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Libro de resúmenes
Abstract book

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MEGARA-GC1

MEGARA Early-Science Results: Stellar populations in nearby galaxies

África Castillo-Morales, M. Chamorro, A. Gil de Paz, J. Gallego, E. Carrasco, J. Iglesias-Páramo, B.T. Dullo, C. Catalán-Torrecilla, S. Pascual, M.L. García-Vargas, and the MEGARA Commissioning team

MEGARA@GTC IFU observations acquired during the commissioning period between June and August 2017 will be presented to show its excellent performance to study stellar populations properties in nearby galaxies.

Our objective is to target a well-defined sample of 150 nearby disks from the S4G survey to measure their light-weighted (1) stellar velocity ellipsoids, (2) stellar population ages and (3) abundances along the galaxies ɤ major and minor axes using MEGARA spectroscopy in the CaT region at R=20000 and in multiple Low-resolution (R=6000) setups. In a first step we have obtained HR-I data on a subsample of S4G objects plus nearby galaxies (NGC7025, UGC10205, M32). In this talk different showcase examples will be presented for the central (12.5 arcsec x 11.3 arcsec) stellar properties.

MEGARA will allow to study the radial variation of the effective star formation history of the galactic disks and of its stellar abundances by means of comparing R=6k-20k data with the predictions of the galaxy evolution (backward) modeling of the effective (in-situ plus ex-situ) star formation history and chemical abundances by Boissier & Prantzos (2000) and also by Mollá et al. (2006, 2015). The deviations of our observations from the smooth inside-out growth predicted by the models would reflect the presence of ex-situ processes, such as radial migration and/or satellite accretion.

MEGARA-GC2

MEGARA Early-Science results: neutral and ionized galactic winds in the central parts of nearby galaxies

Cristina Catalán Torrecilla, Armando Gil de Paz, África Castillo-Morales, Jesús Gallego, Esperanza Carrasco Licea, Jorge Iglesias-Páramo, María L. García Vargas, and MEGARA Commissioning team

Galactic winds are widely recognized as essential components in the evolution of galaxies. In order to study the properties of galactic winds driven by AGN and/or star formation, we have analyzed high-quality IFS data from the MEGARA IFU (LCB) mode. These observations were taken during the instrument commissioning on June-August 2017. From an observational point of view, MEGARA capabilities are unique to study the effects of the galactic winds on their surroundings. The MEGARA IFU covers 12.5" x 11.3" on the sky with a spaxel size of 0.62". MEGARA is already installed at the 10.4m GTC telescope in La Palma (Spain) and it has been offered as part of the 2018B call. In this talk, I will present the first results obtained from the mapping of the central regions of a small sample of nearby galaxies. At the moment, we are focused on investigating the morphology and the properties of the multi-phase structure of winds. On one hand, the neutral gas outflows traced by the interstellar Na I λλ 5890,5896 doublet (Na D) excess using a low-resolution set-up (5143 - 6164 Å at R = 6K). On the other hand, discriminating kinematically the ionized component of the outflowing material thanks to the high-resolution set-up (6445 - 6837 Å at R = 20K). The spatial distribution of the cold absorbers and the ionized component's properties will provide unprecedented information on the wind geometry and kinematics. This study will shed light on the role that AGN activity and galactic outflows play on the evolution of galaxies and measure the balance between negative and positive feedback in the center of galaxies.

MEGARA-GC3

MEGARA Early-Science Results: Stellar dynamics in external galaxies

Mario Chamorro, África Castillo-Morales, Armando Gil de Paz, Jesús Gallego, Esperanza Carrasco, Jorge Iglesias-Páramo, Bililign T. Dullo, Cristina Catalán-Torrecilla, Sergio Pascual, María L. García-Vargas, and MEGARA Commissioning team

In this talk we present the capabilities of the MEGARA instrument at GTC for studying stellar dynamics in external galaxies. The analysis carried out so far in this regard is based on data taken with MEGARA during the commissioning period with the LCB IFU of MEGARA between June and August 2017.

We show results on stellar kinematics in the central regions of a number of nearby galaxies such as velocity, velocity dispersion, skewness and kurtosis maps, obtained with the pPXF code, including NGC7025, M32, ...

These results are helping to reveal the role of dynamical processes in the formation and evolution of galaxies, thanks to the unprecedented capabilities of MEGARA@GTC, mainly the its combination of spaxel size (0.62 arcsec), FoV (12.5 arcsec x 11.3 arcsec), efficiency and spectral resolution (R=6000-20000).

MEGARA-GC4

MEGARA Early-Science results: Low metallicity regions observed during MEGARA commissioning at the GTC

María Luisa García Vargas, Armando Gil de Paz, Esperanza Carrasco Licea, Mercedes Mollá Lorente, África Castillo-Morales, Jesús Gallego Maestro, Jorge Iglesias Páramo, and MEGARA Commissioning Team

We present the results obtained during MEGARA commissioning of the low luminosity compact star forming galaxies SDSSJ1608+3528 and SDSS0159+0751J with different set-ups (the whole visible range with the 6 Low Resolution (LR) VPHs at R=6000) and two set-ups around Hbeta + [OIII] and Halfa + [NII], using MR-G and MR-RI at R=12000 respectively. We have mapped the 2D distribution of gas and stellar population around the central blue compact object with an unprecedent combination of spatial sampling and resolving power. This study also demonstrates the opportunity window that MEGARA at the GTC offers in the extragalactic star forming regions field.

ANULADOMEGARA-GC5

MEGARA Early-Science results: Study of abundances and kinematics of ionized gas in BCDs during MEGARA commissioning

Ismael Martínez Delgado, Armando Gil de Paz, María L. García-Vargas , Africa Castillo-Morales, Esperanza Carrasco-Licea, Jesús Gallego, Jorge Iglesias-Páramo, and MEGARA Commisioning Team

We present the results obtained during the MEGARA commisioning of the Blue Compact Dwarf Galaxy Mrk324, where we have map the ionized gas with high resolution (R~18000) centred in Ha. Abundaces and kinematics of the gas is presented showing broaden and double peak emission profiles associated to a supersonic gas movement generated by the violent action from massive stars. Results are complemented with observations with the low resolution (R~6000) VPH-LRV@5695AA using a MEGARA observational mode that allow avoiding or minimizing the impact of the cross-talk.

MEGARA-GC6

MEGARA: Herramienta de procesado de datos

Sergio Pascual Nicolás Cardiel, Pablo Picazo

Presentamos la herramienta de procesado de datos obtenidos con MEGARA, megaradrp, basada en numina. Estas herramientas han sido escritas en python y permiten la extracción, calibración en longitud de onda y en flujo de los datos.

GC7

TRUE2: establishing a detectability limit on hidden broad line regions

Beatriz Agís González, Damien Hutsemékers

True Seyfert 2 candidates are those Seyferts galaxies whose optical spectral do not show broad lines, nevertheless in the X-ray domain, they exhibit some characteristic behavior of Seyferts 1 such as lack of X-ray obscuration and/or short timescale variability. A true 2 candidate will be confirmed as a true Seyfert 2 if the lack of its broad line region (BLR) is not only observational but physical. These kind of objects are thought to accrete at low Eddington rates, in agreement with theoretical models that predict that the BLR disappears below a certain critical value of accretion rate and/or luminosity. In the last decade, a significant number of true Seyfert 2s with low accretion rates has been claimed in the literature. However, some exceptions as GNS 069 or 2XMM J1231+1106 show high accretion rates, which seem to contradict the generally accepted explanation.

A limit on the detection of hidden broad line regions (HBLRs) must be established in order to make sure that BLRs are not present intrinsically. Since true Seyfert 2 candidates are selected by the absence of X-ray obscuration, the most plausible explanation to cause the non-detection of a physically present HBLR would be the absence of an adequate scattering medium. Polarimetry can play a key role to answer this question. The presence of an efficient scattering region would imply a high continuum of polarization. We propose to assess what degrees of polarization are high enough to indicate the presence of a scattering medium able to act as a mirror and thus providing us with the indirect view of the HBLRs.

We got new imaging polarimetry data from ISIS@WHT of 10 true 2 candidates which had not been checked in polarized light. If scattering regions are present, undeniable degrees of polarization around 1−3% should be measured. Comparing the measured continuum of polarization with simulations we will be able to estimate a decidability limit on HBLRs. Specifically, we will apply STOKES, a Monte Carlo radiative transfer code which can be used to model, predict, fit and interpret the polarization of AGN.

GC8

Optical follow-up of galaxy cluster candidates detected by Planck satellite in the PSZ2 catalogue

Alejandro Aguado Barahona, Jose Alberto Rubiño, Rafael Barrena, Antonio Ferragamo, Alina Strebyanska

The Legacy PLANCK all-sky Sunyaev-Zeldovich (SZ) galaxy cluster catalogues PSZ1 and PSZ2 (Planck Collaboration XXIX 2013 and Planck Collaboration XXVII 2015) constitute the most complete cluster survey covering the full sky. These catalogues are the prove that the SZ effect signature on CMB is a very efficient method for the detection of galaxy clusters. However, in order to constraint cosmological parameters from these catalogues, the clusters must be characterized in their physical properties, mainly redshift and mass. Here, we describe our optical follow-up program with the aim of validating SZ Planck sources with no known optical counterparts. Thanks to a 4-year observational programme, using 2.5-m INT telescope at the Observatorio Roquede los Muchachos (La Palma), we confirm candidates and estimate photo-z. After this, we study spectroscopically a significant sample of confirmed clusters. We perform multiobject spectroscopy (MOS) in the 3.5m TNG and 10.4m GTC, in order to retrieve redshifts, velocity dispersion and dynamical masses. This allows us to compare SZ masses with dynamical ones and calibrate the uncertainties in this scaling laws understanding possible biases. I will present the status of the imaging observations (more than 400 objects observed), the spectroscopic observations (more than 120 MOS masks), and the first scientific results of this program.

GC9

The first Super Massive Black Holes: indications from models for future observations

Stergios Amarantidis, José Afonso

We present an exploration of state-of-art galaxy formation and evolution semi-analytic models and hydrodynamical simulations for the prediction of the detection of the earliest AGN in the Universe. To assess this, we estimate the number and radiative characteristics of Super Massive Black Holes (SMBHs) at $z \geq 6$, a redshift range that will be intensively explored by the next generation of telescopes, in particular in the radio through the Square Kilometre Array (SKA) and at high energies with ESA's Athena X-ray Observatory. We find that the Athena mission, will be able to observe at least $514/\mathrm{deg}^2$ Active Galactic Nuclei (AGN) at the Epoch of Reionization (EOR), $z = 6-10$. Similarly, the models-simulations indicate that the lower limit of the number of AGNs that the SKA telescope will observe will be $28/\mathrm{deg}^2$. With this study we aim except from estimating the AGN population at high redshifts, which can allow modifications in the observing strategy of the aforementioned telescopes, modifications and improvements of the models as well. In this sense we stress the importance of the Volume of the simulation box as well the initial physical conditions of the models on their effect on the luminosity functions (LFs) and the creation of the most massive SMBHs that we currently observe at the EOR. Furthermore, following the evolution of the accretion mode of the SMBHs in each model show us that the radiative-quasar mode is the main feedback mechanism at the EOR. Finally, we present the effect that the radiative efficiency has on the LFs by comparing results with a constant value and more complex calculations.

GC10

On the analysis of the FREDs gamma ray bursts

Adrián Ayala Gómez, Juan Carlos Tello, Alberto J. Castro-Tirado

FREDs (Fast Rise Exponential Decays) are a kind of gamma ray bursts (GRBs) which have reached a certain interest in the last years. They are characterized by a steep luminosity increase, followed by an exponential fade down. In this communication we present a systematic study of a set of 1000 FREDs, detected by SWIFT.

GC11

Phase-referencing measurements of positional frequency-dependent shifts in ultra-compact AGN cores

Rebecca Azulay, Andrei P. Lobanov, Eduardo Ros, Jose Carlos Guirado, Richard W. Porcas

Accurate alignment of the optical reference frame with the VLBI based International Celestial Reference Frame (ICRF) requires good understanding of the positional discrepancies of the reference objects used for the alignment. The compactness of the ICRF objects requires relative astrometry for measuring the frequency-dependent core shifts, however, there are no established methods and approaches for such measurements. We have designed a project aimed at testing several potential methods for core shift measurements using relative astrometry. For that purpose, we have used phase-referencing VLBA observations at 5 and 15 GHz in a sample of 10 compact, high declination radio sources. These observations will provide crucial input for devising an optimal approach for the radio-optical reference frame aligment.

GC12

Characterizing the ionized outflows in optically obscured quasars at z~0.4

Enrica Bellocchi, M. Villar-Martín, A. Cabrera-Lavers, J. Acosta, N. Castro

Ionized outflows are ubiquitous in non radio-loud obscured quasars (QSO2s) at different redshifts. The actual size of the outflows and their efficiency for gas ejection and star formation truncation are controversial. We have recently proposed that large scale (>~several kpc) extended radio structures might be necessary to identify (even to trigger) outflow signatures across such large spatial scales. Based on this, we have investigated the properties and sizes of the ionized outflows in a sample of 7 SDSS type 2 QSO2 at z~0.3-0.4 with known extended radio sources. The study is based on long slit Osiris/GTC spectroscopy. Ionized outflows are identified in 6 objects. For 4 objects the outflows are unresolved relative to the seeing disk. Upper limits on the radial sizes are in the range <~2-4 kpc. For one object the radial size of the outflow is R~1 kpc. SDSS0741+3020 is the only one object that shows signatures of an outflow across a remarkable extension from the AGN (R ~ 44 kpc), possible triggered by the interaction of a very extended radio source and the ambient gas.

Results on the "Beatle" QSO2 (z=0.10) will also be presented. To the best of our knowledge, this is the first radio-quiet system where radio-induced feedback has been securely identified at ≫few kpc from the AGN (~26 kpc; Villar-Martin et al. 2017). Results will also be presented on a recent study based on GTC/EMIR NIR spectroscopy, aimed at investigating the impact of the outflow in the ionized, coronal and molecular phases of the "Beetle".

The results will be placed in the context of current studies of AGN induced outflows and their potential impact on the evolution of the host galaxies.

GC13

Massive black hole seeds from gas-rich galaxy mergers

Silvia Bonoli, Lucio Mayer

In this poster I will present a new model for the formation of the "seeds" of supermassive black holes. The observation of extremely luminous quasars at redsfhifts as high as z~7, likely powered by black holes of M>10^9 Msun, can be more easily explained if black hole seeds were massive (~10^5-10^6 Msun), rather than simple PopIII remnants. In this new scenario, studied both with hydro simulations and analytical models, the seed is formed during the mergers of gas-rich massive galaxies at z~8-10. Despite being rare, massive galaxies were already presents at those epochs, in high-sigma peaks of the density fluctuations.

GC14

The continuous rise of bulges out of galactic disks

Iris Breda, Polychronis Papaderos

A key subject in extragalactic astronomy concerns the chronology and driving mechanisms of bulge formation in late-type galaxies (LTGs). The standard scenario distinguishes between classical bulges (CBs) and pseudo-bulges (PBs), the first thought to form monolithically prior to disks and the second gradually out of disks. These two bulge formation routes yield antipodal predictions on the bulge age and bulge-to-disk age contrast, both expected to be high (low) in CBs (PBs).

Using a combination of spectral synthesis and photometric techniques we study the physical and evolutionary properties of bulges in a representative sample of 135 nearby LTGs from the CALIFA survey. In particular, our analysis highlights <δμ9G>, a new distance- and formally extinction-independent measure of the contribution by stellar populations of age >9 Gyr to the mean r-band surface brightness of the bulge component. Our study reveals that LTG bulges span a tight continuous sequence of increasing <δμ9G> with increasing stellar mass, surface density (Σ*) and mass-weighted age and metallicity. Furthermore, the bulge-to-disk mass ratio and age and metallicity contrast shows a positive trend with the LTG stellar mass M*.

These lines of evidence argue against a genuine dichotomy between CBs and PBs, and suggest instead that bulge and disk evolve alongside in a concurrent process that leads to a continuum of physical and evolutionary characteristics. Specifically, our results are consistent with a picture of sub-galactic downsizing where bulge growth in LTGs is driven by a superposition of quick-early and slow-secular processes, the relative importance of which increases with M*. These processes are expected to lead to a non-homologous radial growth of Σ*.

Moreover, our analysis shows that accretion-powered nuclear activity is confined to dense/massive bulges, whereas gas excitation in lower-mass bulges is dominated by star formation. This is consistent with the notion of an asynchronous growth of super-massive black holes (SMBH) and LTG bulges and/or a link between Σ* and SMBH spin parameter.

GC15

Accurate number densities and environment for compact and relic massive galaxies

Fernando Buitrago, Ignacio Ferreras

The quest to find relic galaxies is ongoing, i.e. galaxies that seem to remain untouched from the primeval Universe. These galaxies are usually massive (>8x10^{10} M_{Sun}), with very small sizes (effective radius < 2 kpc) and with old (>10 Gyr) stellar populations. Observationally, it is not well tested whether these objects live in galaxy overdensities, as simulations predict. Additionally, their number densities in the nearby Universe (z < 0.3) are also under debate, due to the lack of large area spectroscopic surveys. To top it up, their sizes and structural parameters are not very reliable due to the shallow ancillary imaging of previous works, typically SDSS. I take advantage of the GAMA spectroscopic survey, in the KiDS and VIKING fiels (~150 deg^2, 2 mag deeper) to create a complete census of this elusive galaxy population. Each of the galaxies in my sample, surprisingly being many of them satellites of bigger objects, are a treasure trove to understand the properties of the high redshift Universe.

GC16

First results of an observational test of a double reionization scenario by detecting galaxies at high redshift

Cristina Cabello González

The study of high redshift galaxies is crucial for understanding the reionization process, the formation and evolution of galaxies and the large-scale structure in the Universe.

The aim of this project is to obtain an ultra-deep image taken with a narrow-band filter (FWHM = 11nm and central wavelength λc=1.254 μm) designed by ALBA team and the CIRCE nIR camera for GTC in order to detect LAEs (Luminous Lyman-α Emitters) at z=9.3 by the flux excess due to the Lyα emission.

Moreover, this project allows us to support or to reject the double reionization scenario predicted by the AMIGA (Analytical Model for IGM and GAlaxy evolution) model (Salvador-Solé 2015), since one of the AMIGA predictions is that the reionization of the intergalactic neutral hydrogen occurred in two stages: a first one at z∼10, due to Pop. III stars, and a second and definitive one at z∼6, due to young galaxies formed at z >6.

The ultra-deep image has been obtained within the Extended Groth Strip (EGS) field, reaching a limiting AB magnitude ∼23 in the ALBA narrow-band filter. If the Lyman α emitters are so bright like the luminous galaxy found by Zitrin et al. 2015 (LAE at z=8.68, H∼25), we can be able to detect them. Finally, we have performed a scientific analysis of some properties of the identified galaxies, gathering the available ancillary information of these objects from the 3D-HST survey.

GC17

Estructura estelar en teorías de gravedad modificada

Jorge Carro Maroto, Antonio López Maroto, María Ángeles Pérez García

En este trabajo se ha realizado un estudio de los posibles efectos sobre la estructura estelar que pueden aparecer en teorías que van más allá de la Relatividad General de Einstein. Las teorías de gravedad modificada tratan de extender las ecuaciones de la Relatividad General para que puedan resolver ciertos problemas actuales de la Cosmología. Nuestro objetivo ha sido, a partir de un modelo sencillo de modificación de las ecuaciones de Einstein, analizar las posibles consecuencias sobre algunas magnitudes características de las estrellas como el radio y la masa. A través de una aproximación perturbativa se ha estudiado la ecuación de Tolman-Oppenheimer-Volkoff modificada y calculado los efectos sobre varios índices politrópicos correspondientes a diferentes tipos de estrellas.

GC18

Testing structure formation in Unified Dark matter-energy models

Diogo Castelão, Ismael Tereno, Alberto Rozas-Fernández

UDM models usually have oscillations in the matter power spectrum caused by a non-zero speed of sound, which cause difficulties in an MCMC sampling of the parameter space. In this talk, I will test an UDM model with fast transition using weak lensing and CMB data, using both MCMC and Nested sampling algorithms. The second method is found to be considerably better. I will also enumerate some issues relevant for future Euclid tests of UDM models.

GC19

Optical spectroscopy of local type-1 AGN LINERs

Sara Cazzoli

The broad line region (BLR) could be either weak and difficult to detect, or even absent, for low luminosity active galactic nucleus (AGNs), as low ionization nuclear emission-line regions (LINERs). This makes LINERs challenging to fit in the AGN unification scheme. Moreover, a long debate can be found in the literature proposing different ionization sources driving the main gas emission mechanism and no universal agreement has been reached.

In this poster, I will present some novel results from our recent study of the 22 local ($z < 0.025$) type-1 LINERs from the Palomar Survey, on the basis of optical long-slit spectroscopic observations taken with TWIN/CAHA and ALFOSC/NOT (Cazzoli et al. Submitted).

We explored the AGN-nature of nearby type-1 LINERs by studying the broad (BLR-originated) Halpha component. Then, we derived reliable interpretation for the different component of emission lines by studying their kinematics and ionization mechanism. Finally, we studied the neutral gas in the nuclei of these LINERs by modeling of the NaD absorption.

Our results are compared with those obtained exploiting nuclear spectra from HST/STIS for the same sources. We found that the Halpha broad component is elusive in our ground-based spectroscopy whereas it is ubiquitous for space-based data questioning the current AGN classification of these LINERs. By combining the location of line ratios onto BPTs, theoretical models (for AGNs, pAGB-stars and shocks) and the weak/strong -[OI] classification, we exclude the pAGB-stars an scenario in favor of the AGN as the dominant mechanism of ionisation in these LINERs. Shocks are not the dominant mechanism but they seem however important in LINERs.

We found that ionised outflows are frequent in these LINER-nuclei in contrast to neutral gas ones.

GC20

Anisotropic Domain Walls

José Ricardo Correia, Carlos Martins

Cosmic strings and other topological defects arise naturally in many proposed theories of new physics beyond the standard model unifying the electroweak and strong interactions, as well as in many Type-IIB brane inflation models, where horizon sized superstrings are produced as a result. In both cases the need for higher resolution and extra complexity to model realistic defects, and future observational searches (CORE and LISA) can heavily tax the underlying hardware (to the point where unfeasible amounts of time and resources are necessary).

In this poster we take a recently developed "domain wall" network evolution parallel code which harnesses the power of a Graphics Processing Units. We show the significant speed-ups that incur from parallelising the code, and study possible errors. We then put this implementation to use, by showing how successful the recently extended Velocity-dependent One-Scale (VOS) model for domain walls is at describing the post-inflationary evolution of domain walls produced at an anisotropic era and frozen in comoving coordinates in some open inflationary epoch.

GC21

Stellar kinematics and dynamics of a sample of LIRGs observed with SINFONI

Alejandro Crespo Gómez, Javier Piqueras López, Santiago Arribas Mocoroa, Santiago, Luis Colina Robledo

We have studying the stellar kinematics of a local sample of 10 Luminous Infrared Galaxies (LIRGs) observed with the instrument SINFONI at the VLT. We have extracted the line-of-sight velocity distribution (LOSVD) using the CO stellar absorption bands in the K-band and obtained the 2D velocity and velocity dispersion distributions of the stellar component. By combining our kinematic maps and light profiles with a NFW density model, we have also obtained their dynamical masses. His this talk we will introduce the procedures and their limitations when applied to LIRGs, and discuss the main results.

GC22

The capabilities of the J-PLUS survey for stellar population studies

Luis Alberto Díaz García, A.J. Cenarro, C. López-Sanjuán

Owing to the increasing number and the capabilities of the current multi-filter surveys (e.g. J-PLUS, J-PAS, ALHAMBRA, SHARDS, COSMOS, COMBO17, etc.), many analysis techniques are being adapted to deal or include this kind of data to explore different topics of Astrophysics and Cosmology. In our particular case, we pursue to unveil the stellar population studies that can be carried out with the multi-filter data of J-PLUS (a combination of 7 narrow- and 5 broad-bands in the optical range). For this aim, we build mock galaxies mimicking J-PLUS galaxies with the same observational conditions of this survey, including transmission curves, signal-to-noise ratios, depth, etc. These mock galaxies are subsequently analysed with the SED-fitting code MUFFIT (which includes a Monte Carlo approach taking the uncertainties in each band into account) to state the range of uncertainties, degeneracies and/or potential systematics affecting the retrieved stellar population properties. Thanks to these simulations, we state the stellar population parameters that can be fairly constrained as a function of magnitude and redshift. These predictions can be taken as reference values of stellar populations or limitations for future studies involving full spectral fitting techniques and J-PLUS like data.

GC23

Discovery of a lensed ultrabright submillimeter galaxy at z=2.0439

Anastasio Díaz-Sánchez, Susana Iglesias-Groth, Rafael Rebolo, Helmut Dannerbauer

We report an ultra-bright lensed submillimeter galaxy (SMG) at z=2.0439, WISEJ132934.18+224327.3, identified as a result of a full-sky cross-correlation of the AllWISE and Planck compact source catalogs aimed to search for bright analogs of the submillimeter galaxy SMMJ2135, the Cosmic Eyelash. Inspection of archival SCUBA-2 observations of the candidates revealed a source with fluxes consistent with the Planck measurements. The centroid of the SCUBA-2 source coincides within 1 arcsec with the position of the AllWISE mid-IR source, and, remarkably, with an arc shaped lensed galaxy in HST images at visible wavelengths. Low-resolution rest-frame UV-optical spectroscopy of this lensed galaxy obtained with 10.4 m GTC reveals the typical absorption lines of a starburst galaxy. Gemini-N near-IR spectroscopy provided a clear detection of Hα emission. The lensed source appears to be gravitationally magnified by a massive foreground galaxy cluster lens at z = 0.44, modeling with Lenstool indicates a lensing amplification factor of ~11. We determine an intrinsic rest-frame 8-1000-μm luminosity of 1.3 x 10^{13} Lsun, and a likely star-formation rate (SFR) of 500-2000 Msun/yr. The SED shows a remarkable similarity with the Cosmic Eyelash from optical-mid/IR to sub-millimeter/radio, albeit at higher fluxes.

GC24

Molecular gas in/outflows in the nuclear regions of five Seyfert galaxies

Alejandro Javier Domínguez Fernández, A. Alonso Herrero, S. García Burillo, C. Ramos Almeida, L. Colina, J.M. Rodríguez Espinosa, E. Sani, R. Mason, C. Packham, N. Levenson, P. Roche, D. Rigopoulou, M. Imanishi, P. Esquej

One of the most challenging open questions in Astrophysics is how Active Galactic Nuclei (AGN) are fueled. For this to happen, gas has to be driven from the outskirts of the galaxy to the nuclear regions. Different mechanisms such as bars (large-scale and nuclear), lopsided disks, m=1, 2 instabilities or warps have been suggested to remove the gas angular momentum at different spatial scales of galaxy disks. On the other hand, stellar and AGN feedback in the form of outflows prevents galaxies from becoming overmassive. Studies about inflows/outflows in the central 10's of parsecs of galaxies are only possible in the local universe where current instruments are able to reach the required angular resolutions (less than 1"). In this talk I will present the results of interferometric observations of the cold CO(2-1) molecular gas and 1.3 mm continuum obtained with NOEMA of five nearby (mean luminosity distance of 34 Mpc) Seyfert galaxies. The superb angular resolution of the NOEMA data (~0.6"~100 pc) enables us to study the CO(2-1) morphology and kinematics as well as to measure the molecular gas content of the nuclear regions. I will show that all the galaxies in our sample show evidence of non-circular motions in their nuclear regions and will discuss for each galaxy whether they are interpreted as inflows or outflows.

GC25

Deep learning for morphological classification of galaxies

Helena Domínguez Sánchez, Marc Huertas Company, Mariangela Bernardi

Galaxies exhibit a wide variety of morphologies, which are strongly related to their star formation histories. Having large samples of morphologically classified galaxies is fundamental to understand galaxy formation and evolution. We present a morphological catalogue obtained with a Supervised Deep Learning algorithm for 670,000 galaxies in the Sloan Digital Sky Survey. By combining accurate existing visual classification catalogues with convolutional neural networks, we provide the largest and most accurate morphological catalogue up to date. Although these algorithms provide robust classifications, they rely on large training sets (~5000 galaxies). A key question in view of using Deep Learning to asses the morphologies of galaxies in future big-data surveys, such as EUCLID or LSST, is how much of the knowledge acquired from an existing survey can be exported to a new dataset. We test the performance of Deep Learning models, trained with SDSS data, on Dark Energy survey images. After a fast domain adaptation step machines can quickly adapt to new instrument characteristics (e.g., PSF, seeing, depth), reducing by almost one order of magnitude the necessary training sample for morphological classification.

GC26

Environmental dependence of the IMF-sensitive features in intermediate-mass quiescent galaxies

Elham Eftekhari, Alexandre Vazdekis, Moein Mosleh, Saeed Tavasoli

In this work, we investigate the impact of large-scale environment on the IMF in quiescent galaxies. For this purpose, we compare the trend of IMF-sensitive spectral features with respect to galaxy mass in three samples of intermediate-mass galaxies that reside in low, intermediate and high-density environments. Using SDSS DR7 spectra stacked by velocity dispersion and redshift, in a purely observational approach, we find that the IMF of intermediate-mass galaxies does not significantly depend on the galactic environment.

GC27

The MUSE Atlas of Disks (MAD): Ionized gas properties in local galaxies

Santiago Erroz Ferrer

I will present Erroz-Ferrer et al. (2018, in prep.), entitled MUSE Atlas of Disks (MAD) -. Resolving Star Formation Rates and Gas Metallicities on < 100pc Scales. MAD observes a large representative sample of nearby “star-forming Main Sequence” galaxies with the MUSE instrument on VLT at greater spatial and spectral resolution than any other previous 2D spectroscopic survey on these systems. Based on known structural and colour properties of these 10^{8}-10^{11} M_{Sun} galaxies from HST imaging, MUSE provides with stellar and gaseous maps at very local scales <<100 pc.

I will focus on the first results from the ionized gas properties from the 38 galaxies observed so far. With the great spatial resolution achieved with our data we can now analyse at very small scales the ionization state, BPT diagrams, ISM properties, SFRs and chemical enrichment (oxygen abundance) of the different galaxy substructural components such as bars, bulges, pseudo-bulges, star forming rings, HII regions, inner rings and inner disks. I will also show how we identify the relative contributions to SFR from clusters vs diffuse component, and how the results vary for each component.

We identify declining and flat metallicity gradients, showing that the chemical enrichment in these galaxies are different and linked to different evolutionary scenarios such as inside-out growth, merging, secular evolution or radial migration. We find a correlation between the stellar mass surface density and the gas metallicity (Mass-Metallicity Relation), which holds at these local scales. We also find a correlation between the stellar mass surface density and the star formation rate density (a "Star Formation Main Sequence" at <100 pc scales). Our results point towards a scenario where the formation of stars has a local origin and depends on the amount of gas available and not on the galaxy potential well.

GC28

Total and linearly polarized synchrotron emission from overpressured magnetized relativistic jets

Antonio Fuentes, José L. Gómez, José M. Martí, Manel Perucho

We present relativistic magnetohydrodynamic (RMHD) simulations of stationary overpressured magnetized relativistic jets which are characterized by their dominant type of energy, namely internal, kinetic, or magnetic. Each model is threaded by a helical magnetic field with a pitch angle of 45deg and features a series of recollimation shocks produced by the initial pressure mismatch, whose strength and number varies as a function of the dominant type of energy. We perform a study of the polarization signatures from these models by integrating the radiative transfer equations for synchrotron radiation using as inputs the RMHD solutions. These simulations show a top-down emission asymmetry produced by the helical magnetic field and a progressive confinement of the emission into a jet spine as the magnetization increases and the internal energy of the non-thermal population is considered to be a constant fraction of the thermal one. Bright stationary components associated with the recollimation shocks appear presenting a relative intensity modulated by the Doppler boosting ratio between the pre-shock and post-shock states. Small viewing angles show a roughly bimodal distribution in the polarization angle due to the helical structure of the magnetic field, which is also responsible for the highly stratified degree of linear polarization across the jet width. In addition, small variations of the order of 26deg are observed in the polarization angle of the stationary components, which can be used to identify recollimation shocks in astrophysical jets.

GC29

La búsqueda de nebulosas planetarias en las afueras de M33: Qué encontramos cuando no encontramos "nada"

Rebeca Galera-Rosillo, Romano L.M. Corradi, Antonio Mampaso

Resumiré en el poster los resultados del artículo aceptado por A&A en diciembre 2017, Galera-Rosillo et al.: " A deep narrowband survey for planetary nebulae at the outskirts of M33" . Realizamos una búsqueda de Nebulosas Planetarias (NPs) en las afueras de la galaxia M33 en la dirección de la galaxia M31, sobre una combinación de imágenes muy profundas (mag 26) en filtro ancho (r', g') y estrecho (Halpha y [OIII]), del telescopio INT. Cubrimos unos 5 grados cuadrados del cielo y alcanzamos unos 40 Kpc de distancia desde el centro de la galaxia.

El exhaustivo estudio de los resultados fotométricos combinado con una búsqueda visual da como resultado la ausencia de NPs en la zona estudiada. Este resultado establece un límite superior en la luminosidad de la población subyacente, acotando las características del posible halo de la galaxia, y poniendo en cuestión la interacción entre las galaxias M31 y M33. Dicha interacción ha sido empleada como una de las posibles explicaciones para la presencia de las NPs que sí se encuentran sin embargo en las afueras de la galaxia M31, y que presentan una metalicidad más propia de objetos del disco de la galaxia.

Me gustaría aprovechar este resultado científico para hacer un guiño a la influencia que tiene la astronomía en otras ramas (científicas y no científicas), y a cómo el mero hecho de mirar hacia el cielo, incluso cuando el resultado que obtenemos es la ausencia de los objetos que se buscan, nos ofrece relevantes resultados y una increíble fuente de inspiración.

GC30

Modelling subdominant gravitational waves modes and its astrophysical implications

Cecilio García Quirós Marta Colleoni, Geraint Pratten, Sascha Husa

The angular shape of gravitational wave signals is well described by a multipolar expansion in spherical harmonics. Gravitational wave data analysis has almost entirely focused on the dominant quadrupole
spherical harmonic. In this talk a new waveform model that includes
several harmonics will be presented, and the implications on gravitational wave data analysis and astrophysics will be discussed.

GC31

Feedback in Lyman-alpha halos around two radio galaxies at z~2.5

Sandy Gonçalves Morais

In this work we present new spectroscopic observations of two high-redshift radio galaxies, TXS0211−122 (z=2.34) and TXS0828+193 (z=2.57), known to be associated with large Lyα halos. In both objects, we detect spatially extended Lyα emission perpendicularly to the radio axis. In line with previous studies, we find evidence for outflowing gas along the radio axis of TXS0211-122 which may be the result of jet-gas interactions. In the slit oriented perpendicularly to the radio axis we find less perturbed gas kinematics, suggesting outflows of ionized gas in this object are focused along the radio jet axis. Additionally, we find evidence for a giant, UV-emitting arc or shell-like structure surrounding the Lyα halo, possibly resulting from feedback activity. In TXS 0828+193, a large Lyα halo (∼56 kpc) is detected perpendicularly to the radio axis. Along both slit position angles we find evidence for outflowing gas, which we argue is part of an expanding shell or bubble of gas powered by feedback activity in the central regions of the galaxy. Our results suggest a diversity in the spatial distribution of ionized outflows in powerful radio galaxies at z~2.5.

GC32

A multi-wavelength approach towards the characterization of Luminous Infrared Galaxies

Rubén Herrero-Illana

Nuclear starbursts and AGN activity are the main heating mechanisms in luminous infrared galaxies (LIRGs). Understanding their relationship and disentangling their contribution is fundamental to understand galaxy evolution. I will present our recent study of the star-formation and AGN activity of a sample of local LIRGs imaged with subarcsecond angular resolution at radio and near-infrared. This allowed us to characterize the central kpc of these galaxies with a spatial resolution of ~100pc. Additionally, we modeled their multi-wavelength spectral energy distribution (SED) using template libraries of starburst, AGN and spheroidal/cirrus models, determining the luminosity contribution of each component. Our sources show high star formation and supernova rates, and similar starburst ages. A comparison of our derived star-forming parameters with estimates obtained from typically used tracers at different wavelengths shows an overall consistency among the different star formation tracers, albeit some considerations need to be taken into account. Finally, I will also show how these multi-wavelength analysis can be complemented with very long baseline radio interferometric observations, where the extremely high angular resolution can isolate individual supernovae and pinpoint the location of AGNs.

GC33

Photoionization models for extreme Lyα ratios from high-z quasar halos and Lyα

Andrew Humphrey

We explore potential mechanisms to produce extremely high Lyα/HeII flux ratios, or to enhance the observed number of Lyα photons per incident ionizing photon, in extended AGN-photoionized nebulae at high-redshift.

We compute models to simulate photoionization of interstellar gas by the radiation field of a luminous AGN, exploring the impact of ionization parameter, gas metallicity, ionizing SED, electron energy distribution, and cloud viewing angle on the relative fluxes of Lyα, HeII and other lines, and on the observed number of Lyα photons per incident ionizing photon. We compare our model results with recent observations of quasar Lyα halos at z∼3.5.

In addition, we present a set of UV-optical diagnostic diagrams to distinguish between photoionization by Pop III stars and photoionization by an AGN.

GC34

Mock Galaxy Lightcones with Emission Lines for Narrow-Band Photometric Surveys

David Izquierdo-Villalba, Raul Angulo, Alvaro Orsi

We present a synthetic galaxy catalogue over the past lightcone built by applying the L-Galaxies semi-analytic model to the subhalo merger trees of the Millennnium simulation. Our new method for constructing a lightcone is embedded into L-Galaxies and computes the properties of each galaxy up to the exact moment it crosses the past lightcone of a given observer. This produces accurate results across cosmic time, minimising time-discreteness effects. Additionally, we include a model for the nebular emission from star forming regions in galaxies, which is crucial for correctly predicting the narrow/intermediate-band photometry of galaxies.
As an application of our mock lightcones, we study the accuracy with which J-PLUS -a large optical galaxy survey featuring 5 broad- and 7 intermediate/narrow-band filters- is able to identify and estimate emission lines in galaxies as well as to produce contiguous maps of the integrated line emission.

GC35

Supermassive black hole growth in galaxy formation models

David Izquierdo-Villalba, Silvia Bonoli, Alvaro Orsi, Daniele Spinoso

In this work we present a new model for SMBH growth which takes into account the role of both galaxy mergers and galaxy secular evolution in the BH cosmological evolution. Using the Munich L-galaxies semi-analytical model run on top of the Millennium N-body simulations, we corroborate the idea that mergers are an important process to trigger powerful quasars at any redshift and we test the role of disk instabilities, induced by secular evolution or minor merger, as an important mechanism in the BH fuelling at high-z. The model also tracks self-consistently the BH spin evolution due to both gas accretion and BH-BH mergers. The results show that the assembly history of BHs is very sensitive to the model for spin evolution, and thus to accretion efficiencies and bolometric luminosities.

Finally, since our model can be run on all versions of the Millennium simulations, we are able to study the evolution of a broad range of black holes, from SMBHs in dwarf galaxies, to the brightest quasars and BHs at the center of BCGs.

GC36

MIRI GTO spectroscopy of high-z galaxies

Álvaro Labiano

MIRI, with the spectral coverage from 5 to 28 um and its sensitivity, is the JWST instrument best suited to explore the rest-frame optical/near-infrared spectrum for galaxies at High-z, and the only one that can detect the Halpha emission line on sources at redshifts beyond 6.7.

The European MIRI Guaranteed Time Observations (GTO, PI: G. Wright) will dedicate 65 hours with the Medium-resolution integral field spectrograph (MRS) and the IMAGER to individually study three Lyman alpha emitters (LAEs), two quasars in the Epoch of Reionization (EoR), and two dusty star-forming galaxy (DSFG) at z~4-7.

In this talk we discuss the main goals of the program :
a) detect the Halpha emission line for three spectroscopically detected LAEs (COS-zs7-1, EGS-zs8-1 y EGSY8P7) from z~7 to 9.
b) explore the optical/near-infrared continuum spectrum and emission lines for two QSOs (J1120+0641 and J2348-3054) at z~7.
c) study the sub-arcsec view over the rest-frame near-infrared spectrum for two DSFG (GN-20 and HFLS3).
d) perform Mid-IR imaging for all the galaxies and surrounding fields.

In addition, we will show realistic MIRISim simulations of our future GTO observations and the first calibration tests with the JWST pipeline.

GC37

J-PLUS DR1: 2D SFR properties in nearby galaxies

Rafael Logroño-García, Carlos López-Sanjuan, Jesús Varela, Gonzalo Vilella-Rojo, Kerttu Viironen

J-PLUS [1] is a multi-filter photometric survey which is being developed at the "Observatorio Astrofísico de Javalambre" (OAJ) with the JAST/T80 telescope and the T80Cam. The large field of view FoV (2 deg^2 [2]) and the set of filters of the system, allow us to perform 2D star formation rate (SFR) studies in the nearby universe, by using the Hα emission line. The DR1 will soon be released with more than 1000 deg^2 [2] observed. Previously tested methodologies [2,3] to measure the Hα emission line and carry out 2D SFR studies will be applied to the entire data set; obtaining Hα emission maps, SFR radial profiles, and SFRs for ~800 galaxies at redshifts (z): $0 < z < 0.015$. With this unprecedented sample of galaxies in this z range, we will be able to study the 2D SFR properties of galaxies and how they correlate with variables as the stellar mass, the close environment or the nuclear activity. In addition, we will obtain the SFR density in the nearby universe.

[1]Cenarro et al. 2018, submitted
[2]Vilella-Rojo et al. 2015
[3] Logroño-García et al. 2018, submitted

GC38

Measuring disc growth of Milky Way-like galaxies with ultra-deep imaging

Cristina Martínez-Lombilla, Ignacio Trujillo, Johan H. Knapen

The hierarchical model of galaxy formation suggests that galaxies are continuously growing. But can we actually measure the ongoing growth of present-day galaxies? In this talk, we show for the first time a quantification of disc growth in two Milky Way-like galaxies (NGC 4565 and NGC 5907) which we derive from the position of their truncations. The truncation is a low surface brightness feature of the disc, located on their outskirts, and whose location is thought to change dynamically. We measure this change by exploring the position of the truncation at different heights above the galactic disc plane (0<z<8 kpc) and at different wavelengths (from NUV to 3.6 μm). Our results are compatible with an upper limit to the growth rate of 0.5 kpc/Gyr. We will discuss the relevance of our findings within a cosmological context and we will debate whether such a growth rate is compatible with a deceleration of the growth of galaxies at the present cosmic epoch.

GC39

Searching for the first Radio Galaxies

Israel Matute

Radio galaxies are ideal probes of galaxy assembly at high redshifts, tracing systems with very high star-formation and pinpointing the build ups of massive galaxies and proto-clusters. Radio galaxies are also prime tracers of AGN activity and have become a key ingredient in any galaxy evolution model able to reproduce the high-mass stellar mass function in the local universe. In fact, the impact of "radio-mode" feedback at high redshift is poorly constrained. But the identification of these radio sources close to the Epoch of Re-ionization is yet to be achieved, although we know AGN exist up to z~7 and theory predicts a significant number of such sources at z>6 well within the reach of current radio surveys. Has this high-z radio population already been detected but still hidden at the faintest fluxes waiting for a way to identify them? We discuss here the approach taken by our team to characterize this faint radio population by coupling it with FIR contraints and multiwavelength information in the most prominent cosmological fields. We also present some robust high-z candidates and tentatively discuss the implications that this might have for the radio models and for the strategies for the upcoming generation of whole-sky deep radio surveys such as ASKAP-EMU and Westerbork-WODAN, and SKA itself.

GC40

AGN demography with JWST - broad-band imaging to the rescue

Hugo Messias

With available X-ray surveys getting to extreme deep levels with Chandra (~10^{-17}erg/s/cm^2) and probing harder energies with NuSTAR (8-24keV), one may wonder how JWST will contribute to obscured-AGN demography when online. Although deep spectroscopy will be enabled with spectroscopic instrumentation on board JWST (especially with MIRI), such modes will be mostly used for candidate follow-up. This presentation -based on Messias et al. 2012 and 2014, and recent literature developments- aims at showing how deep high-spatial resolution NIRCam and MIRI broad-band imaging can excell in what obscured-AGN demography is concerned with respect to what is currently achieved by X-ray surveys. In the process, some misconceptions undermining the use of this technique will also be addressed. I will show one way to pursue a telescope-time-efficient survey aiming to select AGN up to redshift 2 (and potentially to redshift 6), and what other current science questions such project could address in addition "for free" (i.e., stellar assembly in galaxies or high-redshift source selection).

GC41

The role of dust in galactic chemical evolution

Iker Millán Irigoyen, Mercedes Mollá Llorente, Yago Ascasibar Sequeiros

From their formation in the last stages of stellar evolution to their destruction by the shock waves of supernova explosions, dust grains have a very complex life cycle. Furthermore, they play a very important role in the evolution of galaxies. For instance, molecular hydrogen is mainly formed in the icy mantle of dust grains, which also shield the molecules from photodissociating UV radiation and prevent the destruction of Giant Molecular Clouds. Thus, it is very important to implement the dust cycle in a self-consistent way in order to realistically model galactic chemical evolution. In this talk, I will summarize the results we have obtained by considering different dust species and discuss the implications for our understanding the formation and destruction of dust grains.We have shown that the self consistent model GCE of the Milky Way including dust formation in AGB stars and SNe and dust destruction in SN shock waves do not reach the observable dust to gas ratio. This result suggests that it is necessary to consider more mechanisms of dust formation to reproduce the observed dust to gas ratio of the Milky Way.

GC42

2D-Galaxy Chemical evolution models: The role of the spiral wave over-density on the elemental abundances

Mercedes Mollá, Sheillah Wekesa, Dismas Wamalwa, F. Fabian Rosales-Ortega, Yago Ascasibar, Angeles I. Díaz, Oscar Cavichia

We will present here the work which we are doing within a collaboration with the Univ. of Nairobi as part of the Ph.D. by Sheillah Wekesa. Chemical evolution models (CEM) are a powerful tool to interpret and explain the possible scenarios and/or mechanisms of galaxies formation and evolution, as they are able to infer how the chemical elements are formed inside the stellar interiors and how these are redistributed into the ISM. However, due to the lack of 2D information, CEMs commonly assume that abundances distributions are azimuthally symmetric, and the important issue of the possible dispersion of abundance values at a given galactocentric distance is not addressed, e.g. a spiral disk requires a full 2D description so that arms, bars and other structures, as those produced by mergers or interactions, may be also included. Our objective is to develop the most comprehensive and sophisticated 2D chemical evolution models for spiral and irregular galaxies, constrained by observed abundance distributions using the state-of-the-art IFS data of nearby galaxies, which have improved extraordinarly the spatial resilution. In the present preliminary work we start by including the spiral wave as a first step. The spiral wave produce an over-density in comparison with the average mass density on the disk (with its radial exponential decrease).We have modified our classical chemical evolution model in 1D and performed a first model applying it to a Milky Way like galaxy,to analyze the effects of the overdensity of a spiral wave on the resulting elemental abundances and star formation rate (SFR) 2D-distributions. We also study the role of the different ingredients over these models. We will present here these results.

GC43

Función de correlación del catálogo Ks de ALHAMBRA

Lorena Nieves Seoane, Alberto Fernández-Soto, Pablo Arnalte-Mur

En este trabajo hemos medido la función de correlación de galaxias de tipo rojo en el rango de redshift 0.75<z<1.45, extendiendo el trabajo realizado en Hurtado-Gil et al. (2016). Para ello utilizamos el método descrito en Arnalte-Mur et al. (2014) para estimar la función de correlación proyectada wp(rp). Hemos observado que existe una evolución significativa en el agrupamiento de galaxias en este rango de redshift y segregación de la luminosidad en las submuestras a más alto redshift (Nieves-Seoane 2018a, in prep.)

GC44

Función de Luminosidad (LF) del catálogo cruzado ALHAMBRA Ks + IRAC

Lorena Nieves Seoane, Alberto Fernández-Soto, Carlos López-Sanjuan

En este trabajo hemos cruzado el catálogo Ks de ALHAMBRA con los datos públicos disponibles de Spitzer-IRAC para extender la fotometría en las longitudes de onda infrarrojas, de manera que hemos conseguido un catálogo adicional ALHAMBRA-Ks+IRAC (AKs-IR). En este catálogo hemos incluido la fotometría en los 20+3 filtros de ALHAMBRA, la banda sintética F814W y los canales de IRAC centrados en las 3.6 µm, 4.5 µm y 5.8 µm. Este catálogo adicional contiene 35,024 fuentes en un área total de 0.93 deg^2. Realizamos tanto la fotometría como los tests fotométricos de manera similar a los que realizamos para en catálogo en banda Ks.

Como parte final de la tesis calculamos la función de luminosidad (LF) en la banda Ks en reposo utilizando los datos incluídos en el catálogo AKs-IR. Para ello utilizamos el m´etodo descrito en López- Sanjuan et al. (2017). La comparación entre los resultados obtenidos y otros trabajos similares (Arnouts et al. 2005; Cirasuolo et al. 2010) muestra un buen acuerdo, especialmente cuando comparamos nuestros resultados con los de Cirasuolo et al. (2010). Finalmente hemos analizado la evolución en redshift de los parámetros M$\star$ Ks $\varphi\star$ y la densidad de luminosidad integrada jK. Los resultados obtenidos muestran una fuerte evolución positiva en número junto con una no aparente evolución en la luminosidad para la población de galaxias rojas. Sin embargo, las galaxias azules muestran una ligera evolución positiva en número junto con una evolución negativa en luminosidad. En cuanto a la densidad de luminosidad observamos un cambio en la población global, donde las galaxias azules dominan a $z\sim2$ y las galaxias rojas dominan a $z\sim0.5$ (Nieves-Seoane 2018b, en preparación).

GC45

Dust-to-gas ratio in a complete sample of type-1 AGN

Ignacio Ordovás Pascual, Silvia Mateos, Francisco J. Carrera, Alessandro Caccianiga, Paola Severgnini, Roberto Della Ceca, Lucia Ballo, Albert Moretti, Amalia Corral

According to the Unified Model of Active Galactic Nuclei (AGN), unobscured AGN based on its optical spectrum (detection of rest-frame UV-optical broad emission lines, type-1 AGN) should appear as X-ray unabsorbed AGN. However, there is an important fraction (10-30%) of AGN whose optical and X-ray classifications do not match, and the origin of the discrepancy is not clear. To provide insight into this topic, we have conducted a statistical analysis of the optical obscuration and X-ray absorption properties of the optically type-1 AGN from the Bright Ultra-hard XMM-Newton Survey (BUXS) with L(2-10 keV)>10^{42} erg/s and z=0.05-1. We have high-quality spectra from XMM-Newton and either SDSS spectra or proprietary observations for the selected sample. In order to provide the most complete sample as possible, we have conducted a detailed analysis of the emission lines to provide a reliable classification of the AGNs. We derive the X-ray absorption by fitting their XMM-Newton spectra and the optical extinction using UV/optical spectral continuum fits. As BUXS is a flux limited X-ray selected sample at hard energies (F(4.5−10 keV)≥6x10^{-14} erg/s/cm^2), it is complete for N_H column densities up to the Compton-thick limit (~10^{24} cm^{-2}). Our preliminary results show that most type-1 AGN in our sample show consistent optical and X-ray classification, but there is a large fraction (~20%) of objects with large N_H column densities (N_H > 4x10^{21} cm^{-2}). We are finding a larger fraction of objects with high optical extinction in terms of Av with respect to other studies, specially optically selected samples. We check as well that the extinction obtained from the continuum is not the same than the one obtained from the Balmer Decrement of the BLR, as the latter depends strongly on the conditions of the BLR. The majority (~70%) of the sources show dust-to-gas ratios compatible with the Galactic relation, but there are as well a large fraction of discordant AGN.

GC46

Star-dust interplay in late type galaxies at z < 0.5

Ciro Pappalardo, M. Baes, S. Viaene, S. Bianchi, J. Davies, J. Fritz, M. Pohlen, M. Smith, J. Verstappen, T. Hughes

The huge growth of data available to the scientific community in the last decade allowed, for the first time in astronomy, a truly panchromatic approach. These data shed light on fundamental correlations, linking the dust component of a galaxy with its star formation rate (SFR). However, the relation between the SFR and dust emission is complex, and still it is not clear what drives it. In this talk I will re-examine these correlations considering the intrinsic properties of the galaxies dust.
The dust luminosities (Ld) and the SFR show a strong correlation, but for low values of both parameters, the scatter in the correlation increases. We show that introducing a selection based on the fraction of ultraviolet emission absorbed by dust, we can reduce drastically the data scatter. Galaxies with similar absorption coefficients, despite a different SFR, have a similar balance between the fraction of dust heated by the star formation and the interstellar radiation field (IRF).

Dust masses (Md) and SFR also show a correlation, but weaker with respect to the Ld. Our study indicates that this scatter is due to a different intensity of the IRF produced by stars during late evolutionary stages, which shifts the galaxies position in the Md-SFR plane. Once selected galaxies with similar IRF, the scatter is removed.

In the SFR versus stellar mass (M*) plane these galaxies occupy a region included between local spirals and higher redshift star forming galaxies. These galaxies represent the population that at z<0.5 quenches its star formation activity and reduces its contribution to the cosmic Star formation rate density. The galaxies subsample with the higher masses (M*>3e10 Msol) does not lie on the main sequence, but shows a small offset, as a consequence of the decreased star formation. Low mass galaxies (M*<1e10 Msol) settle in the main sequence with SFR and M* consistent with local spirals.

The multi-wavelength approach allows the identification of a mixed population, with galaxies still in an assembly phase, or galaxies at the beginning of their passive evolution.

GC47

The Portuguese Alma Center of Expertise: ALMA research in Portugal after 3 years

Ciro Pappalardo

The Institute of Astronomy and Space Sciences in Portugal has recently seen its capabilities for ALMA research internationally recognized, being named by ESO as an ALMA Centre of Expertise. This is a result of an objective effort over the last few years to increase the national capability in the exploration of this revolutionary observatory. This poster will describe the responsibilities and capabilities of the Portuguese ALMA Centre of Expertise (PACE) and show the potential of ALMA in a wide variety of science fields, from our own Sun and Solar System, to galaxy formation and cosmology. With PACE, Portugal offers support to the scientific community, encouraging the Iberian participation in one of the most challenging research institution in the world: ALMA.

GC48

LAEs: don't ever change?

Ana Paulino-Afonso, David Sobral, Bruno Ribeiro, Jorryt Matthee, Sérgio Santos, João Calhau, Sara Pérez

Lyman-α (Lyα) is, intrinsically, the strongest nebular emission line in actively star-forming galaxies (SFGs), but its resonant nature and uncertain escape fraction limit its applicability. The structure, size, and morphology may be key to understand the escape of Lyα photons and the nature of Lyα emitters (LAEs). In Paulino-Afonso et al.(2018) we investigate the rest-frame UV morphologies of a large sample of ~4000 LAEs from z~2 to z~6, selected in a uniform way with 16 different narrow- and medium-bands over the full COSMOS field (SC4K, Sobral et al., 2018). From the magnitudes that we measure from UV stacks, we find that these galaxies are populating the faint end of the UV luminosity function. We find also that LAEs have roughly the same morphology from z~2 to z~6. The median size (re~1 kpc), ellipticities (slightly elongated with b/a~0.45), Sérsic index (disk-like with n≤2), and light concentration (comparable to that of disk or irregular galaxies, with C~2.7) show little to no evolution. LAEs with the highest equivalent widths (EW) are the smallest/most compact (re~0.8 kpc, compared to re~1.5 kpc for the lower EW LAEs). In a scenario where galaxies with a high Lyα escape fraction are more frequent in compact objects, these results are a natural consequence of the small sizes of LAEs. When compared to other SFGs, LAEs are found to be smaller at all redshifts. The difference between the two populations changing with redshift, from a factor of ~1 at z≥5 to SFGs being a factor of ~2-4 larger than LAEs for z≤2. This means that at the highest redshifts, where typical sizes approach those of LAEs, the fraction of galaxies showing Lyα in emission should be much higher, consistent with observations. In this era of new and upcoming cutting-edge facilities, linking the theoretical perspectives and numerical simulations with the observational studies of the properties of the LAEs across the Universe seems to be a key to understand reionization and early stages of galaxy formation.

GC49

Mergers, shocks and turbulence and their effects on galaxy evolution

Ana Paulino-Afonso,Andra Stroe, David Sobral

Galaxy populations in relaxed clusters are dominated by ellipticals. However, little is known about the effect of disturbed clusters on galaxy evolution. Merging clusters represent an extremely violent environment permeated by Mpc-wide shock waves and cluster-wide turbulence. Stroe et al. (2016) completed the first narrow-band survey of Hα emitters in a sample of low-redshift clusters sampling a range of masses and relaxation states. The results have shown that relaxed environments have 25 times fewer Hα emitters compared to merging clusters. What drives this reversal of typical environmental trends and how could shocks and turbulence trigger star formation in cluster galaxies remains unclear. Multi-object spectroscopic observations have been granted using VLT/VIMOS, VLT/FLAMES, and WHT/AF2 in order to efficiently follow-up star formation galaxies and AGN uniformly selected in relaxed and merging clusters. This will allow us to measure the precise redshift, powering source, metallicity, electron density and ionization parameters of these sources. Given the similarities between low-redshift disturbed clusters and high-redshift protoclusters, this unique study not only provides an excellent opportunity to connect observations and theory but it may also provide important clues to the evolution of galaxies at high-redshift analogs.

GC50

Towards a solid determination of the chemical properties of high-z star-forming galaxies using UV lines

Enrique Pérez Montero, Ricardo Amorín, and the VUDS collaboration

Las galaxias con formación estelar masiva son trazadores brillantes de las propiedades del Universo temprano dadas su alta luminosidad y preeminencia en los ambientes densos que caracterizaban estas primeras fases de la formación de galaxias. El gran acopio de datos espectroscópicos ópticos de muestreos profundos con grandes telescopios en los campos cosmológicos así como la previsión de una mayor cantidad de estos datos gracias a las instalaciones por venir exige la adopción de nuevos métodos de análisis a partir de las líneas ultravioletas que, a causa del desplazamiento al rojo, son medidas en estas observaciones.

En esta contribución se describirá una nueva metodología definida a partir de la comparación entre modelos de fotoionización y la medida de las líneas metálicas más prominentes del espectro UV (Lyman alfa, OIII, CIII/CIV) dando resultados consistentes con las medidas de la temperatura electrónica en aquellos objetos con medidas simultáneas de la parte óptica y UV del espectro.

Veremos la aplicación de esta nueva metodología a una muestra de 10 galaxias observadas en el seno del proyecto VUDS (VIMOS Ultra Deep Survey) en el rango de desplazamiento al rojo 2.4-3.5 proveyendo por vez primera de medidas de las abundancias de oxígeno y carbono. Estos resultados junto con el de otras propiedades fotométricas nos han llevado a concluir que estos objetos presentan propiedades muy similares a las de la primera generación de galaxias formadas en la etapa de la Reionización.

GC51

AMS: Carbon flux time variation

Alejandro Reina Conde

El Espectrómetro Magnético Alpha (AMS-02) es un detector de partículas diseñado para operar como un módulo externo acoplado a la Estación Espacial Internacional. Esta ubicación supone un entorno excelente para poder estudiar el Universo y sus orígenes y permite realizar la búsqueda de antimateria y materia oscura así como un análisis detallado de la composición y el flujo de los rayos cósmicos en unas condiciones libres de los efectos de la atmósfera terrestre. En esta contribución damos una breve descripción de los diferentes detectores que forman AMS-02 y que permiten medir de manera redundante las diferentes variables físicas de importancia para una precisa identificación de los diferentes núcleos, como pueden ser la carga de la partícula o el momento de la misma.. Por otro lado, veremos algunos de los resultados más notables que ha obtenido la colaboración AMS-02 a lo largo de los 7 años que lleva operando en la Estación Espacial Internacional.

GC52

O VI in the CGM: Dependence on z and galaxy mass

Santi Roca-Fabrega

Properties of the circumgalactic medium are not well constrained from observations. To obtain information of such properties it is necessary to have a deep knowledge of the processes involved both in the creation of the gas and the ions contained in it. However, the degeneration on the mechanisms that produce the observed ions is high and so to obtain information from observations is not straightforward. We have used a set of cosmological simulations of high mass galaxies, combined with Cloudy models, to determine the amount of O VI produced by photoionization and colisional ionization. We have found a clear dependence of the dominant mechanism on redshift and halo mass.

GC53

Inner and outer star forming regions over the disks of spiral galaxies

Marina Rodríguez Baras, Ángeles I. Díaz, Fernando Fabián Rosales-Ortega

The study of abundance distributions is central to understanding the formation and evolution of galaxies. But so far most of the relations employed for the derivation of gas abundances have been derived from the observations of outer disk HII regions, despite the known differences between inner and outer regions. In order to get a better understanding of the environment influence in star-forming processes, we have performed a systematic comparison of two inner (725 regions) and outer (671 regions) HII regions samples using integral field spectroscopy (IFS) observations. The samples are extracted from the observations of 263 nearby, isolated spiral galaxies, by the CALIFA survey. In this talk I will present the results of the samples characterisation, the analysis of the observational differences and the comparison of the observations with Cloudy photoionization models, that provide more information about the different evolutionary stages of the regions.

GC54

Exploring galaxy clustering with the Dark Energy Survey dataset

Martín Rodríguez Monroy, and the Dark Energy Collaboration

The Dark Energy Survey is a major international effort to pin down the nature of dark energy by performing a 5-year photometric survey of the southern sky, covering 5000 square degrees up to magnitude i = 23.7 and redshifts of approximately z = 1.2. In this contribution, we showcase the angular correlation functions estimated with the Dark Energy Survey's galaxy samples used for Large Scale Structure studies, the Luminous Red Galaxies (LRGs) selected with the redMaGiC algorithm. These samples contain more than half a million galaxies and they cover redshift ranges from 0.1 up to 0.95. We show how are these samples characterized and how are systematic effects treated on such a large scale photometric survey.

GC55

mm-VLBI observations of Active Galactic Nuclei

Eduardo Ros, Matthias Kadler, Thomas P. Krichbaum, J. Anton Zensus, et al.

Very-long-baseline interferometry at the shortest wavelengths is possible with the contribution of the beamformed Atacama Large Millimetre Array since April 2017, providing a big step forward in terms of resolution and sensitivity. The array operates both at 3.5 mm with the Global mm-VLBI Array and at 1.3 mm with the Event Horizon Telescope. First results on the southern, nearby galaxies NGC 1052 and Centaurus A will be presented.

GC56

Constraints on the dark matter core inside the neutron stars

Violetta Sagun, Aleksei I. Ivanytskyi, Ilidio Lopes

We study a compatibility of the dark matter condensation inside the neutron stars with the observational constraints on the properties of these astrophysical objects. Effects of the baryon-lepton matter are taken under control based on the well tested novel equation of state of nuclear matter, which is able to fulfill a rich collection of constraints from nuclear physics and heavy ion collision experiments. Considering the dark matter as a free Fermi gas coupled to usual matter only by gravity we explicitly introduce mass and quantum mechanical degeneracy of these particles to the problem. Integration of the Tolman-Oppenheimer-Volkoff equation allows us to obtain the mass-radius diagram of neutron stars for different concentrations of dark matter particles and their masses from 100 MeV to 1 TeV. We argue, that concentrations of the dark matter typical for the Milky Way galaxy do not allow its particles to be heavier than about 100 GeV. This result can serve as a constraint for beyond the Standard Model theories aiming to explain the dark matter nature in terms of WIMPs.

GC57

The TIMER Project (Time Inference with MUSE in Extragalactic Rings)

Patricia Sánchez-Blázquez, D. Gadotti, J. Falcón-Barroso

The TIMER project (Time Inference with MUSE in Extragalactic Rings) is a survey with the integral-field spectrograph MUSE (installed at the VLT) of nearby barred galaxies with prominent central structures, such as nuclear rings or inner discs. The powerful instrumental setup provides an exquisite dataset and an unprecedented view of the central regions of these galaxies. The main goals of the project include: (i) estimating the cosmic epoch when discs of galaxies settle, leading to the formation of bars; (ii) testing the down-sizing hypothesis for galaxy formation, whereby more massive galaxies are formed first; and (iii) estimating the history of external gas ac- cretion in disc galaxies. Here we present details on the sample selection, observations and data reduction, and the derivation of high-level data products. The latter in-clude maps of the spatial distribution of parameters describing the stellar line-of-sight velocity distribution, and of mean stellar ages and metallicities. We also derive the spatial distribution of star formation histories and physical properties of the warm/hot phases of the interstellar medium (ISM) across our MUSE fields. We also obtain the spatial distribution of the kinematics pa-rameters of the warm/hot ISM. We illustrate how this dataset can be used for a plethora of other scientific applications, e.g., studying stellar feedback into the ISM, AGN outflows, properties of nuclear and primary bars, stellar migra-tion and chemical enrichment, and the gaseous and stellar dynamics of the rich variety of central components in disc galaxies (such as nuclear spiral arms, barlenses, box/peanuts and bulges). We conclude by describing the scientific investigations being led by the TIMER team and laying out a plan for public data releases.

GC58

Black Hole seeding in the L-Galaxies semi-analytical model

Daniele Spinoso, Silvia Bonoli, David Izquierdo-Villalba

I will present a new prescription for the formation and growth of high-redshift seeds in the Munich L-Galaxies semi-analytic code. The new seeding recipe takes advantage of current theoretical models and includes the formation of both light and heavy seeds resulting from either the evolution of PoPIII stars or the direct-collapse of massive, metal-poor gas clouds, respectively. The L-Galaxies model is based on the large-scale dark-matter-only N-Body simulations Millennium and MillenniumII, which, together, span a very large dynamic range of mass resolution. This makes the model an extraordinary tool to test current seeding models on large scales and study the relation among the first black holes formed in the universe and the cosmological environment in which they evolve down to the present time.

GC59

A search for bright Lyman-alpha emitters in the J-PLUS photometric survey

Daniele Spinoso, Alvaro Orsi, Silvia Bonoli, Kerttu Viironen, Siddhartha Gurung

The computation of LAEs luminosity functions is now accessible over a wide range of cosmic epochs: from the reionization era ($z \sim 6 - 8$) to the peak of star formation activity in the universe ($z \sim 2 - 3$). Recent works focused on the $z \sim 2$ LAEs luminosity function revealing hints of an excess with respect to a Schechter-like behaviour at $L\_Ly\alpha > 10^{43}$ erg/s (e.g. Konno et al. 2016, Sobral et al. 2016). These works suggest the bright end is largely dominated by AGN. However, typical surveys on which they are based probe relatively small areas and are thus subject to large statistical uncertainties in the bright-end regime.

In this poster I present preliminary results obtained with J-PLUS. This ongoing survey is probing an unprecedentedly wide area by taking advantage of a unique filter-set configuration. Among the 5 broad- band and 7 narrow-band filters, the J0395 narrow band ($\lambda c \sim 3950$ Å) is ideal to study the properties of $z \sim 2$ LAEs. Despite being relatively shallow ($r_{lim} \sim 22$ and $N_{lim} \sim 21.3$), the survey features a wide sky coverage (≥ 1000 deg 2 already observed and ~1500 deg^2 by the end of this year). These features make it unique to systematically look for bright, high-redshift LAEs and study their Lyα luminosity distribution. I present the potential of J-PLUS photometric data in order to identify and analyse $z \sim 2.2$ LAEs, disentangle them from AGN/QSO contaminants, compute their luminosity function and search for extended emission in stacked images of sources.

GC60

Characterization of SDSS sources at 150 MHz

José Sabater, and the LOFAR surveys collaboration

The LOFAR Two-metre Sky Survey (LoTSS) is an ongoing radio-continuum survey of the northern sky at 150 MHz. With a resolution of 6 arcseconds and a median sensitivity of 71 microJy per beam it provides a source density that is about 10 times higher than the most sensitive existing very wide-area radio-continuum surveys. The first public data release covering 20% of the final area is soon to be published.

In this poster we present the study of the Sloan Digital Sky Survey (SDSS) sources covered by the first LoTSS data release. The SDSS sample has been carefully characterized in the past to study the relationship between environment and nuclear activity. Now, we have been able to extended the study to a higher completeness in radio due to the depth of the survey and probe the low radio frequency regime. We show the radio luminosity function of different types of sources focusing on the differences between high and low excitation active galactic nuclei.

GC61

The host galaxies of luminous obscured active galactic nuclei at z~0.3-0.4

Juan José Urbano Mayorgas, Montserrat Villar-Martin, Fernando Buitrago

We have studied the structural properties of the host galaxies associated with 57 luminous opticall selected type 2 AGN (16 high luminosity Seyfert 2 and 41 obscured QSO2) at z~0.3-0.4. Our analysis is based on high spatial resolution optical HST WFPC2 and ACS images. We use GALFIT to obtain 2-dimensional fits of our objects. We study the galaxy types and structure, the incidence of merger/interactions features and trends with AGN power. These are the main results: a) the main difference that we find between HLSy2 and QSO2 host galaxies in our sample lies on the higher incidence of complex mergers in the QSO2 sample (34^{+6}_{-3}% vs 6^{+10}_{-3}%); b) only 44^{+5}_{-10}% QSO2 are hosted by bulge dominated gaalxies; c) disks are identified in ~24^{+8}_{-6}% of QSO2 hosts; d) when complex mergers are not taken into account, the host galaxies associated with HLSy2 and QSO2 are stastitcally similar in terms of Bulge/Disc classification: ~60-67% spheroidal galaxies, ~27-26% disk-galaxies and ~13-7% bulge-disk galaxies; e) the relative contribution of the spheroidal component to the total galaxy luminosity is found to increase with AGN power; f) the Kormendy relation of the hosts galaxies of our sample is consistent with that of QSO1 at similar z. We will put these results in the context of related works on type 1 and type 2 AGN.

GC62

X-ray study of the double radio relic Abell 3376 with Suzaku

Igone Urdampilleta, H. Akamatsu , F. Mernier, J. S. Kaastra, J. de Plaa, T. Ohashi, Y. Ishisaki, H. Kawahara

We present an X-ray spectral analysis of the nearby double radio relic merging cluster Abell 3376 (z = 0.046), observed with the *Suzaku* XIS instrument. These deep (360 ks) observations cover the entire double relic region in the outskirts of the cluster. These diffuse radio structures are amongst the largest and arc-shaped relics observed in combination with large-scale X-ray shocks in a merging cluster. We confirm the presence of a stronger shock (M_w = 2.8 ± 0.4) in the western direction at r~26', derived from a temperature and surface brightness discontinuity across the radio relic. In the East, we detect a weaker shock (M_E = 1.5 ± 0.1) at r ~ 8', possibly associated to the 'notch' of eastern relic, and a cold front at r ~ 3'. Based on the shock speed calculated from the Mach numbers, we estimate that the dynamical age of the shock front is 0.6 Gyr after core passage, indicating that Abell 3376 is still an evolving merging cluster and that the merger is taking place close to the plane of the sky. These results are consistent with simulations and optical and weak lensing studies from the literature.

GC63

Bias emulator for next generation precision surveys

David Valcin

To take advantage of the next generation surveys like Euclid, DESI etc. and be able to put more thorough constraints on cosmological parameters like the total neutrino mass or the growth rate, we must improved our knowledge of the universe. The bias, which is the relation between tracers and the underlying matter, is usually a main source of uncertainty preventing to achieve this goal.

I present a bias emulator, accounting for various effects such as massive neutrinos, non linear scales, with an extension in redshift space. This emulator will accessible to users through a plugin for MCMC sotware like MontePython.

GC64

Multifrequency analysis of the jet in 0836+710

Laura Vega García

In this poster we present the multifrequency analysis of the jet in 0836+710. The five different frequencies observed at the beginning of 2014 allow us to obtain some of its spectral properties. We perform a shifting with respect to optically thin regions of the jet to correct for the loss of the absolute position during the imaging of the source. This gives us the coreshift due to synchrotron self-absorption. We repeated the same analysis for archive data on 2003, to study the time behaviour of the jet emission with time, and performed a kinematic analysis which related the observed behaviour with the presence of a recollimation shock close to the jet core. Furthermore, the combination of the kinematic analysis with the spectral analysis of the frequency pairs, allowed us to detect the presence of moving shocks and instabilities in the flow. Following this analysis we could also obtain an estimate of the magnetic field in the region, which is compared with that derived using different approaches.

GC65

Numerical analysis of the observed instabilities in the jet of 0836+710

Laura Vega García, A.P. Lobanov, M. Perucho

Active galactic nuclei (AGN) are among the most powerful sources in the Universe. The radiation and kinetic (relativistic jet) power generated by the AGN has a remarkable impact on evolution of their host galaxies and the intergalactic medium. In particular, the enormous kinetic power of jets can dominate the AGN feedback all the way to galaxy cluster scales. In order to assess the magnitude and cosmological effect of this feedback, one needs to understand the physical mechanisms governing the formation and propagation of these outflows. We have used very long baseline interferometry (VLBI) observations of the parsec-scale jet in 0836+710, with the best angular resolution achieved so far. The observations were made with the Russian-led space VLBI mission RadioAstron at frequencies of 1.6, 5, and 22 GHz. The 1.6 GHz observation, in combination with numerical analysis, was used for estimating several jet parameters from the Kelvin-Helmholtz instability patterns detected in the jet. Several solutions of the dispersion relation with different shear layer widths and Lorentz factors were run and the wavelengths compared with those of the observations. This led to an estimation of the Mach number, density ratio and Lorentz factor of the flow. The 5 and 22 GHz observations have probed the inner jet jet closer to the black hole, revealing an asymmetric intrinsic structure of the flow structure which can be due to jet internal rotation.

GC66

High-resolution imaging of the multiphase AGN-driven outflow of NGC1068

Héctor Vives-Arias, Cristina Ramos-Almeida, Santiago García-Burillo

We analyze Atacama Large Millimeter Array (ALMA) observations of the CO(6-5) molecular line and the 432 μm continuum emission from the circum-nuclear disk (CND) and the putative torus of the Seyfert 2 galaxy NGC 1068. The kinematics of both the CND and the torus show non-circular motions that are caused by outflows from the AGN. We compare the ALMA data with high-resolution near-infrared integral field spectroscopy of the molecular H_2 line and some ionized species obtained with the VLT, and investigate the multi-phase nature of the different ISM components of this prototypical AGN-driven outflow.

Gaia-VL1

Open Clusters Membership by Clusterix 2.0 for Gaia DR2

Lola Balaguer-Núñez, David Galadí-Enríquez, Mauro López del Fresno, Enrique Solano Márquez, Carme Jordi

We present an advanced version of Clusterix, a tool for thedetermination of membership probabilities in stellar clusters from proper motion data adapted to the new wealth of Gaia data. Clusterix is a VO web-based, interactive application that allows the computation of membership probabilities from proper motions through a fully non-parametric method (Galadí-Enríquez et al. 1998). Clusterix 2.0 has been adapted to the exploitation of Gaia Data Release 2. Clusterix now features an improved user interface for a faster, easier and more accurate interactive definition of the cluster and field proper motion distributions. The system provides fast feedback between membership probability determinations and the distribution of the observables for the most probable members and field stars. We present the first results of Clusterix for a selection of clusters from Gaia DR2 and a version of Clusterix for the automatic search of new clusters.

Gaia-VL2

The Open Cluster population seen by Gaia

Tristan Cantat-Gaudin

The catalogue produced by the Gaia mission provides parallaxes and proper motions of unprecedented quality for over a billion stars down to magnitude G~20 in the Milky Way, as well as precise photometry, and radial velocities for a large number of sources. Such a large and homogeneous dataset enables us to study all components of the Milky Way.

In particular, Gaia allows us to study open clusters in fine details, and to trace their distributions and motions across the Galaxy. The size and multi-dimensionality of such a dataset requires novel approaches in order to take full advantage of the catalogue and use stellar clusters to help unraveling the structure of the Milky Way and reconstruct its history.

Gaia-VL3

Dynamical ages of the Young Local Associations with Gaia

Francesca Figueras, Nuria Miret-Roig, Teresa Antoja, Mercè Romero-Gómez

In this talk we show how we determine the dynamical age and place of birth of a set of Young Local Associations (YLAs) in a uniform and dynamically consistent manner. The YLA data comes from the cross-match of bona-fide members, accepted as such in recently published catalogues, with first and second Gaia data releases.

Our orbital analysis applied to a set of 9 YLAs with astrometry from DR1 suggested a scenario where there were two episodes of star formation: one ~40 Myr ago in the first quadrant, that gave birth to ε Cha, TW Hya and β Pic, and another 5-15 Myr ago close to the Sun that formed Tuc-Hor, Col, and Car. Here we will also comment on the new insights coming from a preliminary application of our method to the second Gaia data release.

Gaia-VL4

The Spanish Network for Gaia Science Exploitation and the Second Data Release

Francesca Figueras, Carme Jordi, Xavier Luri and Jordi Torra on behalf of the REG Executive Committee and Gaia-UB team

The "Red Española de Explotación Científica de Gaia" (REG) continues to intensify its activities after the second Gaia Data Release (April 25th, 2018). Some of the collective activities developed by its members have been, among others: 1) the presentation and discussion on the first science outcome from Gaia-DR2 data in the annual meeting (May 28th, 2018); 2) the preparation of the Spanish community for the use of the Gaia Data Archive and VO facilities; 3) the exchange of codes, tools and facilities for an optimum exploitation of Gaia-DR2; 4) the joint effort supporting the preparation of the WEAVE Operational Rehearsals (first light, 2019) and, last but not least, the engage on new common projects for exploiting this huge and impressive new data. These activities will be described together with the schedule of future national and international science meetings and the outreach activities being organized.

Gaia-VL5

The Pleiades as seen by Tycho-Gaia Astrometric Solution and the Virtual Observatory

Francisco Manuel Jiménez Esteban, Mauro L. López del Fresno, Miriam Cortés Contreras, Enrique Solano, Jose A. Caballero

Using the TGAS catalogue and the Virtual Observatory (VO), we revisited the stellar population of the brightest end of the famous Pleiades cluster. Using Clusterix VO tool, we assigned membership probabilities to the TGAS sources located towards the Pleiades cluster. The Pleiades member candidate sample was later refined based on the coincident position in the five dimensional space of the astrometric solution provided by TGAS. With the help of VOSA, we obtained the physical properties of the TGAS sources considered to be true members of the Pleiades. This allowed us to studied the mass function of the more massive components of the cluster. In this poster we present the result of this work, which will be extended towards fainter objects with the deeper Gaia-DR2 catalogue.

Gaia-VL6

The OCCASO open clusters revisited with Gaia data

Carme Jordi, L. Casamiquela, R. Carrera, L. Balaguer-Núñez et al.

Hemos completado las observaciones espectroscópicas de alta resolución para 18 cúmulos abiertos de edades intermedias en el marco del proyecto OCCASO (Openc Clusters Chemical Abundances from Spanish Observatories). De estas observaciones hemos derivado abundancias para elementos de la familia del Fe, elementos alpha y Ba. Presentamos los resultados de los gradientes químicos del disco utilizando distancias determinadas a partir de los datos de la segunda release de Gaia (DR2). Analizamos las posiciones de nacimiento de los cúmulos a partir de sus órbitas calculadas con nuestras velocidades radiales y los movimientos propios de Gaia DR2.

Gaia-VL7

¿Qué nos puede decir Gaia sobre las estrellas masivas?

Jesús Maíz Apellániz

En este póster presentaré nuestro trabajo tanto con la primera liberación de datos de Gaia (DR1) como con la segunda (DR2). Con Gaia DR1 hemos combinado los movimientos propios de TGAS y de Hipparcos con información de otras fuentes para detectar varias decenas de estrellas fugitivas, muchas de ellas desconocidas hasta la fecha. Con Gaia DR2 esperamos poder medir distancias y velocidades 3-D de las estrellas masivas ya conocidas así como detectar un gran número de nuevos objetos.

Gaia-VL8

Late-type stars members of young stellar kinematic groups after Gaia-DR2

David Montes Gutiérrez

In this contribution we use the precise kinematic information provide by Gaia-DR2 to constraints the membership of late-type stars (F, G, K and M) possible members of different young stellar kinematic groups and be able to discern between different groups of similar age. We include the classical moving groups and superclusters, the recently identified young nearby loose associations as well as other stellar streams identified in recent surveys. 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. The reanalysis of the kinematic using Gaia-DR2 will allow us 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).

Gaia-VL9

The Galactic warp signature as detected by Gaia DR2

Mercè Romero-Gómez, Francesca Figueras, Cecilia Mateu, Luis Aguilar

In this poster, we assess the possibilities of Gaia DR2 data to kinematically infer the characteristics of the warped disc. By using two tracers, namely disc Red Clump stars and OB stars, and different kinematic information, directly on the observables or in derived quantities, we study the age dependence of the starting radius of the warp and its amplitude. Additionally, the kinematic information in the anticenter can also shed some light on the disc structure and stability.

Gaia-VL10

Gaia Study on the Formation of Intermediate Mass Stars

Miguel Vioque, René D. Oudmaijer, Ricardo Pérez-Martínez, Deborah Baines

The intermediate mass Herbig Ae/Be stars are young stars approaching the Main Sequence and are key to understanding the differences in formation mechanisms between magnetic low mass stars and the non-magnetic high mass stars. Most known Herbig Ae/Be stars have Gaia parallaxes which allowed us to derive their luminosities and locations in the HR diagram.

The number of Herbig Ae/Be stars that could be placed in an HR diagram using directly determined distances has increased by about an order of magnitude when compared to earlier work. Using their positions in the HR diagram we derived masses and ages for most of the sources, which we used to perform an evolutionary analysis of these objects as they move towards the Main Sequence. We show that Herbig Ae/Be stars do not present any consistent evolution of the mid-infrared excess at any mass range.

We studied the characteristics of the infrared excesses, of the photometric variability and of the Halpha emission line typical of these Pre-Main Sequence objects. I demonstrate that high mass stars do barely display an infrared excess and have much lower photometric variabilities. We find that the very variable objects display doubly peaked Hα line profiles, indicating edge-on disks.

Gaia Data Release 2 will improve and greatly increase the number of parallaxes available, which will allow us to search and identify new Herbig Ae/Be stars using the HR diagram. We plan to construct HR diagrams with all the sources within different star forming regions of interest and then, by combining the positions in the HR diagram with the previously described characteristics, we will identify the Herbig Ae/Be stars present in the samples. This in turn will allow us to study the Pre-Main Sequence evolution as a function of mass, age and location in the galaxy to an unprecedented precision.

CARMENES-VL11

CARMENES target characterisation: close and wide multiplicity in M dwarfs

Jorge Carro Maroto, José A. Caballero, Miriam Cortés-Contreras, David Montes et al.

The CARMENES (Calar Alto high-Resolution search for M dwarfs with Exoearths with Near-infrared and optical Echelle Spectrographs, http://carmenes.caha.es/) input catalog contains more than 2000 M dwarfs, 300+ of which have been selected as the most suitable targets for the guaranteed time program of exoearths search using the radial velocity method. Up to date, several astrophysical parameters have been determined for the more than 2000 M dwarfs, but it is necessary to complete the multiplicity study that is helpful to improve the determination of distance, kinematics, metallicity and age of the stars, especially for those that have exoplanets. In this work, we revised the Washington Double Star catalog, compiled all physical companions candidates published, measured angular separations and position angles for wide pairs (rho > 5 arcsec) and close ones (rho < 5 arcsec), and verified if those pairs are physically bound or not according to their proper motions.

CARMENES-VL12

Stellar atmospheric parameters of FGK-type stars from high-resolution optical and near-infrared CARMENES spectra

Emilio Gómez Marfil, D. Montes, H.M. Tabernero, J.A. Caballero, J.I. González Hernández, and the CARMENES consortium

With the aim of using classic spectroscopic methods with high resolution and high signal-to-noise ratio in the NIR spectral window, we made a selection of FGK-type stars observed with CARMENES, the brand-new, ultra-stable, double-channel spectrograph at the Spanish-German 3.5m Calar Alto telescope. We applied the equivalent width method to derive the spectroscopic stellar parameters (T_{eff}, log g, micro-turbulence velocity, and [Fe/H]) using the StePar code alongside new iron line lists covering the whole CARMENES spectral range (550 - 1700 nm).

We compiled four different iron line lists for dwarfs and giants, both metal-rich ([Fe/H] > -0.30) and metal-poor (-1.50 < [Fe/H] < -0.30), which allowed us to split the parameter space into four different regions. We tested the stellar parameters thus obtained with some of the Gaia FGK benchmark stars included in our sample. We also focused on the differences found in the parameter determinations in case only the VIS window is taken into account. We are also working on line list compilations to derive chemical abundances using our code SteAbu.

CARMENES-VL13

The chromospheric activity of M dwarfs from visible and near-infrared CARMENES spectra: analysis of flux-flux relationships

Fernando Labarga Ávalos, D. Montes, J. Cano, J.A. Caballero, and the CARMENES consortium

CARMENES (http://carmenes.caha.es/) is a brand-new, ultra-stable, double-channel spectrograph at the Spanish-German 3.5 m Calar Alto telescope for radial-velocity surveys of M dwarfs with the aim of detecting Earth-mass planets orbiting in the habitable zones of their host stars. The CARMENES survey, which began in January 2016 and will last for at least three years, aims to observe approximately 300 M-type dwarf stars, spread over the complete M spectral range.

The main objective of the work subject of this communication is the extraction of all available information on the chromospheric activity and its variability (rotational modulation, flares, etc.) using for that all the chromospheric indicators included in the spectral range of the spectrograph, ranging from visible (VIS) that include the Na I D1, D2 HeI D3, Hα and Ca II IRT lines to near-infrared (NIR) that include the HeI 10830 Å, P_gamma and P_beta lines. It is intended to carry out this task applying the spectral subtraction technique, and to this end it has been implemented a Python code (iSTARMOD) based on a FORTRAN one, formerly used by the research group (see companion contribution). The code has been adapted to the particular features and formats of the CARMENES spectra and include improvements as the determination of the equivalent widths and automation, in order to perform time series analysis of the set of spectra. The detailed analysis of these activity indicators is important from one side in order to confirm or discard all the possible planets around these stars and by the other studying its dependency with other stellar parameters as rotation, age and depth of the convective zone. Studies of flux-flux relationships of lines formed at different chromosphere layers are the subject of this communication, aimed to a better understanding of the magnetic activity of M-type dwarf stars.

CARMENES-VL14

Spectral synthesis of CARMENES M-type stars: stellar atmospheric parameters

Francisco Javier Lázaro Barrasa, D. Montes, H. M. Tabernero, E. Marfil, J. A. Caballero, J. I. González Hernández, and CARMENES consortium

We show our very first results regarding the stellar atmospheric parameter determinations (T, log g, [Fe/H], and macro-turbulence velocity) of M-type stars observed with CARMENES by means of the spectral synthesis method. Our approach is based on the synthesis of carefully-selected sets of spectral ranges around iron lines found in the spectra of these stars. We took GX And (M1.0 V), Luyten's star (M3.5 V), and Teegarden's star (M7.0 V) as references to split up the parameter space in terms of effective temperature. This, in turn, will help us simplify the analysis of the whole CARMENES sample. Our spectral synthesis code relies on a grid of PHOENIX stellar atmospheres and the radiative transfer code Turbospectrum to obtain the synthetic spectra over the spectral ranges. The atomic line data of the lines found in the ranges were downloaded from the VALD3 database. Our code is then able to derive stellar atmospheric parameters from a Markov Chain Monte Carlo process based on the comparison between the real and the synthetic spectral ranges.

VL15

Stellar component in the OTELO emission-line survey

Emilio J. Alfaro, Ángel Bongiovanni, Marina Ramón-Pérez, Ana María Pérez García, Jordi Cepa, Miguel Cerviño, Jakub Nadolny, Ricardo Pérez Martínez, Héctor O. Castañeda, José A. de Diego, Alessandro Ederoclite, Mirian Fernández-Lorenzo, Jesús Gallego, J. Jesús González, J. Ignacio González-Serrano, Maritza A. Lara-López, Iván Oteo Gómez, Irene Pintos-Castro, Mirjana Povic, Miguel Sánchez-Portal, Joss Bland-Hawthorn, Antonio Cabrera-Lavers, and D. Heath Jones

In this work we present the preliminary analysis of the emission-line objects classified as stars in the OTELO survey. Even considering the low number of candidates, they provide important information on the nature of these stars and their distribution in the Galaxy.

VL16

Planetary nebula LoTr5: hints of a possible third companion in a long-period binary central star

Alba Aller, J. Lillo-Box, M. Vuckovic, H. Van Winckel, D. Jones, B. Montesinos, M. Zorotovic, and L. F. Miranda

LoTr 5 is a planetary nebula with an unusual long-period binary central star. The pair consists of a rapidly rotating G-type star and a hot star, which is responsible for the ionization of the nebula. Both components are in a wide orbit with a period of about 2700 days, one of the longest in central star of planetary nebulae. We present new radial velocity observations of the central star which allow us to discuss the possibility of a third component in the system at 129 days to the G star. This is complemented with the analysis of archival light curves from SuperWASP, ASAS and OMC. We also present a detailed analysis of the complex Halpha double-peaked profile, which varies with very short time scales, and whose origin is still unknown. We conclude that it does not present correlation with the rotation period and that the presence of an accretion disk via Roche lobe overflow is unlikely.

VL17

Dissecting the chemical abundance space of the solar neighbourhood with t-SNE

Friedrich Anders, Cristina Chiappini, Basilio Santiago

In the era of industrial Galactic astronomy and multi-object spectroscopic stellar surveys, the sample sizes and the number of available stellar chemical abundances have reached dimensions in which it has become diffcult to process all the available information in an effective manner. We demonstrate the use of a dimensionality-reduction technique (t-distributed stochastic neighbour embedding; t-SNE) for analysing the stellar abundance-space distribution. While the non-parametric non-linear behaviour of this technique makes it diffcult to estimate the significance of found abundance-space substructure, we show that our results depend little on parameter choices and are robust to abundance errors. By reanalysing the high-resolution high-signal-to-noise solar-neighbourhood HARPS-GTO sample with t-SNE, we find clearer chemical separations of the high- and low-[α/Fe] disc sequences, hints for multiple populations in the high-[α/Fe] population, and indications that the chemical evolution of the high-[α/Fe] metal-rich stars is connected with the super-metal-rich stars. We also identify a number of chemically peculiar stars, among them a high-confidence s-process-enhanced abundance pair (HD91345/HD126681) with very similar ages and UV velocities, which we suggest to have a common birth origin, possibly a merged dwarf galaxy. Our results demonstrate the potential of t-SNE and similar methods for chemical-tagging studies of large spectroscopic surveys.

VL18

Taking advantage of Machine Learning to identify potential T-Tauri star candidates

Leire Beitia Antero, Javier Yáñez, Ana Inés Gómez de Castro

Over the last decades, the vast amount of data together with the easiest access to high-performance computers have favoured the development and application of powerful mathematical algorithms, the so-called machine learning algorithms. In astronomy, the classification of certain types of objects has been historically made through a detailed and supervised analysis of colour-colour diagrams or spectra of single sources, but handling with billions of sources is virtually impossible for any human being. Thus, Machine Learning techniques are really useful for solving astronomical problems, but it requires a balanced, representative qualification sample. Sometimes it is not possible to have one, as occurs when dealing with T-Tauri Stars. In this work, we have explored the usefulness of a particular machine learning method that has been scarcely applied in astronomy, Logistic Regression, that when combined with an appropiatedly tuned training sample, provides fairly good results.

VL19

Tracing back the mass loss history of the LBV MGE042.0787+00.5084

Cristóbal Bordiú Fernández, J. R. Rizzo, A. Ritacco

The luminous blue variable (LBV) phase is a short period of high instability that some high mass stars experiment after leaving the main sequence. Through steady and dense winds and sporadic giant eruptions, LBV stars can lose several solar masses in very short timescales (10^4-10^5 years), producing large circumstellar nebulae. By the action of stellar winds, high UV fields and low velocity shocks, these nebulae may become a breeding ground for molecular gas. The study of the chemistry and kinematics of this molecular component has proven to be extremely useful to reconstruct the mass loss history of these objects and estimate their energetic output.

In this talk we report the detection of an expanding torus-like structure surrounding the LBV MGE042.0787+00.5084, achieved by means of CO observations at 1 and 3 mm with IRAM's 30m telescope. We analyze the physical parameters derived from the detected lines, with a particular emphasis on the $^{12}C/^{13}C$ ratio and the estimated mass loss rate. A dynamical model of the structure is also presented. We discuss the implications of these results in the context of LBV mass loss.

VL20

On the name of stars with exoplanets

José A. Caballero

Vega is α Lyrae in 17th-century Bayer's nomenclature, 3 Lyr in 18th-century Flamsteed's, HD 172167 and BD+38 3238 in early 20th-century Henry Draper and Bonner Durchmusterung's... The common sense says that we should not use, for example, the Gliese-Jahreiss identificator, GJ 721, as the only designator of Vega in a publication. Why is this common-sense rule of using the proper star names often not used for designating exoplanet host stars? While there is a also reasonable explanation behind using names of (sponsored) projects and ordinal numbers, stars do still have their proper names. In this contribution, I will show some examples of wrong exoplanet host stars designations.

VL21

Open clusters through the eyes of WEAVE

Ricardo Carrera

Open clusters are key systems to investigate a variety of astrophysical topics from the stellar evolution itself to the evolution of the Milky Way. For this reason, Open clusters are key targets for the massive spectroscopic surveys from ground that complement the Gaia mission providing accurate radial velocities and stellar abundances. In this talk I will present the goals and strategy of the Open Clusters sub-survey that will be performed within the WEAVE Galactic Archaeology survey. This includes a variety of scientific cases such as the study of chemical diffusion in stars, the analysis of internal kinematics or the investigation of gradients in the Galactic disc.

VL22

A new OSIRIS/GTC and IDS/INT spectroscopic survey of young stars in the sigma Orionis cluster

Abel de Burgos Sierra, José Caballero, Francisco J. Alonso-Floriano et al.

The young sigma Orionis cluster in the Ori OB 1b association has become one of the most important clusters for understanding the stellar and substellar formation and evolution. In this work we present almost 200 low-resolution optical spectra of 166 stars towards the sigma Orionis cluster, with spectral types from O9.5V to intermediate M, and collected with OSIRIS at the 10.4 m GTC and IDS at the 2.5 m INT. For each of them, we measure equivalent widths of activity-indicator lines and determine spectral types. Many of these stars had not been investigated spectroscopically before. With this contribution we update the Mayrit catalog, which is the most suitable input for studying the spatial distribution, multiplicity, properties and frequency of disks, and the complete mass function of sigma Orionis.

VL23

Stellar dating using chemical abundances

Elisa Delgado Mena, V. Adibekyan, A. Moya, N. Santos, J. González Hernández et al.

Some stellar chemical abundance ratios, such as [Y/Mg], have recently been singled out as potentially very good stellar clocks for solar twins. However, when these relations are tested on stars with other effective temperatures and/or metallicities, these relations almost disappear. In this work we present chemical abundances for a homogenous sample of ~1000 stars and stellar ages derived with Gaia parallaxes and PARSEC iscochrones which allows us to study the Galactic chemical evolution. We find that abundances in thin disk stars present tight correlations with age meanwhile thick disk stars do not show such correlations. By using only the stars with the lowest uncertainties in age we test the validity of different chemical clocks and we obtain several multivariable relations to derive ages with different abundances over a wide range of temperatures and compositions.

VL24

15 years of INTEGRAL/OMC monitoring

Albert Domingo, Julia Alfonso-Garzón, J. Miguel Mas-Hesse

OMC, the Optical Monitoring Camera onboard INTEGRAL, has been monitoring the optical emission of thousands of potentially variable astronomical objects during the latest 15 years. OMC takes one image of its 5degx5deg field of view every 10, 50 or 200 seconds, downloading the photometric data for around 100 objects in each exposure. The OMC Archive, publicly available at http://sdc.cab.inta-csic.es/omc/, contains the light curves of around 90000 scientific objects with more than at least 50 photometric points, including the optical emission of the high-energy targets being observed simultaneously by the other instruments on INTEGRAL: IBIS, SPI and JEM-X. In this contribution we will summarize the most interesting results obtained up to now, including the "First OMC Catalogue of Variable Objects", and the multi-wavelength analysis of several X/gamma-ray emitters monitored simultaneously by OMC and the high energy instruments on INTEGRAL.

VL25

Protostellar jets revealing the physical processes of high mass star formation

Rubén Fedriani

The formation of High Mass Young Stellar Objects (HMYSOs) is a major problem in modern astrophysics. However, there is growing evidence that HMYSOs are born in the same way as their low mass counterparts, through accretion disks and outflow ejection. Therefore, protostellar jets from HMYSOs provide us with an excellent tool to understand the mechanisms of high mass star formation as they offer a clear signature of accretion disks (which are deeply embedded in their parent cloud). Only a few massive jets have been so far observed using low-resolution spectroscopy in the near-IR and have revealed the main physical properties, such as, temperature, mass, extinction, and density. However, no precise information about their dynamic and kinematic properties could be retrieved.

In this talk, I will present high-resolution near-IR spectroscopy of two 20 Msun HMYSOs which are part of a large survey (~20 objects) carried out by our group. On the one hand, I will show the kinematic and dynamic properties of G35.2N. From the spectral images, one can see that the BrG emission extends up to ~5" (~11000 au at d=2.2 kpc) for the atomic jet component, which is seen for the first time in a HMYSO. On the other hand, I will present VLT/ISAAC, CRIRES and SINFONI results on IRAS13481-6124. Comparing the dynamical properties of the NIR jet (atomic + molecular) and the radio jet, the ionisation fraction was derived, for the first time in a HMYSO, to be ~10%. This suggests that the majority of the ejecta is traced by the atomic and molecular components while the radio jet is just tracing a small portion of it.

The study suggests that the formation of HMYSOs is just a scaled-up of their low mass siblings, and properties scale with mass.

VL26

The origin of the most luminous planetary nebulae I: M31

Rebeca Galera-Rosillo, R.L.M. Corradi, A. Mampaso, B. Balick, K. Kwitter, J. García-Rojas

The most luminous planetary nebulae (PNe) populate the bright-end cutoff of the Planetary Nebulae Luminosity Function (PNLF), an important standard candel on the extragalactic distance ladder.
The distance is obtained using the empirical evidence that the PN total luminosity in the [OIII]5007A nebular emission line reaches a maximum value M*, that is invariant with galaxy type and only has a small dependence on metallicity.

The method, applied to more than 50 galaxies with satisfactory results, is well established, but the origin of this universal behaviour is still controversial.
Despite the relevance of the topic, thorough studies of PNe at the tip of the PNLF have not been done before.

As part of the first systematic effort tho characterize the properties and the progenitors of the brightest PNe, we obtained the more detailed and deep optical spectra of a sample of PNe in two stellar systems of different metallicities: 8 PNe in M31 (Z/Zsun 1) using OSIRIS at the 10m GTC and 4 PNE in LMC (Z/Zsun 0.5) from FORS2, at the VLT.

The results obtained from the PNe in M31 (Galera-Rosillo et al. (in prep.)) will be reported.

VL27

The low end of the IMF: very low mass stars and substellar objects in different ages states

Francisco J. Galindo-Guil

We study the Initial Mass Function of 12 open clusters, with distances and ages ranging 190 pc to 400 pc and 20 Myr to 400 Myr. Membership is determined using a multi-wavelength photometric and proper motions approach, obtained data from public surveys and archival data: B_T, V_T and proper motions from Tycho-2, proper motions from TGAS and HSOY, *griz* from SDSS, JHK_s from 2MASS, W_1, W_2, W_3 W_4 from WISE, *gri* from INT-WFC, *iz* from CFHT-12K, *UBV* from KPNO-MOSAIC and *J* from KPNO-NEWFIRM. In addition, we have followed-up some memberships using spectroscopy data with CAHA-TWIN, GTC-OSIRIS and archival data from SDSS.

It is the first time, for these clusters that IMF is studied so deep and using Gaia distances.

VL28

Widespread UV-irradiated Warm and Dense gas in Orion Molecular Cloud

Miriam G. Santa-María, Javier R. Goicoechea, David Teyssier, Nuria Marcelino, Emeric Bron, Sara Cuadrado, José Cernicharo and Benjamin Godard

Massive stars (>8 M_{Sun}) dominate the injection of radiative energy (through UV photons) and mechanical energy (through winds and supernova or stellar merger explosions) into the interstellar medium. While far-IR and sub-mm photometric images provide a ″snapshot" of the impact of high-mass stars over entire molecular cloud complexes, it is only by pursuing large-scale maps of different spectrally-resolved gas that we can probe this radiative and mechanical stellar feedback. We have used the heterodyne instrument HIFI on board Herschel Space Observatory to map the central 85 $arcmin^2$ region of the Orion molecular cloud (OMC1), the closest high-mass star-forming region, in several line diagnostics of UV-irradiated gas warm molecular gas: CH+ 1-0, CO 10-9, HCO+ 6-5 and HCN 6-5 among others. The frequency of these rotationally excited lines are hardly accessible to ground-based radio telescopes. We find that their emission is very extended, demonstrating the dominant role of UV radiation from the Trapezium stellar cluster at large scales, both heating the illuminated surface of the cloud and also enhancing the abundance of UV-pumped vibrationally excited H2. The latter has noticeable effects on the formation of reactive ions such as CH+ that show surprisingly widespread emission.

VL29

The variability of SiO maser emission from evolved stars

Miguel Gómez Garrido, V. Bujarrabal, J. Alcolea, P. de Vicente, F. Colomer, J.-F. Desmurs, R. Soria-Ruiz

AGB stars efficiently eject mass, forming a circumstellar envelope (CSE) around the central object. SiO maser lines are a very useful tool to study the structure of the inner regions of CSEs in evolved oxygen-rich stars and yield a relevant information about the process which leads to the formation of CESs. SiO masers occur between rotational states (J=1-0,2-1,3-2...) in several vibrational states (v=0,1,2,3...) of the main isotopic species (^{28}SiO, and also the rare ^{29}SiO y ^{30}SiO). AGB stars are long-period variables and show strong flux variations at all wavelengths. The periods of these variations are of 300-500 days in Mira-type stars and slightly smaller in semiregular and irregular variables. The optical and infrared curves show a phase lag of 0.1-0.2. SiO masers also show a strong variability that is known to be in phase with the infrared cycle. We are carrying out a monitoring of SiO lines using the 40m radio telescope in the Yebes observatory. The observations are performed at 7mm (J=1-0) in a total of 22 sources. In order to have a good time sample of the variation curve, the observations are separated by 10-15 days. During the monitoring observations, we have also found strong variations in the intensity of the maser lines in very short time scales. A variation rate of 40-50% of the line intensity in 2-3 days is shown at least by one object. In this communication we will present the preliminary results of the first 2 years of monitoring, with special emphasis on the weakest lines which have not been studied in detail before, as well as a preliminary analysis of the variations of the SiO maser lines at short time scales.

VL30

The central star of NGC2346, as a clue to binary evolution through the common envelope phase

Marco A. Gómez-Muñoz, Arturo Manchado, Luciana Bianchi, and Minia Manteiga Outerio

We present an analysis of the central star of NGC2346 based on different spectroscopic observations. Reanalysing the low-resolution UV spectra from the International Ultraviolet Explorer from different epochs, and using our observations of low- and high-resolution optical spectra, we have solved the problem of the extinction, resulting in E(B−V)=0.178. We also found that the companion star of the ionizing star is an A5IV star by analyzing the wings of the Balmer absorption lines of the high-resolution optical spectra. We construct a photoionization model, based on abundances and line intensities derived from the low-resolution optical spectra, to obtain the temperature and luminosity of the ionizing star, resulting in Teff=130000K and L=170L⊙. We conclude that NGC2346 is a binary system that has experienced a common envelope evolution, suggesting a progenitor with a companion star which has been evolved off the main-sequence.

VL31

Dark matter driven conversion of neutron stars into quark stars

Álvaro Herrero Bermúdez, M. Ángeles Pérez García, Marina Cermeño Gavilán

We explore the feasibility of a quantum triggering of the conversion of a regular -nuclear- neutron star into a quark star. Using the theoretical framework of the MIT Bag model we detail the microphysics of the quark droplet nucleation process as a fraction of accreted dark matter accumulated in the star self-annihilates. Such models have been quoted to explain the galactic-center excess in gammas. We determine the probability of such a transition in the galaxy and the discuss about the parameter phase space of the dark matter particle in light of current experimental constraints and perspectives.

VL32

Physical parameters of the low-mass eclipsing binary NSVS 10653195

Ramón Iglesias-Marzoa, María Jesús Arévalo, Mercedes López-Morales, Carlos Lázaro, Guillermo Torres, Jeffrey L. Coughlin

NSVS 10653195 is a double-line detached eclipsing binary star found in 2007 by Coughlin & Shaw among the NSVS periodic variable stars. The first analysis of the optical VRI light curves by Coughlin & Shaw show that this binary could be composed by two low mass stars. Other authors (Wolf et al. 2010, Zhang et al. 2014) analyzed new optical light curves for this system, obtaining some parameters, like the mass ratio (q) from the light curves, given the absence of radial velocity (RV) measurements.This procedure is unreliable in the case of detached eclipsing binaries, leading to large uncertainties in the physical parameters of the system.

We obtained new IR light curves and radial velocity measurements to characterize the physical properties of this system, in particular masses and radii. In addition, calibrated optical BVRI photometry was obtained to fully constrain the effective temperature of the two components of this system.

The modelling of this system with the rvfit and Phoebes package show that the mass ratio q is very different of previously published values, showing that the secondary component, as defined by the light curve, is slightly more massive than the primary. We are currently finishing the modelling of this interesting eclipsing system.

VL33

The vertical structure of the accretion disc in LMXBs

Felipe Jiménez Ibarra, Teo Muñoz Darias, Jorge Casares

Low-mass X-ray binaries are binary systems harboring an accreting compact object, either a neutron star or a black hole, and a companion star less massive than the Sun. These objects are among the brightest X-ray sources in the sky, allowing us to study in great detail both the accretion process and geometry, and the fundamental properties of the compact objects. We obtained GTC-10.4m phase-resolved spectroscopy of the optical counterpart of the neutron star transient system Aquila X-1 during three consecutive accretion episodes in 2011, 2013 and in 2016. Some of these spectra show high excitation emission lines (e.g. Bowen blend at ∼4640 ? arising from reprocessing on the donor star, and therefore trace its movement.

We carried out Doppler mapping in order to determine the radial velocity of these features (Kem). Since Kem traces the motion of the irradiated, inner side of the donor star, its velocity is smaller than the radial velocity of the centre of mass of the companion (K2), which we have recently determined through infrared spectroscopy. By combining Kem with K2 we are able to determine the so-called K-correction. The latter is closely related with fundamental parameters of the system and can be expressed as function of the mass ratio of components and the accretion disc opening angle. In this work we present strong constraints to the accretion disc opening angle obtained, first time, from direct measurements and detailed modelling (Jiménez-Ibarra et al. 2017).

VL34

El baile estelar más largo en una nebulosa planetaria

David Jones, H. Van Winckel, A. Aller, K. Exter, O. De Marco

The importance of long-period binaries for the formation and evolution of planetary nebulae is still rather poorly understood, which in part is due to the lack of central star systems that are known to comprise such long-period binaries. Here, we report on the latest results from the on-going Mercator-HERMES survey for variability in the central stars of planetary nebulae. We present a study of the central stars of NGC 1514, revealed to be a highly eccentric binary system with a period of more than nine years, making it the longest known period central star to date. The morphology of the nebula shows the clear shaping influence of the binary in spite of its long period, highlighting that even wide companions can have a very significant impact on mass loss evolution. This study demonstrates not only the importance of wide binaries in late stellar evolution but also the importance of long-term monitoring campaigns which are only now possible due to modern high-stability instruments and queue mode observing.

VL35

iSTARMOD: a Python code to quantify the chromospheric activity of FGKM stars using the spectral subtraction technique

Fernando Labarga, David Montes

The spectral subtraction technique has proven to be one of the best methods to quantify the chromospheric contribution of different optical and near-infrared features such as the Ca II H&K, Balmer, Paschen, Ca II IRT triplet, Na I D1&D2, He I D3 and He I 10830 lines that are the more important activity indicators in high-resolution spectra of FGKM stars. This method is based in the subtraction of a synthesized stellar spectrum constructed using artificially rotationally broadened, radial-velocity shifted, and weighted spectrum of an inactive star chosen to match the spectral type and luminosity class of the active star under consideration. Spectroscopic binaries can also be analyzed in this way using inactive star spectra that reproduce each component of the system. In this contribution we describe the Python code iSTARMOD that we have implemented to apply the spectral subtraction technique. It is based on the FORTRAN code STARMOD, that was developed at Penn State University and modified later by our research group. The code has been adapted to work with the particular features and formats of the spectra coming for different high-resolution spectrographs (such as FOCES, HERMES and CARMENES) and include improvements as the determination of the equivalent widths and automation, in order to perform time series analysis of large sets of spectra. We show here the results of apply iSTARMOD to some single stars and binary systems to illustrate its applicability. The code will be made publicly available on GitHub when it was completely implemented and tested.

VL36

Direct Deconvolution: a method to minimize the effects of the observational window on power spectra

Mariel Lares Martiz, Rafael Garrido Haba, Javier Pascual-Granado

Fourier transforms of observed light curves, obtained by ground observations or by space photometers, exhibit interference effects that are consequence of the convolution of the true Fourier transform with a spectral window (Deeming, 1974).

These interferences in the power spectra makes the analysis of them very difficult in terms of the asteroseismology techniques, specifically to identify modes of non-radial oscillation of multiple periodic variable stars.

This identification has been made by heuristic methods such as the detection of periodicities or patterns that match the "large splitting" or "small splitting" as used in the sun itself and solar like stars. But these frequencies patterns are not easily observed for δ scuti stars or other types of variable stars because of their denser power spectra. In order to identify potential patterns, it is necessary to obtain a reliable list of frequencies that really belong to the star and not due to the external causes given by spurious peaks in the power spectra.

For the moment, the reliable list has been obtained using algorithms such as Period04 or SigSpec that performs a prewhitening of the light curve in the same manner as the CLEAN algorithm (Roberts, 1986) do for radio observation. But in our case this is not a solution because the frequencies found must have a physical meaning and not be just a way to recover a CLEANed radio image.

The Direct Deconvolution method is aimed to fulfill the purpose of removal or minimizing the interference in power spectra due to the observational window. Its theoretical basis are explained in this poster, as well as some issues to be addressed before the full implementation of the method regarding numeric problems that arise when testing the algorithm.

VL37

TROY - The search for exotrojan planets

Jorge Lillo-Box

As the field of extrasolar planets evolves with numerous discoveries of new and diverse planets, we can start thinking in more challenging (observationally talking) scientific cases that can bring up new, hidden, pieces of the exoplanetary science puzzle. This is the case of the TROY project, a multi-technique effort to look for the first co-orbital planets and to provide estimates of the occurrence rate of these bodies down to the Earth-mass regime. Despite being missed in our Solar System, where only kilometer-size (or smaller) bodies co-rotate with most of the planets, theory allows even equal-mass planets to co-exist in the same orbit. In this invited talk I will present the news on the TROY project including the last ground-based observations, the results from the first radial velocity search involving 46 planetary systems (Lillo-Box et al., 2018) and the first results from our Kepler/K2 search.

VL38

Dependency analysis of stellar Li depletion in the presence of planets

Félix Llorente de Andrés, R. de la Reza, C. Chavero, M. Cortés-Contreras

The initial base of the present paper was the remarkably trend of Li abundance with age. Within this trend there is a depression in the relationship Li abundance / age. This gap is identified at an age ≥ 4Gyr and an abundance around A(Li) <1.5. From this point on Li depletion increases faster. It seems that this gap is a clear hollow that manifested itself when the stars host planets. This gap is not showed when the stars do not host planets. The objective of the present work is to seek a plausible physical explanation of the gap and which kind of mechanisms are acting to accelerate the Li depletion

VL39

Analysis of the physical properties of jets/outflows in T Tauri stars

Fátima López-Martínez, Jorge Filipe Gameiro

Winds and jets are key factors in the evolution of accretion disks in pre-main sequence stars, and deriving their physical properties is one of the most important steps for a full understanding of the connection among outflow, jet and accretion processes. In this work we determine the physical properties of the high velocity component (HVC) and the low velocity component (LVC) emitting region of the optical forbidden [N II], [O I] and [S II] lines for the jets of DG Tau, SZ 102, CW Tau and RW Aur. We found two well defined ranges of temperatures and densities for the gas emission lines: one with $4.125 \leq \log T_e\,(K) \leq 4.55$ and $2.25 \leq \log n_e\,(cm^{-3}) \leq 5.25$, and another one with $5.25 \leq \log T_e\,(K) \leq 5.6$ and $5.25 \leq \log n_e\,(cm^{-3}) \leq 6.75$. The LVC has high temperatures and high densities for DG Tau and CW Tau, whereas for SZ 102 it has much lower densities and temperatures. The peak velocities and full width at half maximum of the LVC pointed out that its origin is from a MHD disk wind at 0.05-1.69 AU and that Keplerian rotation is the main responsible of the broadening of the lines. The relation found between the accretion luminosity with the LVC's temperature and density, suggests that the accretion plays an important role in the physical properties of the emitting region, likely a steady accretion is performing in the outflow driving region. We did not find evidence of Keplerian broadening for the HVC, whereas we found a correlation between the mass loss rate and accretion luminosity, probably because episodic accretion is occurring in the region where the jet is driven.

VL40

GALANTE: 11 bands photometry of Cyg OB2

Antonio Lorenzo Gutiérrez. Emilio J. Alfaro, Jesús Maíz-Apellániz

La creación de un nuevo observatorio en Javalambre (Teruel) con un nuevo telescopio (T80) abrió una gran oportunidad para desarrollar el proyecto GALANTE. Este proyecto está realizando un cartografiado fotométrico en el óptico centrado en el disco norteño galáctico con 6º de anchura, haciendo uso de los filtros de JPLUS y añadiendo 3 nuevos filtros de fabricación propia. Con esta elección de filtros, se pueden determinar los parámetros físicos estelares como la temperatura, el log(g), metalicidad y E(B-V) para magnitud AB<17. GALANTE nace con el objetivo de completar los actuales cartografiados de nuestra galaxia, los cuales saturan para aquellas estrellas más brillantes, aprovechando las 3 noches anteriores y posteriores a la Luna llena, ya que éstas quedan desaprovechadas en la planificación de JPLUS.

En este trabajo se presenta la descripción del sistema fotométrico GALANTE, compuesto por 4 filtros de JPLUS y otros 3 nuevos filtros para este proyecto. Con el uso de fotometría sintética de catálogos observacionales y teóricos, se obtienen las ecuaciones de transformación del sistema GALANTE a SDSS. Además, presento el estado actual de mi tesis, mostrando las observaciones actuales de la región de Cygnus OB2 en 11 bandas y su calibración. El desarrollo de una metodología basada en los colores de GALANTE trabajando en un sistema MonteCarlo con un criterio de chi cuadrado, permite obtener los parámetros físicos de las estrellas. Para ello, este trabajo se apoya en la fotometría sintética GALANTE haciendo uso de los catálogos teóricos y observacionales, obteniendo así las propiedades físicas de los campos observados con el T80 para el proyecto.

VL41

Una biblioteca de espectros de alta resolución de estrellas masivas

Jesús Maíz Apellániz

En los últimos años hemos participado en distintos proyectos orientados a la obtención de espectros de alta resolución de estrellas masivas (OWN, IACOB, NoMaDS, CAFÉ-BEANS y otros proyectos de menor alcance). Hemos combinado dichos datos con otros procedentes de archivos públicos como los de FEROS, OHP o UVES para construir la mayor biblioteca de espectros ópticos de alta resolución para dichas estrellas jamás compilada. En la actualidad son más de 10 000 espectros de más de 1000 estrellas aunque los numeros podrían duplicarse a corto plazo gracias a datos propios nuevos y a más búsquedas en bases públicas. En este póster detallamos el proceso de uniformización y homologación de los datos y presentamos estadísticas sobre la biblioteca. Entre los usos que se pueden hacer con ella destacamos dos: la detección de binarias espectroscópicas y la medición de propiedades del medio interestelar.

VL42

GTC/CanariCam narrow-band Imaging of the Fullerene-rich Planetary Nebula IC 418

Arturo Manchado, J. Jairo Díaz-Luis, D. Anibal García-Hernández, Pedro García-Lario, Eva Villaver, Guillermo García-Segura

GTC/Canaricam seeing-limited narrow-band images of the planetary nebula (PN) IC 418 were analyzed. IC 418 is an extended PN where fullerenes (C60) were detected by SPITZER.

The narrow-band images cover the C60 fullerene band at 17.4 micron, the polycyclic aromatic hydrocarbon like (PAH-like) feature at 11.3 micron, the broad 9-13 micron feature, and their adjacent continua at 9.8 and 20.5 micron.

We have studied the spatial distribution of the fullerene C60, and compare with the dust and PAH emission structure. A ring-like extended structure (at a distance of 6300 AU) is seen at all IR wavelengths. However, after continuum subtraction the dust continuum emission at 9.8 micron , peaks close to the central star while the broad 9-13 micron emission together with the PAH emission show a clear ring-like extended emission. On the contrary the C60 17.4 micron, emission is mainly located at the northeast, extending from the central star to the outer regions of the nebula.

VL43

Cloud Atlas: Discovery of Rotational Spectral Modulations in a Low-mass, L-type Brown Dwarf Companion to a Star

Elena Manjavacas, Dániel Apai, Yifan Zhou, Theodora Karalidi, Ben W. P. Lew, Glenn Schneider, Nicolas Cowan, Stan Metchev, Paulo A. Miles-Páez, Adam J. Burgasser, Jacqueline Radigan, Luigi R. Bedin, Patrick J. Lowrance

Observations of rotational modulations of brown dwarfs and giant exoplanets allow the characterization of condensate cloud properties. As of now, rotational spectral modulations have only been seen in three L-type brown dwarfs. We report here the discovery of rotational spectral modulations in LP261-75B, an L6-type intermediate surface gravity companion to an M4.5 star. As a part of the Cloud Atlas Treasury program, we acquired time- resolved Wide Field Camera 3 grism spectroscopy (1.1-1.69 μm) of LP261-75B. We find gray spectral variations with the relative amplitude displaying only a weak wavelength dependence and no evidence for lower-amplitude modulations in the 1.4-μm water band than in the adjacent continuum. The likely rotational modulation period is 4.78 ±0.95 hr, although the rotational phase is not well sampled. The minimum relative amplitude in the white light curve measured over the whole wavelength range is 2.41±0.14%. We report an unusual light curve, which seems to have three peaks approximately evenly distributed in rotational phase. The spectral modulations suggests that the upper atmosphere cloud properties in LP261-75B are similar to two other mid-L dwarfs of typical infrared colors, but differ from that of the extremely red L-dwarf WISE0047.

VL44

The 1989 and 2015 outbursts of V404 Cygni: a global study of spectroscopic optical features

Daniel Mata Sánchez, Teodoro Muñoz Darias, Jorge Casares Velázquez

Low mass X-ray binaries are formed by a compact object (either a stellar-mass black hole or a neutron star) and a donor star, which transfers mass onto the former via an accretion disc. Among those systems harbouring a black hole, V404 Cygni stands out due to its large accretion disc (orbital period of 6.5 days) and high apparent brightness. After 26 years of quiescence, V404 Cygni exhibited a bright outburst in June of 2015 that was intensively followed in a wide range of wavelengths. Our team obtained high time resolution optical spectroscopy (up to 90 s), which includes a very detailed coverage of the most active phase of the event. We present a database consisting on 651 spectra obtained during this event, that we combine with 58 spectra gathered during the fainter December 2015 sequel outburst, as well as with 57 spectra from the 1989 event.

The analysis of this database led to the discovery of wind-related features in the form of P-Cygni profiles and broad emission line wings (so-called nebular phases) during both 2015 outbursts. Here, we build diagnostic diagrams that enable to systematically study the evolution of typical emission lines parameters, such as line fluxes and equivalent widths, and develop a technique to systematically detect outflow features. We find that these are present all along the outburst, even at very low optical fluxes, and that both types of outflow features are observed simultaneously in some spectra, confirming the initially thought common origin. We also show that the nebular phases depict loop patterns in many diagnostic diagrams, while P-Cygni profiles are highly variable over times-scales of minutes. The comparison between the three outburst events reveals that the spectra obtained during June and December 2015 share many similarities, while those from 1989 exhibit narrower emission lines and lower terminal velocities. The simple diagnostic diagrams presented in this work have been produced using standard measurement techniques and thus may be extrapolated to other low-mass X-ray binaries in outburst.

VL45

Linking young stars, clouds, and galaxies through stellar accretion rates

Ignacio Mendigutía, Charles J. Lada, Rene D. Oudmaijer

The star formation rate linearly correlates with the dense gas mass involved in the formation of stars both for distant galaxies and star-forming clouds in our Galaxy. Similarly, recent studies confirm that the mass accretion rate and the circumstellar gas disk mass of young, Class II stars are also linearly correlated. This poster shows that both relations can be unified. We find a statistically significant, roughly linear correlation between the rate of gas transformed into stars and the mass of gas directly involved on star formation, ranging 16 orders of magnitude and encompassing kpc-size galaxies, pc-size star forming clouds within our Galaxy, and young stars with au-size protoplanetary disks. In order to explain this finding we propose a bottom-up hypothesis suggesting that a relation between the stellar mass accretion rate and the total (disk+envelope in Class 0/I stars) circumstellar mass drives the correlation in clouds (hosting stars) and galaxies (hosting clouds). Lines of evidence supporting this hypothesis and a future observational test are provided. If this scenario was confirmed, theories aiming to explain the correlations for stars, clouds, and galaxies should not remain isolated from each other. Instead, all scales and physical systems involved in one single, global correlation must be considered.

VL46

Calibrating the metallicity of M dwarfs in wide physical binaries with F-, G-, and K- primaries: a sample of 192 physically bound systems

David Montes Gutiérrez, R. González-Peinado, H. M. Tabernero, J. A. Caballero, E. Marfil, F. J. Alonso-Floriano, M. Cortés-Contreras, J. I. González Hernández, A. Klutsch, and C. Moreno-Jódar

We have established a sample of 192 physically bound systems made of late-F, G-, or early-K primaries and late-K or M dwarf companion. For all these systems, we carried out observations with HERMES/Mercator and obtained high resolution spectra for the primaries. We used these spectra and the automatic StePar code for deriving precise stellar atmospheric parameters: Teff, log g, Vmicro, and chemical abundances for 13 atomic species, including [Fe/H]. After computing Galactocentric space velocities for all the primary stars, we performed a kinematic analysis and classified them in different Galactic populations and stellar kinematic groups of very different ages, which match our own metallicity determinations and isochronal age estimations. We are using all this information to derive a calibration of spectral indices from optical to infrared low-resolution spectra (CAFOS/2.2m CAHA spectrograph) and photometry in different bands of M-dwarf companions with the metallicity of their primaries. We will also derive stellar atmospheric parameters and abundances using spectral synthesis of some of the M-dwarf companions that have CARMENES high-resolution spectra, and compare the results with the values presented here.

VL47

Decoding the local star formation scenario with the Besançon Galaxy Model

Roger Mor, Annie C. Robin, Francesca Figueras

The upcoming full sky large data surveys (e.g. Gaia Data Release 2) represents a challenge for the Galaxy modelling and requires new frameworks and tools to deal with huge amounts of data. We developed a new strategy to infer, all at once, the parameters describing the local star formation history (SFH), the initial mass function (IMF) and the density laws of the Galactic thin disc component. The developed framework combines both the generation of Besançon Galaxy Model fast approximate simulations (BGM FASt) and approximate Bayesian computation (ABC) methods. The full strategy is codified to run under Apache Spark and Apache Hadoop environments, which are fast engines coming from business science that are suited to deal with huge data sets.

As a first application, we apply our new framework to Tycho-2 data. For the first time using BGM, we obtain a posterior probability distribution function for each one of the explored parameters that describe locally the Galactic thin disc component. Among the obtained results, we want to emphasise that our findings on the stellar volume mass density at the Solar Neighbourhood points through the highest values reported in the literature, suggesting that we need less local dark matter to explain the Galactic rotation curve. Regarding the star formation, we find an slope of 3.7 ± 0.2 for the high mass range of the IMF. As Tycho-2 data is a mixed set of stars in the field and in stellar associations we are inferring the slope of the composite IMF (or IGIMF), thus such a steep IMF can be interpreted to be due to the preferred formation of small stellar clusters or even to the existence of O and B-type stars formed isolated (e.g. Massey 1998, Selier et al. 2011, Kroupa et al. 2013). The good performance of the BGM FASt together with the ABC methods opens a promising era to decode the star formation scenario in the Milky Way.

VL48

A new classification scheme for B-type stars

Ignacio Negueruela, S. Simón-Díaz, M. Monguió

The criteria for spectral classification of B-type stars were established almost 80 years ago from low-resolution spectra on photographic plates. Since Hipparcos measured accurate distances for nearby stars, it has been clear that, although sound in general terms, the current set of MK standard stars in the B range has many inconsistencies, with luminosity class not always reflecting the actual intrinsic brightness of an object. As part of the efforts to build the IACOB database of high-quality, high-resolution spectra of OB stars, we have gathered the largest existing collection of spectra of B-type MK standards. We have developed a new classification scheme, based on high-S/N spectra at resolving power R=4000, that solves most of the inconsistencies of the original system. Here we present the new list of standards and a general discussion of the new scheme.

VL49

A new infrared view of the Galactic Centre. The GALACTICNUCLEUS survey

Francisco Nogueras-Lara, A.T. Gallego-Calvente, H. Dong, E. Gallego-Cano, J. H. V. Girard, M. Hilker, P.T. de Zeeuw, A. Feldmeier-Krause, S. Nishiyama, F. Najarro, N. Neumayer and R. Schödel

The Galactic Centre (GC) suffers from a very high extinction, Av ~30. Therefore, the proper determination of the extinction curve in this region is of fundamental interest to study the stellar population and its evolution. We use the J, H and Ks data from our high angular resolution (~0.2') GC survey, GALACTICNUCLEUS, to analise in detail the extinction curve in the near infrared. We assume a simple power law. Using five independent methods we find some evidence for a possible difference between the power law index between J and H and H and Ks. However, we conclude that a constant index of 2.30±0.08 described well the extinction. We do not find variations of the index along the line of sight or the absolute value of the extinction. We produce extinction maps that show the clumpiness of the ISM (interstellar medium) at the GC and de-redden the color magnitude diagrams to analise the stellar population.

Equation of state for neutron star outer crusts

Pablo Pajuelo Polo, Conrado Albertus Torres, M. Ángeles Pérez García

We study the equation of state of neutron star crusts using molecular dynamics simulations of a neutron rich system with temperature effects. We provide a microscopic description of the system and its non-homogeneous spatial distribution. We discuss the relevance of the crust properties in light of future and current searches of continuous emission of Gravitational waves from pulsars.

VL51

Detection of Flares in A-type stars using Bayesian Blocks and Super-resolution techniques

Javier Pascual Granado, Antonio García Hernández

Flares are a sudden release of energy in the stellar atmospheres that can be observed photometrically at all wavelengths across the spectrum, especially in UV and X rays. The origin is the reconnection of magnetic field lines. They are observed in solar-type stars since there is a dynamo mechanism and a convective envelope that can support the magnetic field lines.

On the other side, theoretical models predict a very thin, if any, convective envelope in A-type stars but some observations point to a convective envelope that might be effective in producing granulation effects and even magnetic activity.

In order to detect and characterize stellar flares we need a systematic and self-consistent detection algorithm. Nevertheless, to date all the results obtained by flares detection and their characterization that can be found in the literature are based on a set of ad-hoc criteria that are verified manually with no physical support.

We are developing an automatic detection pipeline based on Bayesian Blocks detection and wavelet decomposition that will be capable to detect a flare candidate and reject false positives providing at the same time physical parameters that can be useful for the characterization of stellar activity in A-type and other stars.

Here we will introduce the algorithm for flares detection using a sample of Kepler stars and the characterization of the candidates using superresolution techniques.

VL52

Clustering properties of Herbig Ae/Be stars

Alice Pérez Blanco, René Oudmaijer, Ricardo Pérez, Debora Baines

It is a well-established result that many stars do not form in isolation; young stars are usually found to be members of clusters. But little is known or understood about the origin of the clusters. In particular, evidence that pre-main sequence stars of intermediate (2-10$M_{\odot}$) and higher masses are found in clusters has been found in several studies at optical and infrared wavelengths (e.g. Waters & Waelkens 1998, and their references). Additionally, there has been an increased interest in the study of intermediate-mass stars in the past ten years. Here we study Herbig Ae/Be stars which are optically visible pre-main sequence stars of intermediate-mass. They represent the most massive objects to experience an optically visible pre-main sequence phase, bridging the gap between low- and high-mass stars. Building on the ideas from Testi et al. (1997, 1998, 1999) who analyzed the occurrence of young stellar clusters around Herbig Ae/Be stars from near-infrared images, we are investigating the presence of clusters around previously known and newly discovered intermediate-mass pre-main sequence Herbig Ae/Be stars with the detailed astrometric data offered by Gaia. This will enable us to determine the position of the Herbig Ae/Be stars in the HR diagram and allow us to detect and confirm the presence of the clusters around them. In this contribution, we outline the results obtained with Gaia DR1 through the algorithm we developed for the detection and analysis of the clusters and clustering properties of the Herbig Ae/Be stars and present preliminary results for Gaia DR2.

VL53

Circumstellar effects on the Li and Ca abundances in massive Galac-ticO-rich AGB stars

Víctor Pérez-Mesa, O. Zamora, D. A. García-Hernández, B. Plez, A. Manchado, A. I. Karakas, M. Lugaro

In a previous work, by considering the presence of a extended envelope, we found strong circumstellar effects in the determination of the Rb abundances in massive Galactic O-rich AGB stars. However, the circumstellar effects were very weak for Zr. Here we explore the cicumstellar effects on the Li and Ca abundances determination in a complete sample of massive Galactic AGB stars. In these stars, the abundances of lighter elements like Li and Ca could be altered by the activation of the hot bottom burning (HBB) process, which is expected to overproduce the 7Li and 41Ca isotopes; e.g., the (super-)Li-rich nature of massive AGB stars is an indicator of the HBB activation. By using our pseudo-dynamical models, new Li abundances and Ca abundances are reported for the first time. The presence of a circumstellar envelope is found to be not important in the determination of the Li and Ca abundances; i.e., the abundances obtained from the pseudo- dynamical models are similar to those derived with the hydrostatic ones. The new Li abundances confirm the (super-)Li-rich character and the HBB activation in our massive Galactic AGB stars. On the other hand, massive Galactic AGB stars are found to be underabundant in Ca (sometimes by up to 1-2 dex, with respect to the expected solar value). Possible reasons for the (unexpected) low Ca content in massive Galactic AGB stars are given.

VL54

Discussing the nature of three BeXRBs through infrared spectroscopy

José Joaquín Rodes Roca, Guillermo Bernabeu, José M. Torrejón, Antonio Magazzù

European Space Agency's INTEGRAL satellite has discovered new X-ray sources due to its sensitivity above 20 keV. Most of these sources suffer from high absorption and the classical blue band spectral classification region is normally not accessible. This can be overcome, however, through infrared spectroscopy. To characterise these systems can influence the population synthesis models currently in use. We obtained H and K band spectra of selected counterparts to these X-ray sources using the NICS instrument mounted on the Telescopio Nazionale Galileo (TNG) 3.5-m telescope. We complement the spectral analysis with infrared photometry from UKIDSS, 2MASS, WISE and NEOWISE databases. We refine the distances to the sources using suitable calibrations that take into account the contamination by the circumstellar disk. We present the first infrared spectroscopy for three INTEGRAL sources. Our spectra show all the significant features in emission and are, thus, consistent with a Be nature of the companions. Owing to their X-ray characteristics, we classify them as Be X-ray binaries.

VL55

SVO Discovery Tool

Carlos Rodrigo, Almudena Velasco, Enrique Solano

The SVO Discovery Tool is a tool developed and maintained by the Spanish Virtual Observatory whose goal is to give an answer to the most basic VO question: "Given an object / list of objects, I want to know all the information that is available in archives about it / them". This information can be presently gathered in different ways using existing VO tools but there is still a lack of a tool that efficiently executes this search and returns the specific information demanded by the user.

In its current version, the SVO Discovery Tool accepts a list of objects and/or coordinates and offers the possibility of gathering a list of physical parameters from Vizier, the photometry in a format ready to be used by VOSA as well as the list of spectra and images.

In this poster we describe the main functionalities of the tool.

VL56

VOSA: A Virtual Observatory tool to estimate physical parameters of stellar objects from SED fitting

Carlos Rodrigo, Enrique Solano, Amelia Bayo

VOSA (VO Sed Analyzer, http://svo2.cab.inta-csic.es/theory/vosa/) is a public web-tool developed by the Spanish Virtual Observatory (http://svo.cab.inta-csic.es) and designed to help users to (1) build Spectral Energy Distributions (SEDs) combining private photometric measurements with data available in VO services, (2) obtain relevant properties of these objects (distance, extinction, etc) from VO catalogues, (3) analyze them comparing observed photometry with synthetic photometry from different collections of theoretical models or observational templates, using different techniques (chi-square fit, Bayesian analysis) to estimate physical parameters of the observed objects (temperature, mass, luminosity, etc), and use these results to (4) estimate masses and ages using collections of isochrones and evolutionary tracks from the VO. In particular, VOSA offers the advantage of deriving physical parameters using all the available photometric information instead of a restricted subset of colors. The results can be downloaded in different formats or sent to other VO tools using SAMP.

VOSA is in operation since 2008 (Bayo et al, 2008, A&A 492,277B). At the time of writing this proposal there are more than 1500 active users in VOSA (~15.000 files uploaded by users and ~4.000.000 objects analysed), and more than 90 refereed papers have been published making use of this tool.

In this presentation I will describe the main functionalities recently implemented in VOSA, in particular those oriented to the efficient management of large volumes of data in the framework of the Gaia mission.

VL57

Disentangling the internal structure of Cygnus OB2 using Gaia-DR2 data

Sara Rodríguez Berlanas, Nick Wright, Artemio Herrero

A key difficulty in the study of Milky Way massive stars and OB associations has been the large uncertainty in their distances, hindering the comparison with theories of stellar and cluster evolution.

Cygnus OB2, located at only ~1.4 kpc from us, represents an excellent target to study massive star properties, formation and evolution in a very active environment. It hosts hundreds of OB stars and it is the most obvious example of recent star formation in the massive Cygnus X complex.

We have used the recent Gaia-DR2 data and bayesian methodology to resolve the internal structure of the association, whose preliminary results we present in this contribution.

VL58

Realistic equation of state for neutron stars interior consistent with heavy-ion collision data

Violetta Sagun, Ilidio Lopes, Aleksei I. Ivanytskyi

We apply the novel equation of state, which includes the surface tension contribution induced by the interparticle interaction, to the study of neutron stars properties. This high-quality equation of state is obtained from the virial expansion for the multicomponent particle mixtures that takes into account the hard-core repulsion between them. The considered model with a small number of parameters, fully determined according to the experimental constraints, reproduces very well all the known properties of normal nuclear matter, provides a high quality description of the proton flow constraints, hadron multiplicities created during the nuclear-nuclear collision experiments and equally is consistent with astrophysical data coming from neutron star observations. In particular, we found that the mass-radius relation for neutron stars computed with this equation of state is consistent with astrophysical observations.

VL59

Determining the radius of an open cluster from stellar proper motions

Néstor Sanchez, Emilio J. Alfaro, Fátima López-Martínez

We propose a new method for calculating the radius of an open cluster in an objective way from an astrometric catalogue containing, at least, positions and proper motions. It uses the minimum spanning tree in the proper motion space to discriminate cluster stars from field stars and it quantifies the strength of the cluster-field separation. This is done for a range of different sampling radii from where the cluster radius is obtained as the size at which the best cluster-field separation is achieved. The novelty of this strategy is that the cluster radius is obtained independently of how its stars are spatially distributed. We test the reliability and robustness of the method with both simulated and real data from a well-studied open cluster (NGC 188), and apply it to UCAC4 data for five other open clusters with different catalogued radius values. NGC 188, NGC 1647, NGC 6603, and Ruprecht 155 yielded unambiguous radius values. However, ASCC 19 and Collinder 471 showed more than one possible solution, but it is not possible to know whether this is due to the involved uncertainties or due to the presence of complex patterns in their proper motion distributions.

VL60

The intricate nebular architecture of "The Rotten Egg" disclosed by ALMA

Carmen Sánchez Contreras, Javier Alcolea, Aránzazu Castro-Carrizo, Valentín Bujarrabal, Luis Velilla-Prieto, Miguel Santander-García, Guillermo Quintana-Lacaci, José Cernicharo

En esta contribución presentaré algunos resultados recientes obtenidos por nuestro grupo sobre el estudio con ALMA de las envolturas alrededor de estrellas en transicion desde la AGB a la fase de nebulosa planetaria (PN). Me centrare en el cartografiado con resolución angular y sensibilidad sin precedentes de la emisión de líneas moleculares de OH231.8 (también conocido como “The Rotten Egg”), un objeto icónico y clave para comprender el complejo proceso de conformación de las PNs. En tan solo unos pocos años de operaciones, ALMA está revolucionando este area de investigación, proporcionando informacion con un nivel de detalle sin precedentes sobre la compleja arquitectura nebular (a gran y pequeña escala), dinámica y quimica en los envolturas de las estrellas de masa baja/intermedia en sus últimos estadios de la evolución.

ANULADO VL61

A catalogue of binary and multiple stars from TGAS and the Virtual Observatory

Enrique Solano, Francisco Jiménez-Esteban, Carlos Rodrigo, Luis M. Sarro

The existence of wide binary systems (separations >20,000 au) poses a challenge to binary formation models as their physical separations are beyond the typical size of a collapsing cloud core (~5000-10,000 au). We mined the Tycho-Gaia Astrometric Solution (TGAS) catalogue to identify co-moving systems in the five-dimensional space (sky position, parallax, and proper motion). We identified 6704 co-moving binary and multiple stellar candidate systems, most of them (~89%) not previously reported in the literature, and with separations between ~130 and 500,000 au. Some of the multiple co-moving system were associated to known stellar clusters and moving groups. However, a number of them are reported in this work for the first time. The robustness of our methodology is demonstrated by the identification of well known co-moving systems and by the low contamination rate for candidate binary pairs with projected separations <65,000 au. These pairs constitute a reliable sample for further studies. We also found a significant number of ultra-wide (separation > 100,000 au) binary candidates, whose number increase with increasing separation and that cannot be purely explained by chance alignments. We used the analysis tools of the Virtual Observatory to characterize the co-moving system members and to assess their reliability. The catalogue is available online at the Spanish VO portal (http://svo2.cab.inta-csic.es/vocats/v2/svobin/).

VL62

Identification of ultracool dwarfs in ALHAMBRA and COSMOS fields

Enrique Solano Márquez, M.Cruz Gálvez Ortiz, Inés Gómez Muñoz, Eduardo Martín Guerrero de Escalante

Through VO tools we have searched for new ultracool dwarfs in the ALHAMBRA (Advance Large Homogeneous Area Medium Band Redshift Astronomical) and COSMOS (Cosmological Evolution Survey) extragalactic surveys.

The photometric coverage and the magnitude limits of these surveys allowed us to find objects down to L spectral types. We made quality cuts in each survey to select stellar objects with good photometric information. We took advantage of a Virtual Observatory tool like VOSA to, first, add new data to the Spectral Energy Distribution by querying in VO archives and services and, then, to obtain effective temperatures from the SED fitting to the BT-Settl collection of theoretical models.

Keeping objects with Teff<=2900K, we used color-color diagrams and measured proper motions to clean the sample from possible contaminants (e.g., extragalactic objects or giant stars), leaving a list of more than a hundred ultracool dwarf candidates.

This study validates the procedure and the performance of VO tools to make similar searches in other deep, small-area extragalactic as well as shallower, large-area galactic surveys.

VL63

A catalogue of variable stars in the near-infrared from the WFCAM Transit Survey

Hristo Stoev, Luis M. Sarro, David Barrado

In recent years, time-resolved photometric surveys have marked a memorable boom in time-domain astronomy. However, stellar variability in the near-infrared still remains a largely unexplored realm. With the increasing amount of data in the near-infrared, this would require some degree of automation of the processing and analysis of the resulting light curves.

We present a catalogue of variable stars which have been detected and classified from a search in the datasets of the WFCAM Transit Survey, carried out in the J-band (1.25 μm) with the Wide-field camera on the 3.8-m UK Infrared Telescope in Hawaii. One of the goals of the survey is to detect a large sample of eclipsing binary stars with low-mass primary components and characterise them so that such objects could contribute significantly to our understanding of the stellar mass-radius relationship at low masses. The survey has been conducted between 2007 and 2012 spanning over four fields which cover a total of 6 square degrees.

As a result, a sample of periodic variables primarily populated by eclipsing binaries and RR Lyrae stars and a relatively small sample of long-period variables have been detected in the near-infrared. The majority of the detected variables have not been catalogued yet. The resulting dataset will be a suitable benchmark set for supervised automatic classification of more extensive near-infrared variability surveys.

VL64

Magnetic cycles and rotation in late type stars

Alejandro Suárez Mascareño, C. Lovis, X. Dumusque, S. Udry, R. Rebolo, J. I. González Hernández

High precision radial velocity (RV) measurements give astronomers the possibility of detecting small exoplanets, down to the mass of the Earth. At this stage, signals induced by stellar activity are one of the main causes for false positives. Intrinsic variations of the magnetic regions on the stellar surface induce RV variations both at the timescales of the stellar rotation and the magnetic cycle of the stars. The detection and analysis of those signals is not only important in order to disentangle keplerian induced signals from stellar activity signals, but also to better understand the behavior and the structures of late type stars. We present the results of a study conducted over more than 600 stars in the solar vicinity, with spectral types ranging from F0 to M6, combining measurements from different ground sources (from HARPS to the Mount Wilson HK project), aimed at the detection, characterization of such signals and their statistical properties.

VL65

The entropy of stellar oscillations

Juan Carlos Suárez, L.M. Sarro, A. Moya, A. García-Hernández, M.A. Mendoza

I will present a simple yet powerful method based on Shannon's entropy to detect frequency patterns in the oscillation spectra. In particular we will seek for the so-called "large separation", which is proportional to the stellar mean density. This method relies only on the observed powerspectra. I will present how large separation of the Sun, solar-like stars and even A-F, main-sequence stars are accurately detected with this method. Likewise, an estimate of the mean densities for A-F stars is provided. Due to its simplicity, it can easily be implemented in automated pipelines, e.g. those providing precise values of the mass, radius, and age, which will run in space missions like TESS or PLATO.

VL66

Pulsar observations at the highest radio frequencies

Pablo Torne, G. Desvignes, R. P. Eatough, K. Liu, M. Kramer, G. Paubert, C. Kramer, B. Klein, K. Schuster

Two main scientific drivers motivate the efforts to observe pulsars above a few GHz: a) understanding better how pulsar radio emission is exactly produced (a mystery that lasts since pulsar discovery 50 years ago), and b) searching for and studying pulsars in regions where the interstellar medium effects (in particular the scattering) can severely affect the detections at low radio frequencies. The main challenge arises from the faintness and steep spectra of pulsars: at very high radio frequencies detecting a pulsar is a difficult task that can only be achieved for certain pulsars with shallow or flat spectra, and by using the most sensitive radio telescopes available today. This poster shows an overview of radio observations carried out for a set of pulsars from ~2 to ~475 GHz, and presents the results from the highest-radio-frequency detections of pulsed emission from neutron starts to date; achieved for PSR J1745-2900 (the magnetar close to Sgr A*) up to 291 GHz, and PSR B0355+54 up to 138 GHz.

VL67

Searching for pulsars around Sgr A* at radio wavelengths

Pablo Torne, R. P. Eatough, G. Desvignes, K. Liu, R. Wharton, M. Kramer

Pulsars orbiting black holes are a long-sought holy grail in astrophysics, both for their importance in stellar evolution and their potential to measure black hole properties and test General Relativity and alternative Gravity theories to the highest precision. A case of particular significance is the Milky Way's super massive black hole (SMBH), Sgr A*, for which a pulsar in a close orbit could enable the most precise measurement of the SMBH mass, and potentially the spin and quadrupole moment, enabling tests of the No-Hair theorem and the Cosmic Censorship conjecture. In addition, such measurements would be an important complement to the ongoing studies of the properties of Sgr A* through stellar orbits in the infrared domain, and the high-resolution radio imaging of the shadow projected by an event horizon. Nonetheless, although the stellar evolution theory predicts the existence of pulsar-black hole systems (with several of them in the inner parsec of the Galaxy), and despite repeated efforts in the last decades surveying the Galaxy, no pulsar-black hole binary has been detected to date. The potential for high-precision measurements of the gravitational field in the central stellar cluster, the magneto-ionic medium around Sgr A*, and relativistic effects in binaries allowing for tests of Gravity theories to unprecedented precision, strongly motivates continued efforts to find pulsars in the Galactic Centre region. In this oral contribution we will discuss the motivation and ongoing attempts to detect the elusive Galactic Centre pulsar population, in particular those pulsars in close orbits to Sgr A*.

VL68

A Systematic Study of Northern O-type Binaries

Emilio Trigueros Páez, Ignacio Negueruela Díez, Jesús Maíz Apellániz

This poster is a review of the work that is being done by the author in the frame of his Ph.D. Tesis. In it, I will present the results and some of the problematics regarding the analysis of the multiple systems that contain high-mass stars. The study is focused on the northern hemisphere as it is the continuation of the CAFÉ-BEANS survey and a complementary work of those of the OWN project for the southern hemisphere.

VL69

Constraining the structure of X-ray emitting jets close to the launching site

Sabina Ustamujic, Ana Inés Gómez de Castro

Observations of stellar jets show evidence of X-ray emitting shocks close to the launching site. In some cases, the shocked features appear to be stationary, also for YSOs at different stages of evolution. We study the case of HH 154, the jet originating from the embedded binary Class 0/I protostar IRS 5, and the case of the jet associated to DG Tau, a more evolved Class II disk-bearing source (CTTS), both located in the Taurus star-forming region. We aim at investigating the effect of perturbations in X-ray emitting stationary shocks in stellar jets, and explore the differences from Class 0 to Class II sources. We performed a set of 2.5-dimensional MHD numerical simulations modelling supersonic pulsed jets ramming into a magnetized medium, exploring different parameters for the model. We consider two cases: a jet less dense than the ambient medium (HH 154), and a jet denser than the ambient (DG Tau). We synthesized the count rate from the simulations and compared with available Chandra observations.

VL70

Mapping the Owl Nebula

Mónica Vara Lubiano, Jorge Carro Maroto, Miriam G. Santa-María

Presentamos los resultados de las observaciones en el óptico (imagen y espectroscopía de rendija larga) de la nebulosa planetaria M97. Las imágenes se han tomado en los filtros anchos BVR y en los filtros estrechos Halpha, Hbeta, [NII], [SII], [OI] y [OIII], con el instrumento CAFOS del telescopio de 2.2m del Centro Astronómico Hispano Alemán de Calar Alto. El estudio incluye mapas de la metalicidad, ionización y extinción, y velocidad de expansión de la nebulosa, además de información espectral de su estrella central y de un AGN que se ve a través de ella.

VL71

Identification of RR Lyrae stars in the Javalambre Photometric Local Universe Survey

Héctor Vázquez Ramió

The large and indiscriminate area Javalambre Photometric Local Universe Survey (J-PLUS) will observe, together with the survey's depth, magAB=22 in the broad bands, makes it very convenient for deriving properties of the Galactic halo structure. Among the stars than can be used for that purpose, RR Lyrae pulsating stars are of outstanding importance for several reasons (see e.g. Sarajedini 2011): i) they are ubiquitous species in our Galaxy, so they can be found distributed virtually everywhere without being linked to any particular Galactic component; ii) they are relatively bright (M_V~=0.6 for mean halo metallicity), so they are easily detectable up to a few hundred kpc from us; iii) their pulsation periods obey a period-luminosity-metallicity relation that makes them standard candles, becoming very useful to constraint distances; iv) they are relatively old stars, so they are fair tracers of the Milky Way old component. J-PLUS will provide the SED of a unprecedented amount of RR Lyrae stars.

Here the first preliminary mandatory steps towards the achievement of those goals are addressed: the development of a method allowing the identification of RR Lyrae star candidates. For that purpose, a twofold strategy is followed. Single epoch J-PLUS photometry is used in conjunction with external photometric archives in order to detect variability. On the other hand, the stellar locus of the RR Lyraes at different color-color spaces is inspected in order to isolate highly pure and complete candidate samples. J-PLUS photometry from already known RR Lyrae stars is used to tune the methodology to be applied to the whole survey data.

CP1

The internal structure of small solar system bodies related to their collisional environment

Rafael Andrés Alemañ Berenguer, Adriano Campo Bagatin, Paula Benavidez, Derek C. Richardson

Internal structure of small bodies of the solar system is one of the missing direct observables to date, only indirect indications can be obtained by asteroid density estimation. Laboratory impact experiments and numerical modelling can provide further understanding of the way asteroids (and comets) are shattered and do recombine to form gravitational aggregates. The structure formed in post-impact re-accumulation is therefore related to the original impact process.

On one hand, the analysis of estimated macroporosity of asteroids, combined with numerical simulations, provides clues for understanding collisional process in different asteroid types. On the other hand, statistics of collisions in the asteroid belt and the transneptunian region can -in turn- provide information on the internal structure of small bodies.

Space missions to sound asteroid and comet interiors are compelling in the near future to understand asteroid interiors and provide main quantitative evidence on the fragmentation process itself.

CP2

Modelización numérica de la interacción entre las exosferas planetarias y el viento estelar

Ada Canet Varea, Ana Inés Gómez De Castro

Recent detections of terrestrial-type exoplanets orbiting in the habitable zone of their host star have motivated the study of the atmospheres and magnetospheres of these bodies. While low atmospheric layers are difficult to detect, exospheres (and possible magnetospheres) are extensive structures that are susceptible of being detected by tracers like the Lyman-Alpha line of atomic hydrogen. The stellar wind plays a fundamental role in the morphology of these structures. In this work we will analyze the interaction between Earth-like planets and the stellar wind, focusing on the case of non-magnetized planets and studying the response of the planetary exosphere. To describe the behavior of planetary exospheres in the face of the action of the stellar wind will be carried out numerical simulations with the modular code PLUTO (Mignone et al. 2007), to analyze the interaction between this plasma and a non-magnetized planet with an Earth-type exosphere and located at different orbital distances.

CP3

A radial velocity search for exoplanets around members of young open clusters and moving groups with CARMENES

Carlos Cardona Guillén, Víctor J. S. Béjar, Nicolás Lodieu and the CARMENES consortium

In this talk we present the preliminary results of our radial velocity (RV) search with CARMENES for exoplanets around members of the Pleiades Open Cluster and Taurus-Auriga star-forming region as well as of moving groups younger than 600 Myr, including IC2391, Beta Pictoris, Ursa Majoris, etc. CARMENES is a ultra-stable, two-channel, high-resolution spectrograph mounted on the Calar Alto 3.5m telescope, which provides a wide and continuous wavelength coverage from 520 to 1710 nm. We have developed a method to correct the RV measurements from the activity induced signals present in most of these young stars. First, we look for correlations between the RV measurements and activity indicators such as Halpha, CCF bisector, rotational period or the chromatic index, a measurement of the wavelength dependence of the RV. Then, we correct the RV values from the activity using these correlations and analyze the resulting data using Generalized Lomb-Scargle periodograms to search for periodic planet signals. Here, we will summarize the results of this analysis, show the cases in which we have reduced the rms of the RVs, set constraints on the presence of super-Earths in those stars and present the most promising candidates.

CP4

Martian dust size and shape from MSL Engineering Cameras

Hao Chen-Chen, Santiago Pérez-Hoyos, Agustín Sánchez-Lavega

Although not designed for scientific purposes, images obtained by the Mars Science Laboratory (MSL) engineering cameras can be used for evaluating the properties of the air-borne dust aerosol. The objective of this study is to validate the use of these cameras for retrieving the amount of dust aerosol suspended in the Martian atmosphere, characterise its physical properties (shape, size distribution) and study its temporal and seasonal variation through the MSL mission

CP5

Spectral energy distributions and luminostities of M dwarfs in the CARMENES search for exoplanets

Carlos Cifuentes San Román, José.A. Caballero, Miriam Cortés-Contreras, David Montes, Andreas Schweitzer et al.

In the quest for Earth-sized exoplanets, M dwarfs are stars of increasing interest during the last two decadess. Their small sizes and masses as compared to our Sun make them specially suitable targets to look for the signatures of planetary companions, as their habitable zones fall closer to their host star. Despite being the most abundant stars in our Galaxy, it still exists large uncertainty about basic physical properties of M dwarfs. In particular, determining properties such as luminosities and effective temperatures is essential to characterize their planetary companions, since their properties are derived from those of their host stars. This means that the larger the uncertainties in these fundamental stellar properties, the broader is the span of compatible planetary compositions and parameters. CARMENES is a next-generation spectrograph, built and operated by the homonymous German-Spanish consortium of eleven institutions, which monitorizes bright nearby M dwarfs using the radial velocity method. Carmencita, its input catalog, contains dozens of parameters for about 2200 M dwarfs, from M0.0 to M7.0, including photometric data in a broad range, from UV to mid-infrared. These photometric date, compiled and updated for 18 broadband filters, FUV, NUV, u', $B_{T,}$ B, g', $V_{T,}$ G, V, r', I', J, H, Ks, W1, W2, W3, W4, have made possible the determiation of important stellar properties using the Virtual Observatory SED Analyzer (VOSA).

CP6

Exploring the nature of AB Dor C with NIR interferometry

Juan Bautista Climent Oliver, J.C. Guirado, J.M. Marcaide. J. -P. Berger, A. Mérand, I. Martí-Vidal, R. Azulay

AB Doradus A is the main star (K0V) of the system AB Doradus, located at a distance of ~15 pc and with a low-mass companion, AB Dor C (0.090 Msun, Guirado et al. 1997), orbiting at an average angular distance of 0.2". These low-mass multiple systems are relevant since they provide tests of stellar evolution models that are used to derive the theoretical masses of brown dwarfs and planets, as long as we have their dynamically-determined masses.

When comparing observed magnitudes with theoretical mass-luminosity relationships (DUSTY models; Chabrier et al. 2000) the models tend to underpredict the mass of AB Dor C (Close et al. 2007). This discrepancy could be easily corrected if AB Dor C were a binary brown dwarf as pointed out by Marois et al. (2005) with a maximum apoastron of 0.138 AU, that is, ~10 mas at 14.9 pc (Nielsen et al. 2005).

To further investigate this hypothesis we observed AB Dor C with the VLTI (UT1, UT2 and UT4) using the AMBER instrument at low spectral resolution mode in the J, H, and K bands. Due to the faint magnitude of AB Dor C we had to use a non-standard configuration with AB Dor A as a fringe tracker (Guirado et al. 2013).

The observed visibilities suggest that AB Dor C is not a point-like object but it has an extended shape. We explored the different possible scenarios modeling the visibility curve, making use of both LITpro (Tallon-Bosc et al. 2008) and an in-house code, and discussed their implications for stellar evolution models.

CP7

Identification and characterization of asteroids using the WFCAM Transit Survey and the Virtual Observatory

Miriam Cortés Contreras, F. M. Jiménez-Esteban, E. Solano, B. Carry, C. Rodrigo

Small Solar System bodies are objects that are neither planets nor dwarf planets, nor satellites of a planet or dwarf planet. More than 750000 Small Solar System bodies are known today, most of them asteroids, occupying a variety of orbits ranging from near-Earth to the Kuiper belt. Their study is motivated by their intrinsic importance as remnants of the early stages of the solar system formation process as well as by practical reasons concerning space exploration and the impact frequency with Earth.

We desribe here a methodology to identify asteroids serendipitously in the WFCAM Transit Survey using Virtual Observatory tools like SkyBoT, TOPCAT and STILTS. We provide more than 15000 accurate positions and J-band magnitudes for over 2000 asteroids. We will build light curves and use them to determine their fundamental physical parameters, such as the asteroid's shape, rotational period or the binary nature.

CP8

TFAW: wavelet-based signal reconstruction to reduce photometric noise in time-domain surveys

Daniel del Ser Badia, Octavi Fors Aldrich, Jorge Núñez de Murga

There have been many efforts to correct systematic effects in astronomical light curves to improve the detection and characterization of planetary transits and astrophysical variability in general. Algorithms like the Trend Filtering Algorithm (TFA) use simultaneously-observed stars to measure and remove the systematic effects, and binning is used to reduce high-frequency random noise.
We present TFAW, a modified version of TFA which reduces the high-and-low-frequency noise in variable-star light curves without modifying their intrinsic characteristics. We modified TFA's signal detection by adding a Stationary Wavelet Transform filter that allows to do a preliminary noise and outlier removal to increase the signal-to-noise ratio of any variable signal within the data. An additional wavelet-based filter is added to TFA's iterative signal reconstruction to characterize the noise- and trend-free signal and the underlying noise contribution at each iteration. The algorithm performs an adaptive noise estimation through the wavelet transform which reduces correlated and uncorrelated noise while preserving signals typical of astrophysical changes. We carried out a series of tests over simulated sinusoidal and transit-like signals to assess the effectiveness of the method, and applied TFAW to real light curves from the Telescopi Fabra-ROA at Montsec (TFRM). We also studied TFAW's application to simulated multiperiodic signals to show its capabilities to separate the different signal contributions. TFAW is a generic algorithm which is applicable to any kind of ground-based or space-based time-domain survey and stellar variability type.

CP9

Uso de la ecuación de Lorentz-Lorenz en astrofísica

Manuel Domingo Beltrán, Ramón Luna Molina, Carlos Millán Verdú, Carmina Santonja Moltó, Miguel Ángel Satorre Aznar

Las medidas de densidad e índice de refracción de hielos en condiciones astrofísicas en un rango de temperaturas, permiten comprobar si cumplen la ecuación de Lorentz-Lorenz. En caso afirmativo, es posible calcular la densidad a partir del índice de refracción del hielo a cualquier temperatura de dicho rango.

La densidad es imprescindible para el cálculo de las absorbancias integradas que permiten deducir las abundancias (densidad columnar) de los hielos observados por los diferentes telescopios espaciales (Iras, Iso, Spitzer, Herschel) en distintos contextos astrofísicos.

Sin embargo, la determinación de la densidad requiere instrumentación que los laboratorios de astrofísica no suelen tener a su alcance. Por el contrario, el índice de refracción se determina fácilmente en dichos laboratorios. Por tanto, el factor de Lorentz es de gran utilidad para cualquier laboratorio dedicado al estudio de hielos de interés astrofísico.

CP10

Modelización 3D de escarpes lobulados en Marte

Andrea Herrero-Gil, Javier Ruiz, Ignacio Romeo

Los escarpes lobulados son estructuras tectónicas consideradas como la expresión topográfica de grandes fallas inversas. En superficie tienen una morfología de arqueada a lineal, alcanzando alturas que pueden superar los 2000 metros. Presentan una sección transversal asimétrica con una pendiente frontal abrupta y una pendiente trasera tendida.

La modelización de escarpes lobulados nos permite aproximar los parámetros de las fallas inversas que controlan la formación de estas estructuras, obteniendo valores de desplazamiento, ángulo de buzamiento y profundidad de la misma. Las estimaciones de profundidad de falla realizadas en escarpes lobulados en Marte y Mercurio por diversos autores han sido asociadas a la profundidad de la transición frágil-dúctil en el momento de formación de la estructura.

La modelización 3D de estos escarpes permite obtener una visión del comportamiento de la estructura en conjunto y conocer cómo es la interacción con las estructuras cercanas y la influencia de estas en el desarrollo de la estructura, algo que en las modelizaciones 2D no es posible. Mediante restitución de la superficie deformada y posterior modelado 3D usando los algoritmos de trishear para una deformación dúctil asociada a un pliegue de propagación de falla realizada en varios escarpes lobulados sobre la superficie de Marte, se han obtenido los parámetros de las fallas que controlan la formación de escarpes, así como variaciones de estos valores a lo largo de la estructura. Las estimaciones de profundidad obtenidas son del orden de 5-10 kilómetros menores que las obtenidas previamente con métodos de modelado 2D (balanced cross sections y forward mechanical dislocation modeling) por diversos autores, lo que supondría una disminución de la profundidad de la transición frágil-dúctil calculada para la edad de formación de los escarpes lobulados.

CP11

JUICE: a European Mission to Jupiter and its Icy Moons

Rosario Lorente Balanza, N. Altobelli, C. Vallat, C. Muñoz, R. Andres, M. Costa, O. Witasse, C. Erd, and the Science Working Team

JUICE - JUpiter ICy moons Explorer - is the first large mission in the ESA Cosmic Vision 2015-2025 programme that will provide a thorough investigation of the Jupiter system in all its complexity: it will characterize the three ocean-bearing icy worlds, Ganymede, Europa and Callisto, as planetary objects and potential habitats; it will also explore the Jupiter system as an archetype of gas giants, focusing in its atmosphere and magnetosphere. Finally, it will be the first mission to orbit a Moon (Ganymede) of a Giant Planet.

The JUICE payload is aimed to address all of the mission's science goals. A remote sensing package includes imaging (JANUS) and spectral-imaging capabilities from the UV to the sub-mm wavelengths (MAJIS, UVS, SWI). A geophysical package consists of a laser altimeter (GALA) and a radar sounder (RIME) to explore the surface and subsurface of the moons, and a radio science experiment (3GM) to probe atmospheres and to measure gravity. An in situ package comprises a suite to study plasma and neutral gas environments (PEP), a magnetometer (JMAG) and a radio and plasma wave instrument (RPWI). An experiment (PRIDE), will improve the ephemeris of the Jovian system.

The current mission baseline assumes a launch in May 2022 and a Jupiter orbit insertion in October 2029. A Jupiter tour of almost three years will include several close flybys of Europa, Ganymede and Callisto, together with a high inclination phase of six months. Finally JUICE will orbit Ganymede for a total of 280 days, first in elliptical orbits and then at 500 km circular orbits.

The ESA Science Operation Centre (SOC) is in charge of implementing the science operations of the JUICE mission. During the mission development phase, and in collaboration with the Science Working Team (SWT) and the Science Working Groups (WGs), SOC is performing studies of science operation feasibility and coverage. The development of high level mission segmentation and detailed science scenarios for specific mission phases allow to size both the resource constraints and the science return of the mission.

CP12

Estudio de la desorción térmica del metanol con una microbalanza de cuarzo

Ramón Luna

Poder interpretar el mecanismo de la desorción de un hielo por el efecto de la temperatura es esencial para entender los procesos dinámicos de las superficies donde se encuentran dichas sustancias. En este trabajo vamos a presentar el estudio experimental sobre la desorción programada en temperatura (TPD) del hielo de metanol. La técnica aplicada en este estudio ha sido la variación de la frecuencia de la microbalanza de cuarzo (QCMB) usada como portamuestras. Dicho método presenta la ventaja (frente a otros métodos usados para estudios similares) de poder medir directamente las moléculas que desorben de su superficie (portamuestras). En este trabajo, también se ha elaborado un modelo teórico para poder extrapolar nuestros resultados a las condiciones presentes en determinados ambientes astrofísicos.

CP13

Towards a comprehensive view of planet formation: The role of the host star's metallicity

Jesús Maldonado, Eva Villaver, Carlos Eiroa

The role of the host star's metallicity in planet formation has been largely discussed in the framework of the so-called gas-giant/planet metallicity correlation. However, previous works are mainly focused on particular kinds of stars or planets. In this contribution we aim to put together all the pieces of the planet formation puzzle by analysing in the most homogeneous possible way a large sample of stars (without any restriction on spectral type or evolutionary status) showing all the possible outcomes of the planet formation process (from debris discs to massive brown dwarfs).

CP14

Exomoons in the habitable zones of M dwarfs

Héctor Martínez Rodríguez, José Antonio Caballero, Carlos Cifuentes

M dwarfs are the most abundant stars in the Milky Ways, and host the least massive exoplanets found with current technology. A few M dwarfs have been reported to be orbited by exoplanets in their habitable zone (HZ), the circumstellar region where a terrestrial planet can sustain liquid water on its surface. However, the discovered exoplanets, either super-Earths or mini-Neptunes, have an important constraint to habitability: they are tidally locked to their stars. Therefore, they have two very different hemispheres, one permanently illuminated and suffering from flaring activity typical in M dwarfs, the other in the dark side and completely frozen. Here, we compile the most updated list of M-dwarf exoplanet hosts and investigate the habitability of hypothetical moons around them. For that, we compute precise luminosities with the Virtual Observatory SED Analyzer and Gaia DR2, compute equilibrium and most-probable surface temperatures, determine conservative inner and outer boundaries of HZs, and discuss particular exoplanet-exomoon cases and its detectability.

CP15

Use of a QCMB to measure the diffusion coefficients and desorption of volatiles in ices of astrophysical interest

Carlos Millán Verdú, Ramón Luna Molina, Carmina Santonja Moltó, Miguel Ángel Satorre Aznar, Manuel Domingo Beltrán

En los últimos años se han presentado trabajos de medidas de coeficientes de difusión de moléculas de CO, HNCO, H_2CO y NH_3 (Mispelaer et al. 2013; Lauck et al. 2015) a través de la estructura porosa del agua. También en Cooke et al (2018) se ha estudiado la difusión y posterior desorción de la molécula de CO en hielo de CO_2. Estos estudios se han basado en la aplicación de la segunda ecuación de Fick, obteniendo la concentración de las moléculas difundidas a partir de la medida de la absorbancia integrada de bandas concretas de absorción en el infrarrojo. En el presente trabajo presentamos el desarrollo de un esquema experimental para medir dichos coeficientes a partir de la pérdida directa de masa del depósito, consistente en dos películas, la primera con el material más volátil y, sobre ésta, una segunda menos volátil dotada de estructura porosa. El experimento consiste en medir el espesor de las dos películas mediante interometría de doble láser (Satorre et al. 2008). La masa depositada se mide con una microbáscula de cuarzo (QCMB). Posteriormente se aumenta la temperatura de la muestra por medio de una resistencia ensamblada al portamuestras, hasta que el material más volátil alcance la temperatura a la que inicia el proceso de sublimación y transporte a través del hielo poroso. La pérdida de masa del portamuestra se mide con la QCMB. Con este sistema esperamos poder medir los coeficientes de difusión, las permeabilidades del hielo poroso, y esperamos poder discernir el tipo de flujo que tiene lugar.

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CP16

Caracterización de una tormenta de polvo en Marte con medidas in situ obtenidas por REMS en el Mars Science Laboratory y datos orbitales con MARCI/MRO

Iñaki Ordóñez Etxeberria, Ricardo Hueso, Agustín Sánchez Lavega

El instrumento REMS (Gómez-Elvira et al., 2012) en el rover Mars Science Laboratory (MSL) realiza mediciones diarias de parámetros meteorológicos de la atmósfera de Marte. Las mediciones a lo largo de más de dos años marcianos obtenidas en el cráter Gale en latitudes ecuatoriales han proporcionado una gran información sobre los ciclos estacionales y diarios de la atmósfera marciana y muestran fenómenos atmosféricos típicos de la atmósfera de Marte. Entre ellos la influencia sobre la presión atmosférica que tienen las grandes tormentas de polvo que se forman en el planeta y que pueden influir la señal de presión medida en Gale aún cuando la tormenta se forma a gran distancia de este cráter (Ordoñez-Etxeberria et al. 2018). En este trabajo analizamos los datos obtenidos por REMS en el transcurso de una tormenta local de polvo formada al norte del cráter y su disipación posterior cubriendo la región de Gale. Esta tormenta, acontecida en el sol 852 de la misión, es la más intensa que ha alcanzado hasta ahora la posición del rover MSL. El paso de la tormenta muestra una señal clara en el sensor de presión atmosférica, en las medidas de opacidad de polvo y en los sensores de temperatura de aire y humedad. Además analizamos imágenes de alta resolución espacial obtenidas por el instrumento MARCI (Bell et al., 2009) a bordo de la misión en órbita Mars Reconnaissance Orbiter (MRO) que captan en detalle el desarrollo de la tormenta y su dispersión posterior. Presentaremos una descripción global de esta tormenta en base a las imágenes orbitales y sus efectos en superficie medidos con REMS, así como un primer análisis de los resultados utilizando como referencia las predicciones climáticas del modelo Mars Climate Database (MCD, Forget et al., 1999).

CP17

Local heat flow and subsurface temperature in InSight landing-site

Laura M. Parro, Isabel Egea-Gonzalez, Laura M. Parro, Alberto Jiménez-Díaz, Federico Mansilla, Andrea Herrero-Gil, Javier Ruiz

In this work, we have investigated the local heat flow and the subsurface thermal state in the InSight landing site (Elysium Planitia), in preparation to exploit surface compositional and thermal data returned from this mission. Given that previous works have stated that local context influences the heat flow pattern, we have solved the three dimensional heat conduction equation by taking into account topography, crustal thickness and crustal thermal properties in Elysium Planitia. From the results of our model, we find that the surface heat flow is lower than the planetary average as a consequence of a thinner crust, which entails a lower heat production. Although lateral variation of temperature and surface heat flows are obtained in the simulation, lateral heat flow has a minor influence in our results because differences in topography are small in the studied area.

Additionally, we analyze how variations of thermal and compositional properties modify the thermal state of the region. Simulations indicate that temperature vary greatly with these properties. However, surface heat flow is not as affected as temperature because its value is very influenced by the heat production and the heat flow from the interior.

We have also preformed calculations by considering a top layer of megaregolith. Our results show an important reduction of surface heat flow for areas with thicker megaregolith due to the transfer of heat to the more conductive regions. Also, the insulating layer increases subsurface temperature dramatically compared to the case without a megaregolith layer. This effect is more important in thick megaregolith areas. Limitations in the range of plausible temperatures in the crust and the stagnant lid provide information about the thermal and mechanical crustal properties of the studied regions. Furthermore, results obtained in this work allow to define the impact of the different local properties on regional surface heat flow and will help to understand surface compositional and thermal data returned from the InSight mission.

CP18

Marte: Evolución térmica y estructura de su corteza

Laura M. Parro, Alberto Jiménez-Díaz, Isabel Egea-González, Federico Mansilla y Javier Ruiz

El estudio de un planeta como Marte, y su respectiva comparación con otros planetas rocosos, y en especial, con la Tierra, puede ser de gran ayuda para aumentar nuestro conocimiento sobre los planetas de este tipo y, por consiguiente, sus capacidades para albergar vida. Analizando su geología, superficie e interior, podemos descubrir una interesante y compleja historia evolutiva, así como describir su geodinámica y tectónica globales. En este sentido, el flujo térmico es un buen indicador de la geodinámica de un planeta, y es un parámetro fundamental para comprender la evolución térmica y, en general, la evolución interna de un cuerpo planetario.

En Marte el flujo térmico varia a lo largo de su superficie (y en el tiempo), dependiendo de la abundancia y distribución de los elementos productores de calor de la corteza y el manto, y del estado térmico del interior del planeta y su capacidad de disipar el calor. Es esencial, por tanto, obtener modelos de flujo térmico globales para caracterizar geográficamente esas variaciones en todo el planeta.

Recientemente, hemos modelizado el flujo térmico de Marte en la actualidad, a partir del escalado de estructuras geológicas actuales (la región del Polo Norte y Polo Sur), obteniendo modelos globales que nos describen el estado térmico del planeta hoy en día [1]. Nuestro siguiente paso en el estudio de la evolución térmica de la litosfera marciana será elaborar modelos de flujo térmico (globales o regionales) para diferentes épocas, teniendo en cuenta la evolución temporal de la producción de calor radiactivo, y siguiendo el procedimiento utilizado para el modelo de flujo térmico actual.

[1] Parro, L. M. et al., Sci. Rep. 7, 45629, 2017.

CP19

Dinámica del Sistema Planetario GJ 273

Francisco José Pozuelos Romero, Juan Carlos Suárez, Antonio Claret

El sistema planetario GJ 273 es uno de los sistemas múltiples más cercanos a nosotros conocido hasta ahora, a tan sólo 3.8 pc. Recientes estudios indican que tiene dos planetas tipo terrestre, uno de ellos en la zona de habitabilidad de su estrella. Ambos planetas tienen distancias heliocéntricas suficientemente pequeñas como para que las fuerzas de marea sean significativas, afectando así a diferentes parámetros como la oblicuidad, el periodo de rotación, y la excentricidad. Asímismo, debido a esta situación, las fuerzas de marea producen un calentamiento extra que debe ser tenido en cuenta a la hora de evaluar el potencial de habitabilidad de dichos planetas. Además, presentamos un detallado estudio de las posibles localizaciones de cuerpos menores como cometas y asteroides a través de mapas de estabilidad. Estos mapas nos permiten estudiar las resonancias existentes en el sistema e identificar diferentes estructuras ya conocidas en el Sistema Solar como son el Cinturón de Asteroides o el Cinturón de Kuiper.

CP20

Possible dike systems in Elysium Planitia (Mars); reducing the knowledge gap

Samuel Rivas Dorado, Javier Ruiz, Ignacio Romeo

Dikes are the main magma transport mechanism between the magmatic reservoirs in the lithosphere and the surface. They usually manifest as a myriad of radial and concentric linear intrusions around volcanic centers, and they play an essential role in internal planetary geodynamics, distributing fluids and heat. They are one of the least investigated, and thus least known, geological structures, both on Earth and other planetary bodies. On Mars, many authors have identified dikes in different zones of the planet, mostly around large volcanoes (Montesi, 2001; Pedersen et al., 2010, etc.) and in canyon walls exposures (Flahaut et al., 2011, etc.). However, being volcanism the planet´s dominant geological process through its history, many other areas are likely to show evidences of dikes. We have identified at least two possible dike systems in the low-lying plains (2600-2800m elevation) of northern Elysium Planitia as sets of long (up to several tens of kms), linear, positive-relief features in NW-SE and NE-SW directions, both in high-resolution (e.g., HiRISE -High Resolution Imaging Science Experiment-, at 0.26-0.5 m/pixel res.), and in large regional images (e.g., CTX -Context Imager-, at 6m/pixel res.). Detailed structural mapping of these possible dikes suggests that at least in some locations the NE-SW system post-dates the NW-SE set. Associated to them exist other structures which share all their features but their linearity, and thus do not fit into the general model of linear intrusions. We have compared these odd structures with terrestrial and Martian features such as lava tubes, glacial deposits, etc., but found no similarity between them. Therefore, we still interpret the whole set of observed structures as dikes, and provide a tentative explanation for their presence. We propose that they may be part of a large-scale Amazonian extensional system coeval with volcanic activity, which allowed for the intrusion of dikes up to the surface over an area greater than 2500 km^2, creating a large network of fractures which we observe today.

CP21

Detecting the RM effect in presence of stellar differential rotation

Luisa Maria Serrano, Mahmoudreza Oshagh, Susana Barros, Nuno Santos, et al.

In this work we aim at analyzing the detectability of the RM effect that can be spectroscopically observed with ESPRESSO precision, while an exoplanet transits a stellar disk characterized by differential rotation. As a first step we have modified the tool SOAP by substituting the description of the star as a rigid rotator with that of a differential rotator. Then, we have analyzed the effects of varying different parameters of the planet-star system on the RM curve, like the stellar inclination, the orbital inclination, the spin-orbit misalignment... Finally we have verified the limit we can reach with ESPRESSO in detecting the RM effect, considering observed planets and determining what happens if we change the differential rotation intensity.

CP22

Spectroscopic time series of activity indicators of the Barnard's Star

Borja Toledo-Padrón, Jonay I. González Hernández, Cristina Rodríguez-López, Paul Butler, Alejandro Suárez Mascareño, Rafael Rebolo López, Ignasi Ribas, Guillem Anglada-Escudé and the CARMENES consortium

The search of Earth-like planets around late-type stars using ultra-stable spectrographs requires a very precise characterization of the stellar activity and the magnetic cycle of the star, since these phenomena induce radial velocity signals that can be misinterpreted as planetary signals. Among the nearby stars, we have selected the Barnard Star (GJ699) to carry out a characterization of these phenomena using a set of spectroscopic data that covers about 14.5 years and comes from seven different spectrographs: HARPS, HARPS-N, CARMENES, HIRES, UVES, APF and PFS. We present here the measurements of different chromospheric activity indicators (Halpha, CaHK and NaID), as well as the FWHM of the cross-correlation function computed for a sub-set of the spectroscopic data. With these measurements, we have searched for periodic signals applying the Generalized Lomb-Scargle periodogram to all the time series. The analysis of the periodograms of the different activity indicators reveals that the rotation period of the star is about 150d, consistent with the expected rotation period according to the relatively low activity level of the star. We also find evidence of a long-term cycle of about 3700d that is consistent with previous estimates from photometric time series in other M stars of similar activity levels. The predicted activity-induced RV signal corresponding to this rotation period is ~0.6 m/s. The available photometric data of the star also support the detection of both the long-term and the rotation signals.

IS1

DEAVI: Dynamic Evolution Added Value Interface

José Manuel Blanco, Ignacio de la Calle, José María Herrera-Fernández, Aitor Ibarra, Jesús Salgado and Luis Valero-Martin

We present DEAVI, an Added Value Interface (AVI) to manage and exploit data from the ESA missions Gaia and Herschel. AVIs are software packages that provide scientists with the mechanisms to submit their own code to be executed close to the ESA mission archives. GAIA AVIs are deployed at the Gaia Added Value Interface Platform (GAVIP), a Python-based platform designed and developed by ESA and hosted at the European Space Astronomy Centre (ESAC). The proposed AVI is part of the software package been developed by Quasar Science Resources for the *"StarFormMapper (SFM): A Gaia and Herschel Study of the Density Distribution and Evolution of Young Massive Star Clusters"* project, funded by the European Union under the Horizon 2020 programme.

IS2

Reducing EMIR spectroscopic data with Python

Nicolás Cardiel

EMIR, the near-infrared camera and multi-object spectrograph operating in the spectral region from 0.9 to 2.5 microns, has been commissioned at the Nasmyth focus of the Gran Telescopio Canarias. One of the most outstanding capabilities of EMIR is its multi-object spectroscopic mode which, with the help of a robotic reconfigurable slit system, allows to take around 53 spectra simultaneously. This poster describes how important reduction steps, concerning image rectification and wavelength calibration, are performed with the help of PyEmir, the python code developed as part of the contribution of the Universidad Complutense de Madrid in this instrument.

IS3

What can VLBI do for your research? The EVN and JIVE

Francisco Colomer

Very Long Baseline Interferometry (VLBI) is providing key information to the study of processes in the Universe, in star formation regions and circumstellar envelopes around evolved stars, galactic structure and cosmology through precise astrometry, measuring magnetic fields, etc. The European VLBI Network (EVN) offers superb capabilities and, most importantly, support to users through JIVE, ensuring that the EVN research infrastructure is fully accessible and that the best science always emerges.

IS4

The WEAVE Core Processing System at CASU

J. Lewis, M. Irwin, C. Worley, D. Murphy, L. Peralta de Arriba, N. Walton

WEAVE es un nuevo espectrógrafo para el Telescopio William Herschel. Su primera luz, esperada para mediados de 2019, permitirá a este telescopio de 4,2 metros tanto realizar observaciones multi-objeto con 1000 fibras en un campo de visión de 2 grados, como el uso de una unidad de campo integral. Otra prestación relevante de este instrumento es que ofrecerá dos resoluciones distintas: R~5000 en el rango 370-1000nm, y R~20000 en un rango más limitado.

El procesado y el análisis de las observaciones realizadas con WEAVE serán llevados a cabo por una colaboración entre el Cambridge Astromical Survey Unit (CASU), el Instituto de Astrofísica de Canarias y el Telescopio Nazionale Galileo. En esta contribución se describirá la aportación realizada por el CASU: el "WEAVE Core Processing System", que incluye una utilidad de análisis en tiempo real de las exposiciones, comprobaciones básicas de control de calidad de las observaciones, la reducción de los datos y el seguimiento del progreso del cartografiado realizado con este instrumento.

IS5

Object classification in big astronomical surveys by self-oganizing maps. Application to the Alhambra survey

Minia Manteiga Outeiro, Marco Antonio Álvarez González, Daniel Garabato Míguez, Carlos Dafonte Vázquez, Angel Gómez García, Ana Ulla, Ruth Carballo

In the framework of Gaia survey Data Analysis and Processing Consortium (DPAC) we have developed GUASOM, a data mining tool designed for data classification and knowledge discovery in large astronomical spectrophotometric archives. Our tool is based on named Self-organizing maps (SOMs). SOMs are a type of unsupervised learning Artificial Neural Networks used to organize the information in clusters of objects, as homogeneously as possible according to their spectral energy distributions, and to project them onto a 2D grid where the data structure can be visualized. Each cluster has a representative, called prototype which is a virtual pattern that better represents or resembles the set of input patterns belonging to such a cluster. Prototypes make easier the task of determining the physical nature of the objects populating each cluster. Our algorithm performance has been tested on the Alhambra survey observations, where GUASOM provides a useful toolbox to study the data distribution and to discover neighborhood relationships.

IS6

The WEAVE Quick-Look GUI

L. Peralta de Arriba, J. Lewis, D. Murphy, M. Irwin

WEAVE es un nuevo espectrógrafo para el Telescopio William Herschel. Su primera luz, esperada para mediados de 2019, permitirá a este telescopio de 4,2 metros tanto realizar observaciones multi-objeto con 1000 fibras en un campo de visión de 2 grados, como el uso de una unidad de campo integral. Otra prestación relevante de este instrumento es que ofrecerá dos resoluciones distintas: R~5000 en el rango 370-1000nm, y R~20000 en un rango más limitado.

El espectrógrafo contará con una herramienta que permitirá una diagnóstico rápido de la calidad de las observaciones realizadas. Para ello, se realizará una reducción preliminar de los datos, que será mostrada para su análisis en tiempo real en la sala de control del telescopio. En esta contribución se describe la interfaz de usuario desarrollada para la visualización de esta reducción de datos preliminar.

IS7

Interaction of clouds and fog with the measure of Night Sky Brightness (in dark and not so dark locations)

Salvador José Ribas Rubio, Jordi Torra, Francesca Figueras and Ramon Canal-Domingo

Light emitted or reflected up to the sky can interact with clouds or fog changing Night Sky Brightness (NSB) evaluation in comparison with clear skies situation. So the evaluation of NSB in any place can be affected by this meteorological features and needs to be analyzed. To evaluate this effect is required to use a good set of data of NSB, in the case described data obtained with the Catalan Light Pollution Network (XCLCat) of Sky Quality Meters have been used.

The combination of NSB data with cloud coverage data is a critical step to evaluate this interaction. For this purpose, data of ceilometer devices have been used in combination to get completely independent information of this meteorological parameter. It is well known the effect in urban areas of increasing the NSB linked to the presence of clouds and fog. But just few studies have analyzed the situation in dark skies areas as astronomical observatories, so results of both cases in Catalonia sites will be discussed.

If it is well identified the effect of clouds and fog in NSB, it is possible to develop an inverse procedure to evaluate cloud coverage starting from simple NSB measurements and their evolution during the night. The definition of some possible parameters to determine the cloud coverage from NSB will be discussed and how this method could be applied in different locations and in different cloud coverage situations.

IS8

AsteroModelGenerator: Creating your asteroseismic models and publish them in the Virtual Observatory

José Ramón Rodón Ortiz, Juan Cárlos Suarez, Cárlos Rodrigo, Enrique Solano, Javier Pascual, Rafael Garrido

Context: In order to publish scientific content on platforms that help the scientific community is increasingly necessary to synthesize and organize information. Based this idea, in the field of astronomical research, the international initiative called Virtual Observatory (VO) was created. Currently, this platform is widely used by this scientific community. As a new project, the astronomical groups of the Instituto de Astrofísica de Andalucía (IAA-CSIC) and the University of Granada (UGR) together with Spanish VO have created a VO service called TOUCAN[1] that handles detailed and accurate information about asteroseismology theoretical models. TOUCAN provides tools for searching, obtaining (downloading) and representing result.
[1]. TOUCAN: A VO tool for asteroseismology. Scientic preparation and utilization of the PLATO mission.

Main goal: The tool is in the final phase of development and will soon be accessible by the scientific community. However, the generation of asteroseismic models on distributed platforms and their subsequent inclusion in the VO TOUCAN service is a very expensive process.

In order to address this, a tool called AsteroModelGenerator has been developed entirely in the python language. This tool allows the automatic generation upon request of a large number of models described by a user interface, using multiple computing platforms (especially dedicated heterogeneous servers) and subsequent publication in the VO TOUCAN service. This requires the creation not only large numbers of models, but also relational Data Bases and CVS files that have all the necessary information for TOUCAN.

Other goals: With this tool we create a fast and automatic process for the building of huge grids of models. The tool also performs the verification and quality control of data in order to publish in VO TOUCAN service. Thus, we achieve diffusion in the scientific community.

IS9

GRAVITY: Reaching out to SgrA* with VLTI

Gustavo Rodriguez-Coira, the GRAVITY collaboration

As one of the 2nd generation of interferometric instruments in VLTI, GRAVITY was installed at the end of 2015 and has been observing the Galactic Center since May 2016. With the goal to reach an accuracy of tens of micro arcseconds, it is able to perform the most precise astrometric measurement of SgrA* to date. The study of the physical origin of its changes of brigthness observed and the possibility to test General Relativity in the strong gravity regime are among its primary scientific goals. In the present talk, we present and discuss the techniques used to study Sgr A* with imaging and astrometric data.

FS1

SOPHISM: instrument simulation software

Julián Blanco Rodríguez, SO/PHI Team

SOPHISM is an instrument simulator coded in IDL, prepared to represent a wide variety of astronomical systems, including platform effects and post-acquisition software.

Developed originally for the PHI instrument of the Solar Orbiter mission, it is being prepared with enough flexibility to allow for representation of solar and nocturnal instrumentation in general, including polarization modulation, filtergraph and detector characterization, for example. It continues to be enhanced with new features and effects and it is already being adapted for simulations of new instruments, like the payload for the third SUNRISE flight, i.e. IMaX+, SUSI, SCIP. SOPHISM has already been used to analyse design options and test the limits of possible underperformances in PHI and it is showing first analyses for ImaX+.

We present the main characteristics of the simulator along with an example of its flexibility to represent night instrumentation and an illustration of its use for testing instrument options.

FS2

Alfven Waves in a partially ionized two-fluid plasma

Marc Carbonell Huguet, R. Soler, J. L. Ballester, J. Terradas

We study Alfven waves in a partially ionized plasma from the theoretical point of view using the two-fluid description. We consider the plasma is composed of an ion-electron fluid and a neutral fluid, interacting by particle collisions. We take the neutral-ion collision frequency and the ionization degree as free parameters. First, we perform a normal mode analysis. We find the modification due to neutral-ion collisions of the wave frequencies and study the temporal and spatial attenuation of the waves. In addition, we discuss the presence of cutoff values of the wavelength that constrain the existence of oscillatory standing waves in weakly ionized plasmas. Later, we go beyond the normal mode approach and solve the initial-value problem in order to study the time-dependent evolution of the wave perturbations in the two fluids. An application to Alfven waves in the low solar atmospheric plasma is performed and the implication of partial ionization for the energy flux is discussed.

ED1

El proyecto "Chicas en el Museo": promoviendo la igualdad de género en la ciencia en espacios de educación no-formal

Sandra Benítez Herrera, Patricia Spinelli, Ana Paula Germano

Un estudio publicado en 2015 por la UNESCO, muestra que la media mundial de investigadoras mujeres en ciencia y tecnología es 28%. Otras investigaciones apuntan que desde pequeñas las niñas aprenden a infravalorar su género y comienzan a alejarse de los juegos asociados con una mayor inteligencia. Además, la escuela, la familia y los medios de comunicación reproducen la segregación y los estereotipos de género relacionados con las capacidades intelectuales de las mujeres. Considerando que la ciencia debe ser usada en beneficio de todos, si excluimos a las mujeres del proceso de producción del conocimiento científico, estamos perdiendo el 50% del talento para la ciencia.

El proyecto "Chicas en el Museo" del Museo de Astronomía y Ciencias Afines de Río de Janeiro (Brasil), realizado desde julio de 2016 a diciembre de 2017, ofreció formación continuada en Astronomía y otras áreas científicas a chicas estudiantes de educación secundaria. El objetivo era estimular su interés por la ciencia y orientarlas en la elección de su futura carrera profesional.

Paralelamente, se realizaron una investigación para evaluar las diferentes etapas del proyecto y un seguimiento de las actitudes y opiniones de las participantes respecto de la ciencia, incluyendo la autopercepción de sus capacidades antes y después del proyecto.

Al término del mismo, se constata que las participantes consideran la ciencia como un área más cercana, en la que desean participar activamente y ante la cual no se sienten intimidadas como al principio. Además, sienten más confianza para explicar sobre ciencia a familiares y amigos, actuando de esa forma como mediadoras del conocimiento científico.

Los resultados muestran que este tipo de proyectos contribuyen al proceso de empoderamiento de las niñas en la ciencia, así como en la deconstrucción de premisas socio-culturales respecto de la presencia femenina en las carreras científicas.

ED2

Studying Astronomy in Portugal and the IA, the best choice for your future career

Fernando Buitrago, José Afonso

When Spanish students (and not only those) consider possible places where to study Astronomy in the Iberian peninsula, many of them overlook Portugal as an interesting destination. Both the University of Lisbon and the University of Porto offer high quality university degrees in Astronomy. Moreover, the Institute of Astrophysics and Space Sciences (IA) links in a single institute researchers from both institutions, making it one of the best places for interacting and learning from top astronomers in many different areas (Solar System and Exoplanets, Stars, Galaxies and Cosmology, Instrumentation). Additionally, a number of PhD positions are offered every year. With so many good things going on… why don't you join us?

ED3

ESO opportunities for early career scientists

Jesús M. Corral-Santana, C. Harrison, F. A. Battaia on behalf of the ESO Science Ambassador project

The European Southern Observatory (ESO) is the pre-eminent intergovernmental science and technology organisation in astronomy. In addition to designing, building and maintaining world-leading astronomical facilities, ESO hosts a vibrant scientific community. There are over 100 active astronomers spread across the offices in Garching (Munich, Germany) and Santiago (Chile). The research covers all areas of astronomy from small-bodies in the solar system to cosmology. ESO offers several exciting opportunities for early career astronomers to become part of this community and enhance their scientific prospects. Undergraduate students can participate in short term internships. PhD students can undertake 1-2 years of their programme at ESO under the competitive studentship programme, or their whole PhD through the IMPRS scheme. ESO ́s prestigious Fellowship programme offers 3 years (Garching) or 4 years (Chile) of fully-funded independent research. In addition to the research, all of these opportunities enable the scientist to engage in observatory activities such as observing, instrument support and outreach (at the new Supernova Visitor Centre and Planetarium). This poster summarises these opportunities.

ED4

Los observatorios de la iniciativa CESAR

Abel de Burgos Sierra, Michel Breitfellner et al.

CESAR (Cooperation through Education in Science and Astronomy Research) es un programa educativo perteneciente a la Agencia Espacial Europea (ESA), que pretende proporcionar a los estudiantes europeos experiencia práctica en investigación astronómica, en particular en los campos de las ciencias del espacio, la astronomía óptica y la radioastronomía. Para ello, contamos con una infraestructura basada principalmente en observatorios semi-automatizados y antenas, que observan tanto de día como de noche. En esta contribución se quiere dar a conocer estos observatorios completamente dedicados a educación y presentar los resultados alcanzados hasta el momento.

ED5

Graffiti para Henrietta Leavitt. Murales de arte callejero en los municipios tinerfeños de Tacoronte y La Laguna

Carmen Del Puerto Varela, UC3 IAC

El proyecto "El regreso de Henrietta Leavitt: de la escuela a la carrera investigadora pasando por el teatro", del Instituto de Astrofísica de Canarias (IAC) y la FECYT, incluía la propuesta de difusión del mismo a través de murales de arte callejero (más conocido, aunque impropio, como graffiti) en el entorno urbano, al tiempo que se rendía homenaje al papel de las mujeres en ciencia, representadas en esta ocasión por la astrónoma estadounidense Henrietta Leavitt.

Para ello se contó con dos murales sobre esta astrónoma estadounidense realizados por el artista Matías Mata, de "Sabotaje al Montaje", y con la colaboración del Vicerrectorado de Infraestructuras y Servicios y el Decanato de la Facultad de Ciencias de Universidad de La Laguna (ULL), así como con la Concejalía de Cultura del Ayuntamiento de Ciudad de Tacoronte.
Los murales pueden contemplarse desde octubre de 2017 en el aparcamiento de la Facultad de Ciencias de la ULL y junto al Auditorio Municipal Capitol de Tacoronte.

Además se hizo una campaña en las redes sociales, invitando sobre todo en Instagram y Twitter a descubrir a Henrietta Leavitt con el hashtag #Astrónomaoculta, a localizarla en Tenerife (en referencia a los murales callejeros con su imagen) y a hacerse un selfie con ella Leavitt.
En este póster se muestra el proceso y el resultado final de esta actividad, con dos grandes murales de arte callejero que tuvieron su presentación pública en los municipios tinerfeños de Tacoronte y La Laguna.

ED6

Nixnox

Lucía García Sánchez-Carnerero, Jaime Zamorano, Jesús Gallego, Nicolás Cardiel, Francisco Ocaña, Alejandro Sánchez de Miguel, Carlos Tapia

Los lugares donde disfrutar de cielos oscuros que permitan observar la bóveda celeste en todo su esplendor están desapareciendo como consecuencia del aumento de la contaminación lumínica.

El proyecto Nixnox promueve un esfuerzo común entre asociaciones de astrónomos aficionados y profesionales para localizar y caracterizar el cielo nocturno de diversos parajes de fácil acceso, desde donde contemplar el firmamento.

Realizar medidas precisas del brillo de fondo de cielo midiendo estrellas de magnitudes conocidas con un telescopio y una cámara CCD es un proceso laborioso, que exige mucho tiempo y conlleva un pesado análisis de datos. Este es el motivo por el que nosotros proponemos tomar las medidas con fotómetros de mano sencillos, como el Sky Quality Meter (SQM) y el Telescope Encoder and Sky Sensor (TESS), en noches despejadas y sin luna.

No se trata de simples medidas cenitales. Se están tomando datos para alturas sobre el horizonte de 20, 40, 60 y 80 grados, así como en doce acimutes espaciados 30 grados empezando desde el sur y continuando hacia el oeste. Esto permite a los profesionales construir mapas de brillo de cielo que muestran de forma rápida e intuitiva la información sobre la situación de las fuentes de contaminación lumínica cercanas.

La iniciativa, cuenta ya con más de 130 fichas en las que se ofrece información sobre el lugar, con indicaciones de acceso y fotografías panorámicas tanto diurnas como nocturnas, que permiten hacerse una idea del horizonte antes de visitar el lugar. Todo el trabajo se presenta en una página web de acceso libre con la que se trata de animar a la sociedad a disfrutar de estos espacios e incentivar a las administraciones públicas a valorarlos y preservarlos.

ED7

Observando el movimiento de los satélites principales de Saturno, Urano y Neptuno: una práctica de astrodinámica

J. Hernández-Bernal, A. Sánchez-Lavega , V. Almendros , I. Ochoa, A. Ormaechea, T. del Río-Gaztelurrutia

Presentamos un estudio del movimiento de los satélites principales de Saturno (Mimas, Encélado, Tetis, Dione, Rea, Titán, Hiperión, Japetus), Urano (Miranda, Ariel, Umbriel, Titania y Oberón) y Neptuno (Tritón) basado en imágenes tomadas con un telescopio Celestrón 11 (diámetro 28 cm) del Aula EspaZio Gela [1] a lo largo de varias campañas (2014-2017), con el fin de calcular los parámetros básicos de sus órbitas y estudiar el fenómeno de la resonancia gravitatoria en el caso de Saturno. Describimos la técnica de observación y análisis de las imágenes, así como la metodología seguida e incertidumbres resultantes a la hora de obtener dichos parámetros. El estudio se presenta como una práctica docente del Máster en Ciencia y Tecnología Espacial de la UPV/EHU [2], y se suma a otra serie de prácticas semejantes con los satélites Galileanos realizadas por los alumnos [3-5].

[1] Aula EspaZio Gela webpage, http://www.ehu.eus/aula-espazio/
[2] A. Sánchez-Lavega, S. Pérez-Hoyos, R. Hueso, T. del Río-Gaztelurrutia, A. Oleaga, “The Aula EspaZio Gela and the Master of Space Science & Technology in the Universidad del País Vasco (University of the Basque Country)”, Eur. J. Eng. Edu., 39, 518-526 (2014).
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ED8

"Euphoria" Under the shadow

Óscar Martín Mesonero

En este póster se narra la experiencia de observación de eclipses totales de Sol durante 12 años en China, Australia, Islas Molucas (indonesia), Kenia, EEUU… y muestra las aportaciones que los aficionados a la astronomía pueden hacer al estudio de los eclipses de Sol. Muestra también un avance del próximo eclipse de Sol que podremos ver desde España.

ED9

Observatorio Astronómico de la UAM: Proceso de rehabilitación

Iker Millán Irigoyen, Asier Castrillo Varona, Nuria Matey, Raul Contreras, Yago Ascasibar Sequeiros,Marina Rodriguez-Baras, Sandra Zamora Arenal, Ivana Dominguez, Pablo Corcho Caballero, Rosa Mª Mérida González

Durante los últimos tres años se ha realizado la rehabilitación del Observatorio Astronómico de la UAM. Desde su construcción en 1989 el observatorio fue una importante estructura de formación y divulgación, hasta que en el año 2005 se cerró el acceso por decisiones administrativas. Diez años más tarde, en 2015, comenzaron las labores de rehabilitación del observatorio, Implementando diferentes mejoras en los diferentes equipos: instalación del sistema óptico, motorización y colimación del Telescopio Jerónimo Muñoz de 50 cm de diámetro, así como el acondicionamiento de la terraza de observación y la cúpula del observatorio, puesta apunto y renovación de los telescopios auxiliares y la instrumentación de toma de datos.

ED10

Exposición “Un tros de cel” (“Trozo de cielo”)

Cristina Negro, Mónica Pallardó, María Jesús Moya, Amelia Ortiz Gil

El proyecto "Un tros de cel" ("Un trozo de cielo") consiste en una exposición de recipientes transparentes en cuyo interior se ha recreado la superficie de diferentes planetas y lunas de nuestro Sistema Solar. Está dirigido principalmente a escolares de primaria y secundaria que visitan el Observatorio Astronómico de la Universidad de Valencia dentro del proyecto del "Aula del Cel" (Aula del Cielo).

En primer lugar, se buscó información sobre la composición de las superficies de diez planetas y lunas para, posteriormente, reproducirlos en cada uno de los recipientes utilizando materiales semejantes en composición y proporción a los reales, dentro de lo posible. Para simular las atmósferas de los planetas gaseosos utilizamos recipientes herméticos con humo de colores producido con bombas de humo.

Los alumnos pueden ver, tocar y oler en cada recipiente un "trocito" de planeta o luna, experimentando en sus propias manos "un tros de cel" ("trozo de cielo”).

Esta exposición contribuirá a que los alumnos conozcan mejor nuestro Sistema Solar y que lo vean como algo más cercano, real y familiar.
Se pueden realizar diferentes actividades con la exposición, como identificar a qué planeta corresponde cada recipiente y viceversa, a partir de unos datos básicos iniciales.

ED11

Nuevas estrategias para la enseñanza de la Astronomía en la Educación Secundaria Obligatoria

Pere L. Pallé, Laureen Vanessa Pérez Pinto, Adán Manuel Yanes Gómez, Alejandro José Hernández González, Antonio Eff-Darwich Peña

Desde el Departamento de Didácticas Específicas de la Universidad de La Laguna y el Instituto de Astrofísica de Canarias estamos desarrollando y aplicando diversas estrategias y metodologías de enseñanza-aprendizaje acerca de conceptos astronómicos, aplicables a la Enseñanza Secundaria Obligatoria (ESO), particularmente al primer y segundo curso.

Entre los objetivos de esta serie de estrategias, cabe destacar, por una parte, el diseño de actividades y talleres que permitan fomentar en el alumnado ciertas actitudes como la indagación, la reflexión sobre lo observado, la valoración sobre la fiabilidad y objetividad de la información procedente de Internet, así como la compresión e interacción con el mundo que les rodea. Por otra parte, nos fijamos como objetivo el análisis de la organización física del aula y la forma de interacción profesor-alumno como formas de hacer aflorar la emoción como motor del proceso enseñanza-aprendizaje.

Y, finalmente, destacar el estudio pormenorizado del currículum oficial para poder encontrar oportunidades donde la Astronomía, sus resultados y sus métodos puedan servir para cubrir objetivos didácticos y criterios evaluativos. Como ejemplo de estas estrategias, se presentan tres acciones: un taller de búsqueda de agua en Marte; el “Agora”, una estrategia de organización del aula y el análisis preliminar del Sol como recurso didáctico en la ESO.

ED12

Resultados del taller “¿Y si Kepler hubiera sido del Atleti?”

Pere L. Pallé, Antonio Eff-Darwich Peña, Alfred Rosenberg González, Alejandro José Hernández González, Adán Manuel Yanes Gómez, Laureen Vanessa Pérez Pinto

Presentamos los resultados del proyecto financiado por la Sociedad Española de Astronomía ¿y si Kepler hubiera sido del Atleti? Consiste en un taller, orientado a alumnos de los últimos cursos de Educación Primaria y Educación Secundaria, en el que se explica la historia del modelo heliocéntrico. El taller reproduce el método de trabajo utilizado por Kepler, pero usando como observaciones, las posiciones de La Tierra, Marte y el Sol en momentos importantes de la historia del club de fútbol Atlético de Madrid. La elección de la temática futbolística responde a la premisa de enganchar y promover la curiosidad del alumnado participante en esta actividad. En definitiva, repasamos uno de los grandes momentos de la historia de la ciencia, enfatizando la importancia de la capacidad de observación y análisis de datos (matemáticas, geometría, cálculo...) en el método científico.

ED13

When Future Scientists Communicate Science

João Retrê, José Afonso, Rui Agostinho, Sérgio Pereira

There is a need for a growing number of motivated people who are able to create a bridge between scientific research and the public, with a strong scientific component and communication skills. Investing and developing these characteristics in science students and future researchers is essential.

This contribution addresses a successful, low budget, informal education programme in astronomy that makes use of the practice of science communication as a way to enhance formal science education, stimulate the development of communication skills, and emphasise the importance of science communication in the context of scientific research.

Having initially been designed for students in the first cycle of higher education, currently the programme also includes high school students, as well as MSc and PhD students.

The programme consists of training aimed at students and their involvement in science communication events. In this format, they receive monthly training given voluntarily by researchers in astronomy and astrophysics, as well as by science communication professionals.

The knowledge acquired by the students is actively put into practice in periodic public outreach activities, where they have an active role in organising events, interacting with the public and communicating scientific knowledge.

The project began in 2009 with 14 students from the Physics course of the Faculty of Sciences of the University of Lisbon. Eight years later, it has the participation of 70 students from different areas of knowledge, colleges and universities. With an average enrollment of 2 students per month, it became self-sustained, with more than 300 students that already participated in the programme.

This presentation will cover the resources and methodologies applied, framed in a temporal evolution, that led this programme to gain the current dimension. It will be evaluated the relevance of this programme to build a community of young scientists supporting the outreach of the institution, and also to nurture a culture of science communication in the research community.

ED14

Observatorio Astronómico de la UAM: Impacto social de actividades

Marina Rodríguez Baras, Ivana Quiroz, Asier Castrillo, Sandra Zamora, Iker Millán, Yago Ascasibar, Pablo Corcho, Rosa Mª Mérida, Nuria Matey, Raúl Contreras, Ángeles I. Díaz

El Observatorio Astronómico de la Universidad Autónoma de Madrid (UAM) se encuentra en la Facultad de Ciencias. Está constituido por una sala de informática, para simulación numérica y reducción de datos observacionales, y una cúpula de 5 metros que alberga el Telescopio Jerónimo Muñoz (TJM).

En este póster se presentan los resultados de la campaña de divulgación científica que se ha llevado a cabo. Se han organizado múltiples eventos presenciales como: Noches Abiertas, dirigidas a todo tipo de público; visitas especializadas de asociaciones de aficionados, como sesiones de astrofotografía; y otros eventos anuales preestablecidos, como las Jornadas Astronómicas Anuales de la UAM. Actualmente se han incluido visitas para Centros Educativos (primaria, secundaria, adultos y personas con diversidad funcional) con observaciones diurnas/nocturnas y diversas charlas y talleres. También se han creado diferentes medios digitales para la comunicación científica orientados a diferentes perfiles y edades. Durante nuestra labor se han recopilado datos de carácter voluntario como edad, disposición geográfica y género de los visitantes. A su vez, se han realizado encuestas con el fin de analizar la calidad del servicio y la opinión objetiva del público. Se presentan las estadísticas de los parámetros estudiados y las conclusiones obtenidas acerca del perfil de los participantes, el interés despertado y el impacto conseguido.

ED15

Radio-astronomy projects for university students

José Sabater

The recent availability of cheap Software Defined Radio (SDR) receivers makes possible the exploration of new aspects of radio-astronomy in a practical and inexpensive way. The SDR is one of the base technologies of upcoming data intensive radio-telescopes, like the Square Kilometre Array (SKA). We are currently building a radio station, based on general use SDR receivers, at the Royal Observatory of Edinburgh. Our main aim is to develop innovative projects for the training of students in the new radio data intensive techniques. The projects range from the measurement of Milky Way atomic gas to the detection of pulsars. In this poster we present an overview of the observatory and the projects under development and show how it can be used to train students in the new aspects of astronomical research.

ED16

Inclusión de aspectos docentes de la astronomía en grados científico-técnicos. Casos de estudio y ejemplo

Ana Ulla Miguel, Carlos Dafonte Vázquez, Ruth Carballo Fidalgo, Minia Manteiga Outeiro

La astronomía supone una herramienta docente de gran alcance, en tanto que aporta una visión realista y muy ilustrativa sobre el funcionamiento del universo. Complementada con el uso de las leyes de la física y las matemáticas, ayuda a comprender desde un punto de vista científico-técnico muchas situaciones, procesos y fenómenos de la vida diaria u otros a todas las escalas, desde las subatómicas a las cosmológicas.

En esta contribución presentaremos varios casos representativos de la inclusión del conocimiento astronómico como parte de la metodología docente diaria en estudios de grado cuya temática principal no es la astronomía en sí, junto con algunas reflexiones sobre los resultados obtenidos con tales prácticas.