Research activities of the Spanish Network for Gaia Science Exploitation (REG)
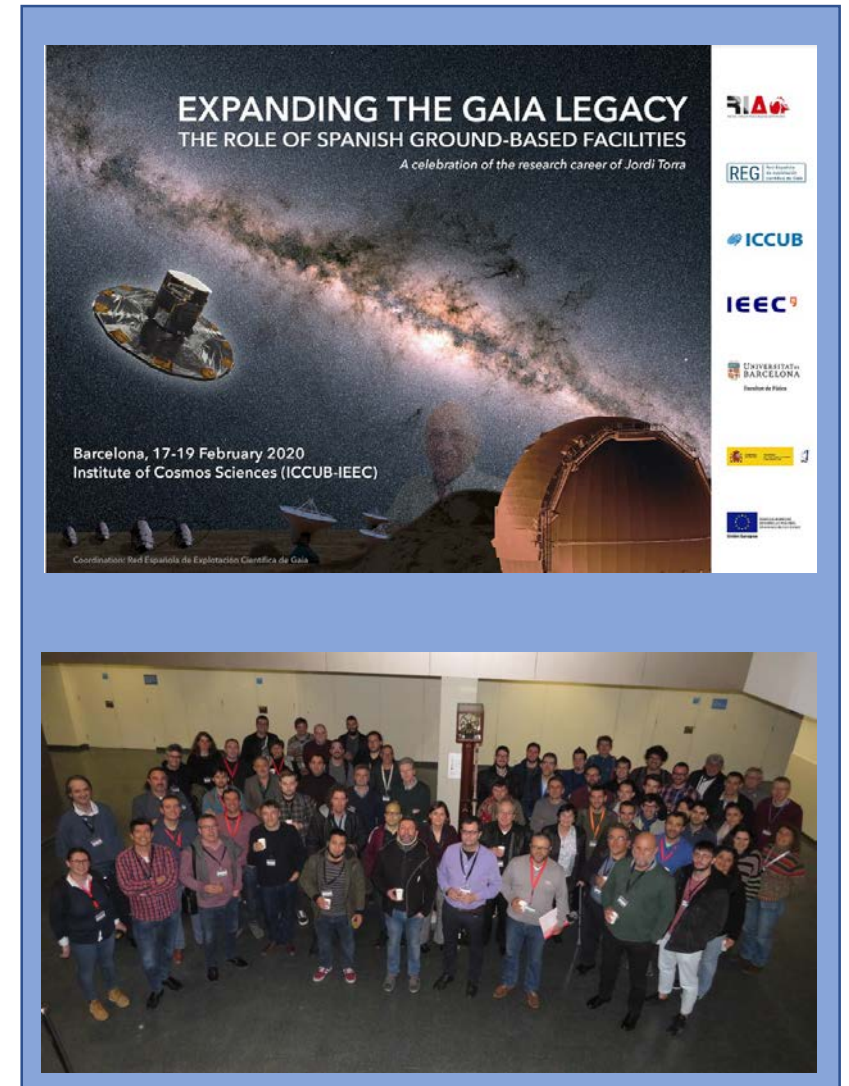
F. Figueras[1], X. Luri[1] and C. Jordi[1] on behalf of the REG Executive Committee and Gaia-UB team.

1. *Institut de Ciències del Cosmos (ICCUB), Universitat de Barcelona (IEEC-UB) Barcelona, Spain.*

REG webpage: https://gaia.ub.edu/twiki/do/view/RecGaia

*The "**Red Española de Explotación Científica de Gaia**" (REG), funded through the MCIN and consolidated after 10 years of operation, continues supporting ongoing projects for the exploitation of Gaia data and promoting the creation of joint research activities among its **more than 180 members**. Here we describe both, the collective activities completed up to now, and the joint effort supporting the preparation of the new Gaia DR3 data release (Q4-2020 and H2-2021). Present and future actions to contribute to the Gaia on-ground follow-up are described together with the Spanish participation in the EU-COST-GREAT Action networking.*

Gaia / REG / GREAT-COST Timeline

|	
18 mar 2010	**Foundation of the REG**
19 dec 2013	Gaia launch
25 jul 2014	Start of nominal mission
14 set 2016	Gaia data DR1 release
25 apr 2018	Gaia data DR2 release
19 jul 2019	Start of extended mission 2019-2020
19 mar 2019	MW EU COST Action: 4-year period 4/2019-3/2023
14 jan 2020	COST WG1 Milky Way School on Galaxy formation and high performance computing (Barcelona)
17 feb 2020	**VI REG meeting: Expanding the Gaia legacy, the Role of Spanish Ground-based Facilities**
Q4-2020	Gaia data eDR3 release
7-8 jul 2020	ESA SPC: Decision on extension 2021-2022 Expected indicative confirmation for 2023-2025
Q4-2020	COST WG5: Breaking Barriers: Inspiring the Next Generation (Santiago de Compostela)
H2-2021	Gaia data DR3 release
	Full release for nominal mission https://www.cosmos.esa.int/web/gaia/release

EXPANDING THE GAIA LEGACY
THE ROLE OF SPANISH GROUND-BASED FACILITIES
A celebration of the research career of Jordi Torra

Barcelona, 17-19 February 2020
Institute of Cosmos Sciences (ICCUB-IEEC)

Gaia mission numbers

CURRENT DATE AND TIME	2020-07-05T18:11:34 (TCB)
MISSION STATUS	
Satellite distance from Earth (in km)	1,513,141
Number of days having passed since 25 July 2014	2172
Number of days in mission extension	355
OPERATIONS DATA (collected since 2014/07/25)	
Volume of science data collected (in GB)	80,889
Number of object transits through the focal plane	153,375,851,609
Number of astrometric CCD measurements	1,511,847,680,140
Number of photometric CCD measurements	305,152,006,510
Number of spectroscopic CCD measurements	29,887,255,965
Number of object transits through the RVS instrument	10,016,395,857

1.8 trillion CCD measurements
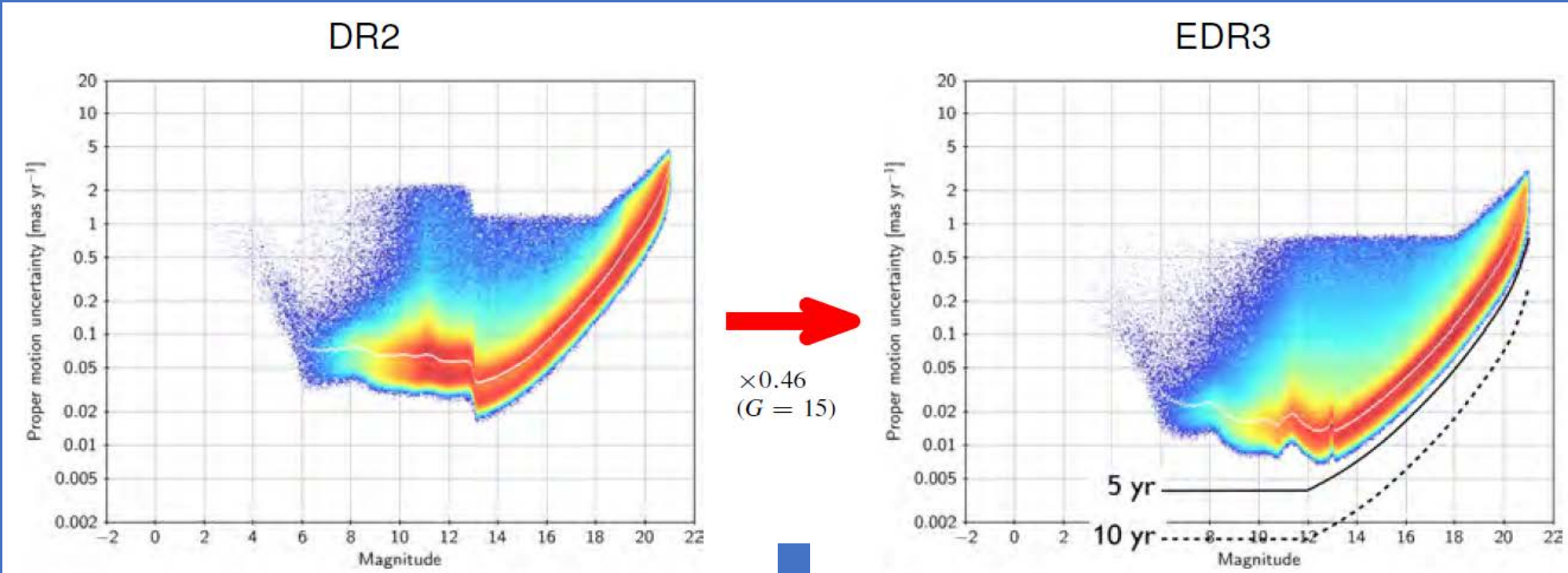**300 billion spectrophotometric measurements**
29 billion spectra

Gaia archive: queries received per month
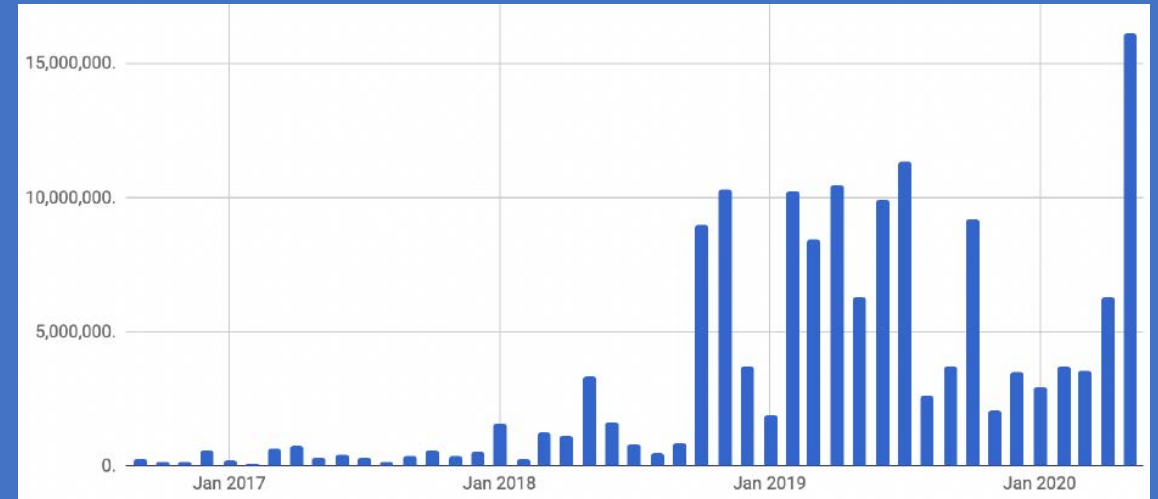
>15 million queries per month
In total 3646 refereed papers from Gaia,
more than 4 a day

Gaia eDR3 (Q4-2020, 34 month of input data)

Actual astrometric uncertainties in DR2 and eDR3

×0.46 (G = 15)

Parallaxes uncertainties improve by 20 per cent, proper motions factor 2 more precise

Subject to successful processing and validation, Courtesy: A. Brown, EAS June 2020

Instrument & Big Data

Making the most of Gaia Raw Data:
Sub-pixellic CrossMatch of
Gaia Observations.

Describing a dual space transformation as a preprocess to cluster observations with large error in one direction.

Expanding Big Data mining for Astronomy

R. Mor and X. Luri on behalf of the Gaia UB team

A Gaia map of the natural sky brightness

J. Ribas[3]

Transient characterization using the Virtual Observatory

SVO

³Parc Astronòmic Montsec-Ferrocarrils de la Generalitat de Catalunya

Contact: emasana@fqa.ub.edu

On-ground spectroscopic surveys

A WEAVE-Cygnus HR: an exploration of Cygnus-X

IGAPS: the merged IPHAS and UVEX optical surveys

of the northern Galactic plane

GALANTE: photometric survey of O+B+WR stars in the Galactic Plane

White dwarfs in the
Javalambre Photometric Local Universe Survey

+PLUS

The IACOB project: searching for empirical signatures of binarity in fast-rotating Galactic O stars and B supergiants.

WEAVE:
THE YOUNG STARS PIPELINE

MONOS:
MULTIPLICITY OF NORTHERN
O-TYPE SPECTROSCOPIC
SYSTEMS

The *Gran Telescopio Canarias OSIRIS* Broad Band First Data Release

Gaia Science Exploitation

Cataloguing new high-mass Pre-Main Sequence and Classical Be stars using Machine Learning and Gaia

The Galactic white dwarf population as seen by Gaia-DR2 and the Virtual Observatory

(Big) Data mining Gaia DR2 to study the Galactic open cluster population

Dissecting the Galactic bar using Gaia observables and statistical techniques

Clusterix 2.0: a virtual observatory tool to estimate cluster membership probability

Gaia mission data reveals a re-ignition of star formation in the Milky Way's disc about 5 billion years ago

The complex lives of Open Clusters: Extended halo of NGC 2682 (M 67)

Probing the precessing bar model for the Galactic warp origin

The recurrent impact of the Sagittarius dwarf on the Milky Way star formation history

Kinematics of M dwarfs in the CARMENES input catalogue

Uncovering the birth of the Milky Way through accurate stellar ages with Gaia

Clustering properties of Herbig Ae/Be stars -- CEREAL

The Halo-Disc dynamical coupling
Gaia blind detection of the Monoceros and ACS structures

Binary Stars in Planetary Nebulae with Gaia DR2

STRUCTURE OF THE OUTER GALACTIC DISK WITH GAIA DR2

Status of the OCCASO survey for the analysis of the chemistry of the Galactic disc

Dynamical traceback age of the β Pictoris moving group

Reanalysing the Galactic open-cluster population in light of Gaia DR2

Chemical abundances of s- and r-process elements in the Solar Vicinity

Wide companions to M and L subdwarfs with Gaia DR2 and the Virtual Observatory