ) is a new astronomical facility located at the Sierra de Javalambre (Teruel, Spain) whose primary role will be to conduct all-sky astronomical surveys leveraging two unprecedented telescopes with unusually large fields of view: the JST/T250, a 2.55m telescope with a 3deg field of view, and the JAST/T80, an 83cm telescope with a 2deg field of view. The immediate objective of these telescopes for the next years is carrying out two unique photometric surveys covering several thousands square degrees: J-PAS and J-PLUS, each of them with a wide range of scientific applications, like e.g. large structure cosmology and Dark Energy, galaxy evolution, supernovae, Milky Way structure and exoplanets. JST and JAST will be equipped with panoramic cameras being developed within the J-PAS collaboration, JPCam and T80Cam respectively, which make use of large format ($\sim$ 10k x 10k) CCDs covering the entire focal plane. CEFCA engineering team has been designing the OAJ control system as a global concept to manage, monitor, control and service the observatory systems, not only astronomical but also infrastructure and other facilities. In order to provide quality, reliability and efficiency for the OAJ control system its design is based on CIA (Control Integrated Architecture) and OEE (Overall Equipment Effectiveness) as keys to improve day and night operation processes. The OCS (Observatory Control System) comprises a low level hardware layer including IOs connected directly to sensors and actuators deployed around the whole observatory, telescopes and astronomical instrumentation, and a high level software layer as a tool for efficient observatory operation. We will give an overview of OAJś control system from an engineering point of view, giving details on the design criteria, technology, architecture, standards, functional blocks, model structure, deployment, goals, current status and next steps in its development.

UV image processing to detect diffuse clouds

Marcelo Armengot Iborra

The presence of diffuse clouds along the Galaxy is under consideration as far as they are related to stellar formation and their physical properties are not well understood.

The signal received from most of these structures in the UV images is minimal compared to the point sources. The presence of noise in these images makes hard the analysis because the Signal-to-Noise ratio is proportionally much higher in these areas.

However, the digital processing of the images shows that it is possible to enhance and target these clouds. Typically, this kind of treatment is done on purpose for specific research areas and the Astrophysicist's work depends on the computer tools and its possibilities for enhancing a particular area based on a prior knowledge.

Automating this step is the goal of our work to make easier the study of these structures in UV images. In particular we have used the GALEX survey images in the aim of learning to automatically detect such clouds and be able of unsupervised detection and graphic enhancement to log them.

Our experiments show the existence of some evidences in the UV images that allow the systematic computing and open the chance to generalize the algorithm to find these structures in universe areas where they have not been recorded yet.

Do you need to compare two histograms, not only by eye?

Nicolás Cardiel López

Although the use of histograms imply loss of information due to the fact that the actual data are replaced by the central values of the considered intervals, this graphical representation is commonly employed in scientific communication, particularly in Astrophysics. Sometimes this kind of comparison is unavoidable when one needs to compare new results with already published data only available in histogram format. Unfortunately, it is not infrequent to find in the literature examples of histogram comparisons where the similarity between the histograms is not statistically quantified but simply justified or discarded "by eye". In this poster several methods to quantify the similarity between two histograms are discussed. The availability of statistical packages, such as R, notably simplify the understanding of the different approaches through the use of numerical simulations.

ATHENA-XIFU Event Processing

M. Teresa Ceballos

The X-ray Observatory ATHENA was proposed in April 2014 as the mission to implement the science theme "The Hot and Energetic Universe"selected by ESA for L2 (the second Large-class mission in ESA's Cosmic Vision science programme). One of the two X-ray detectors designed to be onboard ATHENA is X-IFU, a cryogenic microcalorimeter based on Transition Edge Sensor (TES) technology that will provide spatially resolved high-resolution spectroscopy. X-IFU will be developed by a consortium of European research institutions currently from France (leadership), Italy, The Netherlands, Belgium, UK, Germany and Spain. From Spain, IFCA (CSIC-UC) is involved in the Digital Readout Electronics (DRE) unit of the X-IFU detector, in particular in the Event Processor Subsytem. We at IFCA are in charge of the development and implementation in the DRE unit of the Event Processing algorithms, designed to recognize, from a noisy signal, the intensity pulses generated by the absorption of the X-ray photons, and lately extract their main parameters (coordinates, energy, arrival time, grade, etc.) Here we will present the design and performance of the algorithms developed for the event recognition (adjusted derivative), and pulse grading/qualification as well as the progress in the algorithms designed to extract the energy content of the pulses (pulse optimal filtering). IFCA will finally have the responsibility of the implementation on board in the (TBD) FPGAs or micro-processors of the DRE unit, where this Event Processing part will take place, to fit into the limited telemetry of the instrument.

Wavefront curvature sensing for active correction of the Javalambre Auxiliary Survey Telescope

Sergio Chueca Urzay

The Observatorio Astrofísico de Javalambre (OAJ) is a new astronomical facility located at the Sierra de Javalambre (Teruel, Spain) whose primary role will be to conduct all-sky astronomical surveys with two unprecedented telescopes of unusually large fields of view: the JST/T250, a 2.55m telescope of 3deg field of view, and the JAST/T80, an 83cm telescope of 2deg field of view.

In order to maintain image quality during operations, deformations and rigid body motions must be actively controlled to minimize optical disturbances. Multiple software tools have been developed to accomplish this goal, constituting the "Observatorio Astrofísico de Javalambre" Active Optics Pipeline (OPAC). We present a comprehensive analysis of the curvature wave-front sensing system, including the availability of reference stars, pupil registration, wavefront estimators and the iteration matrix evaluation techniques.

Finnally, it is shown a practical application to resolve the T80 telescope initial aligment among M1 and M2 during commisioning.

Detectores biofotónicos para el espacio

Luis Cuesta Crespo

Uno de los problemas más interesantes de la Astrobiología es el diseño de sensores que sean capaces de identificar actividad biológica en explotración espacial. En esta comunicación se presenta la propuesta del proyecto PBSA basada en cómo cambia el desfase producido en la luz de una guía de ondas frente a un chip especial en presencia de vida. Esta tecnología se está desarrollando para volar en misiones de NASA y ESA.

MOS target-acquisition/fibre-positioning and their impacts on throughput : lessons from AF2

Lilian Domínguez Palmero

The demand for AF2+WYFFOS, the multi-object fibre-fed spectrograph at the WHT prime focus, had been decreasing in the course of the years, with observers often reporting an overall throughput well below that expected from the exposure time calculator. Given the strategic importance of multi-fibre spectroscopy for the WHT future, with the coming of WEAVE, during 2012 and 2013 ING staff carried out an end-to-end analysis of the reasons for the loss of photons. The investigations focused mainly in the areas of target-acquisition/positioning checks and overall system throughput measurements. These showed that poor centering of the fibres on the targets was the dominant contribution to the low throughput. A number of improvements were implemented in AF2 to address this and other issues: new automatic acquisition and guiding tool, a better geometric distortion map, new fiber centroiding and positioning algorithms, etc. AF2 performance has improved very significantly as a result of these enhancements, and we believe that, as a wide-field multi-object spectroscopy facility at the WHT, it is ready to perform as a useful precursor and science test-bed for WEAVE surveys.

Multi-object spectroscopy data reduction: the AF2+WYFFOS pipeline

Lilian Domínguez Palmero

The scientific productivity of complex instrumentation depends strongly on the availability of data-reduction pipelines. In the case of AF2+WYFFOS, the multi-object fibre-fed spectrograph at the WHT prime focus, the non-availability of a dedicated pipeline has in the past hindered full scientific exploitation of the AF2 data. An IDL-based pipeline has been developed to overcome this. It performs full reduction of AF2+WYFFOS data, including fibre-to-fibre sensitivity corrections and optimal extraction, with provision for quick-look.

Deployment of CIRCE for the Gran Telescopio Canarias

Stephen Eikenberry

CIRCE is a near-infrared (1-2.5 μm) imager, polarimeter and low-resolution spectrograph intended as a visitor instrument for the Gran Telescopio Canarias. It was built largely by graduate students and postdocs, with help from the UF astronomy engineering group, and is funded by the University of Florida and the U.S. National Science Foundation. CIRCE is intended to help fill the gap in time between GTC first light and the arrival of EMIR, and provides the following scientific capabilities to complement EMIR after its arrival: high-resolution imaging, narrowband imaging, high-time-resolution photometry, imaging- and spectro-polarimetry, low-resolution spectroscopy. In this poster, we review the status of CIRCE and future prospects. At the abstract deadline, CIRCE is being packed for shipping to GTC in May 2014, and is scheduled for deployment on-sky prior to the SEA meeting.

A Wedged Double Wollaston for linear polarimetry of Solar System bodies

Javier Gorosabel

Very recently our collaboration, formalized as "Unidad Asociada Grupo Ciencias Planetarias", has just purchased the Wedged Double Wollaston (WeDoWo) mounted at the 2.5m Nordic Optical Telescope (NOT). We intend to exploit scientifically the WeDoWo by performing polarimetric studies of Solar System bodies. Among different goals, we plan to investigate the atmospheric optical properties, limb polarization effects, the occurrence of polar hazes (as for Jupiter) and to characterize the particles in suspension in the atmospheres. The first tests carried out in the first half of 2014 with Jupiter have been really promising. Our intention is to extend the use of this device to other objects of the Solar System, where polarimetric observations could provide valuable physical information.

Technical scientific developments at the OAJ

Roberto Manuel Luis Simoes

The Observatorio Astrofísico de Javalambre in Spain is a new astronomical facility particularly conceived for carrying out large sky surveys with two unprecedented telescopes of unusually large fields of view: the JST/T250, a 2.55m telescope of 3deg field of view, and the JAST/T80, an 83cm telescope of 2deg field of view. The most immediate objective of the two telescopes for the next years is carrying out two unique photometric surveys of several thousands square degrees, J-PAS and J-PLUS, each of them with a wide range of scientific applications, like e.g. large structure cosmology and Dark Energy, galaxy evolution, supernovae, Milky Way structure, exoplanets, among many others. To do that, JST and JAST will be equipped with panoramic cameras under development within the J-PAS collaboration, JPCam and T80Cam respectively, which make use of large format ($\sim$ 10k x 10k) CCDs covering the entire focal plane.

This paper describes in detail the CEFCA developments of the overall facilities and infrastructures for the robotic observatory, giving a global overview of current deployment at OAJ passing through all specific areas of engineering knowledge.

Las simulaciones de la misión Gaia

Eduard Masana Fresno

La simulación de la telemetría y de los objetos observados por el satélite Gaia de la Agencia Espacial Europea fue una labor de gran importancia durante el desarrollo y preparación de la misión. Con estas simulaciones se pudieron analizar a fondo algunos aspectos de los intrumentos y se pusieron a punto los programas de reducción de datos que actulamente están procesando los datos reales de la misión. La generación de estas simulaciones estuvo a cargo de la denominada Coordination Unit 2 (CU2), la cual elaboró diferentes códigos para cubrir las necesidades de todos los grupos de trabajo (proceso de datos, objetos del sistema solar, fotometría, estrellas variables, ...). Para ejecutar estos códigos fueron necesarias millones de horas de CPU en superordenadores como el Marenostrum del Barcelona Supercomputing Center. En este póster presentamos un resumen del trabajo de la CU2 a lo largo de los años de preparación de la misión Gaia.

The Imaging and Slitless Spectroscopy Instrument for Surveys (ISSIS) for the World Space Observatory-Ultraviolet (WSO-UV): optical design, performances and verification tests.

Gracia Belén Perea Abarca

ISSIS is the instrument for imaging and slitless spectroscopy on-board WSO-UV. In this work, we present the current ISSIS design and their main characteristics. Also, we present the main performance verification for ISSIS to ensure that the current design of ISSIS fulfils the scientific requirements and to ensure the feasibility of the in flight calibration. We also define the facilities and technical characteristics for realizing the tests.

Desarrollo de un mecanismo criogénico de rueda de filtros en una misión espacial

Manuel Reina Aranda

In the last decades, Spain has built up a strong scientific community with a successfully contribution to space instruments. INTA by means of their Payloads and Scientific instruments Department has collaborated with the Spanish Universities and research institutions, on the achievement of such developments. Under the SPICA mission, INTA, focused on the SAFARI instrument requirements, but highly adaptable to other missions, has designed a cryogenic low dissipation filter wheel with six positions, taking as starting point the past experience of the team with the OSIRIS instrument (ROSETTA mission) filter wheels, and adapting the design to work at cryogenic temperatures. And where one of the main drivers of the mechanism design, is to use as much as possible of commercial components and test them at cryogenic temperature. This paper will put their focus on the experiences achieved during the design phase of the filter wheel, and the tests performed. The idea was to develop a cryogenic filter wheel using as much commercial components as possible. The main lessons are obtained from the design process, material selection for each of the main components of the mechanism, the design of elastic mount for the filter assembly, the design of the positioner device to provide positional accuracy and repeatability to the filter, allowing the locking of the position without dissipation and the motor selection. A series of cryogenic tests were performed in order to validate the material configuration selected, the ball bearing lubrication and the selection of the motor. And finally, a stepper motor characterization campaign was performed including heat dissipation measurements. All the above design and testing working, were developed under the initial system uncertainties, typical of space projects in phase A, which have had high influence on the design and development of the initial breadboard model.

Estudio cinemático preliminar para la generación de trayectorias del brazo robotizado de MIRADAS.

Josep Sabater

El Mid-resolution InfRAreD Astronomical Spectrograph (MIRADAS) es un espectrógrafo de infrarrojo cercano multi-objeto que opera a una resolución espectral R=20,000 en la banda 1-2.5μm para el Gran Telescopio Canarias (GTC). El instrumento posee un sistema de multiplexado (MXS) que le permite observar simultáneamente hasta veinte objetos localizados en su campo de visión. Estos objetivos seleccionados por el usuario son aquiridos por veinte brazos robóticos idénticos que están equipados con los elementos ópticos necesarios para propagar un haz de luz. Dichos brazos están repartidos, siendo mínima la separación entre ellos, de forma circular alrededor de una plataforma de soporte. Esta alta densidad de componentes mécanicos junto con la particular geometría de los brazos dificultan el control de los mismos y en especial la generación de trayectorias que eviten colisiones entre ellos. El mecanismo de MIRADAS presenta ventajas respecto a otros en cuanto a su estabilidad y diseño óptico. En cambio su movimiento en el plano resulta poco intuitivo y su control complejo, siendo de vital importancia un estudio del mismo. En este documento presentamos el brazo de MIRADAS, el cual consiste en una cadena cinemática cerrada compuesta por dos tubos, una barra y un total de cuatro articulaciones que realiza un movimiento planar. A sú vez proponemos un modelo cinemático para el mismo contrastado con el funcionamiento de un prototipo a escala real. También se presenta el concepto de zona de exclusión, de 'slice of pie' y el espacio de trabajo del brazo y su envolvente. Se enumeran finalmente las restricciones que imponen ciertos elementos usados en el prototipo que condicionan la creación de trayectorias satisfactorias.

Midiendo la contaminación lumínica: de arriba abajo y de abajo arriba.

Alejandro Sánchez de Miguel

El brillo de cielo es uno de los fénomenos que más entorpecen la observación astronómica, tanto cerca de las ciudades con el los observatorios de montaña. Actualmente hay varias iniciativas para el control de la contaminación lúminica, pero las medidas de brillo de cielo suelen ser de caracter local. Para poder ejercer un control adecuado de la contaminación lumínica es necesario realizar medidas de las fuentes contaminación lumínica y su relación con la variación espacio-temporal del brillo de cielo. Para ello utilizamos avrias aproximaciones: datos tomados en tierra con fotómetros SQM y lo relacionamos con las emisiones detectadas con los satélites DMSP y VIIRS. Tambien usamos datos multiespectrales tomados desde la Estación Espacial Internacional para distinguir los diferentes tipos de lámaparas que contriguyen a la contaminación lumínica. Por ultimo usamos un espectrografo SAND para el análisis temporal de la evolución de la contribución de la lámaras en el brillo de cielo de una gran ciudad como Madrid.

Catálogo de fuentes detectadas por el Monitor Óptico y Ultravioleta (OM) de XMM-Newton

Antonio Talavera Iniesta

El Catálogo de fuentes detectadas con OM (Versión 2) se hizo público en marzo de 2014. Está basado en todas las observaciones realizadas con XMM-Newton hasta diciembre de 2012: 6604 apuntados en los que se utilizó el instrumento OM. El catálogo contiene información fotométrica (magnitudes y flujos absolutos) de todas las fuentes detectadas en alguno de los filtros de OM (212 nm, 231 nm, 291 nm, 344 nm, 450 nm y 543 nm). En total 5,595,331 de fuentes correspondientes a 4,008,879 objetos únicos, de los cuales 692,223 han sido observados varias veces. El Catálogo es accesible a través del Archivo Científico de XMM-Newton: http://xmm.esac.esa.int/xsa/ Puede ser descargado en su totalidad, o bien se puede utilizar un interfaz para seleccionar objetos determinados. Presentamos algunos ejemplos de aplicación de los datos.

Mapas de distribución de brillo del cielo nocturno a partir de un número finito de medidas SQM.

Víctor Tilve Rúa

La distribución de brillo del cielo nocturno registrado en imágenes all-sky de cielos con contaminación lumínica media o alta puede aproximarse eficazmente mediante una serie polinómica de orden relativamente bajo. Esto abre la posibilidad de estimar esa distribución continua a partir de un conjunto discreto de medidas realizadas en distintas direcciones con un detector fotométrico de moderada resolución espacial. El objetivo de este trabajo es determinar el número óptimo de medidas y las direcciones en las que deben hacerse para obtener mapas de brillo de todo el cielo con unos niveles de exactitud y precisión prefijados, utilizando fotómetros tipo Sky Quality Meter (SQM). Para ello expresamos el valor del brillo real del cielo como una serie de polinomios de Zernike y modelamos las medidas del SQM en función del campo de visión del instrumento, el brillo real y el ruido. Los coeficientes de la serie están relacionados de forma sencilla con las medidas proporcionadas por el detector y pueden obtenerse a partir de estas mediante técnicas estándar de estimación lineal. Una vez obtenidos los coeficientes es inmediato calcular el mapa de brillo estimado en cualquier dirección del cielo. Para evaluar la calidad de estos mapas se compararán con los obtenidos mediante cámaras all-sky de alta resolución espacial, como el sistema de monitorización de la calidad del cielo y contaminación lumínica ASTMon o similares. El objetivo de este póster es presentar los modelos matriciales del brillo del cielo y de las medidas SQM, el análisis de los errores de primer y segundo orden cometidos en la estimación, los avances en la resolución de diversos problemas matemáticos que surgen en este estudio y los primeros resultados obtenidos en la reconstrucción de los mapas all-sky.

Geomagnetic Field Effects and Crab Nebula Spectrum with Gamma-Rays MAGIC telescope (Efecto del campo magnético terrestre y espectro de la Nebulosa del Cangrejo con los Telescopio de Rayos Gamma MAGIC)

Igone Urdampilleta

Los telescopios de Rayos Gamma MAGIC localizados en el Observatorio del Roque de los Muchachos en la isla de La Palma, forman el observatorio terrestre capaz de detectar fuentes astronómicas de rayos gamma de alta energía a las energías más bajas. Con sus espejos de 17 metros de diámetro, los telescopios de MAGIC pueden alcanzar un umbral de energía de unos 60 GeV. A estas bajas energías la influencia que el campo geomagnético terrestre ejerce sobre las cascadas atmosféricas puede ser apreciada. Aunque es un efecto inevitable que se incluye en las simulaciones utilizadas en el análisis de datos, una mejor caracterización del efecto sobre rayos gamma y fondo de hadrones podría ayudar a mejorar el análisis de datos en aquellas direcciones de observación donde el campo magnético terrestre ejerce una mayor influencia. Éste estudio es un primer paso para evaluar este efecto en datos reales con los telescopios MAGIC usando datos stereo tras las últimas mejoras realizadas en los telescopios. Se utilizará el software de análisis y los datos del experimento MAGIC para medir la influencia del campo magnético en las imágenes de las cascadas atmosféricas procedentes de la Nebulosa del Cangrejo (la fuente de referencia en astronomía de rayos gamma de muy alta energía) y en el espectro de energía observado.

Extinction, seeing and sky transparency monitoring at the Observatorio Astrofísico de Javalambre for J-PAS and J-PLUS calibration and scheduling

Héctor Vázquez Ramió

The Javalambre-Physics of the Accelerating Universe Astrophysical Survey (J-PAS) and the Javalambre-Photometric Local Universe Survey (J-PLUS) will be conducted at the brand-new Observatorio de Astrofísica de Javalambre (OAJ) in Teruel, Spain. The J-PLUS is going to start during the summer of 2014 while the J-PAS first light is expected to happen along 2015. Besides the two main telescopes (with 2.5m and 80cm apertures), several smaller-sized facilities are present at the OAJ devoted to site characterization (SEA 2014 contribution: "Meteorological and atmospheric turbulence properties at the Observatorio Astrofísico de Javalambre") and supporting measurements to be used to calibrate the J-PAS and J-PLUS photometry and to feed up the OAJ scheduler with input parameters, in particular: the integrated seeing and the sky transparency. The instruments in charge of these measurements are three: an extinction monitor an 11" telescope estimating the atmospheric extinction at a set of ten selected bands in order to trace the Observatory's extinction curve, which is the initial step to the J-PAS overall photometric calibration procedure; an 8" telescope implementing the Differential Image Motion Monitor (DIMM) technique to obtain the integrated seeing; and an All-Sky Transmission MONitor (ASTMON), a roughly all-sky instrument providing the sky transparency as well as sky brightness and the atmospheric extinction too. The main technical features of these instruments, their performance, their up-to-date results and their importance in the context of the-J PAS, J-PLUS and the general operation of the Observatory are addressed here.

La Vía Láctea y sus Componentes

Sesión G1

Magnetars: the explosive behavior of strongly magnetized neutron stars

[Conferencia Invitada]

Nanda Rea

I will review recent theoretical and observational results on strongly magnetized neutron stars, then focusing on recent results on magnetar progenitors, and on the discovery of a few peculiar magnetars that have recently changed, and deepen our understanding of these bursting pulsars. I will briefly report on the neutron star 'grand unification' theory, and its consequence on the Galactic neutron star census. These new results might have important consequences also on other research fields such as gamma-ray bursts, massive stars, and gravitational waves.

Búsqueda de estrellas de baja masa, enanas marrones y sistemas binarios con ayuda del VO y HST

Miriam Aberasturi Vega

Las estrellas de más baja masa y enanas marrones (tipos espectrales M, L, T, Y) son los objetos más abundantes en la Vía Láctea, llegando a componer el 80 % de la materia luminosa en un radio de 10 pc. Un censo completo de esta población nos proporcionaría información acerca de la función inicial de masas, procesos de formación estelar y cinemática de la Galaxia. Con objeto de incrementar el número de objetos conocidos en la vecindad solar (d $<$ 30pc) hicimos uso del Observatorio Virtual, haciendo posible el manejo de información que contienen las grandes bases de datos. Prueba del éxito de nuestro estudio, son los resultados obtenidos en las siguientes tres líneas de trabajo: * Detección de estrellas M brillantes y cercanas * Identificación de enanas marrones en WISE/2MASS/SDSS * Estudio de la multiplicidad de enanas marrones con tipos espectrales posteriores a T5. En esta presentación describiremos la metodología utilizada y los resultados obtenidos en cada uno de los proyectos anteriormente mencionados.

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11 años de OMC, la cámara óptica a bordo del satélite INTEGRAL

Julia Alfonso Garzón

OMC, la cámara óptica a bordo del observatorio espacial INTEGRAL de la ESA, proporciona fotometría en la banda V de Johnson al mismo tiempo que los instrumentos principales toman imágenes y espectros en rayos gamma blandos. Tras 11 años de operaciones, OMC ha monitorizado 147 110 fuentes potencialmente variables. El archivo de datos de OMC contiene en estos momentos curvas de luz con más de 50 puntos fotométricos para cerca de 80 000 fuentes. La larga duración de la misión ha permitido compilar curvas de luz con una base temporal de más de una década, con una calibración fotométrica estable y consistente. En esta comunicación presentamos un resumen de los resultados obtenidos, incluyendo la elaboración del catálogo de fuentes variables en el óptico, varios estudios de correlaciones temporales entre distintos rangos de energía y el estudio de las curvas de luz de las dos supernovas observadas por OMC.

Inconsistencias en la aplicación del análisis armónico a estrellas pulsantes

Javier Pascual Granado

El análisis armónico es el método matemático fundamental para la identificación de frecuencias de pulsación en astrosismología y en otros muchos campos de la física. En esta contribución presentamos un test para evaluar la validez de la hipótesis en la que está basado el teorema de Fourier: la convergencia de la expansión. Las numerosas dificultades surgidas a la hora de interpretar los periodogramas de estrellas observadas por los satélites CoRoT y Kepler nos han llevado a comprobar si la función subyacente a las series temporales de estrellas pulsantes es analítica. Sorprendentemente, el resultado principal es que éstas provienen de funciones no analíticas y, por tanto, no se puede garantizar que se cumpla el teorema de Parseval. Esta inconsistencia se ha encontrado al estudiar series temporales de estrellas pulsantes pero podría extenderse a todo dominio de la física en que no se pruebe previamente la convergencia de la expansión en series de Fourier con un test adecuado.

A mid-IR imaging search for substellar companions of the nearest stars.

Bartosz Gauza

At the relatively old ages of the solar vicinity, very low-mass brown dwarfs and massive planetary companions have cooled down to temperatures below 500-600 K and emit most of their flux in the mid-IR. In this talk I will outline the first results of our program aiming at detection of substellar companions of the nearest stars of the Northern Hemisphere. We use the mid-infrared instrument CanariCam operating at the 10.4 m GTC telescope, to perform a deep, direct imaging search in the N-band (Si-2 filter, 8.7 micron), reaching the diffraction limit of the telescope. We are sensitive to objects with fluxes above 0.5 mJy at 8.7 microns and at separations in the range from 1 to 10 arcsec, which translates into planet masses down to 10 MJup and physical separations of ∼5-45 AU for our sample stars. These separations imply relatively long orbital periods (P>12 yrs), which are yet unexplored with astrometry or radial velocity programs, and offers a unique opportunity to explore the separations where giant planets are expected to form.

An XMM-Newton view of FeKalpha in HMXBs

Angel Gimenez Garcia

FeKalpha line is a key tool to better understand the physical properties of the circumstellar medium in High Mass X-ray Binaries (HMXBs). We have collected observations from 47 HMXBs, detecting FeKalpha in 21 of them. We have used the standard classification of HMXBs to divide the sample in different groups. We find that (1) different classes of HMXBs display different qualitative behaviour in the FeKalpha spectral region. (2) The flux of the continuum is well correlated with the flux of the line, as expected. Eclipse observations show that the Fe fluorescence emission comes from an extended region surrounding the X-ray source. (3) FeKalpha is narrow, reflecting that the reprocessing material does not move at high speeds. We attempt to explain the broadness of the line in terms of three possible broadening phenomena: line blending, Compton scattering and Doppler shifts (with velocities of the reprocessing material V∼1000km/s). (4) The line is centered at a mean value of 6.42 keV, compatible with FeXIV-XVII. (5) The equivalent hydrogen column (NH) directly correlates with the equivalent width of FeKalpha, displaying clear similarities to numerical simulations. It indicates that the absorbing region is responsible for the fluorescent emission. (6) The observed NH in Supergiant X-ray Binaries (SGXBs) is in general higher than in Supergiant Fast X-ray Binaries (SFXTs). We interpret this divergence as caused by a different interaction between the compact object and the circumstellar medium in the two kinds of systems. (7) Finally, we analyzed in more detail the sources IGR∼J16320-4751 and 4U∼1700-37, covering different orbital phases. The observed variation of NH between different phases is compatible with the absorption produced by the wind of their optical companions. Summarizing, the obtained results clearly point to a very important contribution of the donor's wind in the FeKalpha emission and the absorption, when the donor is a supergiant massive star.

Sesión G2

Gaia es ya una realidad

[Conferencia Invitada]

Carme Jordi Nebot

Gaia, la misión astrométrica de la ESA que realizará un mapa 3D de mil millones de estrellas de nuestra Galaxia, se lanzó con éxito en diciembre-2013. En el momento de escribir este resumen está en plena fase de comisionado y cuando tenga lugar la XI RC ya estaremos de operación nominal. El módulo de servicio, el sistema de micropropulsión, la antena de transmisión de datos y el reloj atómico a bordo están funcionando según las especificaciones, o incluso mejor. Los instrumentos científicos, los 106 CCD y los ordenadores que controlan sus operaciones funcionan a la perfección. La alineación y enfoque de los dos telescopios se ha realizado con resultados muy satisfactorios para los tres instrumentos (astrométrico, fotométrico y espectroscópico). En tierra, la recepción y procesado de datos por parte de ESOC y del 'Data Processing and Analysis Consortium' funciona a pleno rendimiento. Un par de aspectos que no cumplen las expectativas. Gaia tiene magnitud aparente unas 3 mag más débil de lo previsto. Ésto ha podido solventarse introduciendo telescopios de clase 2m (Liverpool en Canarias y VST en ESO-Paranal) para el seguimiento desde Tierra. Algo más preocupante es una pérdida de reflectividad debida al depósito de hielo en los componentes ópticos y la presencia de luz difractada, dos efectos probablemente relacionados. Con las campañas de descontaminación (calentando los elementos ópticos), la presencia de hielo se ha reducido pero no eliminado completamente. En este momento, se está estudiando otra campaña de descontaminación. En paralelo, siguen con normalidad las otras tareas de comisionado. En esta charla haremos balance final de la fase de comisionado, del estado de la misión, de la reevaluación de las precisiones al final de la misma, y por tanto, de las perspectivas científicas, perspectivas que implican la mayoría de los ámbitos de la astrofísica de las próximas décadas.

Galactic warp kinematics: model vs. observations

Hoda Abedi

We explore the possibility of detecting and characterizing the warp of the stellar disc of the Milky Way using synthetic Gaia data. A new kinematic model for the warp is proposed. We use random realizations of test particles which evolve in a realistic Galactic potential that is warped adiabatically to various final configurations. In some cases a twist is introduced additionally. The Gaia observational constraints, its errors model and a realistic 3D extinction map are applied to mimic three tracer populations: OB, A and Red Clump stars. A family of Great Circle Cell Counts (GC3) methods is used to detect and measure the warp parameters. Moreover, using Red Clump stars and early A type stars from UCAC4 star catalogue, we search for the kinematic signature of the warp in the observational space of Galactic proper motions.

Cúmulos Estelares en el proyecto GES (Gaia-ESO Survey)

Emilio J. Alfaro Navarro

El pasado 19 de diciembre el satélite Gaia fue lanzado al espacio desde la Guayana Francesa, así dio comienzo la última etapa de la misión espacial galáctica más ambiciosa de todos los tiempos: la determinación de un mapa estelar de la Galaxia con mil millones de estrellas. Gaia medirá con precisión las componentes del espacio fase de estos objetos hasta magnitud V∼15 pero las estrellas más débiles de la muestra no serán observadas espectroscópicamente. Gaia-ESO Survey (GES) fue diseñado para medir con precisión la velocidad radial y la metalicidad de cien mil estrellas del hemisferio Sur hasta V∼19, incluyendo cien cúmulos estelares y proporcionando por tanto información complementaria a Gaia para una porción no despreciable de la Galaxia. La comunidad española está participando activamente en este consorcio donde interviene en diferentes paquetes de trabajo. Aunque todavía continúa la fase de observación, ya se han reducido los datos de unas decenas de cúmulos y se han publicado una veintena de artículos que han tenido gran impacto en el campo. En esta comunicación queremos presentar los resultados obtenidos hasta la fecha para los cúmulos estelares estudiados por GES y analizar su impacto y prospección con vista al diseño de nuevos proyectos relacionados con el sistema de cúmulos estelares estudiados y/o detectados por esta misión. Gaia necesitará observaciones espectroscópicas complementarias en diferentes épocas de su desarrollo y España con GTC+OSIRIS(MOS) y la herramienta WHT+WEAVE está en condiciones de liderar esta tarea en el hemisferio Norte.

The first Be/BH binary system: discovery and implications

Marc Ribó

Stellar-mass black holes have all been discovered through X-ray emission, which arises from the accretion of gas from their binary companions. Binary evolution models predict the existence of black holes accreting from the equatorial envelope of rapidly spinning Be-type stars. However, among the ∼80 Be X-ray binaries known in the Galaxy, only pulsating neutron stars have been found as companions. In this talk I present the first dynamical evidence for a 3.8-6.9 Msun BH orbiting a Be star, MWC 656, which is the candidate optical counterpart of the high-energy gamma-ray source AGL J2241+4454. This discovery has been allowed by the detection of a HeII emission line from an acretion disc encircling the BH. I also present the discovery with XMM-Newton of a faint X-ray counterpart of MWC 656, which shows both thermal and non-thermal emission. The thermal component is associated with the hot wind of the Be star, whereas the power-law component is associated with emission from the vicinity of the BH in quiescence. These discoveries imply that Be binaries with black-hole companions are difficult to detect by conventional X-ray surveys and may be more abundant than predicted by population synthesis models. In addition, MWC 656 will allow us to study the accretion and the accretion/ejection coupling in BH high mass X-ray binaries at low luminosities for the first time.

Searching for unknown counterparts in X-ray binary systems using Virtual Observatory tools

José Joaquín Rodes Roca

In the framework of an ongoing programme, we have developed strategies to discover and characterize optical/infrared unknown counterparts to X-ray binary systems using the standard tools of the Virtual Observatory. First, we have selected some potential candidates from different X-ray catalogues. Then we have used the Virtual Observatory tools to search for optical and infrared point data sources that were coincident with the position of the X-ray source. In this work we present some examples of our ongoing programme showing the potential of the Virtual Observatory as a discovery tool.

Chemical abundances of the secondary star in the X-ray binary Cygnus X-2

Lucía Suárez Andrés

Spectroscopic data of low-mass X-ray binaries, in particular spectral features formed in the companion's atmosphere, can provide valuable information on supernova properties. In these systems the companion star is probably close enough to be polluted by some of the matter ejected during the supernova (SN) event of the progenitor of the compact object. The X-ray binary Cygnus X-2, containing a high-mass (aprox $1.7M_{\odot}$) neutron star (NS), and a 0.6 $M_{\odot}$ F-type secondary star was observed with UES@4.2-WHT at the Observatorio del Roque de los Muchachos (ORM) in La Palma. We have analysed in detail the high-resolution spectra of Cygnus X-2 to obtain the stellar parameters of the companion, taking into account any possible veiling from the accretion disk surrounding the neutron star. We have studied the chemical abundances, including alpha-elements as O or Mg and some Fe-peak elements, as Ni, to search for signatures of chemical anomalies that could have been imprinted on the secondary star in the SN event. We find a super-solar Fe content in the companion star, and that most of the studied alpha-elements, with the exception of oxygen, are enhanced in comparison with abundances in thin-disk stars with the same Fe content. Also, the presence of Li in this system has been studied and will be discussed within an evolutionary context. Our results suggest that the secondary star may have captured a significant amount of the ejected matter during the SN explosion. We have explored different SNe explosion scenarios that could give us information on the progenitor of the compact object: our results suggest that an aspherical symmetric explosion is the most plausible scenario, suggesting a different situation as the one found in the NS-XB Cen X-4 (González Hernández et al. 2005). We will discuss the implications of these results within this talk.

Sesión G3

The Gaia-ESO Survey: Chemical Evolution of the Globular Cluster NGC 4372

Izaskun San Roman

While conceptually simple, globular clusters are extremely interesting in the sense that they show a large variation in the abundances of light elements both internally and between clusters. However, the abundances of heavier alpha, iron-peak and neutron-capture elements do not, in general, show the same star-to-star variation. These chemical signatures are indicative of the presence of multiple stellar populations in a stellar cluster.

With an estimated age close to that of 47 Tuc and M15, NGC 4372 is one of the most metal-poor Galactic Globular Clusters. At a distance of 5.8kpc (l = 301°, b = -10°), NGC 4372 lies behind moderate optical obscuration. However with limited spectroscopic data available, little is known about its abundance variations. We present here the first high-resolution spectroscopic analysis of NGC 4372. We have performed a detailed chemical abundance analysis of seven red giant branch stars observed with VLT/UVES as part of the Gaia-ESO Survey. We have analyzed a large amount of elements (e.g. light elements, alpha-elements, iron peak elements and neutron capture elements), analyzed its stellar population and studied the chemical evolution of the cluster. We found a metallicity value of [Fe/H]= -2.19 ± 0.03 showing no evidence for an intrinsic Fe abundance spread. However significant spreads are observed in the abundances of the analyzed light elements. We confirm the presence of an extended Na-O anticorrelation. A clear Mg-Al anti-correlation is also evident in our data. This behavior is in agreement with the signature found among massive clusters and/or metal-poor clusters. Analysis of NGC4372 chemical signature appears similar to that of Galactic Globular Clusters ruling out an extragalactic origin.

The nature of FS CMa stars as revealed by host young clusters.

Diego de la Fuente Guillén

The B[e] phenomenon is defined as the presence of forbidden emission lines in the spectra of early-type stars with strong infrared excess. The nature and evolutionary state of the diverse objects displaying such phenomenon are reasonably known, except for a rare subtype named FS CMa stars. These are surrounded by compact disks of warm dust whose origin is unclear. Although the luminosity of these objects corresponds to main-sequence stars, mass loss rates derived from emission lines are 1-2 orders of magnitude larger than predicted by wind theory. Hitherto, FS CMa stars have been only found in isolation, which hinders the study of their nature. In this contribution, we present new serendipitous discoveries of FS CMa stars in two young Galactic clusters hosting Wolf-Rayet stars and OB supergiants. Membership to these coeval populations allows us to constrain the luminosity, circumstellar extinction and age of FS CMa stars with unprecedented accuracy. Due to their relatively low brightness when compared with coeval evolved massive stars, a high number of these stars may remain unnoticed in young clusters. If our finding is the tip of the iceberg of a hidden population of FS CMa stars, these objects would constitute a significant source of dust in regions of recent star formation.

Towards a complete brown dwarf binary fraction including spectroscopic binaries

Elena Manjavacas

Peculiar brown dwarf (BD) spectra or the divergence in optical and near-infrared spectral type classification may be a sign indicating tight BDs systems or low-gravity single BDs. A proper characterization of these peculiar spectra may help either to understand the formation mechanisms of BDs, in the first case, or to identify the least massive objects in star-formation regions, to explain the origin of these peculiar spectroscopic properties in directly-imaged planets and BDs companions, in the second case. We obtain high-resolution spectra in the optical (550-1000 nm, R∼5400) and the near-infrared (1000-2500 nm, R∼3300). Our sample is compound of 22 BDs with optical spectral types between L3 and T7 and peculiar spectra or different classification in the optical and the near-infrared. These objects are candidates to be tight brown dwarfs binary systems. We aim to empirically confirm or refute the binarity of our targets. We also test whether atmospheric models reproduce the physics in the atmospheres of these objects. We used the Wideband ultraviolet-infrared single target spectrograph (X-Shooter) at the Very Large Telescope (VLT) to obtain the spectra of our objects. We compared them to those of mature and young BDs, and young late-type companions to nearby stars with known ages, and combinations of all these spectra, to identify possible tight binaries BDs. We computed spectral indices to derive near-infrared spectral types. Finally, we found the best fit between each spectrum and synthetic spectra from the BT-Settl 2010 and 2013 atmospheric models. Using the best fit, we derived the atmospheric parameters of the objects and identify which spectral characteristics the models do not reproduce.

Espectropolarimetría para el estudio del magnetismo y la morfología de nebulosas planetarias

María Jesús Martínez González

En lugar de ser esféricas, más del 80 % de las nebulosas planetarias muestran formas asimétricas y/o bipolares. Para dar cuenta de esas morfologías tan complejas, existen dos teorías alternativas. Una de ellas supone que un sistema binario en el centro de la nebulosa podría ser el responsable debido a la interacción de los vientos estelares y la influencia de las órbitas en éstos. La otra sugiere que la presencia de un campo magnético (mayoritariamente dipolar) sería un canal para el viento estelar, escapando por los polos. La polarización de la luz es compatible con las roturas de simetría intrínsecas del plasma que la emite. Por tanto, una buena opción para estudiar los mecanismos que podrían estar rompiendo la esfericidad de los vientos estelares que formarán las nebulosas planetarias. Además, en particular, una rotura de simetría puede producirse por la presencia de un campo magnético. La polarimetría y, especialmente, la espectropolarimetría, nos permite obtener de manera cuantitativa información sobre el campo magnético. En esta contribución presentamos los últimos resultados sobre magnetismo en estrellas centrales de nebulosas planetarias, mostrando que el campo magnético no parece jugar un papel excesivamente importante en la morfología de estos objetos. También nos centraremos en el caso particular de la proto-planetaria conocida como el Rectángulo Rojo. Mostraremos cómo la espectropolarimetría de este objeto descarta algunos de los mecanismos de formación propuestos para darle esa forma bicónica.

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s-process enrichments in the planetary nebula NGC3918: results from deep VLT echelle spectrophotometry

Jorge García Rojas

About half of the heavy elements (Z>30) in the Universe are formed by s-process nucleosynthesis in AGB stars. Several of these elements, whose detection is difficult or uncertain in AGB stars, can be detected in planetary nebulae (PNe) by means of deep high-resolution spectroscopy. We present deep high-resolution (R∼40000) UVES@VLT spectrophotometric data of the planetary nebula NGC3918. This is one of the deepest spectra ever taken of a planetary nebula. We have identified and measured more than 700 emission lines and, in particular, we have detected very faint ionic lines of several neutron-capture elements (Kr, Xe and Rb) that enable us to compute their chemical abundances with unprecedented accuracy, thus constraining the efficiency of the s-process and convective dredge-up. An important advantage of these data are the high spectral resolution and the strong dependence of the line profile on the excitation of the line, allowing us to robustly deblend the faint neutron-capture lines from other close-by emission lines. These data will also make it possible to verify the consistency of current ICFs based on photoionization modelling, which are critical to hone nebular spectroscopy into an effective tool for studying s-process nucleosynthesis.

Maser emission of the most abundant SiO isotopomers in O-rich stars

Ricardo Rizzo Caminos

SiO maser emission constitutes one of the most puzzling cases in spectroscopy. The overall inversion of the rotational transitions in each vibrational ladder is rather well understood. However, there are a number of anomalies in specific rotational transitions of 28SiO, 29SiO, and 30SiO, at some vibrationally excited levels, that are still unexplained. O-rich stars are probably the most powerful maser emitters known to date, and therefore the kind of sources suitable to observe and model the SiO maser emission at different rotational and vibrational levels. These sources, however, are highly variable and span a large range of mass-loss rates; these facts difficult appropriate modeling of the emission. In order to properly tackle the SiO excitation problem, it is vital to simultaneously observe a large number of SiO (and isotopomers) lines in a large and varied sample of sources. We profit the availability of new wideband backends to carry out a deep survey of SiO, 29SiO, 30SiO maser emission, in a sample of 67 evolved O-rich stars. The survey was done using the DSS-54 antenna at the Madrid Deep Space Communications complex in Robledo, and the IRAM 30m radio telescope at Pico Veleta. A total of 66 lines were observed, including rotational transitions from J=1-0 to 5-4, for vibrational levels from 0 to 6. The main results of the survey are presented, together with preliminary outcomes about lineal and circular polarization, and the detection of other molecules in the available spectra.

Binary stars in loose associations: HD 160934 and AB Dor B

Rebecca Azulay

Precise determination of dynamical masses of pre-main- sequence (PMS) stars are necessary to calibrate PMS stellar evolutionary models, whose predictions are in disagreement with measurements for masses below 1.2 $M_\odot$. Binary stars in young, nearby loose associations are particularly good candidates, since all members share a common age. We will present phase-reference VLBI observations of two binary systems that belong to the AB Doradus moving , HD 160934 A/c and AB Dor Ba/Bb, from which we have measured both the relative and absolute orbital motion. Accordingly, we obtained precise estimates of the mass of the components of these binaries (ranging from 0.15 to 0.7 $M_\odot$). We will show how these measurements provide precise calibration points for testing PMS models of low-mass stars.

Sesión G4

Deriving extinction laws with O stars: from the optical to the IR

[Conferencia Invitada]

Jesús Maíz Apellániz

We have recently derived a family of extinction laws for 30 Doradus that provides better fits to the optical photometry of obscured stars in the Galaxy and the LMC. Simultaneously, we are extending our Galactic O-Star Spectroscopic Survey (GOSSS) to fainter, more extinguished stars to obtain accurate spectral types for massive stars with more than 6 magnitudes of V-band extinction. I have combined both lines of research with 2MASS, WISE, and Spitzer photometry to obtain the 1-10 micron extinction law for O stars in the solar neighborhood. I will present these results and compare them with the extinction laws in the same wavelength range derived from late-type stars and H II regions.

The Perseus arm in the anticenter direction

Maria Monguió Montells

The Perseus arm in the Galactic anticenter direction has been studied through a Strömgren photometric survey developed with the Wide Field Camera at the Isaac Newton Telescope (Monguió et al. 2013). The individual physical parameters for the stars in the survey have been computed through both, pre-Hipparcos empirical calibrations and a new method based on stellar atmospheric models and evolutionary tracks (Monguió et al. 2014, accepted). We used different samples of intermediate young stars to trace the surface density in the anticenter direction. The Perseus arm has been detected at 1.7kpc from the Sun, with a significance between 6 % and 17 % and a stellar overdensity between 3 % and 8 %. The surface density at the Sun position has been computed following the same steps, and using Hauck & Mermilliod (1998) Strömgren data for OBA stars. The exponential fits developed lead to scale lengths of the Galaxy between 2.9 and 3.5kpc for the different star samples. The data also allowed us to create a 3D extinction map in the anticenter. Through the analysis of the absorption distribution at different distances from the Sun, a change of slope was detected at 1.7kpc. This is coherent with a dust layer in front of the Perseus arm location, thus we could set a lower limit for the corotation radius and a higher limit for the pattern speed of the spiral perturbation. This is the first time that the presence of the Perseus arm has been detected through individual stellar counts, and its location is being supported by the dust distribution.

CAFÉ-BEANS: An exhaustive hunt for high-mass binaries

Ignacio Negueruela Díez

The Calar Alto Fiber-fed Échelle Binary Evolution Andalusian Northern Survey (CAFÉ-BEANS) is an ongoing homogeneous survey of high-resolution spectroscopy for O-type stars. The project, which has been running for almost two years now, utilises the Calar Alto Fiber-fed Échelle (CAFÉ) spectrograph to obtain spectra of a sample formed by all O-type stars in the Northern hemisphere with B<8 and some of the most interesting known binaries with fainter magnitudes, totalling 100 O-type stars. Observations collected at random times are used to search for binarity. Once a star is determined to be a binary, we exploit the flexibility of Calar Alto service mode to obtain observations close to the quadratures to measure the orbital parameters. In this talk, I will present an overview of the programme, ion criteria, status of the project and some of the most interesting scientific results that we have obtained so far, including a preliminary solution for the hierarchical triple system HD17505A.

The IACOB project: a new era in the study of Galactic OB stars

Sergio Simón-Díaz

The IACOB project is an ambitious project aimed at progressing in our knowledge of Galactic massive stars using a large, homogeneous, high-quality spectroscopic dataset (∼3000 spectra of ∼400 Galactic OB stars), and modern tools for its scientific exploitation (including state-of-the-art stellar atmosphere models and techniques for the quantitative spectroscopic analysis of O and B-type stars as well as evolutionary codes). The project is divided into six main working packages. The first one is devoted to the compilation of the IACOB spectroscopic database of Northern Galactic OB stars, a very important piece of the project that is now completed. The other five refer to the scientific exploitation of this unique database of high-resolution spectra, covering several aspects of interest in the massive star research: (WP-1) The IACOB spectroscopic database, (WP-2) Line-broadening in OB stars, (WP-3) Quantitative spectroscopic analyses, (WP-4) Abundances in OB-type stars, (WP-5) Binary/multiple systems, (WP-6) Massive stars and the ISM. In this talk I will present a brief overview of the IACOB project (with special emphasis on the importance of this project for the upcoming Gaia revolution), and summarize some of the main results obtained to date from the scientific exploitation of the IACOB spectroscopic database.

Simulations of activity jitter on the caracterization of exoplanet atmospheres

Enrique Herrero Casas

Stellar activity in late-type main sequence stars induces photometric modulations and apparent radial velocity variations that may hamper the detection of Earth-like planets and the measurement of their size, mass and atmospheric properties. The effect of stellar activity in the photosphere is seen in the form of spots and faculae, whose relationship with stellar parameters such as mass and age is still not well understood. Significant improvement in our knowledge of activity effects on starlight will be crucial to make the most of present and future planet search instruments and space missions. In this work we present a methodology to simulate time series spectra from the photosphere of a hosting rotating star with spots and faculae by computing the contribution of a grid of small surface elements, each one modeled using Phoenix synthetic spectra. This allows us to characterize the effects of activity jitter on multi-band photometry and radial velocity data, as well as to design strategies to correct or remove them on time series observations. The methodology is applied to the case of HD189733, a K5V star hosting a Hot Jupiter planet. Simultaneous MOST/SOPHIE observations are available, which permit to model the surface map and obtain synthetic photometry of the transit events in several filters. This is to study the effects of spots on the measurement of the planet's atmosphere. Moreover, this allows to reproduce the radial velocity signal produced by spots and to evaluate its effects on the measurement of the system parameters. We also present the most recent advances on the strategies to correct for activity jitter on both photometric and spectroscopic data in order to optimize exoplanet search and measurement experiments.

Characterizing brown dwarfs of the Galactic halo

ZengHua Zhang

Metal-deficient brown dwarfs are kinematically associated with the Galactic halo and thick disc. Our knowledge of halo brown dwarfs are limited due to the lack of known L subdwarfs and well tested low-metallicity atmospheric models. There are only 20 L subdwarfs (some are d/sdL) been published in the literature (see Kirkpatrick et al. 2014). I started to search for mid-late type L subdwarfs in UKIDSS and SDSS in 2010, and have confirmed 20 new L subdwarfs with spectra so far, including five (e)sdL6+ (e.g. Zhang et al 2013b). I am expecting more new L subdwafs in our GTC/OSIRIS run in 2014A. I will summarize the current sample of mid-late type subdwarfs, and discuss responses of L subdwarf spectra to changes of metallicity and effective temperature (mass). Then discuss the spectroscopic indicators for L subdwarfs and halo brown dwarfs. I found that the substellar subdwarf gap is likely between (e)sdL4 and (e)sdL6 (Zhang et al. 2013a). I will also compare our L subdwarf sample with Drift-Phoenix (Witte et al. 2009) and BT-settl (Allard et al. 2011) model spectra to support my conclusions. Then I will discuss how future facilities will help us to understand halo brown dwarf population, and how halo brown dwarfs could help us to understand the evolution of brown dwarfs and Galactic halo.

Sesión G5

Dynamical processes in the disc of the Milky Way and Gaia perspective

[Conferencia Invitada]

Teresa Antoja

The dynamics of the disc of our Galaxy is shaped by a complex interplay of processes. For instance, the movement of stars is influenced by the spiral arms and the bar through mechanisms like resonant trapping, scattering and radial mixing. I will review some of these processes and how we model them using controlled simulations. I will also show that these dynamical mechanisms leave strong signatures on the stellar kinematics that we observe today. The models predict overdensities of stars trapped in periodic orbits or non-null mean galactocentric radial velocities at specific positions in the Galaxy, which are not expected in the velocity distributions of an axisymmetric galaxy. As an example, I will show how we have already detected some Galactic bar signatures in the RAVE catalogue, which has allowed us to measure the bar's pattern speed. With ESA's Gaia mission the detection of these signatures will be no longer limited to the Solar vicinity and from these we expect to learn significantly more about the Galaxy's bar and spiral structure, and their effect on stellar orbits and clusters.

Identificación y clasificación de supergigantes rojas

Ricardo Dorda Laforet

En los últimos años varios trabajos han puesto de manifiesto la gran importancia de las estrellas supergigantes rojas. Su altísima luminosidad, baja temperatura y corta edad las convierten en herramientas clave, tanto para estudiar la estructura galáctica y la formación estelar en regiones poco accesibles debido a la extinción, como para comprobar la validez de los modelos de evolución estelar. Ahora bien, son objetos esquivos. Sus características fotométricas no pueden distinguirlas de gigantes rojas, por lo que se requieren estudios espectroscópicos para identificarlas y clasificarlas. Sin embargo, existen tres problemas. Primero, el número de estándares definidas es muy pequeño, especialmente en los tipos espectrales más tardíos. Segundo, las supergigantes rojas frecuentemente son variables, sobre todo en los tipos espectrales más tardíos. Tercero, la aparición de bandas de TiO debilita e incluso hace desaparecer las líneas atómicas de los espectros más tardíos, provocando que las gigantes y las supergigantes rojas de tipo espectral M se puedan confundir fácilmente entre ellas. Pese a todo ello, hasta la fecha no se ha hecho un estudio detallado de sus características espectrales con una muestra estadísticamente significativa, atendiendo, además, al efecto de la metalicidad en dichas características. En este trabajo comprende el análisis espectroscópico multiépoca de más de 200 supergigantes rojas, la mayor muestra estudiada de forma sistemática hasta la fecha, con estrellas provenientes de ambientes muy diferentes: SMC, LMC y la Galaxia. Esta muestra ha sino analizada a resolución intermedia, tanto en la región azul del espectro como en la región del triplete infrarrojo del Ca. Los índices obtenidos distinguen correctamente tipo espectral, clase de luminosidad y el efecto de la metalicidad, incluso si las bandas de TiO, los principales indicadores de tipo espectral en estrellas M, no estan dentro del rango espectral considerado, como ocurre en el caso de Gaia.

Gaia capabilities to determine the length and angle of the Galactic bar

Merce Romero-Gómez

We use a test particle simulation evolved under a 3D potential that includes a Galactic bar to analyse the Gaia capabilities to determine the length and the angle of the Galactic bar. Using the pre-commissioning Gaia science performance models, we generate two realistic mock catalogues of Red Clump K giants. The first includes all stars up to Gaia magnitude, G, 20. The second requires good radial velocities from the Gaia RVS, so we allow a specific maximum error in radial velocity. Once the data from the commissioning phase have been analysed, we will be able to update the performance models and to generate and analyse new catalogues using more realistic input. For the catalogues available at the moment, we plot, for the first time, the stellar surface density in the space of Gaia observables (parallax, galactic longitude). In this space we study the Gaia capabilities to recover the bar characteristics imposed in the analytical potential. If we combine the Gaia data with photometric IR distances, we can recover the bar length and the angle with respect to the Sun - Galactic Centre line.

Origin of Galactic type-Ia Supernovae

Jonay I. González Hernández

Type Ia supernovae (SNe Ia) are the best known cosmological distance indicators at high redshifts. Their use led to the discovery of the currently accelerating expansion of the universe (see e.g. Perlmutter et al. 1999). These SNe are thought to occur when a white dwarf made of carbon and oxygen accretes sufficient mass to trigger a thermonuclear explosion. The explosion could occur via accretion from a companion star (single-degenerate (SD) channel) or via merging of two white dwarfs (double-degenerate (DD) channel). Both channels might contribute to the production of SNe Ia but their relative proportions remain a fundamental puzzle in astronomy. The increase in the empirical knowledge of SNe Ia has led to an enormous advance in their cosmological use, the understanding of the explosion mechanism still requires careful evaluation (Howell 2011). One way to investigate this is by performing direct survey of the field of Galactic historical SNe Ia. Our group have been trying to search for the companion of the progenitor of historical Galactic SN Ia with the aim of clarifying the origin of these cosmological candles (see Ruiz-Lapuente 2014). We have identified a very promising candidate companion for Tycho Brahe's SN 1572 (see e.g. Ruiz-Lapuente et al. 2004 Nature; González Hernández et al. 2009 ApJ; Bedin et al. 2014 MNRAS) but we have not found any candidate companion for SN 1006, suggesting for the latter that this SN event, which occurred in 1006 and remains the brightest stellar event ever registered in our galaxy, could have been the result of the merging of two white dwarfs (González Hernández et al. 2012 Nature). In this talk I will present the details of the work we have done so far in SN 1572 and SN 1006, and I will introduce our next target, the Johannes Kepler's SN 1604

Early to late photometric and spectroscopic analysis of type IIb SN 2013df

Antonia Morales Garoffolo

Type IIb supernovae (SNe) are relatively infrequent events, and are characterized by presenting a transition from hydrogen-dominated spectra at early phases in their evolution to HeI-rich spectra at later times. The nature of the stellar progenitors leading to IIb SNe is currently unknown and in the majority of cases, some hints can only be derived indirectly from the objects' light curves (LCs) and spectra. In this talk I will present the results of the analysis of the observational data we have collected (in the optical and UV ranges) for type IIb SN 2013df in NGC 4414. Until the discovery of SN 2013df, only type IIb SNe 1993J and 2011fu had presented appreciable double-peaked light curves in all optical bands. It is believed that type IIb SNe exhibiting clear double-peaked LCs arise from more extended progenitors than the ones that seem to show only a distinct second peak in the evolution of their brightness, this fact has permitted us to set constraints on some of SN 2013df's progenitor characteristics. On the other hand, the late time optical spectra indicate asphericity of the explosion, clumpyness of the ejecta, and the possibility of the progenitor belonging to a binary system.

What is the progenitor of the type Ia SN 2014J?

Miguel Pérez Torres

In addition to their use as cosmological distance indicators, SN Ia are a major contributor to the chemical evolution of galaxies. It is therefore unfortunate that we do not yet know what makes a SN Ia. This lack of knowledge makes it difficult to gain a physical understanding of the explosions so that we can model possible evolution, which compromises their use as distance indicators. It also means we do not fully understand the timescale over which SN Ia turn on, adding a huge uncertainty to our understanding of the chemical evolution of galaxies. I will present some of the deepest sensitive radio observations ever taken of a supernova Ia, namely of SN 2014J in the nearby galaxy M82, and discuss its possible progenitor scenarios.

CARMENES science preparation: Low-resolution spectroscopy of M dwarfs

Francisco Javier Alonso Floriano

During the last three years, we have obtained low-resolution (R$\sim$1500) spectra of 754 M dwarfs and candidates with CAFOS at the 2.2 m Calar Alto telescope. They come from a number of sources (e.g., Lépine & Gaidos 2011 stars fainter than J = 9 mag, new virtual observatory searches, stars with doubtful spectral typing, etc.). For all of them, we have derived spectral classes and types from comparison with standard stars and from all spectral indices defined in the literature and usable in our wide wavelength coverage from 430 to 830 nm. We have studied how our 31 measured indices vary with gravity, metallicity and activity. We have also measured pseudo-equivalent widths of the Halpha, Hbeta and Hgamma lines in emission, and related them to youth, multiplicity and other chromospheric activity indicators. The least active, brightest, latest M dwarfs are potential targets of CARMENES, the radial-velocity exoplanet hunter being built for the 3.5 m Calar Alto telescope.

Sesión G6

The life of the massive stars seen through optical/near-infrared interferometry.

[Conferencia Invitada]

Joel Sánchez Bermudez

In this talk we will present our results in the study of different aspects in the life of massive stars. Particularly, we will focus our discussion in our findings about multiplicity, the interactions of the massive stars with the ISM and the early stages of high-mass stars. Our studies are based on near-infrared Interferometric observations (both, long-baseline interferometry and sparse aperture masking) and spectroastrometric analysis, making use of the ESO facilities. The talk will briefly describe the principles of the optical/near-infrared interferometry and will make emphasis on the calibration of the Interferometric observables. Henceforth, we will present our results of two massive systems (HD150136 and Herschel 36) for which we have discovered their triple nature using AMBER/VLTI. The determination of the orbital motion of the tertiary component around the inner system will permit to test the coplanarity of the orbits in these multiples, providing important clues about its formation. We will also present our results on the very massive young stellar object IRS9A, in the NGC 3603 region, where we have recently obtained evidence of the existence of a disk (through NACO/VLT Sparse Aperture Masking observations) and a binary system (revealed by CRIRES spectroastrometric data) in its core. Finally, we will show how the new VLTI instruments and the forthcoming upgrade of the existing ones will offer new clues about the evolution of massive stars.

Herschel/HIFI CO, ^{13}CO and H_2O thermal emission in "Water Fountain" stars

Enrique García García

"Water Fountain" stars (WF) are intermediate-mass evolved objects which display water maser emission at 22 GHz, with a large velocity spread. It is thought that the fast WF stage plays a key role in shaping multipolar planetary nebula, because their maser emission are sign-posts of developing fast outflows. Our aim is to find and characterize other components of the circumstellar material associated to WFs, and therefore learn about the environment where the outflows are being formed. We present the results of a study of thermal emission from 8 WF stars using the heterodyne spectrometer HIFI, onboard Herschel Space Observatory. The lines observed are mid- and high-J CO and ^{13}CO, and the lowest rotational transitions of H_2O. Many of the lines have been successfully detected, and we proceed to analyze them by LTE and LVG models. Some parameters of the former AGB envelopes are derived, and also the presence of some signpost of thermal emission associated to the outflows. When possible, isotope ratios are derived and compared with post-AGB stars depicting CO emission.

AK Sco: a unique case for the study of magnetospheric accretion in T Tauri stars

Ana Inés Gómez de Castro

Magnetospheric accretion is poorly constrained from observations in spite of the significant advances in the theoretical framework (Romanova et al. 2008, 2012, 2013). Theoretical models show that the accretion patterns depend on the characteristics of the magnetic field and the stability of the magnetic configuration. Henceforth, observation of the accretion flow provides important clues on the evolution of stellar magnetic field during star formation and its impact on disk evolution. The broadening of the magnetospheric lines has been found to decrease as the accretion rate does it (Ardila et al. 2013, Gomez de Castro 2013). This observation is consistent with a decrease of the mass being loaded into the magnetosphere, as the accretion rate decreases and stars approach to the main sequence. However, it is difficult to extract precise information on the geometry of the magnetosphere. AK Sco is a unique system for magnetospheric studies. The system is composed of two F5 stars in an orbit with eccentricity 0.45. They get as close as 11 stellar radii at periastron. Numerical simulations of the evolution of the system reveal that circumstellar disks grow around each star during half of the orbital period, to be later destroyed when they get in contact at periastron, producing an accretion outburst. Thus, the accretion outburst can be accurately predicted and timed. An XMM-Newton based campaign has shown that the general behavior of UV and X-ray light curves agree well with the predictions of the simulations. Evidence of a plasma oscillation being triggered by the accretion outburst has been found. A Hubble campaign will be run in July-August (HST 13372) to study, by means of (high and low resolution) UV spectroscopy, the evolution of the system. In this contribution, we will describe the system and the theoretical framework for the data interpretation.

La cromosfera de alfa Centauri A vista por el observatorio espacial Herschel

Benjamín Montesinos Comino

El observatorio espacial Herschel de la Agencia Espacial Europea (ESA) completó en su periodo de operaciones (2009 - 2013) un intensivo programa de colección de datos, tanto fotométricos como espectroscópicos, en el infrarrojo lejano (55 - 680 micras) de objetos en todas las áreas de la Astrofísica. El "Open Time Key Programme" DUNES (DUst around NEarby Stars) se dedicó a la búsqueda de estructuras análogas al cinturón de Kuiper de nuestro Sistema Solar en estrellas de tipo FGK de nuestra vecindad, con resultados muy variados y novedosos en el campo de la observación y modelado de discos de polvo ("debris") en estrellas de secuencia principal. Un resultado colateral e interesante de DUNES fue la observación y medida del mínimo de temperatura cromosférico en una estrella distinta del Sol. Desde hace décadas sabemos que la estructura de la temperatura de nuestro Sol presenta la peculiaridad de un mínimo de temperatura ($\sim$4500 K) a unos 500 km por encima de la fotosfera ($\sim$5800 K), a partir del cual la temperatura aumenta hasta la corona. Con observaciones de Herschel, el consorcio DUNES ha observado directamente este mínimo de temperatura en alfa Centauri A, una estrella prácticamente gemela al Sol; para esta estrella, el mínimo de temperatura ocurre a $\sim$3900 K y se observa a $\sim$160 micras. Hasta donde nosotros conocemos, esta es la primera observación y medida directa del mínimo de temperatura en una estrella distinta del Sol, es decir, no inferida indirectamente a partir de observaciones en el óptico, por ejemplo a través del modelado clásico de las alas de las líneas HK de Ca II.

Overview and stellar statistics of the expected Gaia Catalogue using the Gaia Object Generator

Max Palmer

An effort has been undertaken to simulate the expected Gaia Catalogue, including the effect of observational errors. A statistical analysis of this simulated Gaia data is performed in order to better understand what can be obtained from the Gaia astrometric mission. This catalogue is used in order to investigate the potential yield in astrometric, photometric and spectroscopic information, and the extent and effect of observational errors on the true Gaia Catalogue. A simulated catalogue of one billion objects is presented, with detailed information on the 523 million individual single stars it contains. Detailed information is provided for the expected errors in parallax, position, proper motion, radial velocity, photometry in the four Gaia bands, and physical parameter determination including temperature, metallicity and line of sight extinction.

The OCCASO Survey

Ricardo Carrera

Galactic Open Clusters (OCs) are key to investigate the formation and evolution of the Galactic disk. However, complete information is available for only ∼5 % of the about 2100 OCs known in the Milky Way. Therefore OCs are main targets of the Gaia mission and ground spectroscopic surveys. However, these surveys are sampling only Southern OCs (GES, GALAH) or in an heterogeneous way, e.g. different number of stars and spectral types in each system (APOGEE). To complement these surveys we are developing the Open Clusters Chemical Abundances from Spanish Observatories Survey (OCCASO). Its goal is to obtain detailed abundances for about 20 chemical species in red clump stars belonging to 25 northern OCs. OCCASO was selected as a Long-term Program in the Canary Islands Observatories and it is obtaining regularly observing time at the Calar Alto Observatory. During the first year we have acquired spectra for more than 50 stars in 12 OCs, 5 of which have its observations completed with at least 6 star per cluster. In this talk we will describe the survey design and observational strategy and we will present the first results of the chemical abundances obtained in the first year and a half of observations.

Age determination of open clusters with Gaia

Erika Antiche

Stellar clusters are optimal targets in the study of a variety of topics including the star formation process, stellar structure and evolution, dynamical interaction among stars, or the assembly and evolution of galaxies. In fact, most stars are formed in stellar clusters although most of them are dissolved in the first few Myr. Open clusters, which cover large ranges of ages and metallicities, are located in the Galactic disk and are crucial to investigate its formation and evolution. Therefore, the determination of cluster ages is crucial. We investigate the accuracy in the determination of ages through isochrone fitting to CMD from Gaia observations and for a set of open clusters covering a range of ages and distances. The Gaia Object Generator (GOG) has been used to simulate Gaia end-of-mission data of star members of open clusters. Open clusters are generated on a semi-empirical basis. The clusters are placed at positions on the sky where real clusters exist. Then, assuming the real cluster age, metallicity, mass, radius, distance, space velocities, and extinction of the cluster, simulated stars are generated using the Padova luminosity function simulator and assuming a lognormal IMF.

Pósters

Estudio Espectroscópico de NGC 6067

Javier Alonso Santiago

Se presenta el estudio del cúmulo NGC 6067 mediante espectroscopía echelle de alta resolución hecha con FEROS. Se trata de un cúmulo joven, en torno a los 100 Ma, muy interesante para estudiar la evolución de estrellas de masa intermedia, pero poco estudiado. Hemos realizado una clasificación espectral más completa de muchos de sus miembros, especialmente estrellas de tipo B, además de proporcionar tambien abundancias químicas y otros parámetros estelares

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CARMENES science preparation: KARMENES, the KEPLER K2+CARMENES alliance

Pedro Amado González

The Kepler K2 mission uses Kepler spacecraft operating with only two reaction wheels to achieve high precision photometry of thousands of objects along the ecliptic. Twelve different pointings will take place from Mars 2014 to December 2016, observing each field during about 75 days. The CARMENES (Calar Alto high-resolution search for M dwarfs with Exo-Earths with Near-infrared and optical Echelle Spectrographs) Consortium is proposing M dwarf targets to be observed in each pointing in available long (30 min) and short (1 min) cadence sampling, both with a two folded objective. Long cadence observations aim at: 1) detecting transiting planet candidates amenable to confirm and follow-up with the unique capabilities of CARMENES. These are very late-type and faint nearby M-dwarfs which might not be proposed by other teams otherwise. 2) obtain high precision photometry to anticipate or improve the accuracy of Doppler measurements of very late-type stars. Dedicate follow-up proposals have been submitted to obtain Doppler measurements of the brighter KARMENES targets with the HARPS-ESO spectrograph. Short cadence observations are planned to: 1) detect very short, small planets around nearby low-mass stars. 2) detect pulsations in low mass stars Moreover, all targets will be subject to characterization of possible photometric variability due to flares and magnetic activity modulated by stellar rotation.

Membership determination of open clusters with Clusterix

Lola Balaguer Nuñez

Astrophysics offers a plethora of problems whose solutions may be retrieved almost exclusively by using the computational power. The reasons are obvious: thousands of astronomical surveys performed during last several decades produced enormous amount of data (more than 10^{10} stellar object are catalogued so far) whose manual processing is beyond the man's possibilities. Also, mathematical models needed to deal with emerging challenges are often very complex and usage of their numerical representation is inevitable.

Determination of open cluster membership probability is an example of such a problem. Using the statistical methodologies, stars surrounding central coordinates of an alleged cluster may be investigated in order to determine their origin. Such a cluster-field division is requisite as it allows us to form conclusions about separated populations - knowing the cluster members, almost all fundamental properties of examined stellar association (such as age, distance, etc.) may be retrieved via standard astronomical methods. Basic idea of the non-parametric method for the cluster-field separation in the 2-dimensional proper motion space is the empirical determination of the cluster and field stars distributions without any assumption about their shape. Cabrera-Cano & Alfaro (1990) used the kernel estimation technique (with a circular Gaussian kernel function) to derive the data distributions. Different implementations of this approach were further described by Chen et al (1998) or Galadí-Enríquez et al (1998). [L. Jílková, 2013]

Studying the Outskirts of NGC2682 (M67) open cluster

Lola Balaguer Nuñez

The combination of deep and wide astrometry study together with the best set of Strömgren photometry ever obtained for the open cluster NGC2682 (M67) let us study the physical properties of the stars in the cluster area and analyse its outskirts. The astrometric study covers an area of about 2deg $\times$ 1.4deg and down to r'$\sim$17 while our INT-WFC CCD intermediate-band uvby-Hbeta photometry covers an area of about 45'$\times$45' down to V$\sim$19. The stars of the area selected as cluster members are classified into photometric regions and their physical parameters determined, using uvby-Hbeta photometry and standard relations among colour indices for each of the photometric regions of the HR diagram. That allows us to determine reddening, distances, absolute magnitudes, spectral types, effective temperatures, gravities and metallicities in a wider area ever studied, thus providing an astrophysical characterization of the cluster outskirts. We found stars compatible with astrometric and photometric membership up to 33' from the cluster centre, so meaning 2.6 times the radius quoted in Dias et al (2012), and also found members up to 1.2deg with only astrometric criteria. These data lead us to the most complete study of its structure, dynamics and mass segregation up to date.

CARMENES science preparation. Mining public archives for stellar parameters and spectra of M dwarfs with master thesis students

Jose A. Caballero

We are compiling the most comprehensive database of M dwarfs ever built, CARMENCITA, the CARMENES Cool dwarf Information and daTa Archive, which will be the CARMENES 'input catalogue'. In addition to the science preparation with low- and high-resolution spectrographs and lucky imagers (see the other posters at the SEA meeting), we compile a huge pile of public data on thousands of M dwarfs, and analyse them. Here we describe four specific actions carried out by master students. They mine public archives for additional high-resolution spectroscopy (UVES, HARPS and FEROS), multi-band photometry (FUV-NUV-u-B-g-V-r-R-i-J-H-Ks-W1-W2-W3-W4), X-ray data (ROSAT, XMM-Newton and Chandra), and periods, rotational velocities and Halpha pseudo-equivalent widths of M dwarfs. As described, there are many interdependences between all these data and the CARMENCITA database.

Physical parameters of M11 using Strömgren photometry

Laia Casamiquela Floriach

NGC 6705 (M11) is a middle-age well-studied open cluster. Its location in an area where the interstellar extinction is relatively low, its exceptional stellar density and richness, and the presence of both early type and evolved stars make this cluster an interesting target for many scientific issues. Although NGC 6705 has been widely studied, Strömgren photometry was missing. The observations by our team have yielded uvby-Hbeta photometry for some 50,000 stars in an area of 34'x34' and with $V_{lim}\sim21$. All observed stars are classified into photometric regions and their physical parameters determined, using standard relations among colour indices for each of the photometric regions of the HR diagram. That allows us to determine reddening, distances, absolute magnitudes, spectral types, effective temperatures, gravities and metallicities, thus providing a preliminary astrophysical characterization. In addition, we discuss the accuracy of the M11 physical parameters through comparison with those determined by Beaver et al (2013). We also compare our results with those from the spectroscopic Gaia-ESO Survey to assess the quality of the photometric determinations as well as to give input parameters to the spectral analyses being made by GES.

Astrophysics of Galactic Cosmic Rays with AMS-02

Rosa Clavero Jiménez

AMS-02 is a wide acceptance high-energy particles detector operating since May 2011 on board of the International Space Station. Its main physics goals are the indirect detection of dark matter, the search of primitive anti-matter and the precise measurement of the cosmic rays (CRs) spectra. AMS is able to measure the relative abundances and absolute fluxes of the nuclear components of the CRs from Hydrogen up to Iron (Z=26) in a kinetic energy range from GeV/n to TeV/n. The study of the CR propagation in the Galaxy has the goal of describe within a single model the transportation and interaction of all the galactic CR species (hadrons, leptons and diffuse gamma-rays). Secondary CRs, produced by spallation processes in the interestellar medium from the primary galactic CRs during their travel from the source to the Earth, are fundamental for the study of this topic. We report on how the AMS-02 measurements of the secondary-to-primary flux ratios of stable nuclei, such as the Boron-to-Carbon, can constrain the propagation models of cosmic rays throughout the Milky Way.

Preparation of the CARMENES input catalogue. Multiplicity of M dwarfs from tenths of arcseconds to hundreds of arcminutes

Miriam Cortés Contreras

With the help of CARMENCITA, the CARMENES Cool dwarf Information and daTa Archive, we investigate the multiplicity of M dwarfs in the solar neighbourhood observable from Calar Alto to prepare and characterize the final sample of stars of CARMENES with the help pf CARMENCITA, the CARMENES Cool dwarf Information and daTa Archive. Our multiplicity study covers a wide range in projected physical separations, from 0.5 to 55000 AU. The inner range is covered with a lucky-imaging survey of over 600 M dwarfs with FastCam at the 1.5 m Telescopio Carlos Sánchez, complemented with a literature search. We explore visual or physical companions from 0.2 to 10 arcsec around our targets. These observations are important to discard very close companions that may induce spurious variations in the radial velocity of the primary and mimic the presence of planets. The outer range is covered with a detailed analysis of Washington Double Stars catalogue data and optical images taken by us with TCP and CAMELOT at the 0.8 m IAC80 telescope, and an astrometric study of all-sky public images and catalogues. We review the main results of our searches and derive the multiplicity of M dwarfs at close and wide physical separations.

Wind accretion and formation of disk structures in symbiotic systems

Miguel de Val-Borro

We investigate gravitationally focused wind accretion in binary systems consisting of an evolved star with a gaseous envelope and a compact accreting companion. We study the mass accretion and formation of an accretion disk around the secondary caused by the strong wind from the primary late-type component using global 2D and 3D hydrodynamic numerical simulations. In particular, the dependence on the mass accretion rate on the mass loss rate, wind temperature and orbital parameters of the system is considered. For a typical slow and massive wind from an evolved star the mass transfer through a focused wind results in rapid infall onto the secondary. A stream flow is created between the stars with accretion rates of a 2-10 % percent of the mass loss from the primary. This mechanism could be an important method for explaining periodic modulations in the accretion rates for a broad range of interacting binary systems and fueling of a large population of X-ray binary systems. We test the plausibility of these accretion flows indicated by the simulations by comparing with observations of the symbiotic CH Cyg variable system.

Cataclismic Variables at the Observatorio Astrofísico de Javalambre

Alessandro Ederoclite

The Observatorio Astrofisico de Javalambre is equipped with two wide field telescopes with a combination of broad and narrow band filters. The filters of the Javalambre Auxiliary Survey Telescope (80cm diameter) have been designed for stellar classification while the filters of the Javalambre Survey Telescope (2.5m diameter) have been designed for high accuracy determination of photometric redshifts of galaxies. In this article, I explain, through simulations and real data, how the same filter set can also be used to efficiently recover cataclysmic variables and separate them from other objects (quasars) and even tell their type. The observations to be carried out at the Observatorio Astrofisico de Javalambre will provide the best magnitude limited complete sample of cataclysmic variables to date.

Las redes de explotación científica de Gaia

Francesca Figueras Siñol

En el momento de celebrar esta reunión el satélite Gaia, en L2 desde enero de 2014, habrá superado ya la fase de comisionado y estará plenamente dedicado a la obtención de datos científicos. Probablemente dispondremos también de estimaciones más realistas de la precisión astrométrica, fotométrica y espectroscópica que nos aportará el satélite. En esta fase de ejecución de la misión, mostraremos las actividades que la comunidad Gaia desarrolla y desarrollará a nivel europeo, bien sea a través de la red GREAT-ESF o mediante el programa FP7 GREAT-ITN (2011-2015), y a nivel nacional, coordinadas por nuestra Red Española de Explotación Científica (REG). Mostraremos el relevante papel que estas redes juegan en diversos frentes, entre otros, la coordinación para la obtención de datos espectroscópicos complementarios desde tierra, las tareas conjuntas de desarrollo de nuevas herramientas para la interpretación de los datos o la coordinación de los equipos en las tareas de construcción del archivo de Gaia.

Trying to match stellar and nebular abundances in the Cocoon nebula

Jorge García Rojas

The Cocoon nebula is an apparently spherical Galactic HII region ionized by a single star (BD+46 3474). This nebula seems to be appropriate to investigate the chemical behaviour of oxygen and other heavy elements from two different points of view: a detailed analysis of the chemical content of the ionized gas through nebular spectrophotometry and a detailed spectroscopic analysis of the spectrum of the ionizing star using the state-of-the-art stellar atmosphere modelling. In this poster we present the results from a set of high-quality observations, from 2m-4m class telescopes, including the optical spectrum of the ionizing star BD+46 3474, along with long-slit spatially resolved spectroscopy of the nebula. We have used state-of-the-art stellar atmosphere codes to determine stellar parameters and the chemical content of several heavy elements. Traditional nebular techniques along with d atomic data have been used to compute gaseous abundances of O, N and S in the Cocoon nebula. Thanks to the low ionization degree of the nebula, we could determine total abundances directly from observable ions (no ionization correction factors were needed) for three of the analyzed elements (O, S, and N). The derived stellar and nebular abundances are compared and the influence of the possible presence of the so-called temperature fluctuations on the nebula is discussed.

Multi-wavelength study of the young stellar population of the Orion B molecular cloud

Miguel Angel López García

Multiwavelength surveys are the key to explore the mechanisms of star formation. We focused on the Orion B region, a multicore star forming region with more than 1000 young stellar objects in different stages of formation. We are carrying out a multi-wavelength study for a significant part of the Orion B molecular cloud, based on 9 XMM-Newton archival observations, infrared (Spitzer, WISE, and 2MASS) and Optical (XMM Optical Monitor and UCAC4) photometry data. This work is focused on the classification and characterization of young stellar objects and the inhomogeneity along the cloud. After filtering for the background sources, we classify the sample into 332 Classes III, 141 Classes II and 11 Classes 0/I and a dozen of brown dwarf candidates based on their infrared/optical properties. We explore the differences along the cloud and the stellar population distribution. We find 5 different regions where Class 0/I and Class II objects are located, coincident with the centre of NGC2023, NGC2024, NGC2068, NGC2071 and around V1647-Ori. In addition, we are currently carrying out an optical follow-up of the BD candidates.

Long-term infrared photometric monitoring of ultracool dwarfs

Belén López Martí

We report on our long-term (from 3 months to 3 years) photometric monitoring of ten field L-dwarfs (L0 to L5). K_s-band imaging observations of our targets were performed with the OMEGA 2000 infrared mosaic camera from the 3.5m telescope on Calar Alto Observatory between January 2010 and December 2012. With these data, we obtained differential photometry of our targets, constructed the photometric light curves, and carried out a search for periodic variability using four different periodograms. Only two objects display possible periodic variability, with periods of 300-450 days and peak-to-peak variations of 50 to 90 mmag. The rest of our targets do not display long-term variability over 1σ compared to stars of similar brightness and in the same field-of-view. Thus, our results suggest that early to mid L-dwarfs are fairly stable in the K_s-band within ± 20 mmag over periods as long as a few years. This is, to our knowledge, the first systematic variability study of this kind of objects at such long timescales.

Magnetospheric properties of T Tauri stars through CII], FeII] and SiII] ultraviolet emission lines.

Fátima López Martínez

The CII], FeII] and SiII] semiforbidden lines are in the range 2320-2340 Armstrong. These emission lines provide a reliable optically thin tracer for measurement of the plasma properties in the magnetosphere of T Tauri stars (TTSs). In this work these lines are analyzed in a sample of 20 TTSs using 30 medium resolution spectra from the Hubble Space Telescope (HST) data archive.

We developed an algorithm in IDL making use of theoretical values of emission line ratios to fit the observed spectra. The procedure provides the properties of the emission region, such as electron density, temperature and line broadening.

For most of the stars in the sample we obtain temperatures from $10^{4,1}$ to $10^{4,5}$ K and densities from 10^8 to 10^{12} cm^{-3}. These stars have suprathermal line broadening (between 35 and 165 km/s), except TW Hya and CY Tau with thermal line broadening. Both C II] line luminosity and broadening are found to correlate with the accretion rate. Line emission seems to be produced in the magnetospheric accretion flow, close to the disk. Three stars (DG Tau, RY Tau and FU Ori) display blueshifted line centroids indicating that the line emission in these stars could be dominated by the outflow.

MY Cam, a very massive merger progenitor

Javier Lorenzo Espinosa

MY Cam is an eclipsing binary consisting of two early-O type main sequence stars. Phenomenologically, the system is a contact binary and both stars are overfilling their Roche lobes, sharing a common envelope. Components are orbiting around a common center of mass with a short period. From spectroscopic campaign and using cross-correlation technique implemented in TODCOR program, we derive radial velocities and obtain the corresponding radial velocity curves of MY Cam. The templates applied were synthetic spectra obtained from atmosphere model using FASTWIND code. MY Cam has reached the equilibrium state of both a circularized orbit and synchronized rotation. A very exhaustive light curve with 4607 photometric points was folded with a period of 1.1754520±0.0000015 days. Using the Wilson-Devinney code, we derive stellar and orbital parameters, describing completely the binary system. The mass of the primary and secondary star of MY Cam are 39.2±1.6 and 33.0±1.4 $M_{\odot}$, respectively. The temperatures derived from our analysis are 43000 and 41500 K, hotter for the massive component, representing a spectral type of O5 V for the primary star and earlier than O6.5 V for the secondary star. MY Cam is a likely progenitor of merger, owing that it is a binary star with a short period, whose components are massive star.

MGB and the new GOSSS O-B0 spectral classification standard grid

Jesús Maíz Apellániz

In this poster we will present two developments related to the Galactic O-Star Spectroscopic Survey. On the one hand, we are making public the first version of MGB, an IDL code that allows the user to compare oberved spectra to a grid of spectroscopic standards to obtain spectral types, luminosity classes, and rotation indexes. On the other hand, we present the associated grid of standard stars for the spectral types O to B0, with several improvements over the original GOSSS grid of Sota et al. (2010).

A photometric variability study of massive stars in Cygnus OB2

Jesús Maíz Apellániz

We have conducted a 1.5-year-long variability study of the stars in the Cygnus OB2 association, the region in the northern hemisphere with the highest density of optically visible massive stars. The survey was conducted using four pointings in the Johnson R and I bands with a 35 cm Meade LX200-ACF telescope equipped with a 3.2 Mpixel SBIG ST10-XME CCD camera and includes 300+ epochs in each filter. A total of 1423 objects were observed with limiting magnitudes of 15 in R and 14 in I. The photometry was calibrated using reference stars with existing UBVJHK photometry. Bright stars have precisions of 0.01 magnitudes, allowing us to detect over 30 new variables, the majority of them massive stars without previous detections as variables. Some of them are irregular or long period variables but many of them are eclipsing binaries. We derive the light curves for the eclipsing binaries, with periods ranging from under a day to over a month. For some cases we also present spectra obtained from Calar Alto and La Palma.

The Hourglass as seen with HST/WFPC2

Jesús Maíz Apellániz

We present a multi-filter HST/WFPC2 UV-optical study of the Hourglass region in M8. We have extracted the stellar photometry and have derived the best spectral energy distributions using the code CHORIZOS. This has allowed us to model the extinction distribution along the nebula and to measure the variations of the extinction law. One important result is that a large fraction of the UV flux around Herschel 36 arises from the Hourglass and not directly from the star itself. In the UV the Hourglass appears to act as a reflection nebula located behind Herschel 36 along the line of sight. We will discuss the consequences of this effect in the previously derived extinction laws for Herschel 36.

CARMENES science preparation: High-resolution spectroscopy of M dwarfs

David Montes Gutiérrez

To ensure an efficient use of CARMENES observing time, and the highest chances of success, it is necessary first to select the most promising targets. To achieve this, we are observing ∼500 M dwarfs at high-resolution (R = 30,000-48,000), from which we determine the projected rotational velocity vsini with an accuracy better than 0.5-0.2 km/s and radial-velocity stability better than 0.2-0.1 km/s. Our aim is to have at least two spectra at different epochs of the final 300 CARMENES targets. Our observations with FEROS at ESO/MPG 2.2m La Silla , CAFE at 2.2m Calar Alto and HRS at Hobby Eberly Telescope allow us to identify single- and double-line spectroscopic binaries and, especially, fast rotators, which should be discarded from the target list for exoplanet searches. Here we present preliminary results.

In preparation to Gaia: compilation of late-type stars possible members of stellar kinematic groups (stellar streams, moving groups, and associations)

David Montes Gutiérrez

In this contribution we present a compilation of late-type stars (F, G, K and M) possible members of the different stellar kinematic groups analysed in the literature. We include the young and old classical moving groups and superclusters, the recently identified young nearby loose associations as well as other stellar streams identified in recent surveys that contain large number of dwarf and giant stars. These stars were selected by using kinematics (with the precision currently available), by using an age-oriented method using relative age indicators (Li abundances, chromospheric and coronal emission and the kinematics) as well as color-magnitude diagrams and pre-main sequence isochrones or by chemical tagging. However, to add constraints to the membership and be able to discern between different groups of similar age a much better kinematic is needed and this will be only possible with the forthcoming precise data that Gaia will provide. The compilation provided here will be ready to use the data of Gaia as soon as will available in oder to be able to better understand the stellar kinematic groups and discern between real physical structures of coeval stars with a common origin (debris of star-forming aggregates in the disk) and field-like stars (structures formed by resonance interactions, associated with dynamical resonances (bar) or spiral structure).

Constraining the high-mass end of the stellar IMF using galactic Cepheids

Roger Mor Crespo

Here we propose to use the most complete and accurate observational catalogues of Cepheids to constrain the high-mass end of the Initial Mass Function (IMF) in the Milky Way galactic disk. The proposed strategy uses the new version of the Besançon Galaxy model (Czekaj et al.,2014) which allows us to simulate magnitude and distance complete samples of young high mass stars assuming different IMF and Star Formation History (SFH). Comparing these simulation with observational data we evaluate the capability of our method to infer the best IMF that matches the observed number of Cepheids. We evaluate the undesired effects in the star counts produced by both the Cepheid selection function, defining the instability strip boundaries in the theoretical HR diagram, and the uncertainties coming from the 3D interstellar extinction map. Results from three different IMFs (Salpeter, and modified Kroupa(2008) and modified Haywood(1997)) will be presented and discussed. This work allow us to both estimate the number of Cepheids to be observed by Gaia and to explore Gaia capabilities to constrain this fundamental part of the IMF.

Abnormal Behaviour of Lithium in Coeval Stars

Carmen Morales Durán

In previous works (Chavero, et al. 2013, 2014) related with debris stars and the Li abundance it was purposed to answer two questions: the role of stellar rotation and that of a braking disk on Li depletion. Our intention is to extend the study to solar type stars being members of open clusters. Due to the fact that age is known we are yielding to rotation and Teff. Our first approaches lead to a well known dependence of $[\mathrm{Ab_{Li}}]$ on Teff and the behaviour of $[\mathrm{Ab_{Li}}]$ versus $\mathrm{v}\sin i$, such behaviour shows a plateau whose inflexion point is independent of the age. However in some clusters there are some stars for which the $[\mathrm{Ab_{Li}}]$ decrease under the plateau. Our research is pointing to make an individual study of these "deviated" stars trying to understand the mechanism responsible for such depletion of lithium. In order to perform the research we collect available wide spectral information. We advance a preliminary result; the study of Pleiades cluster shows that all deviated stars are classified as flare stars.

Estrellas Rezagadas Azules en cúmulos abiertos: las 100 más brillantes

Carmen Morales Durán

En esta reunión de la SEA vamos a presentar resultados preliminares de un estudio de las 100 estrellas rezagadas azules (RA) más brillantes, todas ellas con V< 10mag. Las rezagadas azules (blue stragglers en inglés) son estrellas de la Secuencia Principal de cúmulos abiertos y globulares que son más brillantes y más azules que el punto de giro del cúmulo al que pertenecen. Existen varias teorías para explicar su origen: evolución en binarias cerradas con intercambio de masa, formación tardía, extensión de su vida de Secuencia Principal debida a corrientes de difusión interna, fusión de estrellas,...pero todavía no se ha llegado un consenso definitivo sobre su formación. En este trabajo vamos a utilizar las listas de RA publicadas por Ahumada (1995A & AS, 109, 375; 2007A & A, 463, 789), 789 estrellas actualizadas y corregidas a la fecha. Primero vamos a estudiar su pertenencia al cúmulo por distintos métodos: movimientos propios, velocidades radiales, posición en el cúmulo, tipo espectral y enrojecimiento. Vamos a seleccionar las 100 estrellas RA más brillantes y estudiarlas en profundidad: estudio de sus tipos espectrales, binaridad y peculiaridad si la hubiera, ajuste de modelos de atmósferas estelares desde el ultravioleta hasta el infrarojo (con VOSA, Observatorio Virtual Español), determinación de abundancias metálicas en el ultravioleta y comparación con estrellas normales y químicamente peculiares. Finalmente estudiaremos la evolución de las características espectrales de las estrellas RA con el tiempo, estudiando estrellas pertenecientes a cúmulos galácticos de diferentes edades.

A study of non-thermal emission from RSG passing through the ISM during different life stages

Víctor Pereira Blanco

Runaway O- and early B-type stars moving supersonically (> 30 km/s) through the ISM may produce bow shocks by the interaction of their strong winds and the dust. Theoretical models predict the production of high-energy photons by non-thermal radiative processes originated in the bow shock region, which can serve as particle acceleration sites. Massive stars undergo fast transitions from blue supergiant (BSG) to cool red supergiant (RSG) at late evolutionary stages, and vice versa. During the RSG phase, the moment of the wind decay. However, high velocity stars (v > 100 km/s) may transfer enough energy to the ISM to trigger non-thermal photons. The transition from the fast BSG to the slow RSG winds and the evolution of the bow shock during the evolutionary track of Betelgeuse have been recently modeled by Mackey et al. (2012). We apply our non-thermal model to the different RSG stages considered in that work to check for the suitable conditions that can lead to high-energy emission in each stage.

Modelling the non-thermal emission from bowshocks produced by runaway stars

Víctor Pereira Blanco

Runaway O- and early B-type stars passing throughout the interstellar medium at supersonic velocities and characterized by strong stellar winds, can produce bow shocks that can serve as particle acceleration sites. Previous theoretical models predict the production of high energy photons by non-thermal radiative processes, but their efficiency is still debated. We present a new insight in the non-thermal emission treatment by introducing new approaches, new formulae and explaining the procedures we follow in our computations, and we also test its feasibility. We applied our model to AE Aurigae, the first reported star with an X-ray detected bow shock (López-Santiago et al. 2012), and BD+43° 3654, in which the observations failed in detecting high-energy emission. From our analysis, we confirm that the X-ray emission from the bow shock produced by AE Aurigae can be explained by inverse Compton processes involving the infrared photons of the heated dust. We also predict low high-energy flux emission from the bow shock produced by BD+43° 3654, which explains its non detection in X-rays by Terada et al. (2012).

A sensitive spectral survey of Orion KL at wavelengths between 6 and 7 mm

Ricardo Rizzo Caminos

The close star-forming region Orion KL is one of the richest molecular reservoirs known in our Galaxy. The region hosts newly formed protostars, and the strong interaction between their outflows and the environments results in a series of complex chemical processes currently carrying out. The region is therefore one of the most observed sources, and the site where many molecular species have been discovered for the first time. With the availability of powerful wideband backends, it is nowadays possible to conduct complete spectral surveys in all the mm range. In this contribution we present a sensitive spectral survey of Orion KL, done with one of the 34m antennas of the Madrid Deep Space Communications Complex in Robledo de Chavela. The region surveyed is from 41.5 to 50 GHz, with a velocity resolution of 1.2 km/s. The rms achieved is less than 5 mK. This is the most sensitive survey at this frequency range, and also the one with the widest band. We also present the results of radiative modeling of all the molecular species present in the survey, which are detected by more than 200 rotational lines.

Vertex deviation maps to bracked the Milky Way resonant radius

Santi Roca-Fábrega

We map the kinematics of stars in simulated Milky Way like galaxy disks using the vertex deviation (lv). For the first time the behavior of this parameter of the stellar velocity distribution function is analyzed using fully self-consistent high resolution N-body models. Our results demonstrate that, for all barred models, vertex deviation sign changes from negative to positive when crossing the spiral arms in the direction of disk rotation, in regions where the spiral arms are in between corotation (CR) and the Outer Lindblad Resonance (OLR). By contrast, when the arm sections are inside the CR and outside the OLR, lv changes from negative to positive. Test particle simulations and the classical analytical approach (Lin & Shu density waves) are used to complement our understanding of this behaviour. This exhaustive work allows us, for the first time, to use the vertex deviations pattern to trace the position of the main resonances of the spiral arms in our Milky Way. This strategy is proposed for an optimal exploitation of the uncoming Gaia data.

ISOTOPIC SEPARATION FOR LIGHT COSMIC RAYS WITH AMS-02

Isabel Rodríguez Herranz

By means of the capabilities of the Alpha Magnetic Spectrometer (AMS-02), a general purpose Cosmic Rays (CRs) detector installed on the International Space Station (ISS) on May 19th 2011, we will be able to display the most accurate CRs spectra up to date. In the case of the lightest elements (He, Li, Be, etc.), the isotopic separation is possible in order to measure their relative abundances with an unprecedented amount of statistics and reaching an unexplored kinetic energy range (beyond 10 GeV). To compute the mass (m) of the particles, it is needed to well determine their velocity (β) and momentum (p): m=p$(1/\beta^2 - 1)^{-1/2}$. In AMS-02, p is derived from the rigidity value, R=p/Z (where Z is charge), given by a Silicon Tracker Detector (STD) inside a permanent magnet. And β can be obtained from two independent sub-detectors: (a) the Time of Flight (ToF) and (b) the Ring Imaging Cherenkov detector (RICH). In addition, the presence of the geomagnetic field imposes a cutoff in the R spectra of incoming charged particles that depends on the orbiting position and the incident angle. This can be converted, assuming a specific m, into a threshold in our measurement with the best resolution, β. Therefore, we can distinguish between particles with the same atomic number, Z, and different atomic mass, A, since there is a certain energy region, E(β), in which only the heaviest isotope is allowed to reach the detector. This way, the composition of any species can be known. Our precise results on the isotopes ratio could help to better understand CRs propagation through the galaxy and to constrain parameters, such as the diffusion coefficient and the diffusive halo size, in the propagation models actually used.

An automatic tool for the selection of Massive Obscured Galactic Clusters candidates.

Klaus Simon Rübke Zúñiga

The Milky Way is expected to contain a large number of young massive (few x 1000 solar masses) stellar clusters, borne in dense cores of gas and dust. Yet, their known number remains small. We have started a programme to search for such clusters, MASGOMAS (MAssive Stars in Galactic Obscured MAssive clusterS). Initially, we selected promising candidates by means of visual inspection of infrared images. In a second phase of the project we have presented a semi-automatic method to search for obscured massive clusters that resulted in the identification of new massive clusters, like MASGOMAS-1 (with more than 10,000 solar masses) and MASGOMAS-4 (a double-cored association of about 3,000 solar masses). We have now developped a new automatic tool for MASGOMAS that allows the identification of a large number of massive cluster candidates from the 2MASS and VVV catalogues. Cluster candidates fulfilling criteria appropriated for massive OB stars are thus selected in an efficient and objective way. We present the results from this tool and the observations of the first selected cluster, and discuss the implications for the Milky Way structure.

Young Stellar Object candidates in the Orion region ed from GALEX

Néstor Sánchez

We analyze 359 ultraviolet tiles from the All Sky Survey (AIS) of the space mission GALEX covering roughly 400 square degrees towards the Orion star-forming region. There is a total of 1,555,174 ultraviolet sources that were cross-matched with the 2MASS, UCAC4 and WISE catalogs to produce a list of 290,717 reliable sources with a wide range of photometric information. Using different color selection criteria we identify 120 Young Stellar Object candidates having ultraviolet and infrared excesses, of which 85 are new. We discuss the spatial distribution, the Spectral Energy Distributions and other physical properties of these stars.

Numerical simulations of jet/interstellar medium interactions

Sabina Ustamujic

The physical system formed by a very young star and its accretion disc is a scaled version of the compact object+accretion disc scenario observed in AGNs. For young stars with accretion discs (e.g. classical T Tauri stars), dense gas coming from the disc is collimated into a jet as explained in the context of the theory of magneto-centrifugal launching.

We aim at studying the jet propagation and its interaction with the ambient medium. In particular, we are interested in determining the properties of the jet material in terms of density and temperature. Our objective is to understand the morphology of the jet at different wavelengths and the appearance of distinct structures such as blobs and Herbig-Haro objects and their relation with initial conditions.

We performed a set of numerical model simulations of supersonic jet ramming into uniform ambient medium using the PLUTO code.

Periodicity and Eclipse Minima Timing of CM Draconis

Sandra Vázquez Martín

CM Dra is an eclipsing binary system of magnitude V=12.9 which forms a common proper motion pair with a white dwarf of magnitude V=15 at a separation of ∼26 arcsec. This system has one of the lowest known total mass of 0.44 $M_\odot$, at a distance of 14.5 pc in the Draco constellation. The system consists of two almost identical M4.5 dwarfs orbiting each other with a period of 1.27 days. With its nearly edge-on inclination of 89.59 deg it was chosen as the target of the first photometric search for planetary transits in the mid 1990s. Periodic deviations from a linear ephemeris of the binary eclipses can indicate the presence of a third body in orbit around both components. Hints for such a hypothetical companion around CM Dra were published by Deeg et al. in 2000 and 2008. The assignment of a planet in the CM Dra system can however only be accepted if the earlier observed periodicity trends can be verified through further observations over several years. In this poster we show the analysis of several new eclipse minimum observations, from 2009 to 2014. For eclipsing binary stars of low mass, the method of eclipse minimum timing allows one to set mass limits for the detection of a third body. Our goal is to elucidate the physical process that causes the behavior of the observed minus calculated (O-C) eclipse timings and to test for any evidence of a third body around CM system.

Very high spatial resolution study of multiplicity in T tauri systems.

Sergio Velasco Muñoz

We present first relevant results from our survey, which aims to search for multiplicity on T Tauri systems and its relation with disk presence on these stars. A key component in the formation and evolution processes of a star and its planetary system is thought to be the existence of a circumstellar disk and mostly its evolution on early stages. While the formation of these disks is pretty well known as a consequence of stellar formation theory, their evolution is yet poorly understood. Till now there is a great controversy about the existence of any difference on the survival times of disks in isolated stars or binary systems.

Our high spatial resolution survey in the I-band includes northern hemisphere T Tauri stars from Herbig-Bell Catalogue, thus, it represents a vast group of early-stage stars with the presence of disks. This first major study about the presence of multiple companions on T Tauri stars is being done through Lucky Imaging techniques with FastCam at TCS and NOT. Most relevant targets will be followed up with the newly Adaptive Optics Lucky Imager (AOLI).

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