INSTITUTO DE ASTROFÍSICA DE ANDALUCÍA

EXCELENCIA SEVERO OCHOA

CSIC

2023
Annual report

The **IAA-CSIC 2023 Annual Report** is the result of a collective process of the people who make up the Instituto de Astrofísica de Andalucía. We would like to thank all of them for their dedication and willingness to capture the best possible picture of what we do and what we work for.

1st Edition: october 2024

Editor: IAA-CSIC
Coordinators: José Francisco Gómez & Isabel Márquez
Design: Tarma, estudio gráfico
Cover image: Artist's conception of the NIRS3 outburst.
Credit: R. Fedriani (IAA-CSIC) and J. Pizarro
Printing: Lozano impresores
Legal dep.: Gr-1832-2021

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Index

Foreword

Antxon Alberdi
Director IAA-CSIC

Isabel Márquez
Scientific Director SO-IAA Project

On the following pages you will find an overview of our activities in 2023, a good year in the IAA life. **We started with our new second Severo Ochoa Award that covers the period 2023-2026**. A number of new activities were initiated, that will be detailed in this report. Besides that, the Director of the SO-IAA Strategic Project –Isabel Márquez– became the Vicepresident of the SOMMa Alliance. Congratulations Isabel!

We received the visit of the External Scientific Advisory Board (ESAB), which was very valuable. We organised it according to the suggestions of the previous evaluation, with a detailed report sent to the ESAB before their visit, a number of scientific talks reflecting the activities performed at the IAA in 2020-2023, including what we consider the scientific and technical highlights, and with a lot of time for interaction with the different IAA Collectives, including predocs, postdocs, technical and scientific staff and the administration personnel. Let me remark some of the most important messages left by the ESAB Committee:

"ESAB members greatly appreciate the work that went into preparing for our visit, the frank, informative and detailed discussions we had with various groups and individuals at the Institute, and the care that the management and administrative support put into organising the visit. These efforts, the written report and the high quality presentations made during our visit gave us a clear picture of relevant aspects of IAA science, its staffing situation, recent achievements and plans. We also had a clear view of the relevance of the Severo Ochoa Programme, its impact on the Institute since its implementation in July 2018, and its recent renewal to be implemented in the coming years (...)

Building on its proven high quality research and technology activities in the area of astrophysics and space science, the IAA is in a privileged position to exploit and identify new challenges for the coming years, which will consolidate it as highly competitive for national and international calls for excellence. We thank all the members of the IAA and especially the CSIC for a very informative and interesting visit."

This message has increased our enthusiasm for a better IAA that faces new challenges. ESAB's advice was very valuable to the IAA. They have made two visits to the IAA, in 2020 and 2023, and produced two thor-

Prof. Reinhard Genzel, Nobel Laureate in Physics 2020, gave an outreach talk at the Science Park, organised by the IAA-CSIC

ESAB meeting

ough, very useful reports. Now half of the committee is being renewed. This is a good opportunity to thank ESAB for their work.

On 13 April 2023, JUICE, the European Space Agency (ESA) mission to study the icy moons of Jupiter, was launched. The IAA-CSIC participates in two of the mission's instruments, the GALA laser altimeter and the JANUS camera, which will work in a complementary way to study the surface and interior of the satellites. At the time of writing this foreword, in the summer 2024, Juice will return close to the Earth in its first Juice's lunar-Earth flyby. It will be the first-ever lunar-Earth flyby, and the first-ever double gravity assist manoeuvre. It will change Juice's speed and direction to alter its course through space.

We organised **a large number of relevant scientific workshops on different scientific topics**: the Cherenkov Telescope Array Observatory General Meeting; the "Galactic Centre 2023 Workshop" with the presence of Prof. Reinhard Genzel, Nobel Laureate in Physics 2020; a series of meetings under the auspices of the RIA ("VI Meeting of AGN Research in Spain in the Era of the New Observatories", "VIII Reunión Española de Física Solar y Heliosférica: 25 años de física solar en Granada"), the "20th Electromagnetic and Light Scattering Conference" or the "Quantum Field Theory in Curved Spacetimes Workshop II". Also in the area of "Scientific Culture", we organised two exceptional events: the "Congreso de Comunicación Social de la Ciencia", where we were responsible for the LOC, and the "100 X Ciencia 7" workshop within the SOMMa Alliance, with the motto "Seven questions that will change the world". Finally, within the framework of the Spanish Presidency of the European Community, we organised the "Meeting on Light Pollution: Challenges and Responses for Monitoring it", with representatives from all the sectors involved in this issue.

Some figures on IAA activities in 2023: the IAA published more than one paper per day (386 SCI papers). The total budget of the IAA reached almost 17 Meuros, of which more than 50% came from competitive funding. More than 7.4 Meuros of new projects were obtained in competitive calls. I would like to mention the coordination by the IAA of the "Complementary Plan of Astrophysics and High Energy Physics" in Andalusia, linked to the "Recovery and Resilience Funds" of the European Community. The main objective of this proposal is to achieve a qualitative leap in Spanish participation in the next generation of leading international projects in astrophysics and high-energy physics, with particular emphasis on their more technological aspects. At the same time, it aims to increase the visibility and specific weight in international collaborations in order to achieve more ambitious goals. New staff have joined the IAA: 4 new positions of "Científico Titular", 2 positions of "Investigador Científico" and 4 new positions of "Permanent Employment as Doctor". The process of stabilising the technical staff is still underway, on the basis of the merits established during the period of work at the IAA. In terms of governance, **a new internal commission on sustainability was launched,** that would officially start in February 2024.

We also worked hard to ensure that **Granada is a candidate to host the General Assembly (GA) of the International Astronomical Union (IAU) in 2030.** It was a candidacy presented by the Presidency of the CSIC and the National Astronomy Commission (CNA), the Spanish Astrophysical Society (SEA), and the IAA-CSIC as host organisation. We submitted our Letter of Intent on 1 November, and a first dossier with some relevant information about our bid on 1 December. There were 9 bids and Granada's bid was shortlisted to the final list of 4 selected cities. Santiago de Chile, Perth and Mumbai were the other three candidates. At the next IAU General Assembly in Cape Town in August 2024, the final presentation and selection of the venue for the 2030 IAU General Assembly will take place.

Many new results have come from our scientific and technical activities. The scientific activities cover various areas such as the study of peculiar planetary systems (TOI-2096), the physical interpretation of GHOSTS (GreenisH Optical emission from Sprite Tops), or the presence of filamentary structures as the origin of blazar jet radio variability. Throughout this report you will find information on the main scientific highlights of the year. On the technological side, several milestones were reached: for the Comet Interceptor, activities focused on the construction and testing of the Elegant BreadBoard 2 for the EnViss and OPIC instruments and the Structural Thermal Model of the EnViss instrument; for Plato, the Main Electronics Unit (MEU) Engineering Qualification Model was integrated and the flight models of the MEU were also tested and delivered to ESA; for Vigil, the Development Model of the Digital Processing Unit for the Photospheric Magnetic Field Imager (PMI) instrument was designed and the various PMI subsystems were defined. For MOSAIC/ELT, the first cryogenic tests with cryomotors were carried out at IAA. MIMA was installed at OSN and its functionalities were confirmed. And at CAHA, the conceptual design review for the TARSIS instrument took place in May 2023. We should also mention that, finally, **Spain joined the SKA Observatory as the 9th member country on April 5, 2023.**

At the IAA's year-end celebration, we paid tribute to those who retired during 2023. These are very important people in the life of the IAA, at its various levels. **María Ángeles Cortés with her proverbial kindness and efficiency in administration**, and **Rafael Garrido and Emilio Alfaro as passionate researchers.** They will always be part of the IAA.

We hope you enjoy reading this report. We want to give you not only the key findings of our research, but also the sense that we work hard and enjoy our work.

IAA Organizational Chart

Director
Antxon Alberdi Odriozola

Deputy Science Director
Isabel Márquez Pérez

Deputy Tech. Director

Manager
Francisco Tapia Ruiz

DEPARTMENTS

Solar System
René Duffard

Stellar Physics
Pedro J. Amado González

Radio Astronomy & Galactic Structure
Emilio Alfaro Navarro

Extragalactic Astronomy
Rosa Mª González Delgado (up to November)
Rubén García Benito (since December)

SERVICE UNITS

General services
Francisco Tapia Ruiz

Outreach & Communication
Emilio J. García Gómez-Caro

Instrumental & Technological Development Unit
María Balaguer Jiménez

Computer Center
José Ruedas Sánchez

OBSERVATORIES

Calar Alto (CAHA)
Jesús Aceituno Castro

Sierra Nevada (OSN)
Pablo Santos-Sanz

ADVISORY COMMITTEES

External Advisory Board

Institute Board

Picture group at the "IAA Day 2023"

The three central personal, from left to right, Rafael Garrido, Mª Ángeles Cortés and Emilio Alfaro, receive the IAA tribute for their retirement. Next to them are the IAA Director, Antxon Alberdi (left) and the IAA SO Scientific Director, Isabel Márquez

IAA overview

The **Instituto de Astrofísica de Andalucía** (IAA) is the largest Astronomy institute of the **Consejo Superior de Investigaciones Científicas** (CSIC)

The IAA research is supported by twelve active CSIC research groups, covering most of the research topics in modern Astrophysics. This research is carried out within four different departments.

Research Groups

Solar System

- Solar Physics
- Planets and minor bodies
- Terrestrial Atmosphere

Stellar Physics

- Low mass Stars
- Stellar Variability
- ARAE

Radio Astronomy and Galactic Structure

- Stellar Systems
- Physics of the Interstellar Medium
- AGN jets

Extragalactic Astronomy

- Galaxy evolution
- Theoretical gravitation
- Observational Cosmology
- Cosmology and Astroparticle Physics

The **Instrumental and Technological Development Unit** (UDIT) and the **Computer Center** (CC) provide technical support to the research lines.

The IAA owns the **Sierra Nevada Observatory** (OSN) and is also the reference research center for the **Calar Alto Observatory** (CAHA).

Staff

267
Total member

Category and gender distribution

59 Permanent Staff (**14** Female / **45** Male)

58 Postdoc Fellows (**20** Female / **38** Male)

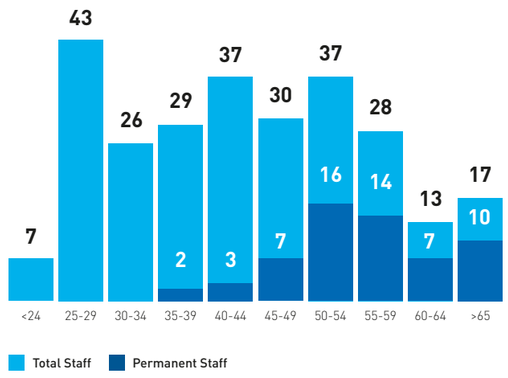
53 Predoctoral Researchess (**15** Female / **38** Male)

62 Technicians/Engineers (**12** Female / **50** Male)

23 Services (**16** Female / **7** Male)

12 Entailed personnel (**3** Female / **9** Male)

Age distribution

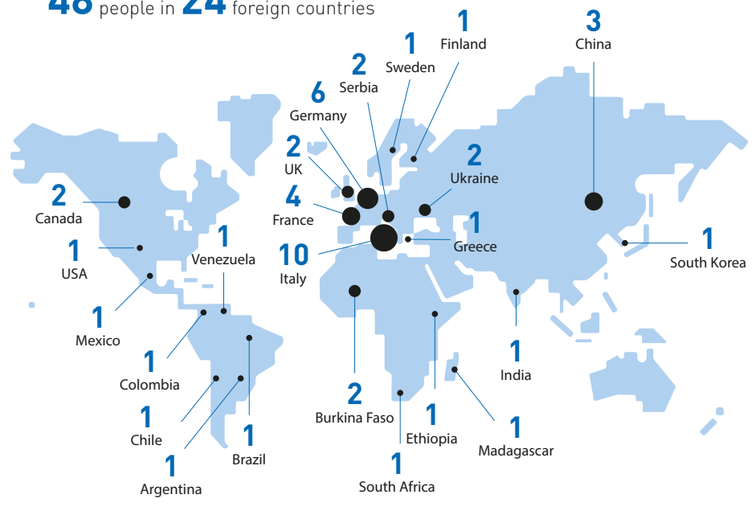


Detailed Cientifical and Technical Staff /of which women

- **19** /5 Scientific researcher
- **25** /5 Senior scientist
- **9** /2 Research professor
- **6** /2 Permanent doctor contract
- **54** /18 Postdoc contract
- **1** /1 Ramón y Cajal
- **1** /1 Marie Curie postdoc
- **2** /0 Juan de la Cierva
- **33** /8 FPI/FPU
- **4** /2 PhD contract
- **16** /5 JAE-Intro
- **20** /3 Electronics
- **26** /7 Software
- **9** /0 OSN
- **5** /2 Mechanics
- **2** /0 Optics
- **6** /2 Project management

International Staff

48 people in **24** foreign countries



2023 results

386
SCI publications

42
seminars at the IAA

37
press releases

13
meetings and schools

30
theses (PhD, Master, Degree)

29
courses

7
awards

16.9 M€
total budget

The IAA Severo Ochoa Programme

Isabel Márquez
Scientific Director SO-IAA Project

The beginning of 2023 coincided with the start of our **new, second recognition as a Severo Ochoa Centre of Excellence**. A dream and a challenge for the next four years. This time, we will be focusing on three strategic lines involving cutting-edge science and technology and covering a wide range of research: the exploration of planetary systems, the study of star formation in the Milky Way and the local Universe, and the study of galactic evolution and cosmology. With this new award, we aim to build on related activities that were successfully initiated and developed during our previous SO-IAA Strategic Plan, to bring them to full maturity, and to expand the consolidated activities. One of the very first actions we had to deal with was the selection of the **PhD projects** to be offered within the SO plan, as the National Agency had decided that the 10 FPI contracts allocated should start in the first year of accreditation. This was the first time that our system for the internal call and evaluation by the new Scientific Committee was put to the test. We then launched our **first call for postdoctoral and engineering recruitment**. We also had the JAE-intro ICU call to attract Masters students to take their first steps in research. In total, a number of contracts were offered in 2023 through the Severo Ochoa programme: three people for the **SO Technical Office**, together with one engineer, four postdocs, five FPIs and four JAE-intro fellows.

The **incoming and outgoing visits and the SO colloquia** started very soon, with the first colloquium already taking place in January. We also started the activities of the **new proposed training programme** with, in addition to a number of smaller actions, **two Advanced Schools** to be celebrated in 2023: the IAA-CSIC Severo Ochoa **SKA Open Science School**, co-organised with the Square Kilometer Array Observatory (SKAO), and the IAA-CSIC Severo Ochoa **Advanced School on Star Formation**.

Our **External Advisory Board** came to review the IAA in March, in a two-day meeting. The Board received extensive documentation, which was enriched by the discussions and presentations at the face-to-face meeting, where the Board had the opportunity to interact with various IAA staff. As a result, they completed the report we received in November. They informed us that *"...the SO programme, initiated in July 2018, has improved the scientific performance of the Institute. In addition, obtaining a second SO grant with excellent ratings is a significant achievement." The report also states that they "support the vision presented by the Institute and its key strategic goals of producing outstanding scientific research, developing instrumentation, efficiently allocating resources and talent to scientific and technological development, and strengthening its observational astronomy activities". "The Board appreciated and supported the continuation of productive scientific lines, together with the development of the Square Kilometre Array (SKA) regional centre, the growing participation in the Event Horizon Telescope (EHT), and the increased technological involvement in Calar Alto and in ESA's planetary and solar missions"*. Overall, our ESAB ***"commends the Institute for its achievements and wishes it continued success in the future"***. We are convinced that this report will help facilitate future external reviews by the Agency, in particular the mid-term review to be carried out at the end of the second year (i.e. 2024).

Among the **numerous and significant scientific results** of 2023, let's briefly mention those which, led by the IAA, gave rise to a press release. **Lightning strikes could increase by 40% by the end of the century,** leading to an increase in forest fires caused by thunderstorms. **The first spectroscopic study of GHOSTS** (GreenisH Optical emission from Sprite Tops) linked these rare and brief events in the mesosphere to unexpected compounds such as iron and nickel. IAA led a **JWST run that observed the thin rings of Chariklo** using the high-precision occultation technique; the finding that crystalline water ice dominates the spectrum of Chariklo and its rings suggested continuous micro-collisions. The **discovery of TOI-2096, a unique planetary system** consisting of a super-Earth and a mini-Neptune orbiting a cool nearby star in a synchronised dance, had major implications for understanding how planets form. The IAA led **the sharpest analysis of NIRS3, a forming massive protostar**, suggesting that it alternates between recurrent episodes of accretion and ejection of material. **Unexpected tails of gas and stars were seen in two Hydra cluster galaxies** in advanced interaction with the cluster, which should have lost most of its gas. The highest resolution and sensitivity observation to date of the **jet emerging from the nucleus of galaxy 3C 279** at almost the speed of light revealed large helical filaments at its base, the existence of which requires an alternative model to explain the variability of these jets. **The study of 22 very luminous and distant quasars** was added to our knowledge of the diversity of these objects.

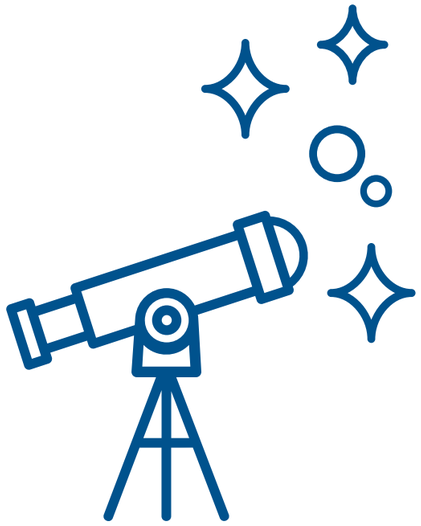
Among the activities of our **Gender programme**, we would like to highlight the organisation of an online round table on "Equality in the Scientific Societies in Spain". In terms of **outreach**, we organised the "Meeting on Light Pollution: challenges and responses for monitoring it" and also actively contributed to other outreach activities, such as the event "The future of high energy astrophysics through Open Science" or the "Congreso de Comunicación Social de la Ciencia" in Granada.

As part of our activities as a member of the **SOMMa Alliance**, we organised an impactful outreach activity as the main organiser of the annual meeting of the SOMMa Alliance, **"100 x ciencia.7. Siete preguntas para cambiar el mundo"**. Along with the meeting of all the Centres and Units of Excellence in the country and the celebration of their General Assembly, a series of master classes for outreach workers were also celebrated. On the last afternoon, a general public event was held to try to imagine the challenges for science in the medium term; eight experts tried to answer seven key questions that will mark the path of the future that awaits us. All of this was surrounded by a musical sphere that travelled from the most traditional and classical music to the present day.

At the time of writing, we are still waiting for the official ceremony of the Severo Ochoa Award to be organised by the Spanish Ministry of Science, Innovation and Universities. Hopefully it will be included in the report for 2024!

VOLVER AL ÍNDICE →

Research groups



CSIC considers the research groups as specific fundamental units which contribute to achieving the scientific objectives of the institution.

During 2023, the IAA had 12 active research groups, which belong to the global area of "Materia". At the IAA we cover all major fields of astrophysics and space science. Our research is based on the three pillars of modern astrophysics: observation, instrumental development, and theoretical and numerical studies, all of which are firmly established and interconnected. The IAA groups study:

• **The Sun**, via spectropolarimetry, and their magnetic fields from an observational, theoretical and instrumental point of view: "Solar Physics Group".

• **The Earth's atmosphere** and planet atmospheres, including exo-atmospheric studies: "Group of Terrestrial Planet Atmospheres".

• **Planets** and the formation and evolution of minor bodies in the Solar System: "Planets and Minor Bodies Group".

• **The physics of planetary systems** and their low-mass stars: "Physics of low-mass stars, exoplanets and associated instrumentation Group".

• **The variability of stars** and asteroseismology , including theoretical stellar evolutionary models: "Stellar Variability Group".

• **Stellar clusters,** massive stars and the Galactic Center: "Stellar Systems Group".

• **The formation, evolution and death of stars** at different mass and spatial scales and the interstellar medium: "Physics of the Interstellar Medium Group".

• **The structure and evolution of galaxies,** from the inner stellar and diffuse components to their large-scale cosmic distribution and evolution: "Galaxy Evolution Group".

• **Supermassive Black Holes** and their immediate environments, including their associated relativistic jets: "Relativistic Jets and Blazars Group".

• The combination between **General Relativity and Quantum Mechanics** in astrophysical scenarios: "Theoretical Gravitation and Cosmology Group".

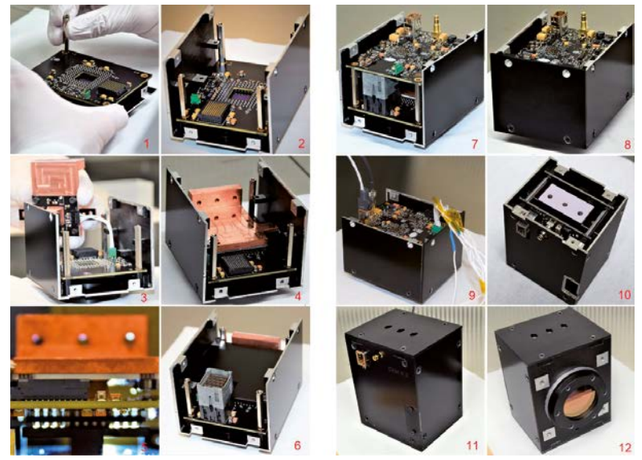
• The analysis of **large-scale galaxy clustering mechanisms** and the production of accurate cosmological simulations and galaxy mock catalogs: "Cosmology and Astroparticle Physics Group".

• Multirange observations of **high-energy phenomena** and stellar tidal streams: "High Energy Astrophysics and Robotic Astronomy Group (ARAE)".

The following pages present a summary of the results obtained in 2023 by the different research groups. The publications corresponding to the highlights of the research groups are identified in brackets, with the corresponding number in the publication list (from page 76 on).

SOLAR SYSTEM

Solar Physics



Overview

The IAA's Solar Physics Group (SPG) focuses on solar spectropolarimetry and magnetic fields from the theoretical, observational, and instrumental aspects:

- The Radiative transfer equation (RTE) for polarized light in the presence of magnetic fields and its use for diagnostics in interpretating spectropolarimetric measurements.
- Structure and physical nature of all kind of solar magnetic structures including quiet-sun and active region magnetism.
- Magnetic coupling of the solar atmosphere, space weather, and the solar cycle.
- Theoretical modeling of optical devices and phase-diversity based image reconstruction methods.
- Design, development, and construction of solar instrumentation.

Research lines:

- Quiet-Sun and active regions magnetism
- Magnetic coupling of the solar atmosphere
- Diagnostic techniques in spectropolarimetry
- Solar cycle
- Solar instrumentation

Highlights

Instrumentation

SUNRISE III MISSION (TUMAG & SCIP INSTRUMENTS)

- TuMag fine-tuned and installed in the platform at MPS facilities. Ready for flight again in Sunrise III.
- Works on updating the flight software of SCIP for Sunrise III.

ESA'S VIGIL MISSION (PMI INSTRUMENT)

- Design of the Digital Processing Unit (DPU) development model (DM). The printed circuit board (PCB) design for the DPU is now finalized.
- Contract with Max Planck Institute for Solar System Research (MPS, Germany) for Preliminary Authorization to Proceed involving the E-Unit and DPU requirements consolidation.
- Schedule and risks management.
- Negotiations with ESA, AEE, and MPS continue.

SOLAR ORBITER PHI (SO/PHI) INSTRUMENT

- Support to scientific operations as instrument co-leads. Several campaigns led from IAA-CSIC.
- Year 2022 data released to the community.

TISes FOR EST

- Group leaders of the international consortium (Spain, Italy, Sweden, Germany) for the development of the Tunable Imaging Spectropolarimeters (TISes) for the European Solar Telescope (EST).

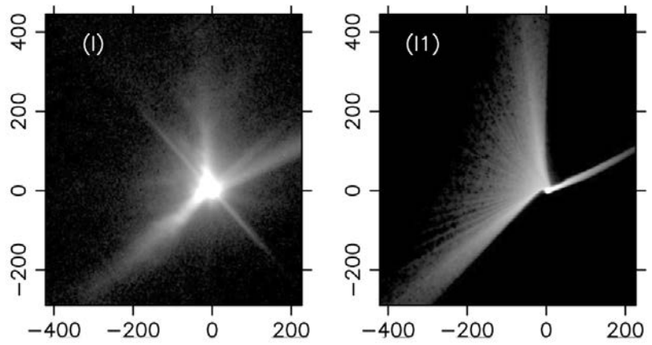
Science

- CMAG: A Mission to Study and Monitor the Inner Corona Magnetic Field [263]. Full proposal for a mission to study solar coronal magnetic fields prepared in combination with industry (SENER Aerospace).
- SPGCam: A specifically tailored camera for solar observations [262]. Description of in-house cameras.
- Fabry-Pérot etalons in solar astronomy. A review [26].
- Leadership of Spanish Space Solar Physics Consortium.

Image above
SPGCam cameras were developed in house for the TuMag and SCIP instruments aboard Sunrise. Several steps of its assembly are shown.

SOLAR SYSTEM

Planets & minor bodies of the solar system



Ejecta pattern caused by the impact of DART spacecraft on Dimorphos, the small component of the Didymos asteroid binary system. The image on the left (I) was obtained with the Hubble Space Telescope, while the image on the right (I1) is the simulation used to obtain the dust properties and ejection parameters through Monte Carlo modelling codes [241].

Overview

The activities of this group are mainly focused on four research lines: planets, minor bodies, exoplanetary atmospheres, and the laboratory measurements carried out at the Cosmic Dust Laboratory (CoDuLab). Broadly speaking, we aim to provide an integrated view of the Solar System and the atmospheres around exoplanets. Observational projects are being conducted from the ground as well as by using instrumentation on board space vehicles. The data interpretation is based on theoretical modeling, numerical simulations, and laboratory studies. We are involved in a number of space missions such as BepiColombo, Exomars, JUICE, Comet Interceptor, EnVision, DART, and Hera.

Research lines

- Planets and minor bodies of the Solar System
- Dust in the Solar System
- Exoplanetary atmospheres

Highlights

Edition of the book Planetary Systems Now, by Luisa M. Lara and David Jewitt (eds.), resulting from the IAA Severo Ochoa Advanced School on "Planets, exoplanets and their systems in a broad and multidisciplinary context" (2021). The book gives a broad, interdisciplinary perspective and introduction to the latest results from leading experts in each field, offering an unusually wide range of research on topics both inside and outside of the solar system [https://doi.org/10.1142/q0388].

Characterization of the ejecta generated after the collision of DART spacecraft with Dimorphos, the satellite of the asteroid Didymos [241].

An occultation of a bright star by Chiron allowed the authors to infer the presence of two ring-like structures surrounding the body, one of these at least outside the Roche limit, possibly in connection with a 0.6 mag outburst detected through photometry [264].

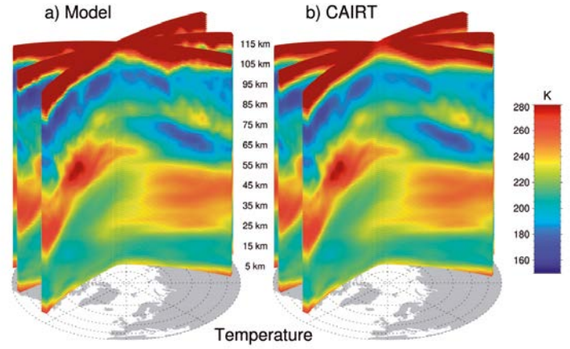
An advanced light-scattering model to retrieve the optical constants of three Martian dust analogs was developed, including a ray-optics code to compute scattering properties for individual particles, and a radiative-transfer treatment to simulate the surface. Among other results, it is found that the derived refractive indices are much smaller than previously reported for Martian dust modelling [215].

We conducted a proof-of-concept study of the detection of two synthetic models of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) using polarimetric imaging [124].

Spectra of sprites revealed that for the first time the greenish flash producing the Mesospheric Green emissions from excited Oxygen in Sprite Tops (ghosts) is mostly due to metals, iron and nickel, compounds that had never been taken into account when developing optical models for Transient Luminous Events [269].

SOLAR SYSTEM

Terrestrial and planetary atmospheres



Overview

We investigate the thermal structure, composition, chemistry, dynamics, and electricity phenomena of the Earth and planetary atmospheres. About the Earth, we focus on the study of solar particles and radiation effects on atmospheric composition, trends in temperature and species abundances, and the occurrence and impacts of lightning, thunderstorm coronas and Transient Luminous Events phenomena on the composition. About Mars and Venus, we study their temperature structure, dynamics, ionosphere, and composition with GCMs and satellite data. We use a large variety of models and measurements from instruments on satellites, on the ground and in the laboratory. More recently we are studying the planetary formation, evolution and characterization of exoplanet atmospheres by modelling and analysing ground-based and space data.

Research lines

- Drivers of the Earth's middle atmosphere variability and its impact on climate
- Atmospheric Electricity in Planetary Atmospheres
- Thermal structure, composition and dynamics of Mars and Venus atmospheres. Remote sensing of other solar system planetary atmospheres in IR/UV
- Planetary formation, evolution and characterisation of exo-atmospheres.

Highlights

a) Long-Continuing-Current lightning (LCCL) flashes are the main igniters of Lightning-Ignited natural Wildfires (LIW). We investigate space-based measurements of LCCL associated with LIW and present LCCL projections for the 2090s. We find a 41% global increase in the LCCL flash rate [275]. We report the time evolution of a ghost greenish spectrum from an energetic Sprite Top. Besides excited atomic oxygen, we show four main contributors related to the slow decay of the glow: atomic iron and nickel, molecular nitrogen, and ionic molecular oxygen [269].

b) We culminated the retrieval of temperature, nitric oxide and ozone in the middle atmosphere from the latest version of MIPAS spectra, V8. This constitutes an unprecedented high-quality database of global data (covering all latitudes, day and night, from 2005 until 2012) and from the lower stratosphere (20 km) up to the lower/middle thermosphere. The data is available to the whole community and is being used already as reference climatologies of our atmosphere and for validating/testing general circulation and climate chemistry models [113,117,194].

c) NOMAD permitted us to much better understand the Martian atmosphere, achieving a comprehensive view of its current climate by deriving temperature, aerosols and trace species (H_2O, CO). We derived a much colder mesosphere than expected, strong thermal tides, and a variability of H_2O and CO larger than predicted. Aerosols, the key ingredient of Mars climate, were described by their effective size and nature, with an additional N/S asymmetry during the Global Dust Storm of MY34 [37,195,234,335,336].

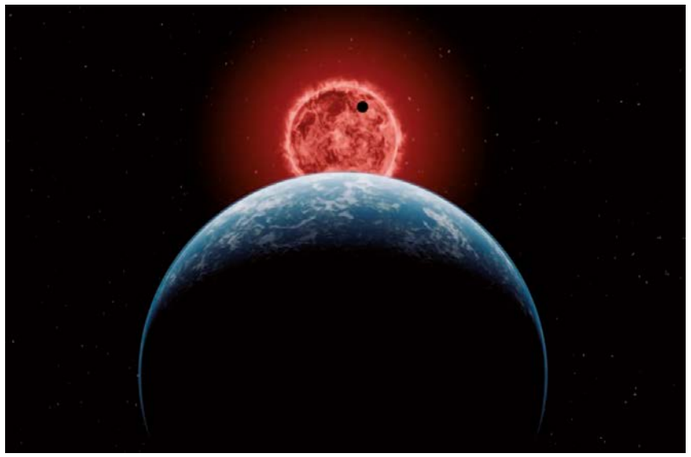
d) The Venus atmosphere may be used as a natural laboratory to predict and prepare future observations of rocky exoplanets potentially similar to Venus. We chose an exoplanet named LP 890-9c, which lies in the so-called "habitable zone", but very close to the limit for a runaway greenhouse effect. We used a 3D model to simulate potential evolution scenarios of its atmosphere and to predict its radiation variation as observed from Earth and the energy re-distribution in its atmosphere [294].

Image above
Morphology of an elevated stratopause event, a rare atmospheric phenomenon where the stratopause is located about 30 km higher than usual, as would be "seen" by the Changing-Atmosphere Infra-Red Tomography Explorer (CAIRT). The figure shows the distributions of temperature (left) from a 3D model simulation sampled on three CAIRT orbits and (right) CAIRT retrievals. Note the strong warming over Greenland indicative of the enhanced descent. The remarkable similarities between the model and the retrieval demonstrate CAIRT's capabilities to resolve mesoscale dynamical processes. CAIRT is an ESA Earth Explorer 11 candidate mission, currently in Phase A.

VOLVER AL ÍNDICE →

STELLAR PHYSICS

Low-mass stars & exoplanets



Overview

We study the physics of planetary systems and their low-mass stellar hosts. M dwarfs are interesting objects in their own right, but also because of their potential as hosts to temperate rocky planets that could sustain liquid water. We work in several aspects of these systems: the general statistics and observational distribution of their exoplanets, theoretical studies of stellar structure and evolution, magnetic activity and asteroseismology, characterisation of the circumstellar environment and of the planet's atmosphere and interior, all this along with the technical development of new instrumentation for these studies.

Research lines

- Stellar structure and evolution of very low-mass stars
- Asteroseismology
- Exoplanets. Magnetic activity
- Astronomical instrumentation

Highlights

CARMENES is a unique, world-leading instrument internationally known for its survey to detect exoplanets around red dwarfs. Its near-infrared channel, designed and built at the IAA, has shown to be a ground-breaking instrument for studying exoplanet atmospheres. Co-led by the IAA, it is, to date, the largest exoplanet survey of red dwarfs. In 2023, we led the CARMENES Legacy-Plus project to continue enlarging and deepening the original survey.

The consortium's productivity is exceptional, having published or submitted more than 110 papers, 22 this year, and discovered or confirmed 65 new planets, with another 9 additional firm candidates. These results have increased substantially the original small number of known planets orbiting red dwarfs. We continued leading the consortium and contributing to its working groups.

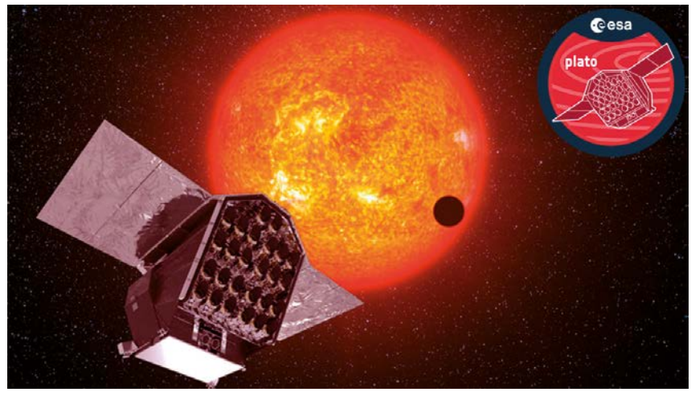
We continued contributing to NASA's space mission TESS by confirming exoplanets with observations taken by several large ground-based surveys in both hemispheres, such as SPECULOOS. Within this collaboration, we led the work to detect and study the two-planet system TOI-2096, with a super-Earth and a mini-Neptune [289]. The characteristics of this system provide information to advance the theory of planetary formation. It is one of the best targets to be observed by the James Webb Space Telescope (JWST) to confirm the existence of the "water worlds".

During 2023, we continued leading the CARMENES-PLUS upgrade project, to improve the performance of the instrument, and participating in the new concept for a large-aperture telescope, MARCOT, for Calar Alto observatory in Almeria. In October 2023, we passed the System Architecture Review of ANDES, a super-CARMENES for the Extremely Large Telescope. This milestone sets the basis to start the phase of its construction. We also participated in several working groups for the next European Space Agency exoplanetary mission PLATO to be launched in 2026.

Image above
Artistic representation of TOI-2096, a planetary system with two planets, a super-Earth and a mini-Neptune, the latter is a candidate to be one of the first water worlds detected by JWST [289]

STELLAR PHYSICS

Stellar variability



Artist illustration of the future PLATO mission in space with its 26 telescopes pointing to planetary systems around Sun-like stars.

Overview

Research at IAA's Stellar Variability Group (SVG) focuses mainly on the study of stellar structure and evolution and its impact on the characterization of planetary systems, stellar populations and galactic archaeology using asteroseismic techniques.

Scientific members of the group are involved in the development of theoretical models as well as innovative time series analysis techniques that can be applied to extract information from ultra-precise data, especially observations from space satellites. The technical team of the group is focused in instrumental developments for space missions such as PLATO. The group also has a member which is the representative of the Sky Quality Office.

Currently we are strongly involved in the preparation of the PLATO 2.0 (ESA M3) space mission. We also participated in the past in the design and exploitation of the precursor asteroseismic space mission, CoRoT.

Research lines

- Stellar Structure
- Stellar Evolution
- Time Series Analysis
- Open Science

Highlights

The AIHUB CSIC Connection aims to transmit artificial intelligence (AI) advances to society at large and ensure their social impact. Since 2022 the SVG of IAA takes part of this CSIC Connection between research institutes and in 2023 we were successful in our application of the program "ALLIES" through this Connection to the Marie Sklodowska-Curie COFUND Action.

ALLIES, the groundbreaking postdoctoral training program in Artificial Intelligence coordinated through the AIHUB Connection and co-funded by the European Union, is going to recruit 17 exceptional postdoctoral researchers who will embark on an interdisciplinary and intersectoral research journey in AI aligned with the Sustainable Development Goals.

The ALLIES program encompasses a wide array of multi and interdisciplinary themes in AI, Big Data, Machine Learning, Robotics, and Data Science, ensuring a rich and diverse experience for the recruited fellows. IAA and ICE institutes have joined ALLIES program with the project named "Big Data analysis techniques applied to simulated data for the preparation of the space mission PLATO"[1].

PLATO is a M3 space mission from the European Space Agency which is aimed to detect and characterize Earth analogs and their hosting stars. The huge amount of data that will be gathered is on a par with the stellar models and theoretical simulations required to extract the information. The development of AI systems provides a unique opportunity to exploit both observations and models and push the current limits of our knowledge of stars and planets.

1 https://aihub.csic.es/allies-cofund-big-data-analysis-techniques-applied-to-simulated-data-for-the-preparation-of-the-space-mission-plato//

VOLVER AL ÍNDICE →

STELLAR PHYSICS

ARAE
(Robotic and high-energy Astrophysics)

The location of the seven robotic stations in five continents completing the Global BOOTES Network. Spain has become the first country to deploy a network of robotic telescopes worldwide (bootes.iaa.es). Credit: A. J. Castro-Tirado (on behalf of the BOOTES Team).

Overview

The ARAE research group was founded in 2001, although some of its members had already started their activity in 1990. Scientists and engineers are working on a variety of projects, combining their strengths. Research lines are multi-range studies of high-energy phenomena and gravitational waves, and dwarf galaxy satellites and stellar tidal streams as dark matter probes in the local Universe. Significant technological developments are also carried out, regarding the robotization of small/medium size observatories and astronomical instrumentation development such as the BOOTES Global network of telescopes. We are also involved at space-borne missions such as ARRAKIHS and THESEUS. Teaching, public outreach and citizen science are also part of the ARAE activities.

Research lines

- Compact Objects in the Galaxy
- Cosmic Gamma-Ray Bursts (GRBs)
- Gravitational Waves (GW) electromagnetic counterparts
- Dwarf galaxy satellites and stellar tidal streams as dark matter probes in the local Universe
- Robotic Astronomy
- Astrophysical Transients

Highlights

Tracking transients night and day [48]

Under the leadership of IAA-CSIC and with strong involvement of the Associated Unit at Universidad de Málaga, Spain celebrated in 2023 to be the first country to complete a worldwide network of robotic telescopes in the five continents: the BOOTES Network (bootes.iaa.es). Studies of astrophysical transients, such as gamma-ray bursts (GRBs) and other high-energy phenomena, have long been hindered by their elusive and unpredictable nature. The scientific community has faced challenges with incomplete observations and sporadic data, leading to considerable limitations in understanding these events. The primary objective is to offer swift, continuous, and global responses to astrophysical transient events, triggered by high-energy satellite alerts or other ground-based observatories.

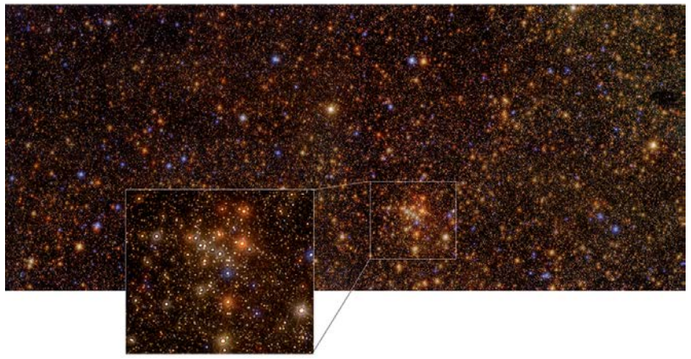
BOOTES can track and monitor suspected neutrino sources and gravitational wave emitters, as well as nearby objects like fireballs, comets, asteroids, or trans-Neptunian objects in the Solar System, variable stars in our Galaxy, supernovae in distant galaxies or blazars. Moreover, BOOTES may diligently commit to space debris monitoring and may survey the sky to identify potentially dangerous objects posing a threat to humanity.

Multiwavelength study of the luminous GRB 210619B observed with Fermi and ASIM [42]

We conducted detailed multiwavelength observations of the very bright and long gamma-ray burst GRB 210619B, detected by the Atmosphere-Space Interactions Monitor installed on the International Space Station and the GRB Monitor on-board the Fermi mission. Our main goal was to understand the radiation mechanisms and jet composition of GRB 210619B, which falls within the 10 most luminous bursts observed by Fermi so far. The energy-resolved prompt emission light curve exhibits an extremely bright hard emission pulse followed by softer/longer emission pulses. The late time broad-band photometric data set can be explained within the framework of the external forward shock model. In addition, we also report late-time optical observations placing deep upper limits for the host galaxy, favouring a faint, dwarf host galaxy for the burst.

RADIO ASTRONOMY
& GALACTIC STRUCTURE

Stellar systems



Near-infrared false-colour image of the Quintuplet region in the Galactic Centre, acquired with the infrared camera HAWK-I at the ESO VLT. The so-called Quintuplet young, massive cluster is magnified in the inset [325].

Overview

The Stellar Systems Group (SSG) was created in 1988. Our research lines are stellar clusters, massive stars, and the Galactic Centre. Currently, we are studying the connection between star-forming processes and spatial and kinematic structures at different scales, and continue to exploit the large Galactic surveys (including Gaia, GES, OTELO, GALANTE, J-PLUS, WEAVE and 4-MOST). The second focus of our work lies on investigating the structure, kinematics, and formation history of the Galactic Center and massive star formation in this emblematic region of the Milky Way. Please visit our website for more information: https://ssg.iaa.csic.es/.

Research lines

- Galactic Centre
- Formation, evolution and destruction of Stellar Systems
- Massive Stars

Highlights

The nuclear stellar disc is a dense, rotating structure at the centre of the Milky Way. It has a mass of about one billion solar masses, lies in the Galactic plane and reaches out to a distance about 100 pc from the central black hole, Sagittarius A*. Similar structures have been detected at the centres of other galaxies and their formation and age is still under investigation. While it was assumed for about 20 years that the nuclear stellar disc had formed via quasi-continuous star formation along the lifetime of our Galaxy, recent work has changed this paradigm and found that most of the stars in the nuclear stellar disc formed over 8 Gyr ago. There seems to have been a significant burst of star formation only about 1 Gyr ago, too, and there are also signs of intense star formation in the past 30 Myrs. In 2023 we studied multi-band imaging data of a field in the nuclear stellar disc around the so-called Quintuplet cluster, that was observed with the Hubble Space Telescope's WFC3 camera and for which there exists a catalogue of the stellar motions. Our analysis confirmed the new paradigm of the formation history of the nuclear stellar disc with completely independent data and new methods [325].

In 2023, the Stellar Systems team focused on the following objectives: (a) the integration into new international consortia for the study of star clusters and the Galactic disk in the solar neighborhood (4MOST), which led us to participate in the design of both projects already approved by ESO; (b) the exploitation of the Gaia-ESO Survey (GES) catalog with the analysis of the population of massive stars in the Car OB1 association; and (c) the development of new AI tools for the morphological classification of galaxies [153]. The latter study was carried out in collaboration with members of the Andalusian Interuniversity Institute of Data Science and Computational Intelligence (DaSCI) of the University of Granada (UGR). The new algorithm was designed to work with learning sets trained by both amateur and professional astronomers, incorporating Citizen Science into the analysis.

RADIO ASTRONOMY
& GALACTIC STRUCTURE

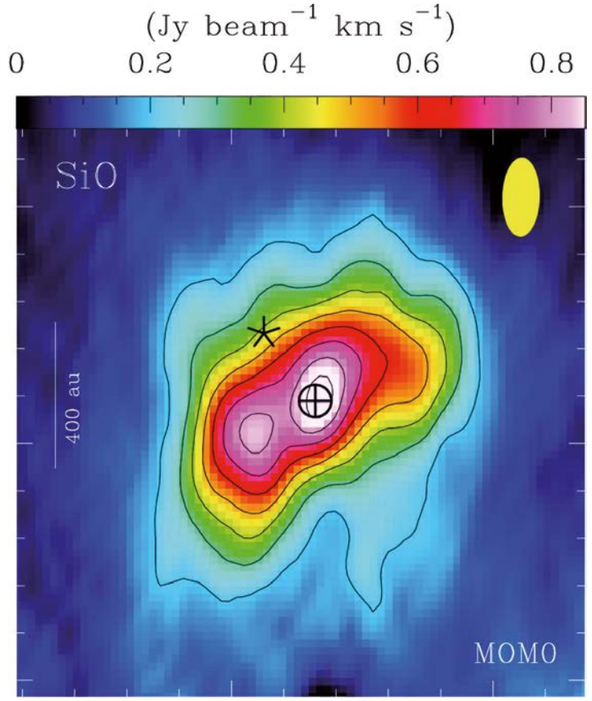
Physics of the Interstellar medium

Overview

The early stages of star and planet formation, with their jets and disks, are studied through radio/infrared observations and modelling.
The final stages of the life of stars are studied by the multi-wavelength characterization of evolved stars and the wind-blown bubbles around them, to understand the processes that shape planetary nebulae and the circumstellar medium around massive stars.
Exoplanetary systems are studied through the observation of the radio emission from star-planet interactions.
Radio interferometric monitoring of supernova (SN) explosions and their distribution in ultra luminous infrared Galaxies is also carried out to determine the SN and star formation rates.

Research lines

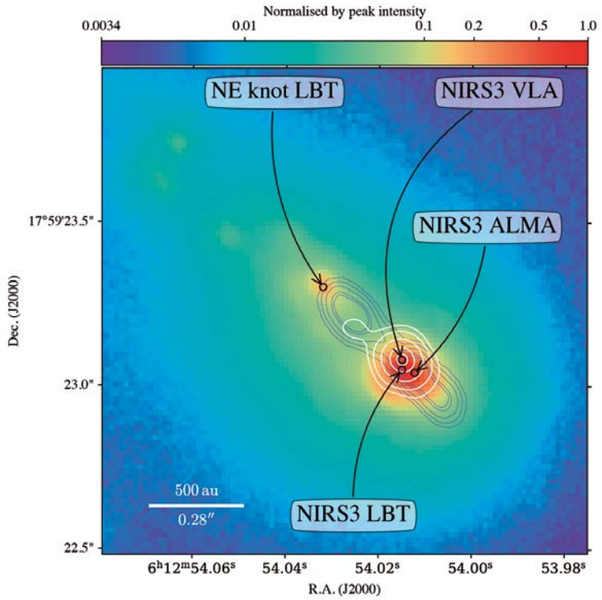
- Star and planet formation. Jets and disks. Modelling and observation.
- Radio emission from star-planet interaction in M-dwarf systems, and from sub-stellar objects.
- Planetary nebulae and their precursors.
- Massive stars and their surroundings. Supernova remnants and wind-blown bubbles.
- Luminous and Ultra Luminous Infrared Galaxies
- Prospective Science work for the Square Kilometre Array.



Integrated intensity of SiO emission around the massive young stellar object W75N(B)-VLA2, obtained with ALMA. The location of the young star is marked with a ringed cross. The emission shows a toroidal structure, perpendicular to the elongation of the outflow. The five-pointed star marks the position where the wind expansion is halted by the presence of a dense clump [123].

Highlight

• The source VLA2 in the W75N(B) region is a massive young star that shows a surprising fast evolution: its mass loss has evolved from an almost isotropic outflow to a collimated one in only 20 yr. This behavior is difficult to explain within current models of star formation. In our previous works, we modeled this fast change in terms of an episodic isotopic wind whose morphology evolves as it moves within a toroidal dense structure. We also hypothesized that the expansion of the wind is halted by a dense obstacle to the northeast. In our new observations with the Atacama Large Millimeter/submillimeter Array (ALMA) [123], we finally confirm the presence of both hypothesized structures (Fig. 1): the SiO emission traces a dense toroidal structure around VLA2, while H_2CO shows the clump that could hindering the expansion of the wind to the northeast.



Adaptive optics assisted Ks (~2 microns) band image showing zoom-in of the central region of S255IR and featuring NIRS3. Blue contours represent ALMA band 3 continuum emission while white contours show VLA 1.3 cm emission [100].

Artist impression of the outbursting source [100].

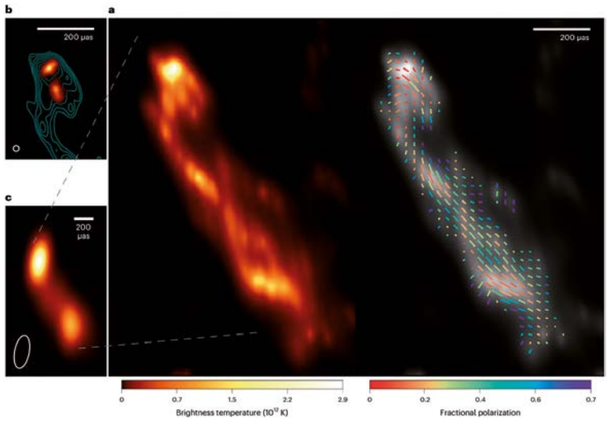
• The first ever recorded disk-mediated accretion outburst for massive protostars (>8 solar masses) occurred in the S255-IR region, in particular, in the source NIRS3. This outburst dated back in 2015, equivalent to an accretion of 2 Jupiter masses, initiated a series of follow-up investigations. In 2022, we conducted a revisit of the region using the Large Binocular Telescope (LBT) with extreme resolution (60 milliarcsec), facilitated by the Adaptive Optics (AO) system SOUL. This exquisite angular resolution allowed us to observe for the first time the response of this accretion outburst in the form of an ejection knot in the infrared. Leveraging our recent observations and the system's geometry, we calculated a total velocity of 450 km/s, aligning with the kinematics of outflows observed in other sources. Additionally, the consistency with the time evolution indicated by our observations was reinforced by prior radio studies, particularly those conducted with the Very Large Array (VLA) and the Atacama Large Millimeter/submillimeter Array (ALMA). Concluding our analysis, we propose the possibility of a second outburst occurring in the system during the 1980s. If confirmed, this would mark the first recorded multi-outburst event in a massive protostar. This in turn suggests a common mechanism in the formation of massive protostars and their low-mass counterparts [100].

VOLVER AL ÍNDICE →

RADIO ASTRONOMY
& GALACTIC STRUCTURE

AGN Jets

Relativistic Jets & Blazars



a, Total intensity (left) and linearly polarized (right) RadioAstron image of the blazar 3C279 at 1.3 cm obtained on 10 March 2014. **b,** The 1:1 scale 1.3 mm EHT image obtained in April 2017. Contours correspond to our RadioAstron image, which are shown to compare the different scales probed. **c,** The 7 mm VLBA-BU-BLAZAR program image obtained on 25 February 2014. White ellipses at the bottom-left corner of **b** and **c** indicate the 20 × 20 μas and 150 × 360 μas convolving beams, respectively [110].

Overview

The main research topic of our group is the study of supermassive black holes (SMBHs) harbored in the nuclear region of active galaxies. Huge amounts of energy are released from their innermost environment in the form of ultra-relativistic jets, as a consequence of mass accretion onto the SMBH and energy extraction through powerful twisted magnetic fields anchored to it. We study these objects at the maximum achievable angular resolution by means of very long baseline interferometry observations at radio wavelengths with the Event Horizon Telescope (EHT) and the space antenna RadioAstron. Thanks to these instruments, we are able to directly image SMBHs and the jets forming close to them.

Research lines

- Imaging supermassive black holes with the Event Horizon Telescope
- Accretion onto supermassive black holes and the formation of relativistic jets
- Blazar jet multi-wavelength phenomenology from the horizon to parsec scales
- AGN, black hole growth and demographics, binary blackholes and gravitational waves

Highlights

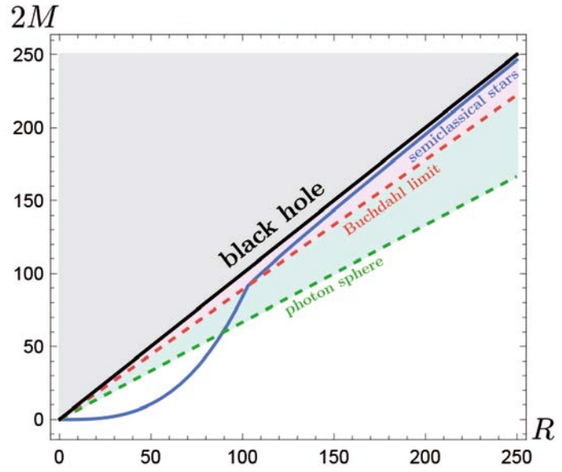
The joint observations of RadioAstron, a 10 m radio telescope orbiting Earth in a highly eccentric trajectory, and a global array of 23 radio telescopes scattered across 4 different continents, revealed the complex and filamentary internal structure of the jet in the blazar 3C 279. These results, published in Nature Astronomy on October 26 in 2023 [110], suggest that this helical morphology might be present in other blazar sources and offer a new explanation to the radio-variability associated with their parsec-scale jets. In contrast to the standard shock-in-jet model, the features in our image seem to indicate that the observed variability corresponds to the differential Doppler boosting of emitting regions within the filaments, which in turn are produced by plasma instabilities in the jet flow. Leveraging on the full polarimetric capabilities of RadioAstron, we could also infer the presence of a helical magnetic field threaded to his flow, which rotates clockwise as seen in the direction of flow motion and has an intrinsic pitch angle of ~45º.

On November 8, 2023, the Event Horizon Telescope Collaboration published a groundbreaking paper in the Astrophysical Journal Letters, revealing firm evidence for a weak circular polarization signal in M87* on event horizon scales. These results provide new constraints on the magnetic fields and high-energy plasma surrounding the black hole. The observed levels of circular polarization favor theoretical models describing a magnetically arrested accretion disk (MAD) over standard accretion disk solutions (SANE). In the preferred MAD models, the circular polarization arises predominantly from ordered magnetic fields threading the accretion flow. These magnetic fields convert linear polarization to circular polarization via the Faraday conversion effect. Overall, the new circular polarization measurements help portray a coherent picture of a hot, magnetized accretion flow around the supermassive black hole in M87. This accretion flow extracts rotational energy from the spinning black hole, giving rise to the observed circular polarization signatures. The results shed new light on the high-energy plasma environment in the extreme gravity near supermassive black holes [312].

EXTRAGALACTIC
ASTRONOMY

Theoretical

Gravitation & Cosmology



Overview

Our group is interested on theoretical gravity, both at the classical level and specially on those situations in which General Relativity (GR) –the best theory of gravity we have– is expected to start failing. The most promising situation in which to observe departures from GR is the physics of gravitational collapse and its end result –black holes in the standard theory. Thus, a large body of our research is centered in analyzing how different situations in standard GR would be modified when going beyond this theory. For instance, we analyze modifications based on semiclassical gravity and those suggested by emergent and analogue gravity scenarios. We study the viability of the new scenarios suggested by these frameworks.

Research lines

- Semiclassical gravity
- Analogue and emergent gravity
- Black holes and their alternatives

Image above
Semiclassical stars Mass-Radius phase diagram. The blue line shows where the semiclassical stars are located as compared with Buchdahl and black hole limits.

Highlights

Hydrostatic equilibrium in semiclassical approximation [20]

In standard GR, there are limits to how much compact stellar configurations can be. The standard lore is that any star surpassing these limits will collapse to form a black hole. However, we have shown that this is no longer correct if one takes into account as a source of gravity the very vacuum polarization of the quantum fields. Then, the resulting modified Einstein equations contain stellar solutions with compactness arbitrarily close to that of black holes.

Hawking radiation from an analogue bouncing geometry [116]

The existence of Hawking radiation is a very general phenomena thought to occur in any situation in which a causal horizon is established. Hawking-like radiation should also occur when dealing with bouncing geometries. We numerically proved this idea and, at the same time, proposed an experimental way of proving this phenomenon using superconducting quantum-interference devices.

Renormalized stress-energy tensor in an order-reduced approximation [21]

We introduced a novel approximation to the renormalized stress-energy tensor (RSET). The RSET encodes how to incorporate the gravitational effects of the energy density of vacuum polarization. The calculation of an exact RSET is plagued with difficulties, thus it is necessary to develop approximations that capture its main properties. Our novel approximation, based on a reduction of the order of the resulting differential equations, has very good properties on this regard and it very manageable. We found solution of the semiclassical gravitational equations in spherical symmetry observing a good agreement with other approximations, but without invoking ad hoc assumptions.

EXTRAGALACTIC ASTRONOMY

Galaxy Evolution

Overview

The group conducts observational and theoretical studies across a wide range of issues concerning galaxy structure, and evolution. These investigations span from the inner stellar and gaseous components of galaxies to their large-scale cosmic distribution and evolution. Additionally, the group participates in research and development projects focused on instrumental and technological advancements. Observationally, various data sources, including 2D spectroscopy, multi-band photometric surveys, and HI surveys, are utilized for studies encompassing the physics of star formation, stellar populations, and the diffuse medium within galaxies, as well as galaxy groups and clusters. Other areas of focus include nuclear activity within galaxies, its interaction with stellar evolution, and the environmental influences on galaxy structure and evolution. These activities extend to supervising PhD students, teaching at the master's and doctoral levels, conducting public outreach conferences, and engaging in eScience initiatives. Furthermore, the group leads Spain's participation in the Square Kilometre Array (SKA) project and the construction of the TARSIS Integral Field Spectrograph for the 3.5m telescope at Calar Alto Observatory.

Highlights

A global study of the H I content of Hickson compact groups

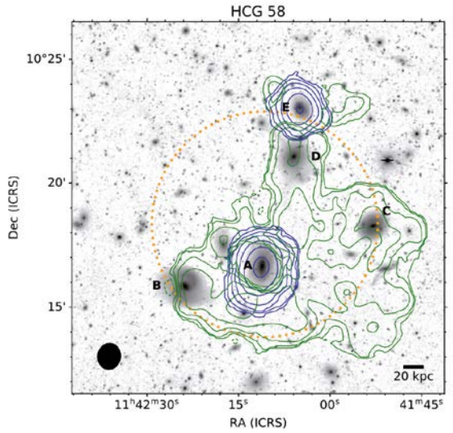
Hickson compact groups (HCGs) are dense configurations of four to ten galaxies. The neutral hydrogen (H I) gas distribution in the HCGs appears to follow an evolutionary sequence of three phases, with gas initially confined to galaxies, then significant amounts spread throughout the intra-group medium, and finally with almost no gas remaining in the galaxies. Given this picture of sequential HCG evolution, it is expected that the H I deficiency can be a rough proxy for the age and evolutionary state of an HCG. We used VLA H I observations of 38 HCGs to test this hypothesis for the first time and applied to them a new pipeline that maximises reproducibility. We found that H I deficiency can be used as an age proxy for the last phase, where little neutral gas remains in the group. We also proposed a new sub-phase where groups contain a lone H I-bearing galaxy, but are otherwise devoid of gas. We argued that this new sub-phase is likely the result of an evolved, gas-poor group acquiring a new, gas-rich member [156].

The miniJPAS survey: Identification of QSOs with artificial neural networks

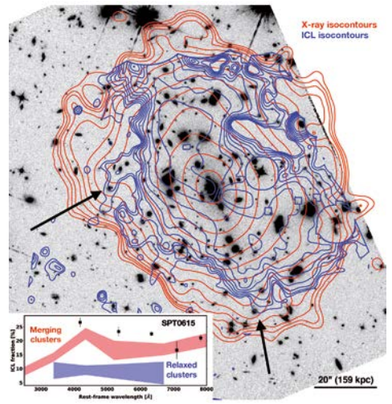
The miniJPAS survey serves as a pathfinder for J-PAS, encompassing one square degree within the AEGIS field and observed with 56 narrow bands spanning the optical spectral range. Utilizing these data, we demonstrated the efficacy of J-PAS in identifying emission line objects through the development of algorithms based on artificial neural networks (ANN). These algorithms classify objects into four distinct categories: stars, galaxies, quasars at low redshift ($z < 2.1$), and quasars at high redshift ($z \geq 2.1$). For one classifier, miniJPAS fluxes are utilized as inputs, while for the other, colors are employed. Additionally, we examined the impact of augmenting the training set by generating hybrid objects, which amalgamate fluxes from stars, galaxies, and quasars. We find that the success of identifying QSOs in the SDSS DR12Q superset miniJPAS sample is high, as indicated by the weighted F1-score that reaches ~0.88 for objects that are mostly within $20 < r \leq 22.5$ [219].

Understanding nuclear activity in galaxies: from low to high accretion rates

In order to quantify the effect of powerful radio ejection on the broad emission line region and looking for a physical dichotomy between radio-loud (RL) and radio-quiet (RQ) quasars, we analysed new optical and near-UV spectra of a sample of 11 extremely powerful jetted quasars with radio-to-optical flux ratio > 1000 and redshift $0.35<z<1$, supplemented with large samples of RL and RQ quasars from our previous work. We found that, compared to RQs, the extreme RL quasars show larger Hß full width at half maximum, weaker FeII emission, larger black hole masses, lower Eddington ratios, and a restricted space occupation in the optical and UV Main Sequence planes. The differences are more elusive when the comparison is carried out by restricting the RQ population to the region of the main sequence occupied by RL, albeit an unbiased comparison matching black hole masses and Eddington ratios indicates that the most powerful RL quasars display systematically highest velocity shifts and stronger redwards asymmetries in the Hß line [226]



HCG 58 Integrated H I emission contours overlaid on a DECaLS r-band image [156]. This is a compact group with 5 galaxies with prominent H I tidal tails. HCG members are shown with blue contours and extended features in green. The orange dashed circle indicates the primary beam of the Green Bank Telescope observation of this group used to obtain the spectrum. The VLA synthesised beam is shown in the bottom left as a solid black.



ICL fractions of SPT0615, consistent with those of merging clusters, triggered a re-analysis of the X-ray data, finding evidences of mergers that have previously been unnoticed [154]. Black arrows mark X-ray excesses matching ICL substructure

Research lines

- Active Galactic Nuclei
- Astronomical instrumentation
- Cosmic evolution of galaxies
- Open Science
- Physics of Quasars
- Star formation and violent star formation in galaxies
- Stellar populations in galaxies and their evolution
- The interplay between massive star formation and chemical evolution in galaxies
- The influence of the environment on the evolution of galaxies

At the highest AGN luminosity, through the analysis of the spectrophotometric properties and the measurements of the most prominent optical and UV emission line profiles of a sample of 22 high-redshift quasars, we show that the behavior of quasars of very high luminosity is strongly affected by powerful outflows involving a broad range of spatial scales in both the Broad- and the Narrow- Line Region. The [OIII]λ5007 and [CIV]λ1549 emission appears strongly dominated by outflowing gas, that in many cases is also detected in the low ionization Hß line. The analysis showed that line widths and shifts are correlated for both [OIII] and CIV, suggesting that emission from outflowing gas is providing a substantial broadening effect to both lines. We also find evidence in favor of the nuclear origin of the outflows diagnosed by [OIII], with [OIII] and C IV blueshifts presenting a high degree of correlation. In addition, we confirmed that the main sequence trends, established at low-redshift, remain valid at high redshift and high luminosity even if a systematic increase in line width is observed [75].

The multiple merging state of cluster formation in the Reionization Lensing Cluster Survey (RELICS)

We investigate the intracluster light (ICL) in the RELICS cluster SPT-CLJ0615-5746. The ICL fraction serves as a reliable marker for determining the dynamical stage of galaxy clusters, distinguishing between merging and relaxed states, particularly for low to intermediate redshifts. We employ this discriminator for the first time on the high-redshift system SPT-CLJ0615-5746 at $z = 0.97$, utilizing observations from the Reionization Lensing Cluster Survey (RELICS) conducted in the optical and infrared wavelengths. Our findings clearly reveal the ICL fraction signature of its merging nature, suggesting the presence of at least one ongoing merger and potentially a second one. This result contradicts previous conclusions drawn from X-ray data, which indicated a relaxed state [154].

The spatial structure of "green pea" compact galaxies

We examine the spatially resolved properties of "green pea" compact galaxies through deep integral field spectroscopy observations conducted with the VLT (8m, ESO Chile) equipped with the MUSE instrument. A sample comprising 24 galaxies was observed using MUSE at the VLT, yielding substantial evidence of extended spatial structures of varying morphology evident in both the emission lines of ionized gas and the stellar continuum light. This discovery reinforces the notion of structural channels present in these galaxies, potentially facilitating the leakage of ionizing photons [22].

UDIT

Instrumental & Technological Development Unit

Overview

The Instrumental and Technological Development Unit (UDIT) was founded in 1975 and since its foundation it has been focused on the development of state-of-the-art instruments for ground-based telescopes and space-borne astrophysical payload instrumentation. During more than 40 years, the instruments developed at the UDIT have placed the IAA as a reference center for technological research projects.

The technical production at the UDIT can be split into two major lines:

- Analysis, design, integration, and verification of astronomical instruments for ground-based telescopes in Calar Alto Observatory (CAHA), Sierra Nevada Observatory (OSN), ELT (Extremely Large Telescope)...
- Analysis, design, integration, and verification of astronomical instruments for interplanetary scientific space missions and stratospheric balloon observatories

In the following lines we present a summary of the activities performed during 2023 for the instrumentation projects that were developed at the UDIT.

Space projects

JUICE (JUpiter ICy moons Explorer): The mission was successfully launched on 14 April 2023. After the launch, UDIT team provided technical support to the commissioning phase.

Comet Interceptor: The IAA is responsible for developing the power converter modules for the instruments COCA and MANIAC as well as the power handling unit and the data handling unit for the instruments Enviss and OPIC. The activities in 2023 have been devoted to manufacture and test the EBB 2 (Elegant BreadBoard) for the instruments EnViss and OPIC as well as the STM (Structural Thermal Model) of the instrument EnViss.

EnVision. In 2023, the UDIT team has worked on the preliminary layout and initial circuit simulations of the three on-board power supplies of the Venspec suite.

PLATO (PLAnetary Transits and Oscillation of stars): The IAA's technical team has been focused on the integration of the MEU (Main Electronics Unit) EQM (Engineering Qualification Model). The flight models of the MEU has also been tested and delivered to ESA, they are ready to be integrated in the system PFM (Proto-Flight Model). The Technical team at IAA also provided tests support to the consortium.

DUSTER: in 2023 the activities performed for the DUSTER project have been oriented, on the one hand, to define the DPU (Data Processing Unit) requirements, interfaces, harness and grounding strategy and on the other hand, to the design and manufacturing of a DPU prototype and the launch of the software and firmware developments.

SUNRISE III. 2023 has been devoted to re-test the two instruments in which the IAA participates: TuMag and SCIP. Testing has been performed at several levels to check both instruments are ready for a new campaign to be held in June 2024.

Vigil: The IAA technical team has been focused on the design of the Development Model (DM) of the Digital Processing unit (DPU) for the PMI instrument, which was finished at the end of the year. The team has also been working on the definition of the PMI subsystems requirements as well as the PMI's instrument firmware and software architecture.

Ground based instruments:

MOSAIC (Multi-object spectrograph for ELT): During this year, the first cryogenic tests with cryo-motors have been performed at IAA. The instrument development phase B started in March 2023 and the team has worked on the system architecture which will be reviewed in 2024.

MIMA (Multi-Spectral Imager Mesopause Airglow): The instrument was installed in the OSN in October 2023. The results obtained in the instrument's commissioning confirmed the expected functionality of MIMA.

JUICE launch. IAA's technical contribution to the mission: power supplies of the GALA and JANUS instruments and JANUS's filter wheel.

CARMENES-PLUS: In 2023 a new pressure control system for the NIR cooling system was installed in the instrument, contributing to improve CARMENES performance.

PANIC: the commissioning of the instrument after the modifications performed due to the camera upgrade has been carried out during 2023. The software system, including the observation tool, pipeline and quick-look, has been updated and debugged. The instrument is expected to be delivered in 2024.

TARSIS: The Conceptual Design Review for TARSIS instrument was held in May 2023. The technical team's effort has been focused during 2023 on the preliminary design of the front-end, calibration unit, acquisition and guiding system and a new workpackage, which is the optical rotator.

Calar Alto Observatory (CAHA)

Panorama of the CAHA domes.

Overview

The Calar Alto observatory (CAHA) is a key institution for the international astronomical community, for its highly competitive astronomical facilities (telescopes and instrumentation). From 2019 on, the current administration of CAHA includes the Junta de Andalucía and the Spanish National Research Council (CSIC). These two institutions manage the operation of the observatory with the same percentage. In this new scenario, the Instituto de Astrofísica de Andalucía (IAA-CSIC) will continue playing the role of benchmark institute of the observatory.

Activities and highlights

Publications and main scientific results

Observations at Calar Alto have produced in 2023 more than 110 publications in international peer reviewed journals. This includes, not only scientific projects awarded with open time, but also the long-term legacy projects that started in 2021. In addition to its scientific activity, Calar Alto has continued its activities involving the development of new instrumentation as well as basic infrastructures. We describe below the most relevant of these results:

A resonant sextuplet of sub-Neptunes transiting the bright star HD 110067 [199]

Using images from space telescopes, an international team of astronomers has found a remarkable system of six planets orbiting in a synchronized manner (in resonance) the relatively bright and nearby star HD110067.

Transmission spectroscopy of the lowest-density gas giant: metals and a potential extended outflow in HAT-P-67b, Bello-Arufe et al. 2023, AJ, 166, 69

An international team of researchers has used the CARMENES spectrograph to study the atmosphere of HAT-P-67b, the largest but least dense transiting gas giant known to date. From the Calar Alto data, the puffy atmosphere of the exoplanet appears highly ionized and could be escaping at a rate of 10 million tons per second.

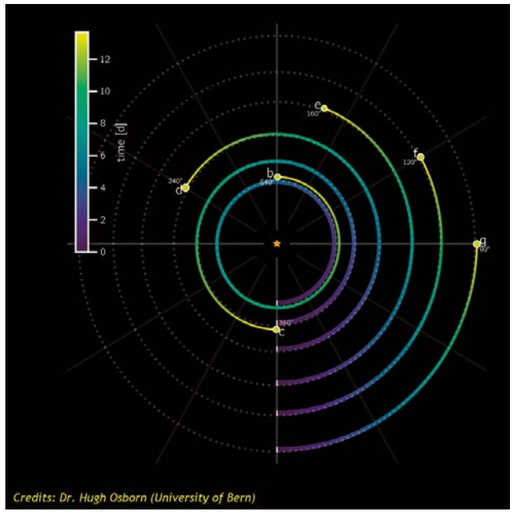
Galaxies in voids assemble their stars slowly [83]

In the framework of the CAVITY project, an ongoing legacy program at Calar Alto, researchers from the University of Granada show, for the first time, that galaxies located in cosmic voids assemble theirs stars more slowly than galaxies in filaments, walls and clusters.

The CARMENES search for exoplanets around M dwarfs. Guaranteed-time observations data release 1 (2016-2020) [303]

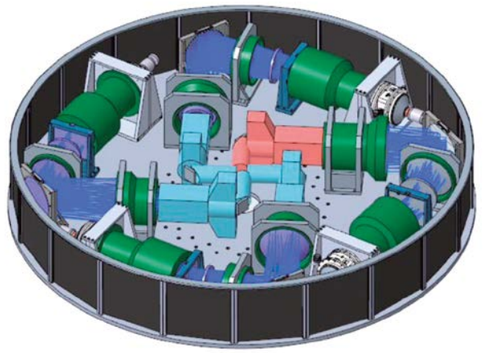
Twenty thousand observations made with the CARMENES instrument are published today. CARMENES is the "planet hunter" spectrograph of the 3.5-meter telescope at Calar Alto. CARMENES was co-developed by the Institute of Astrophysics of Andalusia (IAA-CSIC), and it has already discovered 59 planets, some of them lying in the habitable zone around red dwarf stars in the vicinity of the Sun.

Credits: Javier Sánchez Jiménez, César Blanco González & CAHA



A resonant sextuplet of sub-Neptunes transiting the bright star HD 110067 [199]

MARCOT pathfinder at Calar Alto observatory



The Tetra-ARmed Super-Ifu Spectrograph (TARSIS)

50th anniversary meeting held in Almería, in September 2023.
From left to right: Roland Gredel, Félix Lahulla, Joao Alves, Jesús Aceituno, David Barrado, Pilar Duro, Delma Martínez.

International collaborations

During 2023, Calar Alto has continued its participation in the ORP european network, which started in 2021 as a merging of the OPTICON and RadioNet networks, and it is currently the largest collaborative network of ground astronomy in Europe, that intends to coordinate methods and observation tools, and to provide access to a wider set of astronomical facilities. Calar Alto participates in ORP, together with the Instituto de Astrofísica de Andalucía (IAA-CSIC), Cambridge University (United Kingdom), CNRS (France), and Max-Planck Institute of Radioastronomy (Germany).

The ongoing international long-term observational projects have continued during 2023:

- **SEAMBH (Super-Eddington Accreting Massive Black Hole),** in collaboration with Beijing University, is dedicated to the study of supermassive black holes in active galactic nuclei applying the reverberation method, using the CAFOS instrument at the 2.2m telescope.
- **CAVITY (Calar Alto Void Integral field Treasury surveY),** is devoted to the study of the properties of galaxies in cosmic voids, the most isolated objects in the Universe. This project makes use of the integral field spectrograph PMAS at the 3.5m telescope.
- **KOBE** survey is searching for potentially habitable exoplanets orbiting K-dwarfs, and is using the CARMENES spectrograph at the 3.5m telescope.
- **CARMENES Legacy+,** is an extension of the CARMENES survey, and is intended to the detection and characterization of planets around M-dwarfs, the occurrence of long-period giant planets, and the characterization of exoplanet atmospheres.

New technological developments

During 2023, CAHA has been involved in the development of **TARSIS** (the Tetra-ARmed Super-Ifu Spectrograph), that will be the future instrument for the Calar Alto 3.5m telescope. TARSIS, that is co-lead by IAA-CSIC and UCM, has unique characteristics like its capacity to detect near ultraviolet (down to 320 nm) light, and its unprecedent field of view (~8 sq. arcmin). TARSIS, and CATARSIS, the ambitious observational survey of galaxy cluster that will occupy most of the first years of operation of the instrument, will maintain the largest optical telescope in the European mainland at the forefront of Astronomy. TARSIS passed in 2023 the Conceptual Design phase and will face the Preliminary Design phase in 2024.

The **Multi-Array of Combined Telescopes (MARCOT)** is a modular astronomical infrastructure for high resolution spectroscopy and large field of view, high dynamic range imaging at subarcsecond spatial resolution. The main goal of this project is to carry out the conceptual design and establish a plan for the construction of a new European telescope concept with a large effective aperture and low cost. The idea consists of the combination of multiple identical elements resulting in a new infrastructure facility with a large effective aperture. The photons are collected by individual optical fibers attached to each optical assembly, which are finally combined by a novel multimode photonic lantern into a single fiber, which feeds a high-resolution spectrograph. Each optical assembly is equipped with a low readout noise detector, and the images from the detector can be combined later. This generates a single frame with a signal to noise ratio identical to that of a single large aperture telescope, but with improved resolution, dynamic range and larger field of view.

50 years of Calar Alto (1973 – 2023)

CAHA started its activities in 1973, one year after the signature of the agreement between the Spanish and German governments. For this reason, during 2023 the observatory has organized a special open doors program to position Calar Alto closer to the almerian society. In addition to this, the city of Almería hosted several activities aimed at highlighting the relevance of the observatory as an international scientific institution; among them we mention a photographic exhibition in the popular street Paseo de Almería, a meeting to get together the formers CAHA directors, an astronomical concert in the jazz club Clasijazz, and the participation in the international cinema festival FICAL, and in the associated gastronomical contest Platos de Película.

OSN
Sierra Nevada Observatory

Credits: F.J. Aceituno (IAA-CSIC).

Overview

The OSN is a high-mountain observatory situated at an altitude of 2896m in the Sierra Nevada National Park. It is owned by the CSIC and operated by the IAA. The observatory has two optical telescopes, one with a 1.5m aperture (T150) and the other with a 90cm aperture (T90). To compensate for the limited access to observing time at larger observatories, the OSN offers great flexibility to serve programs that require rapid response or intense temporal coverage, either in terms of sampling or extension. The OSN focuses on long-term follow-up and target of opportunity programs to support IAA research lines. Its location is ideal for mid-upper atmosphere sounding and as a test bed for external instrumentation.

Highlights

The T150 telescope became operational in July 2023 after a secondary mirror problem in 2022. It is equipped with a 4Mp camera and the ALBIREO spectrograph, which is currently being commissioned. The T90 telescope is also equipped with a 4Mp camera and the DIPOL-1 polarimeter (on loan from the University of Turku, Finland) since September 2023. **A total of 25 peer-reviewed papers based on OSN data were published in 2023.** The OSN also hosted the new MIMA spectrometer (since November 2023), dedicated to the study of the mesopause region, as well as instruments from the IAA Sky Quality Office and external equipment. Among the activities we highlight:

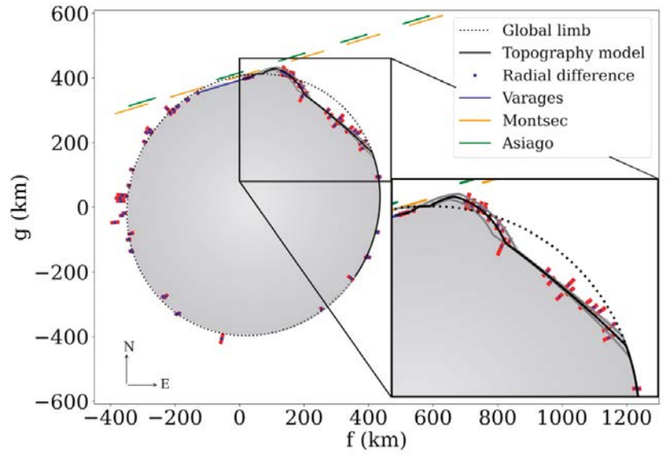
Observation programs

The **CARMENES** target follow-ups are key to characterizing M dwarfs and rejecting false positives for exoplanet detection. Seven papers were published in this program in 2023, most notably the discovery and validation of two transiting planets in orbit around a nearby M star [126] (Fig. 1).

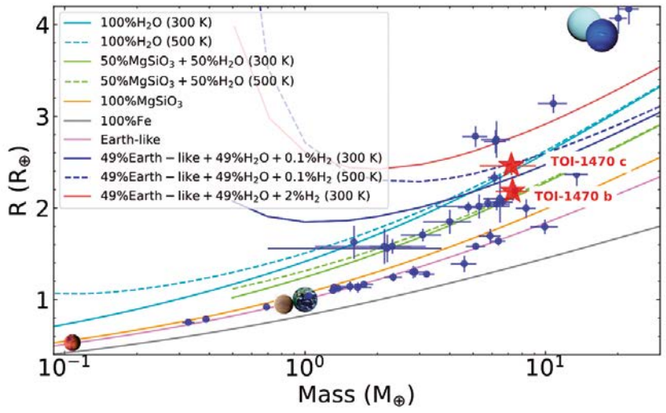
OSN observations of **blazars**, contributing to the MAGIC and WEBT collaborations, have crystallized into six papers in 2023, including the discovery of X-ray polarization angle rotation in the jet from blazar Mrk 421 [78].

The **trans-Neptunian objects (TNOs)** programs are used to constrain the physical properties of distant solar system icy bodies through stellar occultations and photometry. Four papers were published in 2023, one of which detected for the first time a large topographic feature on the surface of TNO 2002MS4 [313] (Fig. 2).

The follow-up of **gamma-ray bursts** to study their temporal evolution has resulted in the publication of a paper [42] and two circulars.



The large topographic feature on the surface of the TNO 2002 MS4 measured by stellar occultations. The plot shows a general view of the detected limb and a summary of possible topographic solutions. In black, the dotted line is the best-fit global limb model and the solid line is the model for the local topography. The solid gray lines limit the 1σ error bars of the topographic model and the filled gray color shows the proposed global limb with topography. The blue segment is the positive detection from the Varages station. The orange and green segments correspond to the negative images acquired at the Montsec and Asiago stations, respectively. Figure from [313].



Planetary radius-mass diagram obtained for planets orbiting M-type stars (blue dots) and discovered using the RV and transit methods (based on the NASA Exoplanet Archive). All planets have masses lower than 14% and radius uncertainties lower than 10%. The different planetary composition models of Zeng et al. (2016) are shown with solid colored lines. The red stars indicate the positions of TOI-1470 b and c. Venus, Earth, Mars, Jupiter, and Uranus are shown for comparison. Figure from [126].

The **SN2** project, focused on building a spectrophotometric sample of Type Ia supernovae, has been completed after three years of observations. Two papers based on this data are in preparation.

Other programs underway at OSN include the **exoplanetary transits** project, the **TESS follow-up** project and the **photometric observations of the recurrent nova T Crb**, which is expected to erupt in 2023 or 2024.

Main Technical Activities

The T150 telescope has been operational since July 2023 thanks to the hard work of the OSN and UDIT staff: the mirrors were positioned in less than half a day and collimated in only 3 hours. The ALBIREO spectrograph was installed on T150 in July 2023 and is currently being commissioned. The DIPOL-1 polarimeter was installed on T90 in September 2023.

External collaborations

- SMART Project (Univ. Huelva), analysis of interplanetary matter impacting our planet with five robotic cameras.
- Topo-Iberia station (Univ. Barcelona), a GPS station used for integrated studies of topography and 4-D evolution.
- Atmospheric CH_4 and CO_2 monitors owned by IACT-CSIC.
- An agreement between OSN and Univ. Granada for the exchange of meteorological data of the Sierra Nevada within the SmartEcomountains project (active since Sept. 2023).
- Master in Astronomy & Astrophysics (Valencia International Univ.), for which observing practices are carried out under an agreement.

VOLVER AL ÍNDICE →

The ESFRI initiatives

Square Kilometer Array (SKA)

The Square Kilometre Array (SKA) project, an ESFRI landmark and the world's second intergovernmental organisation (IGO) dedicated to astronomy, will be the world's most sensitive radio telescope, able to conduct transformational science in different scientific fields. **Spain joined the SKA Observatory as the 9th member country on April 5, 2023.**

SKA construction began in 2021. The IAA is coordinating the Spanish participation in SKA. These coordination activities are largely financed by direct funding for SKA-Spain coordination from the Ministry of Science, Innovation and Universities (MICIU), published in the General State Budget since 2021, and promote the participation of the Spanish community in relevant SKA working groups, committees and forums.

SKAO is working to build a Global Network of SKA Regional Centers (SRCNet). Since 2019, the SRCSC (SRC Steering Committee, with an IAA Representative) and SKAO have been working on the SRCNet governance model, with a provisional model having been approved for its development phase. In 2022, the prototyping phase of the SRCNet began with the participation of 7 international teams, one of them led by members of the IAA-CSIC (called "Coral Team"). During this stage, espSRC (the Spanish prototype SRC, developped as part of the IAA Severo Ochoa Strategic Program) is serving as a testing ground for the evaluation of the technologies to be implemented in the SRCNet. In this sense, in parallel to the development of the platform, espSRC is already providing support to scientific and training projects and, at the same time, operates in development mode for the prototyping of the SRCNet. Furthermore, espSRC is one of the 9 nodes that have shown interest in participating in the first operational version of the SRCNet.

European Solar Telescope (EST)

The European Solar Telescope (EST), an ESFRI landmark, will be the largest solar telescope in Europe. With a 4.2-meter primary mirror and state-of-the-art technology, it will provide astronomers with a unique tool to understand the Sun and study space weather conditions. Currently, the project is articulated around the Canary Islands Foundation "European Solar Telescope", created in July 2023 as a preliminary step to the constitution of a European Research Infrastructure Consortium (EST-ERIC), the legal figure chosen to manage the construction and operation phases of the telescope.

CSIC, through the IAA Solar Physics Group, participates in EST in three different ways. First, it is part of the EST Science Advisory Group (SAG), in charge of defining the scientific objectives of the telescope and supervising the technical aspects of the project. Secondly, CSIC manages the EST Communication Office, coordinating the communication and dissemination activities of the 23 institutions that were part of the EST Preparatory Phase and the 8 entities of the EST Canary Foundation. Thirdly, CSIC is actively involved in the development of advanced scientific instrumentation for the telescope, which imposes unprecedented technological challenges due to the size of the telescope and the amount of data it will generate. Moreover, the IAA-CSIC is responsible for the validation of the new optical elements and polarization modulators that will be used for the first time in these instruments, as well as the data processing and analysis systems. In particular, the IAA is leading the development of three telescope instruments, the Tunable Imaging Spectropolarimeters/Fixed-Band Imagers (TIS/FBI), coordinating a consortium of 5 European institutions.

Credits: SKA Observatory

Credits: EST project, Gabriel Pérez (IAC)

Credits: CTAO,

Credits: ESO, ELT project

Cherenkov Telescope Array (CTA)

CTA will be the largest and most sensitive high-energy gamma-ray observatory in the world, with a large collecting area and wide sky coverage. It will exceed the performance of existing instruments in terms of angular resolution, energy coverage and field of view. The formal application to the European Commission to establish the CTAO (CTA Observatory) ERIC has been submitted. CTA is an ESFRI landmark.

The IAA is involved in the design and development of software relevant to the future operation of the Observatory. In particular, IAA-CSIC is involved in the development of Gammapy (https://gammapy.org), a Python-based package for high-level data calibration and analysis, the reference package for CTA data processing. In addition, the IAA science groups will devote significant effort to the scientific exploitation of the CTA observatory. IAA researchers are co-leaders of most of the early publications from the first CTA telescope (LST-1), focusing on active galactic nuclei fields and black hole-related phenomena at all scales.

Extremely Large Telescope (ELT)

ESO is developing the ELT, a revolutionary ground-based telescope that will have a 39-metre primary mirror, making it the world's largest visible and infrared telescope. In 2021, the ESO Council approved the official launch of two new second-generation instrument projects for the ELT, ANDES and MOSAIC, both with IAA participation.

The most recent and important milestones for ANDES and MOSAIC were the successful completion of the "Early Phase B" (ANDES: 17 September 2023, MOSAIC: 15 March 2023), the completion of which allows the signature of the instrument construction start agreement between the consortia and ESO. For MOSAIC, the first cryogenic tests with cryomotors were carried out at the IAA. In addition, the IAA team worked on the instrument system architecture, to be reviewed in 2024. For Andes, the system architecture review of the instrument passed.

Sky Quality Office
(OCC-IAA)

Southwestern horizon from the megalithic park of Gorafe (Geopark of Granada). The high clouds highlight the light pollution and its colours. Credits: Máximo Bustamante-Calabria

Overview

The OCC was created in 2016 as an instrument to preserve astronomical quality at the Sierra Nevada and Calar Alto observatories against the threat of light pollution. Due to an increase of night sky brightness in recent years, the aim of the office is to serve as a scientific reference for institutions and agents in the protection and improvement of the dark sky, in addition to advising and promoting the best practices for correct outdoor lighting. Illuminate properly and sustainably is essential to preserve the nocturnal ecosystem and minimize the harmful effects to human health. To monitor the sky brightness, the OCC has installed different types of photometers at the Sierra Nevada Observatory and at the IAA buildings.

Highlights and Activities

Research: A scientific paper has been published in 2023 by members belonging to the office. The article shows zenith sky brightness maps of Catalonia combining ground-based measurements, images of space and models [189]. An international scientific meeting, "Light pollution: Challenges and responses for monitoring it", held in November at the IAA, was dedicated to addressing the issues surrounding light pollution, which is a matter of significant environmental and legal concern. This event was organized by the Ministry of Science and Innovation of the Spanish government in collaboration with the Spanish Network of Studies on Light Pollution on the occasion of the Spanish presidency of the Council of the European Union. The OCC also presented the first results on the sky brightness measurements taken at the OSN in the RIA meeting "Red de Infraestructuras de Astronomía: promoviendo sinergias entre grandes observatorios españoles" in La Palma. The office involvement in the interdisciplinary meeting of young researchers on sustainability "Futuro y sostenibilidad", organized by the University of Granada, is also noteworthy.

Regarding actions related to our observatories, an inventory of sources of light pollution in the areas of influence of Sierra Nevada and Calar Alto observatories has been performed. In addition, the OCC has elaborated a technical report on the impact of a possible wind farm project in the vicinity the Calar Alto Observatory.

The participation in **educational and outreach activities** is one of the main tasks of the OCC, with the aim of raising public awareness on the threat of light pollution. The office has participated in the CESAR Teachers' Course, giving a lecture on the problem of light pollution, and in the PIIISA project on how to distinguish the different types of outdoor lighting in cities through their spectra. Moreover, the office staff gave many talks in astronomical activities, and published several articles in outreach science magazines and blogs.

Public Outreach

The activities of the IAA-CSIC Communication, Education and Public Outreach Unit cover almost all existing formats to communicate science.

Events

CCSC2023. Coorganization and participation in the "IX Congreso de Comunicación Social de la Ciencia", which brought together about 400 experts and professionals in communication, outreach, and the promotion of scientific culture in Granada.

100xCiencia. Organization of the annual meeting of the SOMMa Alliance, which brings together the scientific community from the Severo Ochoa Centers of Excellence and the María de Maeztu Units of Excellence. Working groups, communication masterclasses and the public event ""Siete preguntas que cambiarán el mundo".

CAHA 50th anniversary. Organization of an event in Almería to celebrate the 50th anniversary of the Observatorio Astronómico de Calar Alto.

Coorganization of the event "**El Futuro de la Astrofísica de muy altas energías a través del Open Science: Oportunidades con el Cherenkov Telescope Array Observatory (CTAO)"**

Social Networks.
Twitter, facebook, youtube and Instagram profiles managing.

https://twitter.com/iaa_csic
https://www.facebook.com/iaa.comunicacion
https://www.youtube.com/user/iaaudc
https://www.instagram.com/iaa_csic

Festivals

Granada Book Fair 2023. Organization of the "Área de la Ciencia", a stand for science outreach activities at the Granada Book Fair 2023, with EEZ-CSIC and Parque de las Ciencias.

AstroSound II festival in collaboration with the Granada Sound Festival.

The European Researchers' Night takes place every year all over Europe the last Friday of September. The IAA-CSIC took part in the event in Granada on Friday 29th September.

Desgranando Ciencia science festival. Collaboration and participation with differentes talks.

Collaboration and participation in **Pint of Science,** a 3-day event that invites cutting-edge researchers to share their knowledge in a relaxed and informal atmosphere: a bar.

Participation in **TAI Granada**. Talk by Daniel Morcuende (IAA-CSIC) y Alba Fernández Barral (CTAO) about the universe and Artificial Intelligence.

Participation in the **Gravite Festival** with the "Territorio Gravedad" projection.

Special projects

Espectáculo "im=P·r(0): Un viaje de ida a las estrellas". An innovative project that mixes science and improvisation theatre techniques.

Espacio 3: Science and Performing Arts Laboratory. A monthly event in the Palacio del Almirante (Albaicín) that mixes science talks, theater and impro. Project led by Sara Cazzoli.

Training

Organisation of the communication techniques course **"Contar la ciencia con excelencia".**

Participation in different courses and workshops about science communication.

Education

PIIISA Project. A multidisciplinary project designed to allow high school students work with scientists. The IAA-CSIC is the founder of the project.

School visits and **university talks.**

Participation in **"Escuela de Jóvenes Científicos e Ingenieros de FUNDECYT"**

ESCUELA MUNICIPAL de Jóvenes Científicos

Gender & Diversity

11 February, International Day of Woman and Girls in Science. Conferences, workshops with students and video. https://www.iaa.csic.es/noticias/dia-internacional-mujer-y-nina-en-ciencia-2023

8 March, International Day of Woman. Round Table Women leaders of scientific societies

28th June, Pride Day. Seminar "Un universo de diversidad: historias LGTBI en el mundo de la razón y la ciencia" by Javier Armentia

Exhibitions

Expositions "**RoadMap: estudiando el omnipresente pero aún desconocido polvo marciano"** and **"Gaia: mil millones de ojos para 1.800 millones de estrellas"**

Planetarium Go! 360º street cinema. Projection of the IAA productions "El Enigma Agustina", "Territorio Gravedad" and "Reaching for the Sun".

Audiovisuals

IAA Institutional video: Production of a new institutional video

Talks

Lucas Lara popular talks. These conferences are held since in 1995. We celebrated seven talks this year.

Organization of a **public conference by Reinhard Genzel**, the 2020 Nobel Prize in Physics Laureate, at the Parque de las Ciencias.

II Ciclo de Conferencias 'El Universo desde Sevilla'. Talks by Rainer Schoedel, Emilio J. Alfaro, David Orozco and Eulalia Gallego in the Museo Casa de la Ciencia (Sevilla)

TEDxGranada."Explorando el universo a ciegas: un viaje astronómico sin barreas" by Enrique Pérez Montero

Naukas Bilbao 2023. "Feo, fuerte, formal". Charla impartida por Sara Cazzoli

Big scientific projects

PRE-EST project (European Solar Telescope). Communication support and different communication activities.

SKAO (Square Kilometre Array Observatory). Communication support and different communication activities.

CTAO: Communication support and different communication activities.

PLATO: Communication support and different communication activities.

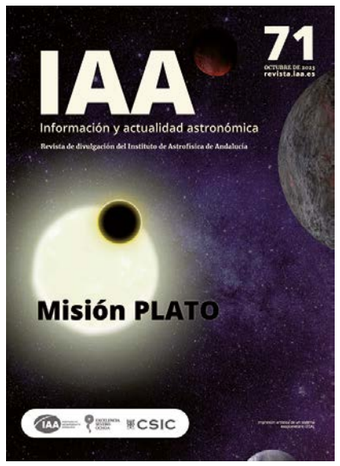
Inclusion

Participation in the **AMANAR project** with a visit of children in Saharawi refugee camps to Calar Alto Observatory.

Astronomía Accesible. This project aims to enhance the popularization of astronomy among blind and low-vision people.

Collaboration with the **NGO Solidarios**. IAA researchers gave lectures in the Culture Classrooms of the Albolote penitentiary center.

Participation in the **solidarity calendar "Granadown 2024"**



Magazines, Journals, Blogs

Popular Science Journal IAA: Información y Actualidad Astronómica. Issued once every four months, it is devoted to high school and university students, as well as general public interested in astronomy. Issues in 2023: 69, 70,71.

Revista Astronomía. The IAA maintains a monthly collaboration with the magazine, the only one with a commercial circulation specialised in astronomy.

Strong participation in **CSIC Investiga 6. Revista de Ciencia,** a biannual popular science magazine edited by the CSIC Communication Department.

Participation in the blog **'La cuadratura del círculo**' (eldiario.es)

Awards

Ascensión del Olmo and José Luis Gómez received the "Granada City of Science and Innovation" 2022 awards in the categories *"Women and Science"* and *"Impact on knowledge"*, respectively.

Francisco Bailén was awarded with the *2023 PhD Prize of the Spanish Astronomical Society (SEA)* in "instrumentation, computation and technological development" for this PhD thesis "Spectropolarimetric and imaging properties of Fabry-Pérot etalons. Applications to solar instrumentation".

Antonio Fuentes received a *2023 Even Horizon Telescope Outstanding Phd thesis award* for his contribution to the first static and dynamic images of Sgr A* and his contribution to a deeper understanding of blazar jet physics through space-VLBI observations and simulations; his Phd thesis also received a Special Mention in the *SEA PhD Prizes*.

Josefa Masegosa was awarded with the Prize to the *"University Spirit and Human Values"* from the Social Council of the University of Almería, for her research work in the field of galaxy evolution, as well as for her activism in promoting women's access to science and engineering studies.

Francisco Prada was awarded with the colective recognifion from the prestigious *Giuseppe and Vanna Coccony Prize in Cosmology of the European Physical Society*, to the SDSS/BOSS/eBOSS Collaboration.

Alberto Castro-Tirado received a *Prize from the University of Málaga* recognising research of excellence in conmmoration of UMA's 50th Anniversary.

Workshops & meetings

International Meetings

VI Meeting of AGN Research in Spain in the Era of the New Observatories
International Meeting
IAA-CSIC, January 30 - February 1
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
A. del Olmo, S. Cazzoli, A. Deconto Machado, M. Guerrero, J. Masegosa
https://www.granadacongresos.com/agn2023

ANDES technical meeting
International Workshop
IAA-CSIC, Oct 24 - 25, 2023
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
P. Amado
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
P. Amado, R. Calvo, R. Varas

SO/PHI team meeting
International Workshop
IAA-CSIC, Oct 09 - 11, 2023
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
D. Orozco, H. Strecker

VIII Reunión Española de Física Solar y Heliosférica
National Meeting
IAA-CSIC, Jul 11 - 13, 2023
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
A. Siu Tapia, J. del Toro
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
F. Bailén, E. Bailón, A. Moreno Vacas, P. Santamarina, A. Siu Tapia, H. Strecker, J. del Toro
https://www.granadacongresos.com/refsh?fbclid=IwAR0bl7jx-UevZ_ohUT6wdE3CrxZ3gQATlaZH9oUYFlGcpV_yxyOtbDN7MfAg

7th Workshop on Robotic Autonomous Observatories (AstroRob2023)
International Workshop
Málaga, Oct 16-20, 2023
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
M. D. Caballero-García, A. J. Castro-Tirado, S. Guziy, D. Martínez-Delgado
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
E. J. Fernández-García, Y.-D. Hu, I. Pérez-García, R. Sánchez-Ramírez y S.-Y. Wu
http://astrorob.iaa.es

Quantum Field Theory in Curved Spacetimes Workshop II
International Workshop
IAA-CSIC, May 24 - 26, 2023
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
J. Arrechea Rodríguez, G. García Moreno
https://sites.google.com/view/qftcsworkshop2023/home

20th Electromagnetic and Light Scattering Conference
International Conference
Almuñecar, May 15 - 19, 2023
IAA MEMBERS OF THE ORGANIZING COMMITEE:
O. Muñoz
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
O. Muñoz, F. Moreno
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
O. Muñoz, F. Moreno, E. Frattin, J. Gómez, F. Malaval, J. Martikainen, D. Guirado, A. Pelegrina
https://www.granadacongresos.com/els2023

CTAC/CTAO General Meeting
International Meeting
IAA-CSIC, Apr 24 - 28, 2023
IAA members of the Local Organizing Commitee:
R. López Coto, J. Agudo, J. Escudero, A. Pelegrina, A. Alberdi
https://www.granadacongresos.com/ctac-ctao

Galactic Center Workshop 2023
International Workshop
Granada, Apr 24 - 28, 2023
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
R. Schoedel, J. Gómez
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
A. Gardini, M. Cano, E. Gallego, Á. Martínez
https://www.granadacongresos.com/gcw2023

Meeting on Light Pollution: Challenges and Responses for Monitoring it
International Meeting
IAA-CSIC, Nov 14 - 15, 2023
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
A. Sánchez de Miguel, S. Martín
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
A. Pelegrina, A. Alberdi, J. Vílchez, J. Ortiz, S. Martín, M. Bustamante, E. García Gómez-Caro, C. Navas
https://www.iaa.csic.es/noticias/meeting-light-pollution-challenges-and-responses-monitoring-it

Schools

2nd IAA-CSIC Severo Ochoa Advanced School on Star Formation
Granada, Nov 27 - Dec 01, 2023
IAA MEMBERS OF THE ORGANIZING COMMITEE:
R. Schoedel
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
A. Pelegrina López, M. González García
https://www.granadacongresos.com/starform2023

IAA-CSIC Severo Ochoa Basics of Neural Networks School
IAA-CSIC, Nov 16 - 17, 2023
IAA MEMBERS OF THE ORGANIZING COMMITEE:
R. Schoedel, L. Darriba Pol, J. Moldón Vara
https://indico.iaa.csic.es/event/4/

Near-Infrared Interferometry
IAA-CSIC, Oct 02 - 02, 2023
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
R. Fedriani
https://indico.iaa.csic.es/event/7/

PySnacks 4: SHERLOCK: A python pipeline to explore space-based observations in the search for planets
IAA-CSIC, Jun 21 - 21, 2023
https://docs.google.com/forms/d/e/1FAIpQLSf3LCWdpRFmz-0JVl9GtG52KDRaGLKNEEw674XWk0WWAAqz6JQ/viewform?usp=pp_url

IAA-CSIC Severo Ochoa SKA Open Science School
IAA-CSIC
IAA MEMBERS OF THE SCIENTIFIC ORGANIZING COMMITEE:
J. Garrido S. Sánchez, L. Verdes-Montenegro Atalaya
IAA MEMBERS OF THE LOCAL ORGANIZING COMMITEE:
L. Darriba, M. González, Y. Jiménez, A. Pelegrina, M. Villaverde
https://www.granadacongresos.com/skaopenscience

Gender actions

Overview

The IAA has been always characterized by its support to inclusive initiatives in Gender Equality. This trajectory has taken form in the creation of the Institute's Gender Equality Commission and the elaboration and approval of the First Gender Equality Plan of the IAA-CSIC (GEP), in 2017. Here we present the main activities of the year 2023. The Equality Commission continued its work of counseling on the necessary or appropriate measures to actively integrate the principle of gender equality between women and men in the daily life of the centre, as well as organizing events to raise awareness of the role of women in science.

Highlights

In addition to ensuring the gender equality measure, the Gender Equality Commission of the IAA-CSIC acts as the Gender Working Group of the gender equality plan drawn up by the Severo Ochoa project. All their governance bodies verify the gender equality, and the following actions have been contemplated:

Activities for the International day of Women and Girls in Science (11 February).

Conferences: Different informal meetings with female researchers, engineers, and technicians of the IAA were held with alumni of educational centers in Granada with the aim of highlighting the role of women in the different branches of science. These included open discussions, reflections, and questions about gender roles and the existing stereotypes around science, technology, and engineering.

Round Table: Primary school children from the CEIP Alcazaba school met a few female astronomers from the IAA-CSIC to ask them questions about astronomy, their careers, or what they desired. This year, researchers Mariel Lares Martiz, Clara Cabanillas de la Casa, Ana Conrado Pérez and Marta Puig Subirà participated in this event.

Astronomical Tables: Secondary school children are confronted with astronomers, who rotate every 10 minutes, allowing them to have a fruitful exchange of information from the different areas of knowledge at the institute. The participants in this event were the researchers María Balaguer Jiménez, Eulalia Gallego Cano, Sara Cazzoli, Susana Sánchez Expósito, Mirjana Pović, Gabriella Gilli, and Yolanda Jiménez Teja, and about 30 ESO students from the Zaidín Vergeles Secondary School.

"Is that question for me?": School children from primary schools posed questions about astronomy, and the astronomers Olga Muñoz Gómez, Camilla Danielski , María del Carmen Pastor Morales, Belén Martínez Mondejar and Teresa Toscano Domingo answered them in a very accessible and funny format. The recording of this event is available at the IAA-CSIC YouTube channel
https://www.youtube.com/watch?v=m-CVb0lncks

Exhibition "AstrónomAs": The exhibition "Astrónomas" (http://astronomas.org) , with the participation of astronomers from the Instituto de Astrofísica was installed in the University of Almería.

In addition, the Severo Ochoa manager, Alicia Peregrina was invited to participate in the round table **"Mujeres Granadinas que hacen Ciencia"**, organized by the equality service of the Granada City Council. It can be watched on the local TV channel tg7.
https://www.youtube.com/watch?v=gJnzKWjKZXg

Activities from the International Day of Women (8 de Febrero):

Evento "Igualdad y Sociedades Científicas": Round table with the participation of Ana Xesus López Díaz (RSEF), Anabel Forte Deltell (RSEM), Alicia García Holgado (SCIE) and Marina Rodriguez Varas (SEA), coordinated by Isabel Márquez Pérez, Science Deputy Director of the IAA. In this event, the role played by the Scientific Societies in the empowerment of female researchers was analyzed.

Participation in "Primer Encuentro de Científicas y Empresarias de Granada". Round table with the participation of the IAA researchers Maria Balaguer and Isabel Márquez.

Other activities:

Vera Rubin Colloquium: 15 colloquia, out of the 28 offered, were given by female researchers.

Production of the **annual statistics** segregated by gender.

We continued **collaborating with scientific outreach magazines** and the newspapers El Pais, Granada Hoy, and Ideal. In the IAA magazine *Información y Actualidad Astronómica*, several articles were published with the aim of enhancing the visibility of female scientists who have contributed significantly to the development of astronomy.

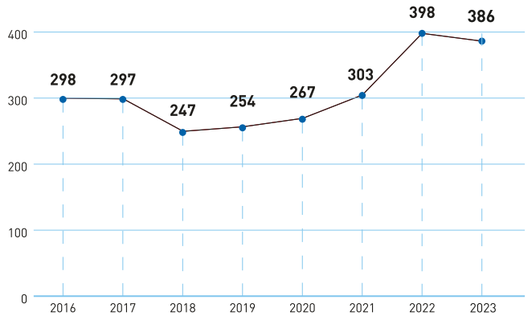
The IAA´s Gender Equality Committee, together with the Committees of the other institutes of the CSIC in Granada, has created a network with the main objective of sharing experiences and resources.

CSIC Gender Equality Commission Meetings: We participated in the meeting of equality committees of the CSIC ICUs, held on 26/05/2023 in the IPLN-CSIC in Granada.

SOMMA Gender Equality Commission Meetings: We participated in the meeting held in Granada in October 2023 during the "100xCiencia7".

Different awards have been obtained during this year: *Ascensión del Olmo Orozco* obtained the award "Women in Science" on the fourth edition of the prices "Granada, Ciudad de la Ciencia y la Innovación", *Josefa Masegosa Gallego* was awarded with the prize of the Consejo Social de la Universidad de Almería al "Espiritu Universitario y Valores Humanos" and *Yolanada Jimemez Teja* with the prize "Menesteo 2022 Mujeres en la Ciencia" from the Ayuntamiento de El Puerto de Santa María.

Publications



IAA publications in SCI journals

The research activity carried out at the IAA-CSIC during 2023 can be measured by the number of publications in scientific journals included in the Science Citation Index (SCI), i.e., international journals recognized by their quality and impact. In 2023, this activity resulted in **386 papers published** in journals of the SCI.

The complete list of the IAA-CSIC publications in 2023 is given in the Annex at the end of this report.

The evolution of the number of SCI publications since 2016 is shown below. Along the years, the number of publications had fluctuated around an average value of 300 papers per year, but it has significantly increased in the last two years.

The publications of the IAA-CSIC are mostly distributed in high impact journals. About 87% of our publications appeared in journals of the first quartile (top 25% journals, or Q1). Among these publications, 6% appeared in the first decile (top 10% journals, or D1); 20 papers were published in journals from the Nature/Science editorial groups. Most of the IAA-CSIC scientific results are published in *Astronomy & Astrophysics* and *Monthly Notices of the Royal Astronomical Society*, the main European astronomical journals. A significant fraction of our results is published in *Astrophysical Journal*, the most important American astronomical journal.

Another aspect of the scientific research of the IAA and its quantitative results is the leadership of these publications. **In about 15% of the IAA SCI 2023 publications their first author belongs to our institute.** This is consistent with the leadership of the IAA in the last 5 years.

Number of publications by journal

129 Astronomy and Astrophysics
66 Monthly Notices of the Royal Astronomical Society
41 Astrophysical Journal
31 Astrophysical Journal Letters
14 Astronomical Journal
11 Galaxies
10 Nature
9 Journal of Geophysical Research, Planets
7 Astrophysical Journal Supplement Series
6 Nature Astronomy
5 Atmospheric Measurement Techniques
Icarus
4 Journal of Geophysical Research, Atmospheres
Planetary Science Journal
2 Aerospace
Atmospheric Chemistry & Physics
Frontiers in Astronomy and Space Sciences
Geophysical Research Letters
International Journal of Modern Physics D
Journal of Cosmology and Astroparticle Physics
Journal of Geophysical Research (Space Physics)
Journal of Quantitative Spectroscopy and Radiative Transfer
Nature Communications
Physical Review D
Publications of the Astronomical Society of the Pacific
Science
Solar Physics
Space Science Reviews
16 Other

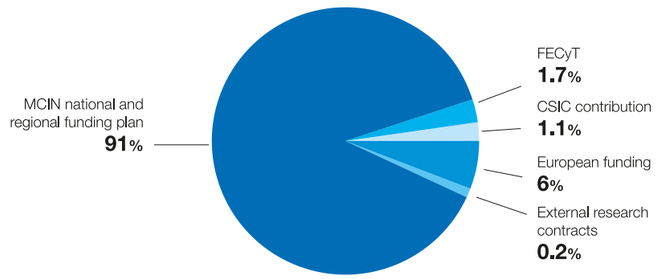
Funding

IAA obtains most of its funding through competitive European and Spanish grants (**7.4 million €**).

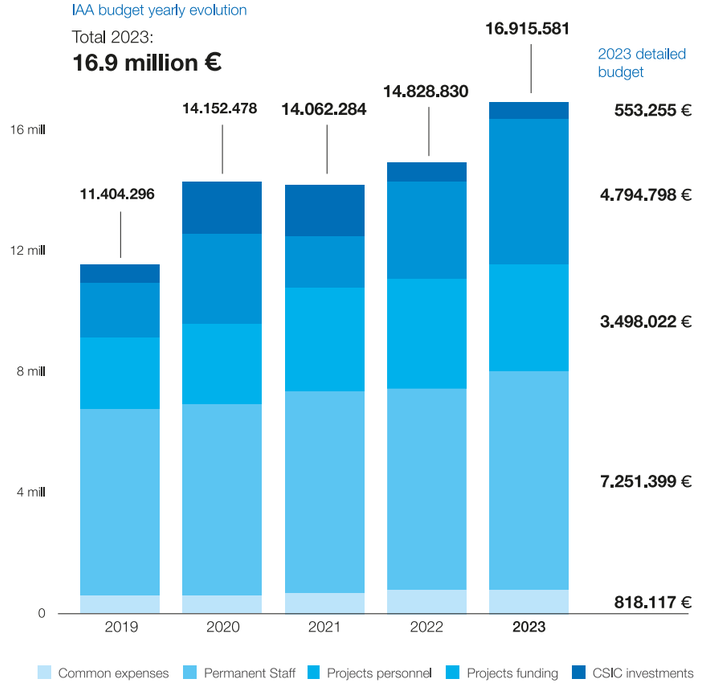
During 2023, IAA has a total budget of **16.9 million €**, from which **8.85 million €** (52%) come from competitive projects and CSIC investments; the other **8.05 million €** (48%) corresponds to the permanent staff total cost and common expenses.

The yearly evolution of the IAA budget in the last 5 years is shown below, including the different concepts.

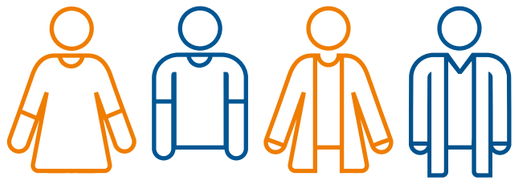
IAA 2023 competitive fundings
Total:
7.4 million €



IAA budget yearly evolution
Total 2023:
16.9 million €



Staff



Assigned research group

[1] Solar Physics
[2] Planets and minor bodies
[3] Terrestrial atmosphere
[4] Low-mass stars
[5] Stellar variability
[6] ARAE
[7] Stellar systems
[8] Physics of the interstellar medium
[9] AGN jets
[10] Galaxy evolution
[11] Theoretical gravitation and cosmology
[12] Cosmology and particle physics

STAFF RESEARCHERS

Research Professors

Alberdi Odriozola, Antonio María [8]
Castro Tirado, Alberto Javier [6]
del Toro Iniesta, Jose Carlos [1]
González Delgado, Rosa María [10]
Lara López, Luisa María [2]
López Puertas, Manuel [3]
Pérez Jiménez, Enrique [10]
Prada Martínez, Francisco [12]
Vílchez Medina, José Manuel [10]

Scientific Researchers

Aceituno Castro, Jesús [10]
Alfaro Navarro, Emilio Javier [7]
Anglada i Pons, Guillem Josep [8]
Bellot Rubio, Luis Ramón [1]
Caballero García, María Dolores [6]
Funke, Bernd Rainer [3]
Gómez Fernández, José Luis [9]
Guerrero Roncel, Martín [8]
Márquez Pérez, Isabel [10]
Masegosa Gallego, Josefa [10]
Moldón Vara, Javier [10]
Moreno Danvila, Fernando [2]
Muñoz Gómez, Olga [2]
Ortiz Moreno, José Luis [2]
Pérez Montero, Enrique [10]
Pérez Torres, Miguel Angel [8]
Rodríguez Martínez, Eloy [4]
Schoedel, Rainer [7]
Verdes-Montenegro Atalaya, Lourdes [10]

Senior Scientists

Agudo Rodríguez, Juan Iván [9]
Amado González, Pedro José [4]
Barceló Serón, Carlos [11]
Claret dos Santos, Antonio [6]
del Olmo Orozco, Ascensión [10]
Duffard, René Damián [2]
Fernández Hernández, Matilde [4]
García Benito, Rubén [10]
García Comas, Maia Leire [3]
Gómez Martín, Juan Carlos [2]
Gómez Rivero, José Francisco [8]
Gordillo Vázquez, Francisco José [3]
Gutiérrez Buenestado, Pedro José [2]
Iglesias Páramo, Jorge [10]
Kehrig Martin dos Santos, Carolina [10]
López González, María José [3]
López Jiménez, Antonio Carlos [1]
López Valverde, Miguel Angel [3]
Luque Estepa, Alejandro [3]
Miranda Palacios, Luis Felipe [8]
Olivares Martín, José Ignacio [5]
Orozco Suárez, David [1]
Perea Duarte, Jaime David [10]
Rodríguez Gómez, Julio Federico [5]
Ruedas Sánchez, José [13]

Permanent doctor contract

González Galindo, Francisco [3]
Guirado Rodríguez, Daniel [2]
Osorio Gutiérrez, Mayra Carolina [8]
Pozuelos, Francisco [4]
Rodríguez López, Cristina Teresa [4]
Santos Sanz, Pablo [2]

Ad honorem

Aldaya Valverde, Víctor [11]
Garrido Haba, Rafael [5]
López Moreno, José Juan [2]

Research Advisor

Rodríguez Espinosa, José Miguel [10]

Associated Doctors

Cardesín, Alejandro [3]
Duarte Puertas, Salvador [10]
Korsaga, Marie [10]
Luque Ramírez, Rafael [4]
Madiedo Gil, José María [2]
Masqué Saumell, Josep María [8]
Namumba, Brenda [10]
Povic, Mirjana [10]

Ramón y Cajal Postdocs

López-Coto, Rubén [9]

Juan de la Cierva Postdocs

Fedriani López, Rubén [8]
Rizos García, Juan Luis [2]

Marie Curie Postdocs

Jiménez Teja, Yolanda [10]

Postdocs

Agís González, Beatriz [10]
Alvarez Candal, Alvaro Augusto [2]
Arrechea Rodríguez, Julio [11]
Attree, Nicholas Oliver [2]
Bender, Stefan [3]
Candini, Gian Paolo [5]
Cazzoli, Sara [10]
Cho, Ilje [9]
Danielski, Camilla [3]
Darriba Pol, Laura [10]
de Franciscis, Sebastiano [5]
Díaz García, Luis Alberto [10]
Fratin, Elisa [2]
Fuentes Fernández, Antonio [9]
Gallego Calvente, Aurelia Teresa [1]
Gallego Cano, Eulalia [12]
Gardini, Angela [7]
Garrido Sánchez, Julian [10]
Gendron Marsolais, Marie Lou [10]
Gilli, Gabriella [3]
Guziy, Seriy [6]
Hess, Kelley Michelle [10]
Hu, Youdong [6]
Ianjamasimanana, Roger [10]
Karunakaran, Ananthan [10]
Lares Martiz, Mariel [5]
Leiva Espinoza, Rodrigo Andrés [8]
Lico, Rocco [9]
Martikainen, Julia Anneli [2]
Martín Ruiz, Susana [5]
Martinez, Antoine [2]
Martinez Delgado, David [6]
Martínez Solaeche, Ginés [19]
Morcuende Parrilla, Daniel [9]
Novakovic, Bojan [2]
Nyffenegger Péré, Yaniss Inouk [3]
Ocaña Fernández, Antonio Jesús [2]
Otero Santos, Jorge [9]
Parra Royón, Manuel Jesús [10]
Pascual Granado, Javier [5]
Pérez Invernón, Francisco Javier [3]
Roche, Nathan [10]
Rodón Ortiz, José Ramón [5]
Sánchez López, Alejandro [3]
Sánchez Ramírez, Rubén [6]
Schoefer, Patrick [4]
Shulyak, Denis [2]
Siu Tapia, Azaymi Litzi [1]
Sorgho, Amidou [10]
Stolzenbach, Aurélien [3]
Strecker, Hanna Maria [1]
Traianou, Efthalia [9]
Van Vliet Wiegert, Theresa Beatrice Veronica [10]
Zhao, Guangyao [9]

FPI & FPU PhD

Agüi Fernández, José Feliciano [4]
Arroyo Polonio, Antonio [10]
Blázquez Calero, Guillermo [8]
Brines Montoro, Adrián [3]
Cala Barón, Roldán Alonso [8]
Conrado Pérez, Ana María [10]
Dorantes Monteagudo, Antonio Jesús [1]
Escudero Pedrosa, Juan [9]
Fernández García, Elena [12]
Ferrer Ereza, Julia [12]
García Izquierdo, Francisco José [2]
García Moreno, Gerardo [11]
Giménez Alcázar, Antonio [10]
Labadie García, Ixaka [10]
Martínez Arranz, Álvaro [7]
Martínez Mondejar, Belén [3]
Méndez Gallego, Javier [9]
Montoro Molina, Borja [8]
Moreno Vacas, Alejandro Miguel [1]
Peláez Torres, Alberto [3]
Peña Moñino, Luis [98]
Pérez Díaz, Borja [10]
Placinta Mitrea, Alexandru Florin [8]
Puig Subirá, Marta [10]
Ramón Ballesta, Alejandro [5]
Revilla Martínez de Albéniz, Daniel [4]
Rodríguez Martín, Julio Esteban [10]
Sánchez Sánchez, David [3]
Santamarina Guerrero, Pablo [1]
Toscano Domingo, Teresa [9]
Vara Lubiano, Mónica [2]
Vera Moreno, Manuel [1]
Woldeyes, Betelehem Bilata [10]

PhD contracts

Cano González, Miguel [7]
Dahale, Rohan [9]
Deconto Machado, Alice [10]
Foschi, Marianna [9]

JAE-Intro

Aguadero Garrido, Pablo [2]
Azuara Andreu , Eduardo [11]
Barrios Tascón, Ignacio [4]
Bonnal, Simon [10]
Bravo Ferres, Lucía [7]
Castillo Cucura, Andreea [5]
Fernández Ruiz, Patricia [8]
García Soto, Silvia [10]
Gavira Balmacz, Leonardo [9]
Gómez-Limón Gallardo, José María [2]
Grana Ramos, Daniel [4]
Lara Bogatell, Huascar Caissara [8]
Lechuga Cabrero, Diego [4]
Moyano Rejano, Inmaculada [4]
Ríos Monje, Carlos [10]
Rodríguez Gallardo, Álvaro [10]

ENGINEERS & TECHNICIANS

Mechanics

Alvarez Moreno, Fernando
Bustamante Díaz, María Isabel
Calvo Ortega, Rocio
Sánchez Carrasco, Miguel Andrés [5]
Varas González, Roberto

Electronics

Abril Martí, Miguel
Alvarez García, Daniel [1]
Aparicio del Moral, Beatriz [5]
Balaguer Jiménez, María [1]
Castro Marín, José María [2]
Girela Rejón, Fernando Javier [1]
Hernández Sánchez, Francisco Antonio
Jiménez Ortega, Jaime [2]
Magan Madinabeitia, Héctor
Martínez Navajas, Ignacio [2]
Mazuecos Nogales, Álvaro
Morales Palomino, Nicolás Francisco [2]
Moreno Mantas, Antonio Jesús [1]
Ramos Más, José Luis [1]
Robles Muñoz, Nicolás Francisco [5]
Rodríguez Venzal, Sergio [10]
Sánchez Castañeda, Jesús [10]
Sánchez Gómez, Antonio [1]
Sanz Mesa, María del Rosario [5]
Tobaruela Abarca, Angel Fernando

Optics

Bailén Martínez, Francisco Javier [1]
Pérez Medialdea, David

Software

Armenteros Escabias, David
Bailón Martínez, Eduardo
Belmonte Giménez, Ángel [3]
Bustamante Calabria, Máximo [2]
Cabanillas de la Casa, Clara [10]
Camino Faillace, Pablo Antonio [3]
Fernández García, Emilio Jesús [6]
Gallardo Jiménez, Julio Miguel [10]
García Illescas, Ángel [10]
García Segura, Antonio Jesús
Gómez García, José Alberto [2]
Gómez López, Juan Manuel [5]
Hermosa Muñoz, Laura [10]
Ibáñez Mengual, José Miguel
Kretlow, Mike [2]
Lobón Villanueva, Francisco de Asís [5]
Mendoza Pérez, María Ángeles [10]
Morales Fernández, José Miguel [1]
Morales Muñoz, Rafael
Muñoz Torres, Sara [4]
Passas Varo, María [3]
Pastor Morales, María del Carmen [5]
Requena Carrión, Víctor [1]
Ruiz del Mazo, José Enrique
Sánchez Expósito, Susana [10]
Xiao, Haifeng [4]

OSN maintenance/support

Aceituno Castro, Francisco José
Casanova Escurín, Víctor Manuel
de la Rosa Alvarez, José Luis
Palomares Martínez, Pedro
Pérez García, Ignacio
Pérez Silvente, Tomás
Ruiz Bueno, José Antonio
Sánchez Funes, Fernando
Sota Ballano, Alfredo

SERVICES & ADMINISTRATION

Administration and project support

Blanca Gámez, Ana Belén
Cortés Guerrero, María Ángeles
Cosano Mañas, José Rufino
Fernández Torres, María Lourdes
Gómez Finnett, Susana Alicia
González Esteva, Alonso M
González García, Manuel Jesús
Heredia Maldonado, María José
Herrera Jiménez, Eva María
Jiménez del Rio, Yrene [11]
Jiménez Zafrilla, María Isabel
López Fernández, Víctor Aníbal [1]
López Moreno, Amanda [1]
Madrid Gómez, Carmen Elisa
Martínez López, Rosario
Medina Ortiz, César
Molina Guerrero, Josefina
Pelegrina López, Alicia
Peregrín Álvarez, Rosario María
Sánchez Jáuregui, Jaione
Tapia Ruiz, Francisco José
Torrededia Rodrigo, Cristina
Villaverde Aparicio, Marcos [10]

Computer center

Bayo Muñoz, Francisco Manuel
Guijarro Jiménez, Juan José
Parra Garófano, Rafael

General services

Caro Fernández, José Fernando
Molero Delgado, José Francisco
Molina Rodrigo, Antonio
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Ongoing projects

AGENCIA ESTATAL DE INVESTIGACIÓN

Title: **Centros de excelencia Severo Ochoa**
Ref.: CEX2021-001131-S
PI: Isabel Márquez Pérez
Dur.: Jan 01, 2023 - Dec 31, 2026

Title: **Desafíos de formación estelar e instrumentación avanzada para telescopios de primer nivel: TARSIS Y MOSAIC**
Ref.: PID2022-136598NB-C32
PI: Jorge Iglesias Páramo, José Manuel Vílchez Medina
Dur.: Sep 01, 2023 - Aug 31, 2027

Title: **Contribución Española a la misión CAIRT (Fase A), Interacción Sol-Tierra y Exo-atmósferas**
Ref.: PID2022-141216NB-100
PI: Bernd Rainer Funke, Maia Leire García Comas
Dur.: Sep 01, 2023 - Aug 31, 2026

Title: **Astronomía de rayos gamma con CTA-NORTE y MAGIC, proyecto 2 - contribución del IAA-CSIC**
Ref.: PID2022-139117NB-C44
PI: Juan Iván Agudo Rodríguez, Rubén López Coto
Dur.: Sep 01, 2023 - Aug 31, 2026

Title: **Contribución del IAA a ASIM: experimentos, observaciones desde suelo, analisis de datos y modelizacion**
Ref.: PID2022-136348NB-C31
PI: Francisco José Gordillo Vázquez
Dur.: Sep 01, 2023 - Aug 31, 2026

Title: **Desvelando las poblaciones más primordiales del sistema solar en la era del telescopio espacial James Webb**
Ref.: PID2022-139555NB-I00
PI: Pablo Santos Sanz
Dur.: Sep 01, 2023 - Aug 31, 2026

Title: **Galaxias en 3D con J-PAS e IFS: trazando el papel de la formación estelar y el entorno en la evolución de las galaxias**
Ref.: PID2022-141755NB-I00
PI: Rubén García Benito, Rosa María González Delgado
Dur.: Sep 01, 2023 - Aug 31, 2026

Title: **La estructura y la historia de formación del centro galáctico y del disco galáctico local**
Ref.: PID2022-136640NB-C21
PI: Rainer Schoedel, Emilio alfaro
Dur.: Sep 01, 2023 - Aug 31, 2027

Title: **Stellar tidal streams as dark matter probe with the space mission ARRAKIHS**
Ref.: PID2022-138896NB-C53
PI: David Martinez Delgado
Dur.: Sep 01, 2023 - Aug 31, 2026

Title: **Entendiendo las enanas frias y sus sistemas planetarios**
Ref.: PID2022-137241NB-C43-ENTENDIENDO LAS ENANAS FRIAS Y SUS SISTEMAS PLANETARIOS
PI: Pedro José Amado González, Cristina Teresa Rodríguez López
Dur.: Sep 01, 2023 - Aug 01, 2026

Title: **Promoviendo sinergias entre las ICTS astronómicas españolas**

Ref.: RED2022-134688-I
PI: Martín Guerrero Roncel
Dur.: Jun 01, 2023 - May 31, 2025

Title: **Red temática para la participacion científica y tecnológica española en el SKA**

Ref.: REF
PI: Lourdes Verdes-Montenegro Atalaya
Dur.: Jun 01, 2023 - May 31, 2025

Title: **Física de los objetos transneptunianos y poblaciones relacionadas**

Ref.: PID2020-112789GB-I00
PI: José Luis Ortiz Moreno
Dur.: Sep 01, 2021 - Aug 31, 2024

Title: **Sistemas planetarios a lo largo de la evolución estelar**

Ref.: PID2020-114461GB-I00
PI: Guillem Josep Anglada i Pons, José Francisco Gómez Rivero
Dur.: Sep 01, 2021 - Aug 31, 2024

Title: **De los exoplanetas a los agujeros negros supermasivos: la exploración de las fronteras**

Ref.: PID2020-117404GB-C21
PI: Miguel Angel Pérez Torres, Antonio Alberdi
Dur.: Sep 01, 2021 - Aug 31, 2024

Title: **El universo cuantico gravitatacional: espaciotiempos efectivos y sus fluctuaciones cuanticas**

Ref.: PID2020-118159GB-C43
PI: Carlos Barceló Serón
Dur.: Sep 01, 2021 - Aug 31, 2024

Title: **Detección de fenómenos transitorios haciendo uso de instrumentación robótica con alta resolución temporal**

Ref.: PID2020-118491GB-I00
PI: Alberto Javier Castro Tirado
Dur.: Sep 01, 2021 - Aug 31, 2024

Title: **Búsqueda de corrientes estelares de marea en el universo local con cartografiados de imagen**

Ref.: PID2020-114581GB-C21
PI: David Martinez Delgado
Dur.: Sep 01, 2021 - Dec 31, 2023

Title: **Space solar physics and space weather PMI instrument**

Ref.: PCI2022-135009-2
PI: Jose Carlos del Toro Iniesta
Dur.: Sep 01, 2022 - Aug 31, 2025

Title: **Estudios de laboratorio de cinética de conversión gas-particula**

Ref.: CNS2022-135828
PI: Juan Carlos Gómez Martín
Dur.: Jul 01, 2023 - Jun 30, 2025

Title: **Corrientes estelares de marea como trazadores de materia oscura con la misión espacial ARRAKIHS**

Ref.: CNS2022-136017
PI: David Martinez Delgado
Dur.: Jul 01, 2023 - Jun 30, 2025

Title: **Un nuevo instrumento de campo integral para el espectografo OSIRIS en el gran telescopio Canarias**

Ref.: EQC2021-007105-P
PI: Francisco Prada Martínez
Dur.: Jun 01, 2021 - Dec 31, 2024

Title: **Galaxias en 3D y sus propiedades integradas: sinergia entre J-PAS/J-PLUS e IFS**

Ref.: PID2019-109067GB-I00
PI: Rosa María González Delgado
Dur.: Jun 01, 2020 - Nov 30, 2024

Title: **Unpuzzling the milky way s nucleus - kinematics as key to structure, history, and star formation**

Ref.: EUR2022-134031 UNPUZZLING THE MILKY WAY S NUCLEUS -
PI: Rainer Schoedel
Dur.: Dec 01, 2022 - Nov 30, 2024

Title: **Monitorización de la calidad ambiental atmosférica y otros parámetros atmosféricos usando procedimientos astronómicos**

Ref.: PDC2022-133985-I00
PI: Pablo Santos Sanz
Dur.: Dec 01, 2022 - Nov 30, 2024

Title: **Participación del IAA-CSIC en la mision espacial PLATO2.0. fases C/D-1. Operación NOMAD-EXOMARS**

Ref.: PID2019-107061GB-C63
PI: Rafael Garrido Haba, Julio Federico Rodríguez Gómez
Dur.: Jun 01, 2020 - May 31, 2025

Title: **Astronomía de rayos gamma con MAGIC y CTA-NORTE - contribucion del IAA-CSIC**

Ref.: PID2019-107847RB-C44
PI: Juan Iván Agudo Rodríguez
Dur.: Jun 01, 2020 - May 31, 2024

Title: **Comprensión de la actividad nuclear en galaxias: de las bajas a las altas tasas de acreción**

Ref.: PID2019-106027GB-C41
PI: Isabel Márquez Pérez, Ascensión del Olmo Orozco
Dur.: Jun 01, 2020 - Feb 29, 2024

Title: **Agujeros negros supermasivos y jets relativistas**

Ref.: PID2019-108995GB-C21
PI: José Luis Gómez Fernández
Dur.: Jun 01, 2020 - Feb 29, 2024

Title: **Contribución del IAA a la explotación científica de ASIM: experimentos, observaciones desde suelo, análisis de datos y modelización**

Ref.: PID2019-109269RB-C43
PI: Francisco José Gordillo Vázquez
Dur.: Jun 01, 2020 - Dec 31, 2023

Title: **Atmósfera y clima de la Tierra y exo-planetas**

Ref.: PID2019-110689RB-I00
PI: Bernd Rainer Funke, Manuel López Puertas
Dur.: Jun 01, 2020 - Nov 30, 2023

Title: **Estallidos de formación estelar a lo largo de la evolución del Universo**

Ref.: PID2019-107408GB-C44
PI: José Manuel Vílchez Medina, Jorge Iglesias Páramo
Dur.: Jun 01, 2020 - May 31, 2023

Title: **Detección y caracterización de los sistemas planetarios en estrellas enanas M: Entendiendo su estrella y sus planetas**

Ref.: PID2019-109522GB-C52
PI: Pedro José Amado González
Dur.: Jun 01, 2020 - May 31, 2023

Title: **Comprensión de los AGN en las galaxias: desde las bajas a las altas tasas de acreción**

Ref.: PID2022-140871NB-C21
PI: Isabel Márquez Pérez, Ascensión del Olmo Orozco
Dur: Sep 01, 2023 - Aug 31, 2026

Title: **Investigación de la atmósfera de Marte y de su evolución con los instrumentos NOMAD y ACS del Exomars Trace Gas Orbiter y con el modelo físico MARS-PCM**

Ref.: PID2022-137579NB-I00
PI: Miguel Angel López Valverde, Francisco González Galindo
Dur: Sep 01, 2023 - Aug 31, 2026

Title: **Agujeros negros supermasivos y jets relativistas**

Ref.: PID2022-140888NB-C21
PI: José Luis Gómez Fernández
Dur: Sep 01, 2023 - Aug 31, 2026

Title: **Key histories of the ejection of material processed by stars to the interstellar medium**

Ref.: PID2022-142925NB-I00
PI: Martín Guerrero Roncel
Dur: Sep 01, 2023 - Aug 31, 2026

Title: **Space science and technology for the exploration of comets and rocky planets envision mission PCU**

Ref.: PCI2022-135027-2
PI: Luisa María Lara López
Dur: Dec 12, 2022 - Dec 11, 2025

Title: **Cometary and Asteroidal dusT Science**

Ref.: PID2021-123370OB-I00
PI: Olga Muñoz Gómez, Juan Carlos Gómez Martín
Dur: Sep 01, 2022 - Aug 31, 2025

Title: **Física solar espacial y tiempo espacial**

Ref.: PID2021-125325OB-C51
PI: Jose Carlos del Toro Iniesta, David Orozco Suárez
Dur: Sep 01, 2022 - Aug 31, 2025

Title: **Ciencia y tecnología espaciales para la exploración de cometas y planetas rocosos**

Ref.: PID2021-126365NB-C21
PI: Pedro José Gutiérrez Buenestado, Luisa María Lara López
Dur: Sep 01, 2022 - Aug 31, 2025

Title: **Un enfoque sostenible para los centros de datos de la infraestructura de Big Data del SKA: el prototipo español de Centro Regional del SKA**

Ref.: TED2021-130231B-I00
PI: Julian Garrido Sánchez
Dur: Sep 01, 2022 - Aug 31, 2025

Title: **AMIGA8: Estudio con precursores de SKA de la evolución de galaxias en entornos extremos regulada a grandes escalas. Nuevas tecnologías para SKA y su Red de Centros Regionales**

Ref.: PID2021-123930OB-C21
PI: Kelley Michelle Hess, Lourdes Verdes-Montenegro Atalaya
Dur: Sep 01, 2022 - Aug 31, 2025

Title: **RADIOBLOCKS**

Ref.: 101093934
PI: José Luis Gómez Fernández
Dur: Mar 01, 2023 - Feb 28, 2027

Title: **DUSTER**

Ref.: 101082466
PI: Julio Federico Rodríguez Gómez
Dur: Jan 01, 2023 - Dec 31, 2024

CDTI

Title: **Convenio CSIC-CDTI para la ejecución del Proyecto «Modelos de Vuelo para la MEU (Unidad de la Electrónica Principal) de PLATO»**

Ref.: ICTP-20210005
PI: Julio Federico Rodríguez Gómez
Dur.: Dec 06, 2021 - Sep 30, 2023

CSIC

Title: **Contribución del CSIC al proyecto ESFRI Telescopio Solar Europeo**

Ref.: INFRA20014
PI: Luis Ramón Bellot Rubio
Dur.: Jun 01, 2022 - May 31, 2024

Title: **Variabilidad de la atmósfera marciana según la misión TRACE GAS ORBITER**

Ref.: 202350E046
PI: Miguel Angel López Valverde
Dur.: Feb 20, 2023 - Jul 19, 2023

REGIONAL GOVERNMENT JUNTA DE ANDALUCíA

Title: **EMC21_00249 Incentivo Junta Andalucia emergia 2021, contrato Gabriella Gilli**

Ref.: EMC21_00249
PI: Gabriella Gilli
Dur.: Mar 01, 2023 - Feb 28, 2027

Title: **Ayudas Planes Complementarios CCAA-PRTR-Astrofísica y física de altas energías. Financiados por la Unión Europea NextGeneration, el Gobierno de España Plan de Recuperación, Transformación y Resiliencia y la Junta de Andalucía**

Ref.: Ayudas Planes Complementarios CCAA-PRTR-Astrofísica y física de altas energías. Financiados por la Unión Europea NextGeneration, el Gobierno de España Plan de Recuperación, Transformación y Resiliencia y la Junta de Andalucía
PI: Antonio Alberdi
Co-Pis: Luis Ramón Bellot Rubio, Pedro José Amado González, Jorge Iglesias Páramo, Luisa María Lara López, Francisco González Galindo, Isabel Márquez Pérez, Juan Iván Agudo Rodríguez, José Luis Gómez Fernández, Francisco Prada Martínez, Lourdes Verdes-Montenegro Atalaya, José Manuel Vílchez Medina

Title: **LUCA: Revelando la estructura fina de las galaxias del Universo Local con espectroscopía 3D**

Ref.: P18-FRJ-2595
PI: Rubén García Benito
Dur.: Dec 01, 2020 - Nov 30, 2023

Title: **Stellar Tidal Streams in the Local Universe as Cosmological Diagnostic**

Ref.: TASE-136
PI: David Martinez Delgado
Dur.: Oct 01, 2020 - Sep 30, 2023

Title: **Supermassive black holes and blazar jets**

Ref.: P18-FR-1769
PI: José Luis Gómez Fernández
Dur.: Jan 01, 2020 - Jun 30, 2023

Title: **IAA4SKA. Contribution of the Instituto de Astrofísica de Andalucía to the Square Kilometre Array (SKA): Open Science and Engineering to reinforce the leadership of the Spanish participation in the SKA.**

Ref.: P18-RT-3082
PI: Lourdes Verdes-Montenegro Atalaya, Antonio Alberdi
Dur.: Jan 01, 2020 - May 31, 2023

Title: **Excelencia científica y tecnológica en el IAA-CSIC: OSN, UDIT y Centro de Cálculo**

Ref.: IE19_242_C SIC-I AA
PI: Antonio Alberdi
Dur.: Dec 28, 2020 - Apr 30, 2023

Title: **Estudiando galaxias jóvenes con tecnología de vanguardia: piezas clave de la evolución del Universo**

Ref.: P18-FR-2664
PI: Jorge Iglesias Páramo
Dur.: Jan 01, 2020 - Mar 31, 2023

Title: **Objetos Transneptunianos y otros remanentes de la formación del sistema solar**

Ref.: P20_01309
PI: José Luis Ortiz Moreno
Dur.: Oct 05, 2021 - Mar 31, 2023

Title: **Descifrando la Vía Láctea: Minería de datos y herramientas numéricas para la explotación de grandes cartografiados galácticos**

Ref.: P20_00753
PI: Emilio Javier Alfaro Navarro
Dur.: Oct 05, 2021 - Mar 31, 2023

Title: **Imaginología y polarimetría en el ultravioleta cercano para aplicaciones espaciales (NUVIP)**

Ref.: P20_01307
PI: David Orozco Suárez
Dur.: Oct 05, 2021 - Mar 31, 2023

Title: **Detección y caracterización de los sistemas planetarios en estrellas enanas. M: Entendiendo su estrella y sus planetas**

Ref.: P20_00737
PI: Pedro José Amado González
Dur.: Oct 05, 2021 - Mar 31, 2023

Title: **Construction of the Calar Alto Schmidt-Lemaitre Telescope (CASTLE), a technology demonstrator for curved detectors**

Ref.: P20_00737
PI: Francisco Prada Martínez
Dur.: Oct 05, 2021 - Mar 31, 2023

Title: **Explorando la formación y supervivencia planetaria en condiciones extremas**

Ref.: P20_00880
PI: Mayra Carolina Osorio Gutiérrez
Dur.: Oct 05, 2021 - Mar 31, 2023

Title: **High-cadence monitoring of the sky and additional developments in Robotic Astronomy**

Ref.: P20_01068
PI: Alberto Javier Castro Tirado
Dur.: Nov 08, 2021 - Mar 31, 2023

Title: **Propiedades físicas del polvo cometario y aplicaciones biomédicas**

Ref.: P18-RT-1854
PI: Fernando Moreno Danvila, Olga Muñoz Gómez
Dur.: Jan 01, 2020 - Jan 31, 2023

EUROPEAN PROGRAM FUNDS

Title: **EXPECT**

Ref.: 101137656
PI: Bernd Rainer Funke
Dur.: Apr 18, 2023 - Jan 31, 2028

Title: **ROle and impAct of Dust and clouds in the Martian Atmosphere: from lab to space (ROADMAP)**

Ref.: 01004052 H2020-LEIT-SPACE/0753
PI: Olga Muñoz Gómez
Dur.: Nov 01, 2020 - Oct 31, 2023

FECyT

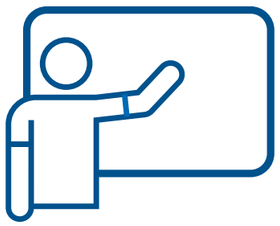
Title: **IM=PR(0) Divulgar ciencia desde el teatro de improvisación**

Ref.: FCT-2021-16702
PI: Manuel Jesús González García
Dur.: Jul 01, 2022 - Sep 30, 2023

Title: **Astrofísica aumentada**

Ref.: FCT-21-17345
PI: Emilio José García Gómez-Caro
Dur.: Jul 01, 2022 - Jun 30, 2023

Education & teaching



PhD Theses

Title: **Analysis of nighttime streamer corona discharges in storm clouds with ASIM data**

Author: Sergio Soler López
Sup.: Francisco J. Gordillo Vázquez and Francisco J. Pérez Invernón
Univ.: Universidad de Granada
Date: 17 March 2023

Title: **Hydrostatic equilibrium in the semiclassical approximation**

Author: Julio Arrechea Rodríguez,
Sup.: Carlos Barceló, Raúl Carballo Rubio, and Luis J. Garay
Univ.: Universidad de Granada
Date: 22 May 2023

Title: **Vacuum polarization and regular gravitational collapse**

Author: Valentin Boyanov Savov
Sup.: Carlos Barceló, Raúl Carballo Rubio, and Luis J. Garay
Univ.: Universidad Complutense de Madrid
Date: 24 March 2023

Title: **Electron thermal runaway in atmospheric electrified gases. A microscopic approach**

Author: Anthony Schmalzried
Sup.: Alejandro Luque and Nikolai Lehtinen
Univ.: Universidad de Granada
Date: 30 October 2023

Title: **Estudio de la Expansión de Novas y su Difusión en el Medio Interestelar**

Author: Edgar Ivan Santamaría Domínguez
Sup.: Gerardo Ramos Larios & Martín A Guerrero Roncel
Univ.: Universidad de Guadalajara, Jalisco, Mexico
Date: 3 March, 2023

Title: **Propiedades físicas de objetos trans-neptunianos y centauros combinando técnicas fotométricas, astrométricas, radiométricas y de ocultación estelar.**

Author: Mónica Vara Lubiano.
Sup.: José Luis Ortiz / Pablo Santos Sanz.
Univ.: Universidad de Granada
Date: 1-December-2023

Title: **Outflows from active galactic nuclei (AGN) and star-forming galaxies**

Author: Antoine Mahoro
Sup.: Petri Vaisanen, Mirjana Povic, Pheneas Nkundabakura, Kurt Van Der Heyden
Univ.: University of Cape Town and South African Astronomical Observatory, South Africa
Date: July 2023

Title: **Espectropolarimetría Milne-Eddington para la cromosfera solar**

Author: Antonio Jesús Dorantes Monteagudo
Sup.: David Orozco Suárez
Univ.: Universidad de Granada
Date: 24 March 2023

MASTER Theses

Title: **The quasar Main Sequence and the X-ray emission**

Author: Silvia García Soto
Sup.: Ascensión del Olmo and Amalia Corral
Univ.: Cantabria
Date: 26 September, 2023

Title: **Morphology and physical properties of the planetary nebula Sh1-89**

Author: Miquel María Molina Oltra
Sup.: Lorenzo Olguín and Luis F. Miranda
Univ.: Universidad Internacional de Valencia (VIU)
Date: 26 June 2023

Title: **Physical study of the planetary nebula IC972**

Author: Federico Soto Badilla
Sup.: Roberto Vázquez and Luis F. Miranda
Univ.: Universidad Nacional Autónoma de México (UNAM)
Date: 17 March 2023

Title: **A multi-band near-infrared study of the stellar population in the Galactic Center**

Author: Lucía Bravo Ferres
Sup.: Rainer Schoedel & Francisco Nogueras Lara
Univ.: Universidad de Granada
Date: 17 July 2023

Title: **Espectroscopía de alta resolución con CARMENES para la caracterización de la atmósfera del exoplaneta WASP 76b.**

Author: Saúl López Trujillo
Sup.: Alejandro Sánchez López
Univ.: University of Granada
Date: 17 July, 2023

Title: **Detección de exoplanetas con Imagen Directa.**

Author: Alberto García García
Sup.: Alejandro Sánchez López
Univ.: University of Granada
Date: 17 July, 2023

Title: **Exoplanetas extremos en evaporación: estudiando el escape atmosférico de hidrógeno.**

Author: Marcos Díaz Fernández
Sup.: Alejandro Sánchez López
Univ.: University of Granada
Date: 13 September, 2023

Title: **Chemical abundances of type-2 AGN in galaxy clusters**

Author: Mehbuba Ahmed
Sup.: Mirjana Povic
Univ.: Addis Ababa University and Space Science and Geospatial Institute, Ethiopia
Date: October 2023

Title: **Machine Learning to detect pulsations in CARMENES M dwarfs radial velocity time series.**

Author: Ciro Emmanuel Martínez
Sup.: Cristina Teresa Rodríguez López
Co-Sup.: Pedro José Amado González
Univ.: Valencia International University (VIU)
Date: 3 April, 2023

Title: **Stacked periodograms applied to CARMENES data to constrain low-mass exoplanetary populations**

Author: Javier González Durán
Sup.: Pedro José Amado González
Co-Sup.: Cristina Teresa Rodríguez López
Univ.: Valencia International University (VIU)
Date: 25 May, 2023

Title: **Análisis del espacio fásico vertical del disco Galáctico con datos de Gaia**

Author: Manuel Ramos Jiménez
Sup.: Emilio J. Alfaro Navarro
Univ.: Universidad de Granada
Date: 17 July, 2023

Title: **Análisis fractal de la actividad magnética en estrellas de tipo solar**

Author: Pablo Buzón Garrido
Sup.: Javier Pascual Granado, Juan Carlos Suárez Yanes
Univ.: Valencia International University (VIU)
Date: 25 March, 2023

Title: **Relaciones entre parámetros estelares para estrellas pulsantes**

Author: Diana Karina Sepúlveda Niño
Sup.: Javier Pascual Granado, Jose Ramón Rodón Ortiz
Univ.: Valencia International University (VIU)
Date: 25 March, 2023

Title: **Study of possible Star-Planet Interactions in CARMENES M-Dwarfs**

Author: Diego Lechuga Cabrero
Sup.: Pedro José Amado González
Univ.: Universidad de Granada
Date: 3 September, 2023

Title: **Estudio químico y cinemático de las componentes del flujo molecular asociado con la protoestrella IRAS 18162-2048 en la región HH80**

Author: Raquel Nohemí Mejía Espinoza
Sup.: Josep María Masqué and Mayra Osorio
Univ.: Universidad de Guanajuato, Mexico
Date: 29 March, 2023

Title: **Unveiling the fate of planetary systems: Searching for survivor exoplanets**

Author: Cyril Dethye
Sup.: Francisco J. Pozuelos and Valerie Van Grootel
Univ.: University of Liege
Date: 8 September2023

Title: **Research of survivor planets around subdwarfs**

Author: Mathieu Motte
Sup.: Francisco J. Pozuelos and Valerie Van Grootel
Univ.: University of Liege
Date: 8 September2023

Title: **Searching for unnoticed planets around very late M stars in TESS data**

Author: Magali Limpens
Sup.: Francisco J. Pozuelos and Laetitia Delrez
Univ.: University of Liege
Date: 8 September2023

Title: **Searching for nearby multi-planetary systems in TESS data**

Author: Carlos Corral Van Damme
Sup.: Francisco J. Pozuelos
Univ.: International University of Valencia
Date: 3 april, 2023

DEGREE Theses

Title: **Search for dwarf circumstellar disks, possible precursors of compact exoplanetary systems**

Author: Luis Rivas Zamudio
Sup.: Mayra Osorio
Univ.: Facultad de Fisica de la Universidad Veracruzana, Mexico
Date: 21 April 2023

Title: **Debris Disks in mature stars**

Author: Oier Baraiber
Sup.: José Francisco Gómez and Mayra Osorio
Univ.: Universidad Politécnica del País Vasco
Date: 14 July 2023

Title: **Análise das correlacións entre os períodos de rotación estelares e os períodos orbitais exoplanetarios en sistemas detectados polos satélites Kepler e TESS**

Sup.: Héctor Álvarez Pol (Univ. de Santiago de Compostela)
Co-Sup.: Cristina Teresa Rodríguez López
Univ.: Universidade de Santiago de Compostela
Date: 19 July, 2023

Courses

Title: **Diego de Pantoja y la música como instrumento de diplomacia en la Ciudad Prohibida (ss. XVII-XVIII)**

Teach.: Rubén García-Benito
Prog.: Doctoral Studies of the Department of Art and Musicology (Research Seminar)
Univ.: Universidad Autónoma de Barcelona
Hours: 1
Date: 22/05/2023

Title: **Astrobiología y planetas extrasolares**

Teach.: Manuel López Puertas
Prog.: Máster Universitario en Física: Radiaciones, Nanotecnología, Partículas y Astrofísica
Univ.: Universidad de Granada
Hours: 10
Date: March-June 2023

Title: **Observational Techniques in Astronomy**

Teach.: Mirjana Povic
Prog.: Master in Astronomy and Astrophysics (obligatory/regular course)
Univ.: Space Science and Geospatial Institute, Ethiopia
Hours: 40, 6 ECTS
Date: 01/03/2023 - 15/06/2023

Title: **Galactic and Extragalactic Astronomy**

Teach.: Mirjana Povic
Prog.: PhD in Astronomy and Astrophysics (obligatory/regular course)
Univ.: Space Science and Geospatial Institute, Ethiopia
Hours: 46, 6 ECTS
Date: 01/03/2023 - 15/06/2023

Title: **Modern Observational Techniques in Astronomy**

Teach.: Mirjana Povic
Prog.: PhD in Astronomy and Astrophysics (obligatory/regular course)
Univ.: Space Science and Geospatial Institute, Ethiopia
Hours: 46, 6 ECTS
Date: 01/11/2023 - 15/02/2023

Title: **Observational Techniques in Astronomy**

Teach.: Mirjana Povic
Prog.: Master in Astronomy and Astrophysics (obligatory/regular and intensive course)
Univ.: Mbarara University of Science and Technology, Uganda
Hours: 60
Date: August 2023 (2 full weeks)

Title: **Session 1: Introduction to extragalactic astronomy. Session 2: Hands-on in SED fittings. Session 3: Hands-on in Virtual Observatory. Session 4: Astronomy in Africa**

Teach.: Mirjana Povic
Prog.: Postgraduate (MSc/PhD) training during the BIUST-MPG African Astronomy School 2023
Univ.: Botswana International University of Science and Technology and Max Planck Institute
Hours: 12
Date: 26/06-07/07/2023

Title: **Introduction to galaxies. Introduction to Virtual Observatory and data in astronomy.**

Teach.: Mirjana Povic
Prog.: Postgraduate (MSc) training
Univ.: Jimma University, Ethiopia
Hours: 24
Date: January 2023

Title: **Network for Astronomy School Education Teachers Training**

Teach.: Mirjana Povic
Prog.: Secondary school teachers training
Univ.: Jigjiga University, Ethiopia
Hours: 21
Date: December 2023

Title: **SciGirls-Empowering girls in science through astronomy**

Teach.: Mirjana Povic
Prog.: Extracurricular training for secondary school girls and female science teachers from rural and remote areas in Ethiopia
Univ.: Space Science and Geospatial Institute, Ethiopia, and OAD-IAU
Hours: 10
Date: December 2023

Title: **Origen y Evolución de los Elementos Químicos en el Cosmos**

Teach.: José Manuel Vílchez Medina
Prog.: Master de Física
Univ.: Universidad de Granada, Facultad de Ciencias.
Hours: 12
Date: Marzo 2023

Title: **Matemáticas II**

Teach.: Gerardo García Moreno
Prog.: Grado en Óptica y Optometría
Univ.: Universidad de Granada
Hours: 60
Date: 20.02.2023 - 27.07.2023

Title: **Medio interestelar**

Teach.: Enrique Pérez Montero
Prog.: Máster en Astrofísica
Univ.: Universidad Autónoma de Madrid
Hours: 20
Date: 2023/2024

Title: **Stellar Structure and Star Formation**

Teach.: Mayra Osorio
Prog.: master in "Astrophysics, Particle Physics and Cosmology"
Univ.: Department of Quantum Physics and Astrophysics of the Barcelona University, Barcelona
Hours: 2
Date: May 15-16, 2023

Title: **Accretion disks models in diverse enviroments**

Teach.: Mayra Osorio
Prog.: International summer school "The Life Cycle of Dust"
Univ.: Institute for Space Sciences (ICE-CSIC), Barcelona
Hours: 1:30
Date: Jul 11, 2023

Title: **6º edición del MOOC de la UGR: Sierra Nevada**

Teach.: Alicia Pelegrina López
Prog.: Sierra Nevada: una ventana al Universo.
Univ.: UGR
Hours: 6
Date: 25/09/23/ a 13/11/23

Title: **Cosmología y Galaxias**

Teach.: Emilio J. Alfaro Navarro (con Mar Basteiro; UGR)
Prog.: Master en Física: Radiaciones, Nanotecnología, Partículas y Astrofísica (M44/56/2)
Univ.: Universidad de Granada
Hours: 10
Date: 16/01/2023 - 20/01/2023

Title: **Manejo de datos, Visualización y Machine Learning en BigData**

Teach.: Manuel Jesús Parra Royón
Prog.: Máster en analítica de negocios en un entorno digital
Univ.: Universidad de Castilla La Mancha
Hours: 4
Date: 27 Feb 2023 - 27 Feb 2023

Title: **¿Qué es el Big Data? Herramientas y plataformas para trabajar con Big Data**

Teach.: Manuel Jesús Parra Royón
Prog.: Máster en analítica de negocios en un entorno digital
Univ.: Universidad de Castilla La Mancha
Hours: 4
Date: 23 Feb 2023 - 23 Feb 2023

Title: **Transformación Digital**

Teach.: Manuel Jesús Parra Royón
Prog.: Master en Gestión de Agronegocios, ISAM, Universidad de Almería.
Univ.: ISAM - Universidad de Almería
Hours: 5
Date: 22 Jul 2023 - 22 Jul 2023

Title: **Digital Transformation - Smart Agri**

Teach.: Manuel Jesús Parra Royón
Prog.: Master en Gestión de Agronegocios, ISAM, Universidad de Almería.
Univ.: ISAM
Hours: 10
Date: 2 Feb 2024 - 19 Feb 2024

Title: **Computational Methods (Astrophysics Database module)**

Teach.: Miguel Pérez Torres, Julia Vogel and Alessandro Ederoclite
Prog.: Master in Physics of the Universe: Cosmology, Astrophysics and Astroparticles
Univ.: Universidad de Zaragoza
Hours: 30
Date: Feb 2023 - Jun 2023

Title: **Self-calibration**

Teach.: Javier Moldón Vara
Prog.: CASA VLBI Workshop 2023
Univ.: The Joint Institute for VLBI ERIC (JIVE)
Hours: 1
Date: 07/06/2023-07/06/2023

Title: **Reproducibility in the SKA Challenges and reproducible paper**

Teach.: Javier Moldón Vara
Prog.: IAA-CSIC Severo Ochoa SKA Open Science School
Univ.: IAA-CSIC
Hours: 1
Date: 10/05/2023-10/05/2023

Title: **The Square Kilometre Array (SKA)**

Teach.: Javier Moldón Vara
Prog.: cursos al profesorado CESAR: Los telescopios e infraestructura del futuro.
Univ.: ESA
Hours: 1
Date: 29/03/2023-29/03/2023

Title: **Why open Science?**

Teach.: Lourdes Verdes-Montenegro Atalaya
Prog.: IAA-CSIC Severo Ochoa SKA Open Science School
Univ.: IAA-CSIC
Hours: 1
Date: 08/05/2023-08/05/2023

Title: **Introduction to MeerKAT and MeerKat data archive**

Teach.: Roger Ianjamasimanana (co-lecturer)
Prog.: IAU/I-HOW Joint IRAN-TURKEY Hands-on workshop in Radio Astronomy
Univ.: Ercıyes University, Kayserı,Türkıye
Hours: 1
Date: 04/09/2023-05/09/2023

Title: **Radioastronomy**

Teach.: Angela Gardini, Daniel Espada
Prog.: Master in Physics and Mathematics
Univ.: UGR
Hours: 60
Date: September 2023 - January 2024

Title: **Técnicas observacionales en Astrofísica**

Teach.: Maria D. Caballero Garcia
Prog.: Máster Universitario en Física y Matemáticas (FISyMAT)
Univ.: UGR
Hours: 10.5
Date: 12/04/2023-04/05/2023

Press releases

Acces to all news at:

https://www.iaa.csic.es/en/news

Detected the most distant AGN observed to date at very high energies

26/12/2023

The detection was made by the LST-1, the first LST telescope of the CTAO Observatory. The IAA-CSIC participated in the observations and data analysis. The more distant the source, the more difficult it is to observe it at very high energies because of the so-called Extragalactic Background Light or EBL.

The origin of ghosts, a type of atmospheric transient luminous event, revealed

12/12/2023

Ghosts (or GHOSTs, GreenisH Optical emission from Sprite Tops) are part of a family of events that, although related to thunderstorms, occur in the mesosphere, tens of kilometres above the clouds. The IAA-CSIC led the first spectroscopic study of these infrequent and brief phenomena, which associated them with unexpected compounds, such as iron and nickel.

On the night of 11-12 December, the star Betelgeuse will disappear... for a few seconds

05/12/2023

At around 2:15 in the early hours of 12 December, the asteroid Leona passed in front of the red supergiant star Betelgeuse, a very unusual event that was visible to the naked eye. The IAA-CSIC organised a campaign to observe the phenomenon, which made it possible to study both the asteroid and the star's atmosphere.

A cosmic dance reveals a system of six planets

29/11/2023

The IAA-CSIC participated in the discovery of a sixfold system with synchronised orbits, whose configuration showed that it has remained unchanged since its formation more than a billion years ago. The result was possible thanks to an international collaboration with data from the CHEOPS (ESA) and TESS (NASA) satellites, as well as from the CARMENES instrument at Calar Alto Observatory.

The IAA-CSIC prepares for groundbreaking climate research from space

23/11/2023

The CAIRT mission, in whose scientific design the IAA-CSIC has participated, is among the two proposals selected by the European Space Agency (ESA) to move on to Phase A of the Earth Explorer 11 programme. CAIRT aims to study how the Earth's atmosphere reacts to climate change.

The IAA-CSIC tackles the computational challenge of the SKA Observatory to study the birth of the first stars

21/11/2023

Together with two other CSIC centres, IAA-CSIC has contributed its experience in big data to tackle one of the remains of the future observatory, which will investigate the phase of the Universe in which stars were formed. The SKA Observatory, the largest scientific infrastructure planned to date, is an international effort to build the world's most powerful radio telescopes.

Granada hosts an international meeting to address the problem of light pollution as part of the Spanish presidency of the EU

13/11/2023

The IAA-CSIC, through its Sky Quality Office, organized this meeting in collaboration with the Spanish Light Pollution Network. The event brought together more than fifty light pollution experts from different European countries in Granada. This event was organized in the frame of the Spanish Presidency of the EU.

Space interferometry observations reveal helical filaments inside a supermassive black hole's jet stream

26/10/2023

The IAA-CSIC leads the observation with the highest resolution and sensitivity of the jet of material emerging from the nucleus of galaxy 3C 279 at almost the speed of light. The image shows large helical filaments at their base, the existence of which requires an alternative model to the one used in the last four decades to explain the variability of these jets.

J-PAS: largest mapping of the cosmos begins

18/10/2023

It will observe hundreds of millions of galaxies from the Javalambre Astrophysical Observatory in order to understand the accelerating expansion of the Universe. The IAA-CSIC is part of the J-PAS Collaboration.

Two decades of observing galaxy M87 show an oscillating jet connected to a rotating black hole

27/09/2023

The IAA-CSIC participated in the 23-year follow-up of the central supermassive black hole of the galaxy M87. The study revealed that the jet emerging from the centre oscillates, which in turn provided the first evidence of rotation of a supermassive black hole.

The UGR and the IAA-CSIC join forces to collaborate in climate and ecological research in the high mountains of Sierra Nevada

11/09/2023

The University of Granada and the Spanish National Research Council (CSIC), through the IAA-CSIC, formalised an agreement with the aim of strengthening cooperation in the field of climate and ecological research in Sierra Nevada.

The first detailed image of a radiation belt outside the Solar System is obtained

05/09/2023

It was detected around a brown dwarf, a type of cold, low-mass substar. Published in Science, the image evokes the well-known belts of the Earth and Jupiter and reveals a magnetic field ten times greater than that of Jupiter, as well as intense polar auroras.

NIRS3: the protostar that shows how giant stars grow

01/09/2023

The IAA-CSIC leads the sharpest analysis of this forming massive protostar, suggesting that it alternates recurrent episodes of accretion and ejection of material.

Observations of the Crab Nebula confirm the outstanding performance of the first LST telescope at the CTA Observatory

02/08/2023

With more than sixty telescopes located in both hemispheres, the CTA Observatory will be the leading gamma-ray observatory for the next decades. To assess the performance of LST-1, the LST Collaboration used data from observations of the Crab Nebula made from November 2020 to March 2022. The Crab Nebula is considered a calibration source in very-high-energy gamma-ray astronomy, as its luminosity is known to be stable at these energies.

The IAC and CSIC, through the IAA, participate in the creation of the European Solar Telescope Canary Foundation

25/07/2023

Nine institutions from seven European countries signed the deeds of this entity, which paved the way for the future construction of the European Solar Telescope (EST). One of the main goals of EST is to improve our understanding of the Sun by observing its magnetic fields in unprecedented detail.

Emissions of several oceanic compounds cool the climate, but do not offset warming

28/06/2023

The IAA-CSIC participated in a study that highlights the influence of a series of compounds emitted by the ocean on the Earth's climate. The scientific team, which stressed that this effect does not counteract the warming produced by human emissions, emphasised the need to include it in climate models to improve their predictions.

Galaxies in the great cosmic voids grow more slowly than the rest of the universe

28/06/2023

The IAA-CSIC participated in a study that showed for the first time observationally that galaxies in the sparsely populated regions of the universe evolve more slowly than those in highly populated areas. The result is part of the CAVITY CAHA Legacy project, led by the University of Granada and developed at Calar Alto Observatory (CAHA).

The exoplanet LP 890-9 c, a laboratory to distinguish distant twins of Venus and Earth

14/06/2023

The IAA-CSIC participated in the development of a 3D global climate model of the extrasolar planet LP 890-9 c. These models are essential to analyze exoplanets similar to Earth, as well as to study their evolution.

The Spanish Foundation for Science and Technology (FECYT) grants the IAA-CSIC funding for four outreach projects

07/06/2023

The IAA-CSIC obtained a total of 122,000 euros in the Call for the promotion of Scientific, Technological and Innovation Culture 2022. The projects were committed to innovative and multidisciplinary formats, and included video, theater, improvisation and street outreach proposals.

The sky of the Granada Geopark, threatened by light pollution

31/05/2023

A study, developed by the Sky Quality Office of the IAA-CSIC, revealed a deterioration of the Geopark sky, as well as the need to implement measures to preserve night darkness.

The first radio detection of a type Ia supernova sheds light, after decades of debate, on the origin of these explosions

17/05/2023

These bursts, which show a similar luminosity in almost all cases, are used to measure distances in the universe and for the study of dark energy. The study, in which the IAA-CSIC participated, showed that the explosion occurred in a double star system in which a white dwarf stole material from its solar-type companion.

A terrestrial-type planet found that could be covered with volcanoes

17/05/2023

The IAA-CSIC is participated in the discovery of a third planet around the nearby star LP791-18. Slightly larger than our own, its gravitational interaction with the most massive planet in the system could generate intense volcanic activity.

Astronomers image for the first time a black hole's shadow together with a powerful jet

26/04/2023

The IAA-CSIC participated in obtaining an unprecedented panoramic view, which showed for the first time in a single astronomical image the black hole and the jet of matter that emerges from it. The data revealed that the black hole in the galaxy M87, the first to be imaged, consumes matter at a very low rate.

JUICE mission takes off to Jupiter

11/04/2023

JUICE, the European Space Agency (ESA) mission to study the icy moons of Jupiter, was launched on 13 April from the Kourou Spaceport (French Guiana). The IAA-CSIC participated in two of the mission's instruments, the GALA laser altimeter and the JANUS camera.

Spain joins the SKA Observatory to participate in the construction of the largest radioastronomy facility on the planet

05/04/2023

The Spanish contribution to the project, which amounts to 41.4 million euros until 2030, will allow Spanish companies to participate in contracts of high technological value for the construction of this scientific infrastructure. The IAA-CSIC is responsible for the technical coordination of the Spanish participation in the project, promoting the spanish participation in the Scientific Working Groups and in the future Key Science Projects (KSP).

Cosmic stream found that shows how galaxies form

30/03/2023

The IAA-CSIC participated in the discovery of a gas stream feeding a distant, massive galaxy, which points to the existence of a large-scale material supply network in the universe.

A new planetary system composed of a super-Earth and a mini-Neptune, key to understanding how planets form

22/03/2023

The IAA-CSIC led the discovery of TOI-2096, a unique planetary system composed of a super-Earth and a mini-Neptune, orbiting a cool, nearby star in a synchronised dance, and could function as a Rosetta stone for understanding how planetary formation works.

The visit to the IAA-CSIC of its External Scientific Advisory Board (ESAB) is over

16/03/2023

On March 14 and 16, the External Scientific Advisory Board (ESAB), consisting of internationally recognized researchers, visited the IAA-CSIC facilities to review the activities of the IAA and to provide advice on future actions.

Climate change will increase forest fires caused by thunderstorm lightning strikes

14/03/2023

The IAA-CSIC led a study that concluded that lightning could increase by 40% before the end of this century. The study pointed to a large increase in forest fires in the Mediterranean basin, as well as in the central and west coast of North America.

The brightest and most distant quasars, both young and old, show powerful galactic winds

07/03/2023

The IAA-CSIC led the study of twenty-two very luminous and distant quasars that completes our knowledge of the diversity of these objects showing that both young and old quasars present powerful galactic winds.

The impact of the DART mission excavated more than five million kilos of material from the asteroid Dimorphos

01/03/2023

The IAA-CSIC participated in the study of the material ejected by the impact, which altered the asteroid's orbit around its companion Didymos and produced a crater. The slower material was pushed in an anti-solar direction (almost opposite to the impact) by solar radiation pressure to form a tail, and the faster material showed complex interactions with the asteroid pair.

CARMENES instrument multiplies the number of known planets in the solar neighborhood

22/02/2023

Twenty thousand observations of CARMENES, obtained from the 3.5-meter telescope of the Calar Alto Observatory (CAHA) were made public. The instrument, co-developed by the IAA-CSIC, made it possible to discover 59 planets until 2023, some of them in the habitable zone.

The IAA-CSIC completes the first network of robotic telescopes present on the five continents

14/02/2023

Spain became the first country in the world to lead a global network of autonomous observatories. The BOOTES network, with seven facilities, is pioneer in space surveillance and the study of transient cosmic phenomena, which shine briefly, intensely and suddenly.

The trans-Neptunian object Quaoar shows a ring that questions a theory used since 1850

08/02/2023

The IAA-CSIC participated in the discovery of a dense ring in Quaoar that, with a size equivalent to half of Pluto, far beyond the Roche limit, which defies the accepted theory of how far away the dust and ice fragments that form the rings should accumulate.

Unexpected tails of gas and stars seen in two Hydra Cluster galaxies

01/02/2023

The IAA-CSIC led the study of NGC 3312 and NGC3314a, two galaxies in advanced interaction with the cluster that should have lost most of their gas. The work, which seeks to understand how the environment affects galaxies within a cluster, reveals tidal tails with an anomalous amount of cold gas where stars are even forming.

James Webb telescope observes the rings of Chariklo with a high-precision occultation technique

25/01/2023

The IAA-CSIC led an observation campaign with the JWST to capture the shadows of starlight produced by the thin rings of the object Chariklo, located beyond Saturn. Subsequent observations revealed that crystalline water ice dominates the spectrum of Chariklo and its rings, suggesting that continuous micro-collisions are taking place.

The IAA-CSIC participates in two of the new surveys of the JAST80 telescope of the Javalambre Astronomical Observatory

09/01/2023

The last phases of stars and the formation and evolution of massive stars are the objects of study of these new legacy projects.

Seminars

Giacomo Bonnoli
(INAF)
Title: "Fundamental Physics From Ground-Based Gamma-Rays Observations"
Date: Dec 19, 2023

Victor Mauricio A. Gómez González
(University of Postdam)
Title: "SO Colloquium: Studying star-formation in 'collisional' galaxies with MUSE"
Date: Nov 30, 2023

Lorena Acuña
(Max Planck Institute for Astronomy)
Title: "SO Colloquium: The transition between super-Earths and sub-Neptunes: Interior and atmosphere modelling of the low-mass planet population"
Date: Nov 23, 2023

Eleonora Fiorellino
(INAF)
Title: "SO Colloquium: The evolution of the accretion process: investigating the protostellar phase to constraints planet formation"
Date: Nov 16, 2023

Freek Roelofs
(Harvard-Smithsonian Center for Astrophysics (CfA))
Title: "Studying magnetic fields, dynamics, and fundamental physics near a black hole with current and future mm-VLBI instruments"
Date: Nov 09, 2023

Laura Hermosa Muñoz
(Centro de Astrobiología - CSIC)
Title: "Outflows from low to high luminous AGNs"
Date: Oct 31, 2023

Elena Khomenko
(Instituto de Astrofísica de Canarias (IAC))
Title: "SO Colloquium: Multi-fluid solar chromosphere"
Date: Oct 26, 2023

Isabella Rammala
(Max Planck Institute for Astronomy)
Title: "The Galactic Center seen with MeerKAT"
Date: Oct 24, 2023

Rebecca C. Levy
(University of Arizona)
Title: "SO Colloquium: Feeding and Feedback How to Make a Starburst and What that Means for the Host Galaxy"
Date: Oct 19, 2023

Rafael Luque
(University of Chicago)
Title: "SO Colloquium: The demographics of small exoplanets"
Date: Oct 09, 2023

Jonathan C. Tan
(Chalmers University of Technology)
Title: "SO Colloquium: A Light in the Dark - Massive Star Birth Through Cosmic Time"
Date: Oct 05, 2023

Ignacio Negueruela
(Universidad de Alicante)
Title: " Young massive clusters in the Gaia era"
Date: Oct 03, 2023

Maria Koutoulaki
(University of Leeds)
Title: "A VLTI view of Massive Young Stellar Objects (MYSOs)"
Date: Sep 28, 2023

Roberto Cid Fernandes
(Universidade Federal de Santa Catarina)
Title: "SO Colloquium: Extracting stellar populations and (mainly) emission line information out of S-PLUS photometry"
Date: Sep 26, 2023

Raul Carballo
(Southern Denmark University)
Title: "SO Colloquium: Testing black hole structure with very-long-baseline interferometry"
Date: Sep 21, 2023

Jesús Toalá
(Universidad Nacional Autónoma de México)
Title: "X-ray emission from Symbiotic Stars: a stellar window to the Astrophysics of AGN "
Date: Sep 14, 2023

Sam Crowe
(University of Virginia)
Title: "Near-Infrared Observations of Clustered Massive Star Formation in Outflowing Region AFGL 5180 "
Date: Jul 20, 2023

Teresa Nieves Chinchilla
(NASA Goddard Space Flight Cente)
Title: "Solar Orbiter: An example of an international collaboration "
Date: Jul 13, 2023

Isabel Márquez Pérez, Antonio María Alberdi Odriozola
(Instituto de Astrofísica de Andalucía - CSIC)
Title: "La acreditación Severo Ochoa-IAA 2023-2027 "
Date: Jul 06, 2023

Javier Armentia
(Planetario de Pamplona)
Title: "Un universo de diversidad: historias LGTBI en el mundo de la razón y la ciencia "
Date: Jun 28, 2023

Yannis Liodakis
(University of Turku)
Title: "SO Colloquium: X-ray Polarimetry: a New Window to the Universe "
Date: Jun 22, 2023

Theresa Van Vliet Wiegert
(Instituto de Astrofísica de Andalucía - CSIC)
Title: "Radio continuum halos in nearby galaxies and the CHANG-ES project "
Date: Jun 20, 2023

Joel Sanchez Bermudez
(Universidad Nacional Autónoma de México)
Title: "Aperture Masking Interferometry with the JWST "
Date: Jun 06, 2023

Elisa Delgado Mena
(Instituto de Astrofísica e Ciências do Espaço)
Title: "SO Colloquium: The impact of stellar composition: from galactic chemical evolution to planet formation "
Date: Jun 01, 2023

Béatrice Bonga
(Radboud University)
Title: "SO Colloquium: To be black, or not?"
Date: May 25, 2023

Francisco Manuel Bayo Muñoz
(Instituto de Astrofísica de Andalucía - CSIC)
Title: "Nueva infraestructura de cálculo del IAA"
Date: May 16, 2023

Aline Chu
(Institut d'Astrophysique de Paris)
Title: "Off-centre supermassive black holes in bright central galaxies"
Date: May 11, 2023

Aris Karastergiou
(Oxford University)
Title: "SO Colloquium: Pulsar astrophysics in the era of large surveys "
Date: May 04, 2023

Roberta Zanin, Juan Cortina, Rubén López Coto, Francisco Colomer
(Cherenkov Telescope Array, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT), Instituto de Astrofísica de Andalucía - CSIC)
Title: "El Futuro de la Astrofísica de muy altas energías a través del Open Science: Oportunidades con el Cherenkov Telescope Array Observatory (CTAO) "
Date: Apr 27, 2023

Mariana Sánchez
(Leiden University)
Title: "SO Colloquium: Theoretical models for the formation and evolution of Ultra-Cool Dwarf planetary systems"
Date: Apr 25, 2023

Roberta Zanin
(Cherenkov Telescope Array)
Title: "Gamma rays as cosmic ray tracers: how can CTAO contribute to the cosmic ray physics"
Date: Apr 21, 2023

Guiseppe Morello
(Instituto de Astrofísica de Canarias (IAC))
Title: "SO Colloquium: A holistic approach to exoplanet spectroscopy"
Date: Apr 13, 2023

Javier Pascual Granado
(Instituto de Astrofísica de Andalucía - CSIC)
Title: "Preparation and Asteroseismic exploitation of the PLATO Mission"
Date: Mar 30, 2023

Humberto Campins
(University of Florida)
Title: "International Asteroid Impact Defense Collaboration"
Date: Mar 28, 2023

Cristina Ramos Almeida
(Instituto de Astrofísica de Canarias (IAC))
Title: "SO Colloquium: Investigating the impact of quasar feedback on the central kiloparsecs of galaxies"
Date: Mar 23, 2023

Josep Maria Masqué
(Universidad de Guanajuato)
Title: "An observational study of massive star forming regions at radio wavelengths "
Date: Mar 16, 2023

Raphael Mignon-Risse
(Université de Paris Cité)
Title: "When accretion is as vital as extreme: from massive young stars to binary black holes"
Date: Mar 09, 2023

Tarek Hassan
(Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT))
Title: "Sub-milliarcsecond astronomy with Imaging Atmospheric Cherenkov Telescopes"
Date: Mar 07, 2023

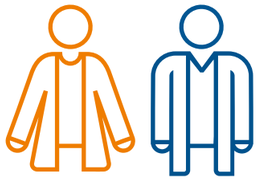
Rosa María González Delgado
(Instituto de Astrofísica de Andalucía - CSIC)
Title: "J-PAS: a survey for tracing the role that star formation and environment play in galaxy evolution"
Date: Mar 02, 2023

Jennifer Donovan Meye
(National Radio Astronomy Observatory)
Title: "ALMA: Planned Sensitivity Upgrades, and Molecular Gas Imaging of a z=0.376 HI-Detected Galaxy"
Date: Feb 23, 2023

Matteo Guainazzi
(ESTEC)
Title: "SO Colloquium: Dirty Dancing - piercing the dusty environment of merging supermassive black holes"
Date: Jan 30, 2023

Roberto Varas González
(Instituto de Astrofísica de Andalucía - CSIC)
Title: "CARMENES-PLUS: a technical upgrade for CARMENES and the impact on its science "
Date: Jan 12, 2023

Visiting scientists



INVITED

José Miguel Rodríguez Espinosa
Instituto de Astrofísica de Canarias (IAC)
01/01/2023 - 31/12/2023

Estela del Mar Fernández Valenzuela
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20/11/2023 - 19/01/2024

Giacomo Bonnoli
INAF, Italy
23/11/2023 - 22/12/2023

Julio Arrechea Rodríguez
Universidad de Granada
10/07/2023 - 27/08/2023

Renato Dupke
Observatorio Nacional de Rio de Janeiro, Brazil
04/06/2023 - 06/07/2023

Álvaro Augusto Álvarez Candal
Observatorio Nacional de Rio de Janeiro, Brazil
29/03/2023 - 25/06/2023

Alejandro Lumbreras Calle
Centro de Estudios de Física del Cosmos de Aragón (CEFCA)
24/04/2023 - 11/06/2023

Mohamed Elhashash
Chiba University
26/11/2022 – 31/01/2023

LONG VISITS

Júlia Thainá da Silva Cunha Batista
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01/11/2023 - 31/08/2024

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02/11/2023 - 15/04/2024

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01/10/2023 - 29/02/2024

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02/11/2022 – 02/11/2023

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19/07/2023 - 31/12/2023

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Roberto Varas González
Ingenyo
04/03/2023 – 01/12/2023

Francisco José García Izquierdo
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29/09/2023 - 27/11/2023

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06/03/2023 - 31/08/2023

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06/03/2023 – 31/08/2023

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15/05/2023 - 28/07/2023

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Alba Fernández Barral
Cherenkov Telescope Array
09/12/2022 - 09/03/2023
21/03/2023 - 31/03/2024

Laura Hermosa Muñoz
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01/12/2022 - 28/02/2023

SHORT VISITS

Siyu Wu
Universidad Estatal Pedagógica de Moscú, Russia
05/09/2023 - 04/09/2024

Alberto Peláez Torres
Universidad de Granada
03/11/2023 - 30/11/2023

Silvia García Soto
Universidad de Cantabria
01/07/2023 - 31/07/2023

Ángel Belmonte Giménez
Universidad de Granada
22/02/2022 - 01/02/2023

List of publications

Acces to all entries at:

https://www.iaa.csic.es/en/publications

1 Abe, H. et al. (includes Agudo, I.; Bernardos, M. I.; Castro-Tirado, A. J.; López-Coto, R.)
"Performance of the joint LST-1 and MAGIC observations evaluated with Crab Nebula data", *Astronomy and Astrophysics,* Vol. 680, p. A66 (2023)
DOI: 10.1051/0004-6361/202346927

2 Abe, H. et al. (includes Agudo, I.; Bernardos, M. I.; Escudero, J.; López-Coto, R.; Morcuende, D.; Ruiz, J. E.)
"Observations of the Crab Nebula and Pulsar with the Large-sized Telescope Prototype of the Cherenkov Telescope Array", *Astrophysical Journal,* Vol. 956, p. 80 (2023)
DOI: 10.3847/1538-4357/ace89d

3 Abe, H. et al. (includes Agudo, I.; Bernardos, M.; Castro-Tirado, A. J.; Escudero, J.; López-Coto, R.)
"Multimessenger Characterization of Markarian 501 during Historically Low X-Ray and γ-Ray Activity", *Astrophysical Journal Supplement Series,* Vol. 266, p. 37 (2023)
DOI: 10.3847/1538-4365/acc181

4 Abe, H. et al. (includes Bernardos, M.)
"Search for Gamma-Ray Spectral Lines from Dark Matter Annihilation up to 100 TeV toward the Galactic Center with MAGIC", *Physical Review Letters,* Vol. 130, p. 061002 (2023)
DOI: 10.1103/PhysRevLett.130.061002

5 Abe, K.. et al. (includes Agudo, I.; Bernardos, M. I.; Escudero, J.; López-Coto, R.)
"Star tracking for pointing determination of Imaging Atmospheric Cherenkov Telescopes. Application to the Large-Sized Telescope of the Cherenkov Telescope Array", *Astronomy and Astrophysics,* Vol. 679, p. A90 (2023)
DOI: 10.1051/0004-6361/202347128

6 Abe, S., et al. (includes Agudo, I.; Bernardos, M. I.; Escudero, J.; López-Coto, R.)
"Multiwavelength study of the galactic PeVatron candidate LHAASO J2108+5157", *Astronomy and Astrophysics,* Vol. 673, p. A75 (2023)
DOI: 10.1051/0004-6361/202245086

7 Acciari, V. A. et al. (includes Agudo, I.; Bonnoli, G.)
"A lower bound on intergalactic magnetic fields from time variability of 1ES 0229+200 from MAGIC and Fermi/LAT observations", *Astronomy and Astrophysics,* Vol. 670, p. A145 (2023)
DOI: 10.1051/0004-6361/202244126

8 Acero, F. et al. (includes Agudo, I.; López-Coto, R.)
"Sensitivity of the Cherenkov Telescope Array to spectral signatures of hadronic PeVatrons with application to Galactic Supernova Remnants", *Astroparticle Physics,* Vol. 150, p. 102850 (2023)
DOI: 10.1016/j.astropartphys.2023.102850

9 Acharyya, A. et al. (includes Agudo, I.; Bernardos, M. I.; Escudero, J.; López-Coto, R.)
"Sensitivity of the Cherenkov Telescope Array to TeV photon emission from the Large Magellanic Cloud", *Monthly Notices of the Royal Astronomical Society,* p. 5353 (2023)
DOI: 10.1093/mnras/stad1576

10 Agudo, I. et al. (includes Caballero-García, M. D.; Castro-Tirado, A. J.; Hu, Y. -D.; Kann, D. A.; Moldon, J.; Perez-Torres, M.; Sánchez-Ramírez, R.
"Panning for gold, but finding helium: Discovery of the ultra-stripped supernova SN 2019wxt from gravitational-wave follow-up observations", *Astronomy and Astrophysics*, Vol. 675, p. A201 (2023)
DOI: 10.1051/0004-6361/202244751

11 Agüí Fernández, J. F.; Thöne, C. C.; Kann, D. A.; de Ugarte Postigo, A. et al. (includes Blažek, M.)
"GRB 160410A: The first chemical study of the interstellar medium of a short GRB", *Monthly Notices of the Royal Astronomical Society,* Vol. 520, p. 613 (2023)
DOI: 10.1093/mnras/stad099

12 Albert, K. et al. (includes Moreno Vacas, A.; Orozco Suárez, D.; del Toro Iniesta, J. C.; Balaguer Jiménez, M.; Bellot Rubio, L. R.; López Jiménez, A.; Strecker, H.; Torralbo, I.; Valori, G.
"Intensity contrast of solar network and faculae close to the solar limb, observed from two vantage points", *Astronomy and Astrophysics*, Vol. 678, p. A163 (2023)
DOI: 10.1051/0004-6361/202346037

13 Albert, K. et al. (includes Orozco Suárez, D.)
"Accuracy Analysis of the On-board Data Reduction Pipeline for the Polarimetric and Helioseismic Imager on the Solar Orbiter Mission", *Solar Physics,* Vol. 298, p. 58 (2023)
DOI: 10.1007/s11207-023-02149-y

14 Alexander, D. M. et al. (includes Prada, F.)
"The DESI Survey Validation: Results from Visual Inspection of the Quasar Survey Spectra", *Astronomical Journal,* Vol. 165, p. 124 (2023)
DOI: 10.3847/1538-3881/acacfc

15 Allende Prieto, C. et al. (inclides Prada, F.)
"GTC Follow-up Observations of Very Metal-poor Star Candidates from DESI", *Astrophysical Journal,* Vol. 957, p. 76 (2023)
DOI: 10.3847/1538-4357/acfa96

16 Almendros-Abad, V. et al. (includes Schöedel, R.)
"Spectroscopic substellar initial mass function of NGC 2244", *Astronomy and Astrophysics,* Vol. 677, p. A26 (2023)
DOI: 10.1051/0004-6361/202346237

17 Amaro-Seoane, P. et al. (includes Danielski, C.)
"Astrophysics with the Laser Interferometer Space Antenna", *Living Reviews in Relativity,* Vol. 26, p. 2 (2023)
DOI: 10.1007/s41114-022-00041-y

18 Anastasopoulou, K. et al. (includes Schödel, R.)
"Study of the excess Fe XXV line emission in the central degrees of the Galactic centre using XMM-Newton data", *Astronomy and Astrophysics,* Vol. 671, p. A55 (2023)
DOI: 10.1051/0004-6361/202245001

19 Aoki, S. et al. (includes Lopez-Valverde, M. A.; Brines, A.; Lopez-Moreno, J. J.)
"Depletion of 13C in CO in the Atmosphere of Mars Suggested by ExoMars-TGO/NOMAD Observations", *The Planetary Science Journal,* Vol. 4, p. 97 (2023)
DOI: 10.3847/PSJ/acd32f

20 Arrechea, Julio; Barceló, Carlos
"Stellar equilibrium on a physical vacuum soil", *International Journal of Modern Physics D,* Vol. 32, p. 2342006 (2023)
DOI: 10.1142/S0218271823420063

21 Arrechea, Julio; Barceló, Carlos; Carballo-Rubio, Raúl; Garay, Luis J.
"Asymptotically flat vacuum solutions in order-reduced semiclassical gravity", *Physical Review D - Particles,* Fields, Gravitation and Cosmology, Vol. 107, p. 085005 (2023)
DOI: 10.1103/PhysRevD.107.085005

22 Arroyo-Polonio, A.; Iglesias-Páramo, J.; Kehrig, C.; Vílchez, J. M.; Amorín, R.; Breda, I.; Pérez-Montero, E.; Pérez-Díaz, B.; Hayes, M.
"A MUSE/VLT spatially resolved study of the emission structure of Green Pea galaxies", *Astronomy and Astrophysics,* Vol. 677, p. A114 (2023)
DOI: 10.1051/0004-6361/202346192

23 Aung, H, et al. (includes NPrada, .; Pérez, .; Ruedas, J.)
"The Uchuu-universe machine data set: galaxies in and around clusters", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 1648 (2023)
DOI: 10.1093/mnras/stac3514

24 Avison, A.; Fuller, G. A.; et al.
"Tracing Evolution in Massive Protostellar Objects-I. Fragmentation and emission properties of massive star-forming clumps in a luminosity-limited ALMA sample", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, Issue 2, p. 2278-2300 (2023)
DOI: 10.1093/mnras/stad2824

25 Bagnulo, S. et al. (includes Muñoz, O.)
"Optical Spectropolarimetry of Binary Asteroid Didymos-Dimorphos before and after the DART Impact", *Astrophysical Journal Letters,* Vol. 945, p. L38 (2023)
DOI: 10.3847/2041-8213/acb261

26 Bailén, F. J.; Orozco Suárez, D.; del Toro Iniesta, J. C.
"Fabry-Pérot etalons in solar astronomy. A review", *Astrophysics and Space Science,* Vol. 368, p. 55 (2023)
DOI: 10.1007/s10509-023-04212-3

27 Balsalobre-Ruza, O. et al. (includes Aceituno, J.)
"KOBEsim: A Bayesian observing strategy algorithm for planet detection in radial velocity blind-search surveys", *Astronomy and Astrophysics,* Vol. 669, p. A18 (2023)
DOI: 10.1051/0004-6361/202243938

28 Barkaoui, K. et al. (includes Pozuelos, F. J.)
"TOI-2084 b and TOI-4184 b: Two new sub-Neptunes around M dwarf stars", *Astronomy and Astrophysics,* Vol. 677, p. A38 (2023)
DOI: 10.1051/0004-6361/202346838

29 Becker, T. et al. (includes Muñoz, O.; Martikainen, J.; Gómez Martin, J. C.)
"Ejected Particles after Impact Splash on Mars: Aggregates and Aerodynamics", *The Planetary Science Journal,* Vol. 4, p. 180 (2023)
DOI: 10.3847/PSJ/acf318

30 Bello-García, A. et al. (includes Amado, P. J.; Luque, R.)
"The CARMENES search for exoplanets around M dwarfs. A deep transfer learning method to determine Teff and [M/H] of target stars", *Astronomy and Astrophysics,* Vol. 673, p. A105 (2023)
DOI: 10.1051/0004-6361/202243934

31 Berlanas, S. R. et al. (includes Sota, A.; Alfaro, E. J.;)
"Gaia-ESO survey: Massive stars in the Carina Nebula. I. A new census of OB stars", *Astronomy and Astrophysics,* Vol. 671, p. A20 (2023)
DOI: 10.1051/0004-6361/202245335

32 Bertemes, C. et al. (includes Cazzoli, S.)
"MASCOT: molecular gas depletion times and metallicity gradients - evidence for feedback in quenching active galaxies", *Monthly Notices of the Royal Astronomical Society,* Vol. 518, p. 5500 (2023)
DOI: 10.1093/mnras/stac3448

33 Blanco-Pozo, J. et al. (includes Pérez-Torres, M.; Amado, P. J.; Peña-Moñino, L.)
"The CARMENES search for exoplanets around M dwarfs. A long-period planet around GJ 1151 measured with CARMENES and HARPS-N data", *Astronomy and Astrophysics,* Vol. 671, p. A50 (2023)
DOI: 10.1051/0004-6361/202245053

34 Borthakur, M. et al. (includes Funke, B.)
"Impact of chlorine ion chemistry on ozone loss in the middle atmosphere during very large solar proton events", *Atmospheric Chemistry and Physics,* Vol. 23, p. 12985 (2023)
DOI: 10.5194/acp-23-12985-2023

35 Braga-Ribas, F. et al. (includes Ortiz, J. L.; Santos-Sanz, P.; Morales, N.; Kretlow, M.)
"Constraints on (2060) Chiron's size, shape, and surrounding material from the November 2018 and September 2019 stellar occultations", *Astronomy and Astrophysics*, Vol. 676, p. A72 (2023)
DOI: 10.1051/0004-6361/202346749

36 Breda, Iris; Papaderos, Polychronis
"Exploring the genesis of spiral galaxies. Classical and pseudo bulges as extremities of a continuous sequence", *Astronomy and Astrophysics,* Vol. 669, p. A70 (2023)
DOI: 10.1051/0004-6361/202245095

37 Brines, A. et al. (includes López-Valverde, M. A.; Stolzenbach, A.; Modak, A.; Funke, B.; González Galindo, F.; Lopez-Moreno, J. J.; Rodriguez-Gomez, J.;)
"Water Vapor Vertical Distribution on Mars During Perihelion Season of MY 34 and MY 35 With ExoMars-TGO/NOMAD Observations", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2022JE007273 (2023)
DOI: 10.1029/2022JE007273

38 Brodzeller, A. et al. (includes Prada, F.)
"Performance of the Quasar Spectral Templates for the Dark Energy Spectroscopic Instrument", *Astronomical Journal,* Vol. 166, p. 66 (2023)
DOI: 10.3847/1538-3881/ace35d

39 Brogan, R. et al. (includes Pérez Torres, M.)
"Still alive and kicking: A significant outburst in changing-look AGN Mrk 1018", *Astronomy and Astrophysics,* Vol. 677, p. A116 (2023)
DOI: 10.1051/0004-6361/202346475

40 Bucciantini, N. et al. (includes Agudo, I.)
"Simultaneous space and phase resolved X-ray polarimetry of the Crab pulsar and nebula", *Nature Astronomy,* Vol. 7, p. 602 (2023)
DOI: 10.1038/s41550-023-01936-8

41 Burns, E. et al. (includes Agüí Fernández, J. F.)
"GRB 221009A: The Boat", *Astrophysical Journal Letters,* Vol. 946, p. L31 (2023)
DOI: 10.3847/2041-8213/acc39c

42 Caballero-García, M. D. et al. (includes Hu, Y. -D.; Castro-Tirado, A. J.; Sánchez-Ramírez, R.; Castro-Tirado, M. A.; Fernández-García, E.; Pérez-García, I.; Sun, T. R.)
"Multi-wavelength study of the luminous GRB 210619B observed with Fermi and ASIM", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 3201–3226 (2023)
DOI: 10.1093/mnras/stac3629

43 Calchetti, D. et al. (includes Balaguer Jiménez, M.; Bellot Rubio, L. R.; Moreno Vacas, A.; Orozco Suárez, D.; Strecker, H.; del Toro Iniesta, J. C.)
"Spectropolarimetric investigation of magnetohydrodynamic wave modes in the photosphere: First results from PHI on board Solar Orbiter", *Astronomy and Astrophysics,* Vol. 674, p. A109 (2023)
DOI: 10.1051/0004-6361/202245826

44 Callingham, J. R. et al. (includes Pérez-Torres, M.)
"V-LoTSS: The circularly polarised LOFAR Two-metre Sky Survey", *Astronomy and Astrophysics,* Vol. 670, p. A124 (2023)
DOI: 10.1051/0004-6361/202245567

45 Campbell, R. J.; Gafeira, R. et al.
"Exploring Magnetic Loops and Serpentine Fields in the Quiet Sun with the GRIS-IFU", *Astrophysical Journal,* Vol. 944, p. 150 (2023)
DOI: 10.3847/1538-4357/acb33e

46 Capitanio, F. et al. (includes Agudo, I.)
"Polarization Properties of the Weakly Magnetized Neutron Star X-Ray Binary GS 1826-238 in the High Soft State", *Astrophysical Journal,* Vol. 943, p. 129 (2023)
DOI: 10.3847/1538-4357/acae88

47 Carter, A. L. et al. (includes Danielski, C.)
"The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems I: High-contrast Imaging of the Exoplanet HIP 65426 b from 2 to 16 μm", *Astrophysical Journal Letters,* Vol. 951, p. L20 (2023)
DOI: 10.3847/2041-8213/acd93e

48 Castro-Tirado, Alberto J.
"Tracking transients night and day", *Nature Astronomy,* Vol. 7, Number 9, p. 1136 (2023)
DOI: 10.1038/s41550-023-02075-w

49 Cerny, W. et al. (includes Martínez-Delgado, D.); Delve Collaboration
"Six More Ultra-faint Milky Way Companions Discovered in the DECam Local Volume Exploration Survey", *Astrophysical Journal,* Vol. 953, p. 1 (2023)
DOI: 10.3847/1538-4357/acdd78

50 Cerny, W. et al. (includes Martínez-Delgado, D.) ; Delve Collaboration
"Pegasus IV: Discovery and Spectroscopic Confirmation of an Ultra-faint Dwarf Galaxy in the Constellation Pegasus", *Astrophysical Journal,* Vol. 942, p. 111 (2023)
DOI: 10.3847/1538-4357/aca1c3

51 Cesaroni, R. et al. (includes Fedriani, R.)
"Radio outburst from a massive (proto)star. II. A portrait in space and time of the expanding radio jet from S255IR NIRS 3", *Astronomy and Astrophysics,* Vol. 680, p. A110 (2023)
DOI: 10.1051/0004-6361/202347468

52 Chamorro-Cazorla, M. et al. (includes Iglesias-Páramo, J.)
"MEGADES: MEGARA galaxy disc evolution survey. Data release I: Central fields", *Astronomy and Astrophysics,* Vol. 670, p. A117 (2023)
DOI: 10.1051/0004-6361/202245111

53 Chatterjee, K. et al. (includes Fuentes, A.; Traianou, E.)
"Accretion Flow Morphology in Numerical Simulations of Black Holes from the ngEHT Model Library: The Impact of Radiation Physics", *Galaxies,* Vol. 11, p. 38 (2023)
DOI: 10.3390/galaxies11020038

54 Chaussidon, E. et al. (includes Prada, F.)
"Target Selection and Validation of DESI Quasars", *Astrophysical Journal,* Vol. 944, p. 107 (2023)
DOI: 10.3847/1538-4357/acb3c2

55 Cheng, X. et al. (includes Zhao, G.-Y.)
"Monitoring the Size and Flux Density of Sgr A* during the Active State in 2019 with East Asian VLBI Network", *Galaxies,* Vol. 11, p. 46 (2023)
DOI: 10.3390/galaxies11020046

56 Cheng, X. et al. (includes Zhao, G.-Y.)
"Toward Microarcsecond Astrometry for the Innermost Wobbling Jet of the BL Lacertae Object OJ 287", *Astrophysical Journal Letters,* Vol. 955, p. L30 (2023)
DOI: 10.3847/2041-8213/acf71c

57 Chian, A. C. -L. et al. (includes Bellot Rubio, L.)
"Intensification of magnetic field in merging magnetic flux tubes driven by supergranular vortical flows", *Monthly Notices of the Royal Astronomical Society,* Vol. 518, p. 4930 (2023)
DOI: 10.1093/mnras/stac3352

58 Chitta, L. P. et al. (includes del Toro Iniesta, J. C.; Orozco Suárez, D.; Strecker, H.)
"Fleeting Small-scale Surface Magnetic Fields Build the Quiet-Sun Corona", *Astrophysical Journal Letters,* Vol. 956, p. L1 (2023)
DOI: 10.3847/2041-8213/acf136

59 Chu, A. et al. (includes Márquez, I.)
"A UNIONS view of the brightest central galaxies of candidate fossil groups", *Astronomy and Astrophysics,* Vol. 673, p. A100 (2023)
DOI: 10.1051/0004-6361/202346119

60 Ciurlo, A. et al. (includes Schödel, R.)
"The Swansong of the Galactic Center Source X7: An Extreme Example of Tidal Evolution near the Supermassive Black Hole", *Astrophysical Journal,* Vol. 944, p. 136 (2023)
DOI: 10.3847/1538-4357/acb344

61 Claret, A.
"Theoretical tidal evolution constants for stellar models from the pre-main sequence to the white dwarf stage. Apsidal motion constants, moment of inertia, and gravitational potential energy", *Astronomy and Astrophysics*, Vol. 674, p. A67 (2023)
DOI: 10.1051/0004-6361/202346250

62 Claret, A.; Southworth, J.
"Power-2 limb-darkening coefficients for the uvby, UBVRIJHK, SDSS ugriz, Gaia, Kepler, TESS, and CHEOPS photometric systems. II. PHOENIX spherically symmetric stellar atmosphere models", *Astronomy and Astrophysics*, Vol. 674, p. A63 (2023)
DOI: 10.1051/0004-6361/202346478

63 Climent, J.B. et al. (includes Pérez-Torres, M.; Peña-Moñino, L.)
"Evidence for a radiation belt around a brown dwarf", *Science,* Vol. 381, Issue 6662 , p. 1120-1124 (2023)
DOI: 10.1126/science.adg6635

64 Cocchi, M. et al. (includes Agudo, I.)
"Discovery of strongly variable X-ray polarization in the neutron star low-mass X-ray binary transient XTE J1701−462", *Astronomy and Astrophysics,* Vol. 674, p. L10 (2023)
DOI: 10.1051/0004-6361/202346275

65 Columba, G.; Danielski, C.; Dorozsmai, A.; Toonen, S.; Lopez Puertas, M.
"Statistics of Magrathea exoplanets beyond the main sequence. Simulating the long-term evolution of circumbinary giant planets with TRES", *Astronomy and Astrophysics,* Vol. 675, p. A156 (2023)
DOI: 10.1051/0004-6361/202345843

66 Cooper, A. P. et al. (includes Prada, F.)
"Overview of the DESI Milky Way Survey", *Astrophysical Journal,* Vol. 947, p. 37 (2023)
DOI: 10.3847/1538-4357/acb3c0

67 Cosentino, G. et al. (includes Fedriani, R.)
"Deuterium fractionation across the infrared-dark cloud G034.77−00.55 interacting with the supernova remnant W44", *Astronomy and Astrophysics,* Vol. 675, p. A190 (2023)
DOI: 10.1051/0004-6361/202346676

68 Courtois, H. M. et al. (includes García-Benito, R.)
"Sociology and hierarchy of voids: A study of seven nearby CAVITY galaxy voids and their dynamical CosmicFlows-3 environment", *Astronomy and Astrophysics,* Vol. 673, p. A38 (2023)
DOI: 10.1051/0004-6361/202245578

69 Creevey, O. L. et al. (includes Shulyak, D.)
"Gaia Data Release 3. Astrophysical parameters inference system (Apsis). I. Methods and content overview", *Astronomy and Astrophysics,* Vol. 674, p. A26 (2023)
DOI: 10.1051/0004-6361/202243688

70 Cui, Y. et al. (includes Kravchenko, E.; Cho, I.)
"Precessing jet nozzle connecting to a spinning black hole in M87", *Nature,* Vol. 621, p. 711 (2023)
DOI: 10.1038/s41586-023-06479-6

71 Danielski, A. et al. (includes Danielski, C.)
"Lower body weight and increasing age are significant risk factors for complications following bi-oblique proximal ulnar osteotomy in dogs", *Journal of The American Veterinary Medical Association,* Vol. 261, Issue 11 (2023)
DOI: 10.2460/javma.23.05.0232

72 Darragh-Ford, E. et al. (includes Prada, F.)
"Target Selection and Sample Characterization for the DESI LOW-Z Secondary Target Program", *Astrophysical Journal,* Vol. 954, p. 149 (2023)
DOI: 10.3847/1538-4357/ace902

73 Das, M.; Ianjamasimanana, R.; McGaugh, S. S.; Schombert, J.; Dwarakanath, K. S.
"Estimating the Oblateness of Dark Matter Halos Using Neutral Hydrogen Velocity Dispersion", *Astrophysical Journal Letters,* Vol. 946, p. L8 (2023)
DOI: 10.3847/2041-8213/acc10e

74 de Oña Wilhelmi, E.; López-Coto, R.; Su, Y.
"High-energy gamma-ray emission powered by a young protostar: the case of S255 NIRS 3", *Monthly Notices of the Royal Astronomical Society,* Vol. 523, p. 105 (2023)
DOI: 10.1093/mnras/stad1413

75 Deconto-Machado, A.; del Olmo Orozco, A.; Marziani, P.; Perea, J.; Stirpe, G. M.
"High-redshift quasars along the main sequence", *Astronomy and Astrophysics,* Vol. 669, p. A83 (2023)
DOI: 10.1051/0004-6361/202243801

76 Delhom, A.; García-Moreno, G.; Hohmann, M.; Jiménez Cano, A.; Koivisto, T. S.
"Bootstrapping gravity and its extension to metric-affine theories", *Journal of Cosmology and Astroparticle Physics,* Vol. 2023, p. 006 (2023)
DOI: 10.1088/1475-7516/2023/12/006

77 Dey, A. et al. (includes Prada, F.)
"DESI Observations of the Andromeda Galaxy: Revealing the Immigration History of Our Nearest Neighbor", *Astrophysical Journal,* Vol. 944, p. 1 (2023)
DOI: 10.3847/1538-4357/aca5f8

78 Di Gesu, L. et al. (includes Agudo, I.; Escudero, J.; Aceituno, F. J.; Bernardos, M. I.; Bonnoli, G.; Casanova, V.; García-Comas, M.; Agís-González, B.; Husillos, C.; Sota, A.; Gómez, J. L.)
"Discovery of X-ray polarization angle rotation in the jet from blazar Mrk 421", *Nature Astronomy,* p. 1245 (2023)
DOI: 10.1038/s41550-023-02032-7

79 Di Marco, A. et al. (includes Agudo, I.); IXPE Collaboration
"First Detection of X-Ray Polarization from the Accreting Neutron Star 4U 1820-303", *Astrophysical Journal Letters,* Vol. 953, p. L22 (2023)
DOI: 10.3847/2041-8213/acec6e

80 Ditrani, F. R. et al. (includes García-Benito, R.)
"Stellar metallicity from optical and UV spectral indices: Test case for WEAVE-StePS", *Astronomy and Astrophysics,* Vol. 677, p. A93 (2023)
DOI: 10.1051/0004-6361/202346563

81 Doeleman, S. S. et al. (includes Fuentes, A.; Gómez, J. L.)
"Reference Array and Design Consideration for the Next-Generation Event Horizon Telescope", *Galaxies,* Vol. 11, p. 107 (2023)
DOI: 10.3390/galaxies11050107

82 Domínguez-Gómez, J. et al. (includes Blázquez-Calero, G.; García-Benito, R.)
"Stellar mass-metallicity relation throughout the large-scale structure of the Universe: CAVITY mother sample", *Astronomy and Astrophysics,* Vol. 680, p. A111 (2023)
DOI: 10.1051/0004-6361/202346884

83 Domínguez-Gómez, J. et al. (includes Blázquez-Calero, G.; Duarte Puertas, S.; García-Benito, R.)
"Galaxies in voids assemble their stars slowly", *Nature,* Vol. 619, p. 269 (2023)
DOI: 10.1038/s41586-023-06109-1

84 Donath, A. et al. (includes Ruiz, J. E.; López-Coto, R.)
"Gammapy: A Python package for gamma-ray astronomy", *Astronomy and Astrophysics,* Vol. 678, p. A157 (2023)
DOI: 10.1051/0004-6361/202346488

85 Donnan, F. R. et al. (includes Aceituno, J.)
"Testing super-eddington accretion on to a supermassive black hole: reverberation mapping of PG 1119+120", *Monthly Notices of the Royal Astronomical Society,* Vol. 523, p. 545 (2023)
DOI: 10.1093/mnras/stad1409

86 Doroshenko, V. et al. (includes Agudo, I.)
"Complex variations in X-ray polarization in the X-ray pulsar LS V +44 17/RX J0440.9+4431", *Astronomy and Astrophysics,* Vol. 677, p. A57 (2023)
DOI: 10.1051/0004-6361/202347088

87 Dullo, B. T. et al. (includes Alberdi, A.)
"LeMMINGs. VI. Connecting nuclear activity to bulge properties of active and inactive galaxies: radio scaling relations and galaxy environment", *Monthly Notices of the Royal Astronomical Society,* Vol. 522, p. 3412 (2023)
DOI: 10.1093/mnras/stad1122

88 Dunajski, M. et al. (includes Arrechea, J.; Barcelo, C.)
"Abstracts of Award Winning and Honorable Mention Essays for 2023 Abstracts", *International Journal of Modern Physics D,* Vol. 32, Number 14, p. 2302003 (2023)
DOI: 10.1142/s0218271823020030

89 Eberhardt, J. et al. (includes Leiva, R.)
"Three Warm Jupiters around Solar-analog Stars Detected with TESS", *Astronomical Journal,* Vol. 166, p. 271 (2023)
DOI: 10.3847/1538-3881/ad06bc

90 Ehlert, S. R. et al. (includes Agudo, I.; Aceituno, F. J.; Bonnoli, G.; Casanova, V.; Agís-González, B.; Escudero, J.; Husillos, C.; Otero Santos, J.; Sota, A.)
"X-Ray Polarization of the BL Lacertae Type Blazar 1ES 0229+200", *Astrophysical Journal,* Vol. 959, p. 61 (2023)
DOI: 10.3847/1538-4357/ad05c4

91 Emami, R. et al. (includes Gómez, J. L.)
"Unraveling Twisty Linear Polarization Morphologies in Black Hole Images", *Astrophysical Journal,* Vol. 950, p. 38 (2023)
DOI: 10.3847/1538-4357/acc8cd

92 Emami, R. et al. (includes Fuentes , A.)
"Tracing Hot Spot Motion in Sagittarius A* Using the Next-Generation Event Horizon Telescope (ngEHT)", *Galaxies,* Vol. 11.0, Number 23, p. 23 (2023)
DOI: 10.3390/galaxies11010023

93 Emonts, B. H. C. et al. (includes Pérez-Torres, M. A.)
"A cosmic stream of atomic carbon gas connected to a massive radio galaxy at redshift 3.8", *Science,* Vol. 379, Issue 6639, p. 1323-1326 (2023)
DOI: 10.1126/science.abh2150

94 Espinoza-Retamal, J. I. et al. (includes Leiva, R.)
"The Aligned Orbit of the Eccentric Proto Hot Jupiter TOI-3362b", *Astrophysical Journal Letters,* Vol. 958, p. L20 (2023)
DOI: 10.3847/2041-8213/ad096d

95 Estrada-Dorado, S. et al. (includes Guerrero, M. A.; Rodríguez-López, C.)
"XMM-Newton Detection of X-Ray Emission from the Metal-polluted White Dwarf G 29-38", *Astrophysical Journal Letters,* Vol. 944, p. L46 (2023)
DOI: 10.3847/2041-8213/acba7e

96 Event Horizon Telescope Collaboration (includes Alberdi, A; Cho, I; Dahale, R; Foschi, M; Fuentes, A; Gómez, J L.; Lico, R; Toscano, T; Traianou, E; Zhao, G-Y

"First M87 Event Horizon Telescope Results. IX. Detection of Near-horizon Circular Polarization", *Astrophysical Journal Letters,* Vol. 957, p. L20 (2023)

DOI: 10.3847/2041-8213/acff70

97 Farinelli, R. et al. (includes Agudo, I.)

"Accretion geometry of the neutron star low mass X-ray binary Cyg X-2 from X-ray polarization measurements", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 3681-3690 (2023)

DOI: 10.1093/mnras/stac3726

98 Fausey, H. M. et al. (includes Kann, D. A.)

"Photometric redshift estimation for gamma-ray bursts from the early Universe", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, p. 4599 (2023)

DOI: 10.1093/mnras/stad2996

99 Federman, S. et al. (includes Osorio, M.)

"300: An ACA 870 μm Continuum Survey of Orion Protostars and Their Evolution", *Astrophysical Journal,* Vol. 944, p. 49 (2023)

DOI: 10.3847/1538-4357/ac9f4b

100 Fedriani, R. et al.

"The sharpest view on the high-mass star-forming region S255IR. Near infrared adaptive optics imaging of the outbursting source NIRS3", *Astronomy and Astrophysics,* Vol. 676, p. A107 (2023)

DOI: 10.1051/0004-6361/202346736

101 Fernández-Arenas, D. et al. (includes Iglesias-Páramo, J.)

"Spatially resolved properties of the ionized gas in the H II galaxy J084220+115000", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 4221 (2023)

DOI: 10.1093/mnras/stac3309

102 Fernández-Valenzuela, E. et al. (includes Morales, N.; Vara-Lubiano, M.; Ortiz, J. L.; Kretlow, M.; Santos-Sanz, P.; Alvarez-Candal, A.; Duffard, R.; Casanova, V.; Castro-Tirado, A. J.)

"The multichord stellar occultation by the centaur Bienor on January 11, 2019", *Astronomy and Astrophysics*, Vol. 669, p. A112 (2023)

DOI: 10.1051/0004-6361/202243214

103 Ferrazzoli, R. et al. (includes Agudo, I.)

"X-Ray Polarimetry Reveals the Magnetic-field Topology on Sub-parsec Scales in Tycho's Supernova Remnant", *Astrophysical Journal,* Vol. 945, p. 52 (2023)

DOI: 10.3847/1538-4357/acb496

104 Fielder, C. E. et al. (includes Karunakaran, A.) et al.

"The Disturbed and Globular-cluster-rich Ultradiffuse Galaxy UGC 9050-Dw1", *Astrophysical Journal Letters,* Vol. 954, p. L39 (2023)

DOI: 10.3847/2041-8213/acf0c3

105 Fletcher, L. N. et al. (includes Lara, Luisa M.)

"Jupiter Science Enabled by ESA's Jupiter Icy Moons Explorer", *Space Science Reviews,* Vol. 219, p. 53 (2023)

DOI: 10.1007/s11214-023-00996-6

106 For, B. -Q. et al. (includes Karunakaran, A.)

"WALLABY pre-pilot survey: ultra-diffuse galaxies in the Eridanus supergroup", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, p. 3130 (2023)

DOI: 10.1093/mnras/stad2921

107 Forbes, J. M. et al. (includes González-Galindo, F.)

"Solar-Synchronous Tides in Mars Thermosphere CO2, Ar, and N2 Densities From MAVEN", *Journal of Geophysical Research A: Space Physics*, Vol. 128, p. e2023JA031637 (2023)

DOI: 10.1029/2023JA031637

108 Forsblom, S. V. et al. (includes Agudo, I.)

"IXPE Observations of the Quintessential Wind-accreting X-Ray Pulsar Vela X-1", *Astrophysical Journal Letters,* Vol. 947, p. L20 (2023)

DOI: 10.3847/2041-8213/acc391

109 Fossati, L. et al. (includes Shulyak, D.)

"The GAPS programme at TNG. XLV. HI Balmer lines transmission spectroscopy and NLTE atmospheric modelling of the ultra-hot Jupiter KELT-20b/MASCARA-2b", *Astronomy and Astrophysics,* Vol. 676, p. A99 (2023)

DOI: 10.1051/0004-6361/202346787

110 Fuentes, A.; Gómez, J. L. et al. (includes Zhao, G.-Y.; Lico, R.; Cho, I.; Traianou, E.; Toscano, T.; Dahale, R. ; Foschi, M.)

"Filamentary structures as the origin of blazar jet radio variability", *Nature Astronomy,* p. 1359 (2023)

DOI: 10.1038/s41550-023-02105-7

111 Fuhrmeister, B., et al. (includes Amado, P. J.; Danielski, C.)

"The CARMENES search for exoplanets around M dwarfs. Variability on long timescales as seen in chromospheric indicators", *Astronomy and Astrophysics,* Vol. 670, p. A71 (2023)

DOI: 10.1051/0004-6361/202244829

112 Fuhrmeister, B., et al. (includes Amado, P. J.; Schöfer, P.)

"The CARMENES search for exoplanets around M dwarfs. Behaviour of the Paschen lines during flares and quiescence", *Astronomy and Astrophysics,* Vol. 678, p. A1 (2023)

DOI: 10.1051/0004-6361/202347161

113 Funke, B.; García-Comas, M., et al. (includes López-Puertas, M.)

"Michelson Interferometer for Passive Atmospheric Sounding Institute of Meteorology and Climate Research/Instituto de Astrofísica de Andalucía version 8 retrieval of nitric oxide and lower-thermospheric temperature", *Atmospheric Measurement Techniques,* Vol. 16, p. 2167 (2023)

DOI: 10.5194/amt-16-2167-2023

114 Gan, T. et al. (includes Pozuelos, F. J.)

"Occurrence Rate of Hot Jupiters Around Early-type M Dwarfs Based on Transiting Exoplanet Survey Satellite Data", *Astronomical Journal,* Vol. 165, p. 17 (2023)

DOI: 10.3847/1538-3881/ac9b12

115 Garay, Luis J.; García-Moreno, G.

"Embedding Unimodular Gravity in string theory", *Journal of High Energy Physics,* Vol. 2023, p. 27 (2023)

DOI: 10.1007/JHEP03(2023)027

116 García Martín-Caro, A.; García-Moreno, G.; Olmedo, J.; Sánchez Velázquez, J. M.

"Hawking radiation from an analogue bouncing geometry", *Physical Review D - Particles,* Fields, Gravitation and Cosmology, Vol. 108, p. L061701 (2023)

DOI: 10.1103/PhysRevD.108.L061701

117 García-Comas, M.; Funke, B.; López-Puertas, M., et al. (includes Martínez-Mondéjar, B.)

"Version 8 IMK-IAA MIPAS temperatures from 12-15 μm spectra: Middle and Upper Atmosphere modes", *Atmospheric Measurement Techniques,* Vol. 16, p. 5357 (2023)

DOI: 10.5194/amt-16-5357-2023

118 Ghachoui, M., et al. (includes Pozuelos, F. J.)

"TESS discovery of a super-Earth orbiting the M-dwarf star TOI-1680", *Astronomy and Astrophysics,* Vol. 677, p. A31 (2023)

DOI: 10.1051/0004-6361/202347040

119 Gianolli, V. E., et al. (includes Agís-González, B.; Agudo, I.)

"Uncovering the geometry of the hot X-ray corona in the seyfert galaxy NGC 4151 with IXPE", *Monthly Notices of the Royal Astronomical Society,* p. 4468 (2023)

DOI: 10.1093/mnras/stad1697

120 Giovannini, G.; Baldi, R. D.; Capetti, A.; Giroletti, M.; Lico, R.

"Jets in FR0 radio galaxies", *Astronomy and Astrophysics,* Vol. 672, p. A104 (2023)

DOI: 10.1051/0004-6361/202245395

121 Gkogkou, A., et al. (includes Prada, F.)

"CONCERTO: Simulating the CO, [CII], and [CI] line emission of galaxies in a 117 deg2 field and the impact of field-to-field variance", *Astronomy and Astrophysics*, Vol. 670, p. A16 (2023)

DOI: 10.1051/0004-6361/202245151

122 Golden-Marx, E., et al. (includes Gendron-Marsolais, M. L.)

"The High-redshift Clusters Occupied by Bent Radio AGN (COBRA) Survey: Investigating the Role of Environment on Bent Radio AGNs Using LOFAR", *Astrophysical Journal,* Vol. 956, p. 87 (2023)

DOI: 10.3847/1538-4357/acf46b

123 Gómez, J. F., et al. (includes Anglada, G.)

"An SiO Toroid and Wide-angle Outflow Associated with the Massive Protostar W75N(B)-VLA2", *Astrophysical Journal Letters,* Vol. 956, p. L45 (2023)

DOI: 10.3847/2041-8213/ad01bd

124 Gomez-Gonzalez, E., et al. (includes Muñoz, O.; Gomez-Martin, J. C.; Aceituno-Castro, J.; Ramos, J. Luis)

"Polarimetric imaging for the detection of synthetic models of SARS-CoV-2: A proof of concept", *Journal of Quantitative Spectroscopy and Radiative Transfer,* Vol. 302, p. 108567 (2023)

DOI: 10.1016/j.jqsrt.2023.108567

125 González-Álvarez, E., et al. (includes Amado, P. J.; Rodríguez, E.; Rodríguez-López, C.; López-González, M. J.)

"The CARMENES search for exoplanets around M dwarfs. A sub-Neptunian mass planet in the habitable zone of HN Lib", *Astronomy and Astrophysics,* Vol. 675, p. A141 (2023)

DOI: 10.1051/0004-6361/202346276

126 González-Álvarez, E., et al. (includes López-González, M. J.; Rodríguez, E.; Rodríguez-López, C.; Amado, P. J.)

"Two sub-Neptunes around the M dwarf TOI-1470", *Astronomy and Astrophysics,* Vol. 675, p. A177 (2023)

DOI: 10.1051/0004-6361/202346292

127 González-Morán, A. L., et al. (includes Rodríguez-Espinosa, J. M.)

"The PAU survey: classifying low-z SEDs using Machine Learning clustering", *Monthly Notices of the Royal Astronomical Society,* Vol. 524, p. 3569 (2023)

DOI: 10.1093/mnras/stad2123

128 Gonzalez-Otero, M., et al. (includes Alfaro, E.; Pović, M.)

"The Lockman-SpReSO project. Description, target selection, observations, and catalogue preparation", *Astronomy and Astrophysics*, Vol. 669, p. A85 (2023)

DOI: 10.1051/0004-6361/202244480

129 Gordon, C., et al. (includes Prada, F.)

"3D correlations in the Lyman-α forest from early DESI data", *Journal of Cosmology and Astroparticle Physics,* Vol. 2023, p. 045 (2023)

DOI: 10.1088/1475-7516/2023/11/045

130 Gorrini, P., et al. (includes Pozuelos, F. J.; Amado, P. J.; López González, M. J.; Rodríguez, E.)

"Planetary companions orbiting the M dwarfs GJ 724 and GJ 3988. A CARMENES and IRD collaboration", *Astronomy and Astrophysics,* Vol. 680, p. A28 (2023)

DOI: 10.1051/0004-6361/202347108

131 Goto, H., et al. (includes Karunakaran, A.)
"Systematically Measuring Ultradiffuse Galaxies (SMUDGes). IV. Ultradiffuse Satellites of Milky Way Analogs", *Astronomical Journal,* Vol. 166, p. 185 (2023)
DOI: 10.3847/1538-3881/acf4f4

132 Grajales-Medina, D., et al. (includes Duarte Puertas, S.)
"SIT 45: An interacting, compact, and star-forming isolated galaxy triplet", *Astronomy and Astrophysics*, Vol. 669, p. A23 (2023)
DOI: 10.1051/0004-6361/202244492

133 Guy, J., et al. (includes Prada, F.)
"The Spectroscopic Data Processing Pipeline for the Dark Energy Spectroscopic Instrument", *Astronomical Journal,* Vol. 165, p. 144 (2023)
DOI: 10.3847/1538-3881/acb212

134 Hahlin, A., et al. (includes Shulyak, D.)
"Determination of small-scale magnetic fields on Sun-like stars in the near-infrared using CRIRES+", *Astronomy and Astrophysics,* Vol. 675, p. A91 (2023)
DOI: 10.1051/0004-6361/202346314

135 Hahn, C., et al. (includes Prada, F.)
"The DESI Bright Galaxy Survey: Final Target Selection, Design, and Validation", *Astronomical Journal*, Vol. 165, p. 253 (2023)
DOI: 10.3847/1538-3881/accff8

136 Hartley, P., et al. (includes Darriba, L.; Garrido, J.; Hess, K. M.; Moldón, J.; Parra, M.; Sánchez-Expósito, S.; Verdes-Montenegro, L.; Alberdi, A.; Márquez, I.; Sorgho, A.)
"SKA Science Data Challenge 2: analysis and results", *Monthly Notices of the Royal Astronomical Society,* Vol. 523, p. 1967 (2023)
DOI: 10.1093/mnras/stad1375

137 Hernán-Caballero, A., et al. (includes Díaz-García, L. A.; González Delgado, R. M.; Vílchez, J. M.; Benítez, N.; Moles, M.)
"J-NEP: 60-band photometry and photometric redshifts for the James Webb Space Telescope North Ecliptic Pole Time-Domain Field", *Astronomy and Astrophysics,* Vol. 671, p. A71 (2023)
DOI: 10.1051/0004-6361/202244759

138 Hintz, D., et al. (includes Amado, P. J.)
"Modeling the Chromosphere and Transition Region of Planet-hosting Star GJ 436", *Astrophysical Journal,* Vol. 954, p. 73 (2023)
DOI: 10.3847/1538-4357/ace103

139 Ho, A. Y. Q., et al. (includes Castro-Tirado, A. J.)
"A Search for Extragalactic Fast Blue Optical Transients in ZTF and the Rate of AT2018cow-like Transients", *Astrophysical Journal,* Vol. 949, p. 120 (2023)
DOI: 10.3847/1538-4357/acc533

140 Hobson, M., et al. (includes Pozuelos, F. J.)
"TOI-3235 b: A Transiting Giant Planet around an M4 Dwarf Star", *Astrophysical Journal Letters,* Vol. 946, p. L4 (2023)
DOI: 10.3847/2041-8213/acbd9a

141 Hsiao, T. Y.-Y., et al. (includes Jiménez-Teja, Y.)
"JWST Reveals a Possible z 11 Galaxy Merger in Triply Lensed MACS0647-JD", *Astrophysical Journal Letters,* Vol. 949, p. L34 (2023)
DOI: 10.3847/2041-8213/acc94b

142 Hu, Y. -D.; Fernandez-Garcia, E.; Caballero-Garcia, M. D.; Perez-Garcia, I.; Carrasco-Garcia, I. M.; Castellon, A.; del Pulgar, C. Perez; Terol, A. J. Reina; Castro-Tirado, A. J.
"The burst observer and optical transient exploring system in the multi-messenger astronomy era", *Frontiers in Astronomy and Space Sciences,* Vol. 10, p. 952887 (2023)
DOI: 10.3389/fspas.2023.952887

143 Hu, Z., et al. (includes Hess, K. M.)
"AMUSE-Antlia. I. Nuclear X-Ray Properties of Early-type Galaxies in a Dynamically Young Galaxy Cluster", *Astrophysical Journal,* Vol. 956, p. 104 (2023)
DOI: 10.3847/1538-4357/acf292

144 Huang, Y.; Kok, J. F.; Saito, M.; Muñoz, O.
"Single-scattering properties of ellipsoidal dust aerosols constrained by measured dust shape distributions", *Atmospheric Chemistry and Physics,* Vol. 23.0, p. 2557-2577 (2023)
DOI: 10.5194/acp-23-2557-2023

145 Hutchens, Z. L., et al. (includes Hess, K. M.)
"The RESOLVE and ECO Gas in Galaxy Groups Initiative: The Group Finder and the Group H I-Halo Mass Relation", *Astrophysical Journal,* Vol. 956, p. 51 (2023)
DOI: 10.3847/1538-4357/acefd4

146 Imai, H., et al. (includes Gómez, J. F.)
"FLASHING: Project overview", *Publications of the Astronomical Society of Japan,* p. 1183 (2023)
DOI: 10.1093/pasj/psad064

147 Ingram, A., et al. (includes Agudo, I.)
"The X-ray polarization of the Seyfert 1 galaxy IC 4329A", *Monthly Notices of the Royal Astronomical Society,* Vol. 525, p. 5437 (2023)
DOI: 10.1093/mnras/stad2625

148 Iovino, A., et al. (includes García-Benito, R.; González Delgado, R. M.)
"WEAVE-StePS: A stellar population survey using WEAVE at WHT", *Astronomy and Astrophysics,* Vol. 672, p. A87 (2023)
DOI: 10.1051/0004-6361/202245361

149 Ivanova, O., et al. (includes Moreno, F.)
"Long-lasting activity of asteroid (248370) 2005 QN173", *Monthly Notices of the Royal Astronomical Society,* Vol. 525, p. 402 (2023)
DOI: 10.1093/mnras/stad2294

150 Iwasawa, K.; Norman, C.; Gilli, R.; Gandhi, P.; Peréz-Torres, M. A.
"Origin of the diffuse 4-8 keV emission in M 82", *Astronomy and Astrophysics,* Vol. 674, p. A77 (2023)
DOI: 10.1051/0004-6361/202245548

151 Janvier, M., et al. (includes Bellot Rubio, L.; del Toro Iniesta, J. C.; Orozco Suárez, D.)
"A multiple spacecraft detection of the 2 April 2022 M-class flare and filament eruption during the first close Solar Orbiter perihelion", *Astronomy and Astrophysics,* Vol. 677, p. A130 (2023)
DOI: 10.1051/0004-6361/202346321

152 Jiang, W., et al. (includes Zhao, G. Yao; Cho, Ilje)
"Applications of the Source-Frequency Phase-Referencing Technique for ngEHT Observations", *Galaxies,* Vol. 11.0, Number 3 (2023)
DOI: 10.3390/galaxies11010003

153 Jiménez, M.; Alfaro, E. J.; Torres Torres, M.; Triguero, I.
"CzSL: Learning from citizen science, experts, and unlabelled data in astronomical image classification", *Monthly Notices of the Royal Astronomical Society*, Vol. 526, p. 1742 (2023)
DOI: 10.1093/mnras/stad2852

154 Jiménez-Teja, Y.; Dupke, R. A.; Lopes, P. A. A.; Vílchez, J. M.
"Dissecting the RELICS cluster SPT-CLJ0615-5746 through intracluster light: Confirmation of the multiple merging state of the cluster formation", *Astronomy and Astrophysics,* Vol. 676, p. A39 (2023)
DOI: 10.1051/0004-6361/202346580

155 Johnson, M, et al. (includes Gómez, J. L.; Lico, R.)
"Key Science Goals for the Next-Generation Event Horizon Telescope", *Galaxies,* Vol. 11, p. 61 (2023)
DOI: 10.3390/galaxies11030061

156 Jones, M. G.; Verdes-Montenegro, L.; Moldon, J.; Damas Segovia, A., et al. (includes Luna, S.; del Olmo, A.; Perea, J.; Garrido, J.; Sanchez, S.)
"Disturbed, diffuse, or just missing?. A global study of the H I content of Hickson compact groups", *Astronomy and Astrophysics*, Vol. 670, p. A21 (2023)
DOI: 10.1051/0004-6361/202244622

157 Jones, M. G.; Karunakaran, A., et al.
"Gas-rich, Field Ultra-diffuse Galaxies Host Few Gobular Clusters", *Astrophysical Journal Letters*, Vol. 942, p. L5 (2023)
DOI: 10.3847/2041-8213/acaaab

158 Jorstad, S., et al. (includes Lico, R.; Zhao, G.-Y.; Alberdi, A.; Cho, Ilje; Fuentes, A.; Gómez, J. L.; Traianou, E.)
"The Event Horizon Telescope Image of the Quasar NRAO 530", *Astrophysical Journal,* Vol. 943, p. 170 (2023)
DOI: 10.3847/1538-4357/acaea8

159 Kahil, F., et al. (includes Bellot Rubio, L. R.; Moreno Vacas, A.; Orozco Suárez, D.; Strecker, H.; del Toro Iniesta, J. C.)
"Wavefront error of PHI/HRT on Solar Orbiter at various heliocentric distances", *Astronomy and Astrophysics,* Vol. 675, p. A61 (2023)
DOI: 10.1051/0004-6361/202346033

160 Kareta, T., et al. (includes Pérez-García, I.; Castro-Tirado, A. J.)
"Ejecta Evolution Following a Planned Impact into an Asteroid: The First Five Weeks", *Astrophysical Journal Letters,* Vol. 959, p. L12 (2023)
DOI: 10.3847/2041-8213/ad0fdd

161 Karunakaran, A., et al.
"The Quenched Satellite Population Around Milky Way Analogs", *Monthly Notices of the Royal Astronomical Society,* p. 5314 (2023)
DOI: 10.1093/mnras/stad2208

162 Karunakaran, A.; Zaritsky, D.
"Extending Ultra-Diffuse Galaxy abundances to Milky Way analogues", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 884 (2023)
DOI: 10.1093/mnras/stac3622

163 Kiefer, M, et al. (includes García-Comas, M.)
"The SPARC water vapour assessment II: biases and drifts of water vapour satellite data records with respect to frost point hygrometer records", *Atmospheric Measurement Techniques,* Vol. 16, p. 4589 (2023)
DOI: 10.5194/amt-16-4589-2023

164 Kiefer, M., et al. (includes Funke, B.; García-Comas, M.; López-Puertas, M.)
"Version 8 IMK-IAA MIPAS ozone profiles: nominal observation mode", *Atmospheric Measurement Techniques,* Vol. 16, p. 1443 (2023)
DOI: 10.5194/amt-16-1443-2023

165 Kim, S.-J., et al. (includes Verdes-Montenegro, L.)
"WALLABY Pilot Survey: H I gas kinematics of galaxy pairs in cluster environment", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 318 (2023)
DOI: 10.1093/mnras/stac3480

166 Komossa, S., et al. (includes Gómez, J. L.)
"Absence of the predicted 2022 October outburst of OJ 287 and implications for binary SMBH scenarios", *Monthly Notices of the Royal Astronomical Society,* Vol. 522, Issue 1, p. L84-L88 (2023)
DOI: 10.1093/mnrasl/slad016

167 Komossa, S., et al. (includes Gómez, J. L.)
"MOMO. VI. Multifrequency Radio Variability of the Blazar OJ 287 from 2015 to 2022, Absence of Predicted 2021 Pecursor-flare Activity, and a New Binary Interpretation of the 2016/2017 Outburst", *Astrophysical Journal*, Vol. 944, p. 177 (2023)
DOI: 10.3847/1538-4357/acaf71

168 Komossa, S., et al. (includes Gómez, J. L.)
"Multiwavelength astrophysics of the blazar OJ 287 and the project MOMO", *Astronomische Nachrichten (2023)*
DOI: 10.1002/asna.20220126

169 Kool, E. C., et al. (includes Moldón, J.; Pérez-Torres, M.)
"A radio-detected type Ia supernova with helium-rich circumstellar material", *Nature,* Vol. 617, p. 477 (2023)
DOI: 10.1038/s41586-023-05916-w

170 Kossakowski, D., et al. (includes Rodríguez, E.; Amado, P. J.; Aceituno, J.; López-González, M. J.; Martín-Ruiz, S.; Pérez-Torres, M.; Rodríguez López, C.; Schöfer, P.)
"The CARMENES search for exoplanets around M dwarfs. Wolf 1069 b: Earth-mass planet in the habitable zone of a nearby, very low-mass star", *Astronomy and Astrophysics*, Vol. 670, p. A84 (2023)
DOI: 10.1051/0004-6361/202245322

171 Kubo, M., et al. (includes Sánchez Gómez, A.; Balaguer Jimenéz, M..; Orozco Suárez, D.; Morales Fernández, J. M.; Aparicio del Moral, B.; Moreno Mantas, A. J.; Bailón Martínez, E.; del Toro Iniesta, J. C.)
"High-speed data processing onboard sunrise chromospheric infrared spectropolarimeter for the SUNRISE III balloon telescope", *Journal of Astronomical Telescopes,* Instruments, and Systems, Vol. 9, p. 034003 (2023)
DOI: 10.1117/1.JATIS.9.3.034003

172 Kutkin, A. M., et al. (includes Hess, K. M.)
"Apertif 1.4 GHz continuum observations of the Boötes field and their combined view with LOFAR", *Astronomy and Astrophysics,* Vol. 676, p. A37 (2023)
DOI: 10.1051/0004-6361/202346618

173 Lafarga, M., et al. (includes Amado, P. J.; Schöfer, P.)
"The CARMENES search for exoplanets around M dwarfs. Line-by-line sensitivity to activity in M dwarfs", *Astronomy and Astrophysics,* Vol. 674, p. A61 (2023)
DOI: 10.1051/0004-6361/202245602

174 Lampón, M.; López-Puertas, M., et al. (includes Danielski, C.; Amado, P. J.)
"Characterisation of the upper atmospheres of HAT-P-32 b, *WASP-69 b,* GJ 1214 b, and WASP-76 b through their He I triplet absorption", Astronomy and Astrophysics, Vol. 673, p. A140 (2023)
DOI: 10.1051/0004-6361/202245649

175 Lan, T.-W., et al. (includes Prada, F.)
"The DESI Survey Validation: Results from Visual Inspection of Bright Galaxies, Luminous Red Galaxies, and Emission-line Galaxies", *Astrophysical Journal*, Vol. 943, p. 68 (2023)
DOI: 10.3847/1538-4357/aca5fa

176 Ledda, S.; Danielski, C.; Turrini, D.
"The quest for Magrathea planets. I. Formation of second-generation exoplanets around double white dwarfs", *Astronomy and Astrophysics,* Vol. 675, p. A184 (2023)
DOI: 10.1051/0004-6361/202245827

177 Lesjak, F., et al. (includes Shulyak, D.)
"Retrieval of the dayside atmosphere of WASP-43b with CRIRES+", *Astronomy and Astrophysics,* Vol. 678, p. A23 (2023)
DOI: 10.1051/0004-6361/202347151

178 Levan, A. J., et al. (includes Agüí Fernández, J. F.)
"The First JWST Spectrum of a GRB Afterglow: No Bright Supernova in Observations of the Brightest GRB of all Time, GRB 221009A", *Astrophysical Journal Letters*, Vol. 946, p. L28 (2023)
DOI: 10.3847/2041-8213/acc2c1

179 Levan, A. J., et al. (includes Agüí Fernández, J. F.)
"A long-duration gamma-ray burst of dynamical origin from the nucleus of an ancient galaxy", *Nature Astronomy,* p. 976 (2023)
DOI: 10.1038/s41550-023-01998-8

180 Li, D.; Luque, Al.; Gordillo-Vazquez, F. J.; Pérez-Invernón, F. J. et al.
"Different Types of Corona Discharges Associated With High-Altitude Positive Narrow Bipolar Events Nearby Cloud Top", *Journal of Geophysical Research D: Atmospheres,* Vol. 128, p. e2022JD037883 (2023)
DOI: 10.1029/2022JD037883

181 Li, D., et al. (includes Luque, A.)
"Observation of Blue Corona Discharges and Cloud Microphysics in the Top of Thunderstorm Cells in Cyclone Fani", *Journal of Geophysical Research D: Atmospheres,* Vol. 128, p. e2022JD038328 (2023)
DOI: 10.1029/2022JD038328

182 Li, J.-Y., et al. (includes Moreno, F.)
"Ejecta from the DART-produced active asteroid Dimorphos", *Nature,* Vol. 616, p. 452 (2023)
DOI: 10.1038/s41586-023-05811-4

183 Li, Li., et al. (includes Castro-Tirado, A. J.; Kann, D. A.)
"A Cosmological Fireball with 16% Gamma-Ray Radiative Efficiency", *Astrophysical Journal Letters,* Vol. 944, p. L57 (2023)
DOI: 10.3847/2041-8213/acb99d

184 Li, Z.; Li, Z.; García-Benito, R.; Jin, Y.
"CAHA/PPAK Integral-field Spectroscopic Observations of M81. II. Testing Photoionization Models in a Spatially Resolved LINER", *Astrophysical Journal,* Vol. 958, p. 89 (2023)
DOI: 10.3847/1538-4357/ad0299

185 Lico, R., et al. (includes Gómez, J. L.; .Dahale, R.; Alberdi, A.; Gold, R.; Traianou, E.; Toscano, T.; Foschi, M.
"Multi-Wavelength and Multi-Messenger Studies Using the Next-Generation Event Horizon Telescope", *Galaxies,* Vol. 11.0, Number 17, p. 17 (2023)
DOI: 10.3390/galaxies11010017

186 Lillo-Box, J., et al. (includes Luque, R.)
"TOI-969: a late-K dwarf with a hot mini-Neptune in the desert and an eccentric cold Jupiter", *Astronomy and Astrophysics,* Vol. 669, p. A109 (2023)
DOI: 10.1051/0004-6361/202243879

187 Lin, X., et al. (includes Verdes-Montenegro, L.)
"FAST-ASKAP Synergy: Quantifying Coexistent Tidal and Ram Pressure Strippings in the NGC 4636 Group", *Astrophysical Journal,* Vol. 956, p. 148 (2023)
DOI: 10.3847/1538-4357/accea2

188 Lin, Z.-Y. D., et al. (includes Muñoz, O.)
"(Sub)millimetre dust polarization of protoplanetary discs from scattering by large millimetre-sized irregular grains", *Monthly Notices of the Royal Astronomical Society,* Vol. 520, p. 1210 (2023)
DOI: 10.1093/mnras/stad173

189 Linares, H., et al. (includes Sánchez de Miguel, A.)
"Assessing light pollution in vast areas: Zenith sky brightness maps of Catalonia", *Journal of Quantitative Spectroscopy and Radiative Transfer,* Vol. 309, p. 108678 (2023)
DOI: 10.1016/j.jqsrt.2023.108678

190 Liu, J., et al. (includes Gilli, G.; González Galindo, F.)
"A Surface to Exosphere Non-Orographic Gravity Wave Parameterization for the Mars Planetary Climate Model", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2023JE007769 (2023)
DOI: 10.1029/2023JE007769

191 Llerena, M., et al. (includes Pérez-Montero, E.; Vílchez, J. M.) .
"Ionized gas kinematics and chemical abundances of low-mass star-forming galaxies at $z \sim 3$", *Astronomy and Astrophysics,* Vol. 676, p. A53 (2023)
DOI: 10.1051/0004-6361/202346232

192 Long, D., et al. (includes Strecker, H.; Orozco-Suárez, D.)
"The Eruption of a Magnetic Flux Rope Observed by Solar Orbiter and Parker Solar Probe", *Astrophysical Journal,* Vol. 955, p. 152 (2023)
DOI: 10.3847/1538-4357/acefd5

193 López, I. E., et al. (includes González Delgado, R. M.; Marquez, I.; Pović, M.; Benitez, N.)
"The miniJPAS survey: AGN and host galaxy coevolution of X-ray-selected sources", *Astronomy and Astrophysics,* Vol. 672, p. A137 (2023)
DOI: 10.1051/0004-6361/202245168

194 López-Puertas, M.; García-Comas, M.; Funke, B., et al.
"MIPAS ozone retrieval version 8: middle-atmosphere measurements", *Atmospheric Measurement Techniques,* Vol. 16, p. 5609 (2023)
DOI: 10.5194/amt-16-5609-2023

195 López-Valverde, M. A.; Funke, B.; Brines, A.; Stolzenbach, A.; Modak, A.; Hill, B.; González-Galindo, F., et al. (includes López-Moreno, J. J.; Rodriguez-Gómez, J.)
"Martian Atmospheric Temperature and Density Profiles During the First Year of NOMAD/TGO Solar Occultation Measurements", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2022JE007278 (2023)
DOI: 10.1029/2022JE007278

196 Lora, V., et al. (includes Guerrero, M. A.)
"Emerging planetary nebulae within 3D spiral patterns", *Monthly Notices of the Royal Astronomical Society,* Vol. 522, p. 3337 (2023)
DOI: 10.1093/mnras/stad1170

197 Lu, L.-Y., et al. (includes ;Wiegert, T.)
"eDIG-CHANGES I: extended Hα emission from the extraplanar diffuse ionized gas (eDIG) around CHANG-ES galaxies", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 6098 (2023)
DOI: 10.1093/mnras/stad006

198 Lu, R.-S., et al. (includes Gómez, J. L.; Traianou, E.)
"A ring-like accretion structure in M87 connecting its black hole and jet", *Nature,* Vol. 616, p. 686 (2023)
DOI: 10.1038/s41586-023-05843-w

199 Luque, R., et al. (includes Amado, P. J.)
"A resonant sextuplet of sub-Neptunes transiting the bright star HD 110067", *Nature,* Vol. 623, p. 932 (2023)
DOI: 10.1038/s41586-023-06692-3

200 Lykou, F., et al. (includes Guerrero, M. A.)
"A New Study on a Type Iax Stellar Remnant and its Probable Association with SN 1181", *Astrophysical Journal,* Vol. 944, p. 120 (2023)
DOI: 10.3847/1538-4357/acb138

201 Maciejewski, G.; Fernández, M.; Sota, A.; Amado, P. J., et al.
"Search for Planets in Hot Jupiter Systems with Multi-Sector TESS Photometry. III. A Study of Ten Systems Enhanced with New Ground-Based Photometry", *Acta Astronomica,* Vol. 73, p. 57 (2023)
DOI: 10.32023/0001-5237/73.1.4

202 Maciejewski, G., et al. (includes Fernández, M.; Aceituno, F.)
"A hot super-Earth planet in the WASP-84 planetary system", *Monthly Notices of the Royal Astronomical Society,* Vol. 525, p. L43 (2023)
DOI: 10.1093/mnrasl/slad078

203 MAGIC Collaboration; Abe, H., et al. (includes Agudo, I.; Bernardos, M.; Castro-Tirado, A. J.; Escudero, J.)
"MAGIC observations provide compelling evidence of hadronic multi-TeV emission from the putative PeVatron SNR G106.3+2.7", *Astronomy and Astrophysics,* Vol. 671, p. A12 (2023)
DOI: 10.1051/0004-6361/202244931

204 MAGIC Collaboration; Acciari, V. A.;, et al. (includes Bernardos, M.)
"Long-term multi-wavelength study of 1ES 0647+250", *Astronomy and Astrophysics,* Vol. 670, p. A49 (2023)
DOI: 10.1051/0004-6361/202244477

205 Mahoro, A., et al. (includes Pović, M.; Cazzoli, S.; ; Márquez, I.; Masegosa, J.)
"The [O III] Profiles of Far-infrared Active and Inactive Optically Selected Green Valley Galaxies", *Astrophysical Journal,* Vol. 952, p. 12 (2023)
DOI: 10.3847/1538-4357/accea1

206 Maire, A.-L., et al. (includes Pozuelos, F. J.)
"Workshop Summary: Exoplanet Orbits and Dynamics", *Publications of the Astronomical Society of the Pacific,* Vol. 135, p. 106001 (2023)
DOI: 10.1088/1538-3873/acff88

207 Malacaria, C., et al. (includes Agudo, I.)
"A polarimetrically oriented X-ray stare at the accreting pulsar EXO 2030+375", *Astronomy and Astrophysics,* Vol. 675, p. A29 (2023)
DOI: 10.1051/0004-6361/202346581

208 Malagón-Romero, A.; Pérez-Invernón, F. J.; Gordillo-Vázquez, F. J.
"Chemical Activity of Low Altitude (50 km) Sprite Streamers", *Journal of Geophysical Research D: Atmospheres,* Vol. 128, p. e2023JD038570 (2023)
DOI: 10.1029/2023JD038570

209 Mallorquín, M., et al. (includes Peña, L.; Pérez-Torres, M.; Amado, P. J.)
"TOI-1801 b: A temperate mini-Neptune around a young M0.5 dwarf", *Astronomy and Astrophysics,* Vol. 680, p. A76 (2023)
DOI: 10.1051/0004-6361/202347346

210 Marchesini, E. J., et al. (includes Agís González, B.)
"Disentangling the nature of the prototype radio weak BL Lac. Contemporaneous multifrequency observations of WISE J141046.00+740511.2", *Astronomy and Astrophysics,* Vol. 670, p. A91 (2023)
DOI: 10.1051/0004-6361/202244899

211 Marciniak, A., et al. (includes Duffard, R.; Morales, N.)
"Scaling slowly rotating asteroids with stellar occultations", *Astronomy and Astrophysics,* Vol. 679, p. A60 (2023)
DOI: 10.1051/0004-6361/202346191

212 Marcq, E., et al. (includes Stolzenbach, A.)
"Minor species in Venus' night side troposphere as observed by VIRTIS-H/Venus Express", *Icarus,* Vol. 405, p. 115714 (2023)
DOI: 10.1016/j.icarus.2023.115714

213 Marin, F., et al. (includes Agudo, I.)
"X-ray polarization evidence for a 200-year-old flare of Sgr A*", *Nature,* Vol. 619, p. 41 (2023)
DOI: 10.1038/s41586-023-06064-x

214 Marsset, M., et al. (includes Duffard, R.)
"The equilibrium shape of (65) Cybele: primordial or relic of a large impact?", *Astronomy and Astrophysics,* Vol. 670, p. A52 (2023)
DOI: 10.1051/0004-6361/202243859

215 Martikainen, J.; Muñoz, O., et al. (includes Gómez Martín, J. C.)
"Optical Constants of Martian Dust Analogs at UV-Visible-Near-infrared Wavelengths", *Astrophysical Journal Supplement Series,* Vol. 268, p. 47 (2023)
DOI: 10.3847/1538-4365/acf0be

216 Martinez, A., et al. (includes Gilli, G.)
"Exploring the variability of the venusian thermosphere with the IPSL Venus GCM", *Icarus,* Vol. 389, p. 115272 (2023)
DOI: 10.1016/j.icarus.2022.115272

217 Martínez-Delgado, D., et al. (includes Román, J.)
"Hidden depths in the local Universe: The Stellar Stream Legacy Survey", *Astronomy and Astrophysics,* Vol. 671, p. A141 (2023)
DOI: 10.1051/0004-6361/202245011

218 Martínez-Delgado, D., et al.
"A giant umbrella-like stellar stream around the tidal ring galaxy NGC 922", *Astronomy and Astrophysics,* Vol. 669, p. A103 (2023)
DOI: 10.1051/0004-6361/202244832

219 Martínez-Solaeche, G., et al. (includes González Delgado, R. M.; García-Benito, R.; Díaz-García, L.; Rodríguez-Martín, J. E.; Márquez, I.; Vílchez, J. M.; Benitez, N.; Moles, M.)
"The miniJPAS survey quasar selection. III. Classification with artificial neural networks and hybridisation", *Astronomy and Astrophysics,* Vol. 673, p. A103 (2023)
DOI: 10.1051/0004-6361/202245750

220 Marvin, C. J.; Reiners, A.; Anglada-Escudé, G.; Jeffers, S. V.; Boro Saikia, S.
"Absolute Ca II H & K and H-alpha flux measurements of low-mass stars: Extending R'HK to M dwarfs", *Astronomy and Astrophysics,* Vol. 671, p. A162 (2023)
DOI: 10.1051/0004-6361/201937306

221 Marziani, P.; Panda, S.; Deconto Machado, A.; Del Olmo, A.
"Metal Content in Relativistically Jetted and Radio-Quiet Quasars in the Main Sequence Context", *Galaxies,* Vol. 11, p. 52 (2023)
DOI: 10.3390/galaxies11020052

222 Mason, J. P., et al. (includes Lopez-Moreno, J. J.)
"Ultraviolet and Visible Reflectance Spectra of Phobos and Deimos as Measured by the ExoMars-TGO/NOMAD-UVIS Spectrometer", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2023JE008002 (2023)
DOI: 10.1029/2023JE008002

223 Maturi, M., et al. (includes González Delgado, R. M.; Rodríguez-Martín, J. E.; Benitez, N.)
"The miniJPAS survey. Cluster and galaxy group detections with AMICO", *Astronomy and Astrophysics,* Vol. 678, p. A145 (2023)
DOI: 10.1051/0004-6361/202245323

224 Meena, A. K., et al. (includes Jiménez-Teja, Y.)
"Two Lensed Star Candidates at z ≃ 4.8 behind the Galaxy Cluster MACS J0647.7+7015", *Astrophysical Journal Letters,* Vol. 944, p. L6 (2023)
DOI: 10.3847/2041-8213/acb645

225 Meli, A., et al. (includes Gómez, J. L.)
"3D PIC Simulations for relativistic jets with a toroidal magnetic field", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 5410-5426 (2023)
DOI: 10.1093/mnras/stac3474

226 Mengistue, S. T., et al. (includes Del Olmo, A.; Pović, M.; Perea, J.; Márquez, I.)
"Optical and near-UV spectroscopic properties of low-redshift jetted quasars in the main sequence context", *Monthly Notices of the Royal Astronomical Society,* Vol. 525, p. 4474 (2023)
DOI: 10.1093/mnras/stad2467

227 Mernier, F., et al. (includes Gendron-Marsolais, M. -L.)
"Discovery of inverse-Compton X-ray emission and estimate of the volume-averaged magnetic field in a galaxy group", *Monthly Notices of the Royal Astronomical Society,* p. 4939 (2023)
DOI: 10.1093/mnras/stad2093

228 Middei, R., et al. (includes Agís-González, B.; Agudo, I.; Bonnoli, G.; Bernardos, M. I.; Casanova, V.; García-Comas, M.; Husillos, C.; Sota, A.; Escudero, Juan)
"X-Ray Polarization Observations of BL Lacertae", *Astrophysical Journal Letters,* Vol. 942, p. L10 (2023)
DOI: 10.3847/2041-8213/aca281

229 Middei, R., et al. (includes Agudo, I.; Aceituno, F. J.; Bonnoli, G.; Casanova, V.; Agís-González, B.; Sota, A.; Escudero, J.)
"IXPE and Multiwavelength Observations of Blazar PG 1553+113 Reveal an Orphan Optical Polarization Swing", *Astrophysical Journal Letters,* Vol. 953, p. L28 (2023)
DOI: 10.3847/2041-8213/acec3e

230 Miles, B. E., et al. (includes Danielski, C.)
"The JWST Early-release Science Program for Direct Observations of Exoplanetary Systems II: A 1 to 20 μm Spectrum of the Planetary-mass Companion VHS 1256-1257 b", *Astrophysical Journal Letters,* Vol. 946, p. L6 (2023)
DOI: 10.3847/2041-8213/acb04a

231 Miró-Carretero, J.; Martínez-Delgado, D., et al.
"A search for stellar tidal streams around Milky Way analogues from the SAGA sample", *Astronomy and Astrophysics,* Vol. 669, p. L13 (2023)
DOI: 10.1051/0004-6361/202245003

232 Mistry, P., et al. (includes Pozuelos, F. J.)
"VaTEST. II. Statistical Validation of 11 TESS-detected Exoplanets Orbiting K-type Stars", *Astronomical Journal,* Vol. 166, p. 9 (2023)
DOI: 10.3847/1538-3881/acd548

233 Mlynczak, M. G., et al. (includes Lopez-Puertas, M.)
"Algorithm Stability and the Long-Term Geospace Data Record From TIMED/SABER", *Geophysical Research Letters,* Vol. 50, p. e2022GL102398 (2023)
DOI: 10.1029/2022GL102398

234 Modak, A.; López-Valverde, M. A.; Brines, A.; Stolzenbach, A.; Funke, B.; González-Galindo, F.; Hill, B., et al. (includes Lopez Moreno, J. J.)

"Retrieval of Martian Atmospheric CO Vertical Profiles From NOMAD Observations During the First Year of TGO Operations", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2022JE007282 (2023)

DOI: 10.1029/2022JE007282

235 Moliné, Á., et al. (includes Prada, F.; Ruedas, J.)

"ΛCDM halo substructure properties revealed with high-resolution and large-volume cosmological simulations", *Monthly Notices of the Royal Astronomical Society,* Vol. 518, p. 157–173 (2023)

DOI: 10.1093/mnras/stac2930

236 Montoro-Molina, B.; Guerrero, M. A., et al.

"NGC 2022, a case study of a multiple-shell planetary nebula", *Monthly Notices of the Royal Astronomical Society*, Vol. 524, p. 1601 (2023)

DOI: 10.1093/mnras/stad1915

237 Montoro-Molina, B.; Guerrero, M. A.; Toalá, J. A.

"Spatially resolved spectroscopic investigation of the born-again planetary nebula A 78", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, p. 4359 (2023)

DOI: 10.1093/mnras/stad2803

238 Moon, J., et al. (includes Prada, F.)

"First detection of the BAO signal from early DESI data", *Monthly Notices of the Royal Astronomical Society,* Vol. 525, p. 5406 (2023)

DOI: 10.1093/mnras/stad2618

239 Moore, T., et al. (includes Pérez-Torres, M.)

"SN 2022jli: A Type Ic Supernova with Periodic Modulation of Its Light Curve and an Unusually Long Rise", *Astrophysical Journal Letters,* Vol. 956, p. L31 (2023)

DOI: 10.3847/2041-8213/acfc25

240 Morello, G., et al. (includes Luque, R.; Pozuelos, F. J.)

"TOI-1442 b and TOI-2445 b: Two potentially rocky ultra-short period planets around M dwarfs", *Astronomy and Astrophysics,* Vol. 673, p. A32 (2023)

DOI: 10.1051/0004-6361/202243592

241 Moreno, F., et al. (includes Castro-Tirado, A. J.; Fernández-García, E.; Pérez-García, I.; Muñoz, O.; Ortiz, J. L.)

"Characterization of the Ejecta from the NASA/DART Impact on Dimorphos: Observations and Monte Carlo Models", *The Planetary Science Journal,* Vol. 4, p. 138 (2023)

DOI: 10.3847/PSJ/ace827

242 Morgado, B. E., et al. (includes Ortiz, J. L.; Santos-Sanz, P.; Kretlow, M.; Duffard, R.; Morales, N.)

"A dense ring of the trans-Neptunian object Quaoar outside its Roche limit", *Nature,* Vol. 614.0, p. 239-243 (2023)

DOI: 10.1038/s41586-022-05629-6

243 Moris, J. V., et al. (includes Pérez-Invernón, F. J.)

"A global database on holdover time of lightning-ignited wildfires", *Earth System Science Data,* Vol. 15, Issue 3, p. 1151 (2023)

DOI: 10.5194/essd-15-1151-2023

244 Murgas, F., et al. (includes Pozuelos, F. J.; Amado, P. J.; Pérez-Torres, M.)

"Two super-Earths at the edge of the habitable zone of the nearby M dwarf TOI-2095", *Astronomy and Astrophysics,* Vol. 677, p. A182 (2023)

DOI: 10.1051/0004-6361/202346692

245 Mushtukov, A. A., et al. (includes Agudo, I.)

"X-ray polarimetry of X-ray pulsar X Persei: another orthogonal rotator?", *Monthly Notices of the Royal Astronomical Society,* Vol. 524, p. 2004 (2023)

DOI: 10.1093/mnras/stad1961

246 Myers, A. D., et al. (includes Prada, F.)

"The Target-selection Pipeline for the Dark Energy Spectroscopic Instrument", *Astronomical Journal,* Vol. 165, p. 50 (2023)

DOI: 10.3847/1538-3881/aca5f9

247 Nagel, E., et al. (includes Amado, P. J.; López-Puertas, M.)

"The CARMENES search for exoplanets around M dwarfs. Telluric absorption corrected high S/N optical and near-infrared template spectra of 382 M dwarf stars", *Astronomy and Astrophysics,* Vol. 680, p. A73 (2023)

DOI: 10.1051/0004-6361/202346524

248 Namumba, B., et al. (includes Ianjamasimanana, R.; Verdes-Montenegro, L.)

"MIGHTEE-H I: possible interactions with the galaxy NGC 895", *Monthly Notices of the Royal Astronomical Society,* Vol. 521, p. 5177 (2023)

DOI: 10.1093/mnras/stad857

249 Nascimbeni, V., et al. (includes Luque, R.)

"A new dynamical modeling of the WASP-47 system with CHEOPS observations", *Astronomy and Astrophysics,* Vol. 673, p. A42 (2023)

DOI: 10.1051/0004-6361/202245486

250 Negro, M, et al. (includes Agudo, I.)

"The IXPE View of GRB 221009A", *Astrophysical Journal Letters,* Vol. 946, Issue 1, p. L21 (2023)

DOI: 10.3847/2041-8213/acba17

251 Nesse, H.; Babu, E. M.; Salice, J. A.; Funke, B.

"Energetic Electron Precipitation During Slot Region Filling Events", *Journal of Geophysical Research A: Space Physics,* Vol. 128, p. e2023JA031606 (2023)

DOI: 10.1029/2023JA031606

252 Neubert, T.; Gordillo-Vázquez, F. J.; Huntrieser, H.

"Optical observations of thunderstorms from the International Space Station: recent results and perspectives", *Npj Microgravity,* Vol. 9, Issue 1, p. 12 (2023)

DOI: 10.1038/s41526-023-00257-4

253 Nishiyama, S.; Funamoto, N.; Schödel, R.

"Search for Young and Intermediate-age Stellar Populations in the Galactic Center with Subaru/MOIRCS and CO Narrowband Filters", *Astrophysical Journal,* Vol. 951, p. 148 (2023)

DOI: 10.3847/1538-4357/acd5cc

254 Njeri, A., et al. (includes Moldon, J.)

"SPARCS-North Wide-field VLBI Survey: exploring the resolved μJy extragalactic radio source population with EVN + e-MERLIN", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 1732 (2023)

DOI: 10.1093/mnras/stac3569

255 Nogueras-Lara, F., et al. (includes Schödel, R.)

"Smooth kinematic and metallicity gradients reveal that the Milky Way's nuclear star cluster and disc might be part of the same structure", *Astronomy and Astrophysics,* Vol. 680, p. A75 (2023)

DOI: 10.1051/0004-6361/202347421

256 Nölke, J. D., et al. (includes Orozco Suárez, D.; del Toro Iniesta, J. C.; Balaguer Jiménez, M.; Bellot Rubio, L. R.; López Jiménez, A.; Moreno Vacas, A.; Strecker, H.)

"Coronal voids and their magnetic nature", *Astronomy and Astrophysics,* Vol. 678, p. A196 (2023)

DOI: 10.1051/0004-6361/202346040

257 Offringa, A. R., et al. (includes Hess, K. M.)

"An interference detection strategy for Apertif based on AOFlagger 3", *Astronomy and Astrophysics,* Vol. 670, p. A166 (2023)

DOI: 10.1051/0004-6361/202245022

258 Oliva, F., et al. (includes Lopez-Moreno, J. J.)

"Minimum Noise Fraction Analysis of TGO/NOMAD LNO Channel High-Resolution Nadir Spectra of Mars", *Remote Sensing: Earth,* Ocean and Atmosphere, Vol. 15, p. 5741 (2023)

DOI: 10.3390/rs15245741

259 Oogi, T., et al. (includes Prada, F.; Ruedas, J.)

"Uchuu-v2GC galaxies and AGN: cosmic variance forecasts of high-redshift AGN for JWST, Euclid, and LSST", *Monthly Notices of the Royal Astronomical Society*, Vol. 525, p. 3879 (2023)

DOI: 10.1093/mnras/stad2401

260 Orell-Miquel, J.; Lampón, M.; López-Puertas, M., et al. (includes Amado, P. J.; Sánchez-López, A.)

"Confirmation of an He I evaporating atmosphere around the 650-Myr-old sub-Neptune HD 235088 b (TOI-1430 b) with CARMENES", *Astronomy and Astrophysics,* Vol. 677, p. A56 (2023)

DOI: 10.1051/0004-6361/202346445

261 Orell-Miquel, J., et al. (includes Luque, R.)

"HD 191939 revisited: New and refined planet mass determinations, and a new planet in the habitable zone", *Astronomy and Astrophysics*, Vol. 669, p. A40 (2023)

DOI: 10.1051/0004-6361/202244120

262 Orozco Suárez, D.; Alvarez García, D.; López Jiménez, A. C.; Balaguer Jiménez, M., et al. (includes Labrousse, P.; Bailén, . J..; Bustamante Díaz, Isabel;Bailón Martínez, E.; Aparicio del Moral, B.; Morales Fernández, J. M.; Sánchez Gómez, A.; Tobaruela Abarca, A.; Moreno Mantas, A. J.; Ramos Más, J. L.; Del Toro Iniesta, J. C.)

"SPGCam: A specifically tailored camera for solar observations", *Frontiers in Astronomy and Space Sciences,* Vol. 10, p. 1167540 (2023)

DOI: 10.3389/fspas.2023.1167540

263 Orozco Suárez, D.; del Toro Iniesta, J. C.; Bailén Martínez, F. J.; Balaguer Jiménez, M.; Álvarez García, D., et al. (includes Bellot Rubio, L. R.n; Atienzar, J.)

"CMAG: A Mission to Study and Monitor the Inner Corona Magnetic Field", *Aerospace,* Vol. 10, p. 987 (2023)

DOI: 10.3390/aerospace10120987

264 Ortiz, J. L., et al. (includes Kretlow, M.; Leiva, R.; Morales, N.; Vara-Lubiano, M.; Santos-Sanz, P.; Fernández-Valenzuela, E.; Duffard, R.; Morales, R.; Alvarez-Candal, A.; Rizos, J. L.; Gómez-Limón, J. M.)

"Changing material around (2060) Chiron revealed by an occultation on December 15, 2022", *Astronomy and Astrophysics*, Vol. 676, p. L12 (2023)

DOI: 10.1051/0004-6361/202347025

265 Ortiz, R.; Guerrero, M. A.

"A large bubble around the AGB star R Dor detected in the UV", *Monthly Notices of the Royal Astronomical Society,* Vol. 522, p. 811 (2023)

DOI: 10.1093/mnras/stad984

266 Palle, E., et al. (includes Pérez-Torres, M.; Luque, R.; Aceituno, F.; Amado, P. J.; López-González, M. J.; Rodríguez, E.; Rodríguez-López, C.;)

"GJ 806 (TOI-4481): A bright nearby multi-planetary system with a transiting hot low-density super-Earth", *Astronomy and Astrophysics,* Vol. 678, p. A80 (2023)

DOI: 10.1051/0004-6361/202244261

267 Papaderos, P.; Östlin, G.; Breda, I.
"Bulgeless disks, dark galaxies, inverted color gradients, and other expected phenomena at higher z. The chromatic surface brightness modulation (CMOD) effect", *Astronomy and Astrophysics*, Vol. 673, p. A30 (2023)
DOI: 10.1051/0004-6361/202245769

268 Pasham, D. R., et al. (includes Perez-Torres, M.)
"The Birth of a Relativistic Jet Following the Disruption of a Star by a Cosmological Black Hole", *Nature Astronomy,* Vol. 7, p. 88-104 (2023)
DOI: 10.1038/s41550-022-01820-x

269 Passas-Varo, M., et al. (includes Gordillo-Vázquez, F. J.; Gómez-Martín, J. C.; Pérez-Invernón, F. J.; Sánchez-Ramírez, R.; García-Comas, M.)
"Spectroscopy of a mesospheric ghost reveals iron emissions", *Nature Communications,* Vol. 14, p. 7810 (2023)
DOI: 10.1038/s41467-023-42892-1

270 Pastor-Marazuela, I., et al. (includes Hess, K. M.)
"A fast radio burst with submillisecond quasi-periodic structure", *Astronomy and Astrophysics,* Vol. 678, p. A149 (2023)
DOI: 10.1051/0004-6361/202243339

271 Pauli, D., et al. (includes ; Kehrig, C.)
"Spectroscopic and evolutionary analyses of the binary system AzV 14 outline paths toward the WR stage at low metallicity", *Astronomy and Astrophysics,* Vol. 673, p. A40 (2023)
DOI: 10.1051/0004-6361/202345881

272 Peirson, A. L., et al. (includes Agudo, I.; Aceituno, F. J.; Bernardos, M. I.; Bonnoli, G.; Casanova, V.; García-Comas, M.; Agís-González, B.; Husillos, C.; Sota, A.; Escudero, J.)
"X-Ray Polarization of BL Lacertae in Outburst", *Astrophysical Journal Letters,* Vol. 948, p. L25 (2023)
DOI: 10.3847/2041-8213/acd242

273 Pereira, C. L., et al. (includes Ortiz, J. L.; Morales, R.; Duffard, R.; Fernandez-Valenzuela, E.; Morales, N.; Santos-Sanz, P.)
"Physical properties of Centaur (60558) 174P/Echeclus from stellar occultations", *Monthly Notices of the Royal Astronomical Society,* p. 3624 (2023)
DOI: 10.1093/mnras/stad3318

274 Pereira, C. L., et al. (includes Fernández-Valenzuela, E.; Ortiz, J. L.; Santos-Sanz, P.; Vara-Lubiano, M.; Kretlow, M.)
"The two rings of (50000) Quaoar", *Astronomy and Astrophysics,* Vol. 673, p. L4 (2023)
DOI: 10.1051/0004-6361/202346365

275 Pérez-Invernón, F. J.; Gordillo-Vázquez, F. J.; Huntrieser, H.; Jöckel, P.
"Variation of lightning-ignited wildfire patterns under climate change", *Nature Communications,* Vol. 14, p. 739 (2023)
DOI: 10.1038/s41467-023-36500-5

276 Pérez-Invernón, F. J.; Gordillo-Vázquez, F. J., et al.
"Lightning-Produced Nitrogen Oxides Per Flash Length Obtained by Using TROPOMI Observations and the Ebro Lightning Mapping Array", *Geophysical Research Letters,* Vol. 50, p. e2023GL104699 (2023)
DOI: 10.1029/2023GL104699

277 Pérez-Invernón, F. J., et al. (includes Gordillo-Vázquez, F. J.)
"On the Role of Continuing Currents in Lightning-Induced Fire Ignition", *Journal of Geophysical Research D: Atmospheres,* Vol. 128, p. e2023JD038891 (2023)
DOI: 10.1029/2023JD038891

278 Pérez-Montero, E.; Amorín, R.; Pérez-Díaz, B.; Vílchez, J. M.; García-Benito, R.
"Assessing model-based carbon and oxygen abundance derivation from ultraviolet emission lines in AGNs", *Monthly Notices of the Royal Astronomical Society,* p. 1556 (2023)
DOI: 10.1093/mnras/stad621

279 Pérez-Montero, E.; Zinchenko, I. A.; Vílchez, J. M.; Zurita, A.; Florido, E.; Pérez-Díaz, B.
"The softness diagram for MaNGA star-forming regions: diffuse ionized gas contamination or local HOLMES predominance?", *Astronomy and Astrophysics,* Vol. 669, p. A88 (2023)
DOI: 10.1051/0004-6361/202244591

280 Pérez-Ràfols, I., et al. (includes Martínez-Solaeche, G.; Benitez, N.; González Delgado, R. M.)
"The miniJPAS survey quasar selection. IV. Classification and redshift estimation with SQUEzE", *Astronomy and Astrophysics,* Vol. 678, p. A144 (2023)
DOI: 10.1051/0004-6361/202347488

281 Perger, M., et al. (includes Amado, P. J.)
"A machine learning approach for correcting radial velocities using physical observables", *Astronomy and Astrophysics,* Vol. 672, p. A118 (2023)
DOI: 10.1051/0004-6361/202245092

282 Peter, K., et al. (includes González-Galindo, F.)
"The effects of atmospheric dust and solar radiation on the dayside ionosphere of Mars derived from 17 years of Mars Express radio science observations", *Icarus,* Vol. 400, p. 115565 (2023)
DOI: 10.1016/j.icarus.2023.115565

283 Peterson, M. S., et al. (includes Pozuelos, F. J.)
"A temperate Earth-sized planet with tidal heating transiting an M6 star", *Nature,* Vol. 617, p. 701 (2023)
DOI: 10.1038/s41586-023-05934-8

284 Piccialli, A., et al. (includes Lopez-Moreno, J. -J.)
"Martian Ozone Observed by TGO/NOMAD-UVIS Solar Occultation: An Inter-Comparison of Three Retrieval Methods", *Earth and Space Science,* Vol. 10, p. e2022EA002429 (2023)
DOI: 10.1029/2022EA002429

285 Plunkett, A., et al. (includes Hess, K. M.)
"Data Combination: Interferometry and Single-dish Imaging in Radio Astronomy", *Publications of the Astronomical Society of the Pacific,* Vol. 135, p. 034501 (2023)
DOI: 10.1088/1538-3873/acb9bd

286 Podgorný, J., et al. (includes Agudo, I.)
"The first X-ray polarimetric observation of the black hole binary LMC X-1", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, p. 5964 (2023)
DOI: 10.1093/mnras/stad3103

287 Pokhrel, R., et al. (includes Osorio, M.)
"Extension of HOPS out to 500 pc (eHOPS). I. Identification and Modeling of Protostars in the Aquila Molecular Clouds", *Astrophysical Journal Supplement Series,* Vol. 266, p. 32 (2023)
DOI: 10.3847/1538-4365/acbfac

288 Ponomareva, A. A., et al. (includes Hess, K. M.)
"MIGHTEE-H I: the first MeerKAT H I mass function from an untargeted interferometric survey", *Monthly Notices of the Royal Astronomical Society,* Vol. 522, p. 5308 (2023)
DOI: 10.1093/mnras/stad1249

289 Pozuelos, F. J., et al. (includes Luque, R.; Amado, P.; Rodón, J. R.; Rodríguez-López, C.)
"A super-Earth and a mini-Neptune near the 2:1 MMR straddling the radius valley around the nearby mid-M dwarf TOI-2096", *Astronomy and Astrophysics,* Vol. 672, p. A70 (2023)
DOI: 10.1051/0004-6361/202245440

290 Prather, B. S., et al. (includes Alberdi, A.; Cho, I.; Fuentes, A.; Gómez, J. L.; Lico, R.; Traianou, E.; Zhao, G.-Y.
"Comparison of Polarized Radiative Transfer Codes Used by the EHT Collaboration", *Astrophysical Journal,* Vol. 950, p. 35 (2023)
DOI: 10.3847/1538-4357/acc586

291 Putkuri, C., et al. (includes Sota, A.)
"The spectroscopic orbit of HD 168112 A,B in NGC 6604: another massive binary target for interferometry", *Monthly Notices of the Royal Astronomical Society*, Vol. 525, p. 6084 (2023)
DOI: 10.1093/mnras/stad2657

292 Queiroz, C., et al. (includes Martínez-Solaeche, G.; Díaz-García, L. A.; González Delgado, R. M.; Benítez, N.; Moles, M.)
"The miniJPAS survey quasar selection I: Mock catalogues for classification", *Monthly Notices of the Royal Astronomical Society,* Vol. 520, p. 3476–3493 (2023)
DOI: 10.1093/mnras/stac2962

293 Quintero Noda, C., et al. (includes Orozco Suárez, D.)
"A study of the capabilities for inferring atmospheric information from high-spatial-resolution simulations", *Astronomy and Astrophysics,* Vol. 675, p. A93 (2023)
DOI: 10.1051/0004-6361/202345890

294 Quirino, D.; Gilli, G., et al. (includes González-Galindo, F.)
"3D Global climate model of an exo-Venus: a modern Venus-like atmosphere for the nearby super-Earth LP 890-9 c", *Monthly Notices of the Royal Astronomical Society,* Vol. 523, p. L86 (2023)
DOI: 10.1093/mnrasl/slad045

295 Quispe-Huaynasi, F., et al. (includes Alvarez-Candal, A.)
"J-PLUS: characterization of high-velocity stars in the second data release", *Monthly Notices of the Royal Astronomical Society,* Vol. 522, p. 3898 (2023)
DOI: 10.1093/mnras/stad1230

296 Raichoor, A., et al. (includes Prada, F.)
"Target Selection and Validation of DESI Emission Line Galaxies", *Astronomical Journal,* Vol. 165, p. 126 (2023)
DOI: 10.3847/1538-3881/acb213

297 Raiteri, C. M., et al. (includes Agudo, I.)
"Extreme photometric and polarimetric variability of blazar S4 0954+65 at its maximum optical and γ-ray brightness levels", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, p. 4502 (2023)
DOI: 10.1093/mnras/stad3064

298 Ramos Almeida, C., et al. (includes Cazzoli, S.)
"Absence of nuclear polycyclic aromatic hydrocarbon emission from a compact starburst: The case of the type-2 quasar Mrk 477", *Astronomy and Astrophysics,* Vol. 669, p. L5 (2023)
DOI: 10.1051/0004-6361/202245409

299 Ravoux, C., et al. (includes Prada, F.)
"The Dark Energy Spectroscopic Instrument: one-dimensional power spectrum from first Ly α forest samples with Fast Fourier Transform", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, p. 5118 (2023)
DOI: 10.1093/mnras/stad3008

300 Reid, H. A. S., et al. (includes Orozco Suárez, D.;)
"The Solar Particle Acceleration Radiation and Kinetics (SPARK) Mission Concept", *Aerospace,* Vol. 10, p. 1034 (2023)
DOI: 10.3390/aerospace10121034

301 Rempel, M.; Bhatia, T.; Bellot Rubio, L.; Korpi-Lagg, M. J.
"Small-Scale Dynamos: From Idealized Models to Solar and Stellar Applications", *Space Science Reviews,* Vol. 219, p. 36 (2023)
DOI: 10.1007/s11214-023-00981-z

302 Rhode, K. L., et al. (includes Karunakaran, A.)
"Exploring the Structures and Substructures of the Andromeda Satellite Dwarf Galaxies Cassiopeia III, Perseus I, and Lacerta I", *Astronomical Journal*, Vol. 166, p. 180 (2023)
DOI: 10.3847/1538-3881/acf859

303 Ribas, I., et al. (includes Amado, P. J.; Abril, M.; Aceituno, J.; Calvo Ortega, R.; Fernández, M.; Huelmo, Á. L.; Lampón, M.; López González, M. J.; López-Puertas, M.; Luque, R.; Magán, H.; Martín-Ruiz, S.; Ramón-Ballesta, A.; Revilla, D.; Rodríguez, E.; Rodríguez-López, C.; Sánchez Carrasco, M. Á.; Sánchez-López, A.; Schöfer, P.)
"The CARMENES search for exoplanets around M dwarfs. Guaranteed time observations Data Release 1 (2016-2020)", *Astronomy and Astrophysics,* Vol. 670, p. A139 (2023)
DOI: 10.1051/0004-6361/202244879

304 Rice, M., et al. (includes Pozuelos, F. J.)
"Evidence for Low-level Dynamical Excitation in Near-resonant Exoplanet Systems", *Astronomical Journal,* Vol. 166, p. 266 (2023)
DOI: 10.3847/1538-3881/ad09de

305 Ro, H., et al. (includes Cho, I; Zhao, G-Y)
"Spectral analysis of a parsec-scale jet in M 87: Observational constraint on the magnetic field strengths in the jet", *Astronomy and Astrophysics,* Vol. 673, p. A159 (2023)
DOI: 10.1051/0004-6361/202142988

306 Roche, N.; Vílchez, J. M.; Iglesias-Páramo, J., et al. (includes Kehrig, C.; Duarte Puertas, S.)
"Integral Field Spectroscopy of the cometary starburst galaxy NGC 4861", *Monthly Notices of the Royal Astronomical Society,* Vol. 523, p. 270 (2023)
DOI: 10.1093/mnras/stad1219

307 Rodrigues, N. V. N., et al. (includes Martínez-Solaeche, G.; González Delgado, R. M.; Márquez, I.; Díaz-García, L. A.; Benítez, N.; Moles, M.)
"The miniJPAS survey quasar selection - II. Machine learning classification with photometric measurements and uncertainties", *Monthly Notices of the Royal Astronomical Society,* Vol. 520, p. 3494 (2023)
DOI: 10.1093/mnras/stac2836

308 Rodriguez C., et al. (includes Agudo, I.)
"The First X-Ray Polarization Observation of the Black Hole X-Ray Binary 4U 1630-47 in the Steep Power-law State", *Astrophysical Journal Letters,* Vol. 958, Issue 1, p. L8 (2023)
DOI: 10.3847/2041-8213/acfd2c

309 Rodríguez Del Pino, B., et al. (includes Vílchez, J. M.)
"The impact of environmental effects on active galactic nuclei: A decline in the incidence of ionized outflows", *Astronomy and Astrophysics,* Vol. 675, p. A41 (2023)
DOI: 10.1051/0004-6361/202346051

310 Rodríguez Valido, M.; Orozco Suárez, D., et al.
"Hardware and Software Implementation of the Embedded Controlling System for the TuMag Camera", *Electronics (Switzerland),* Vol. 12, Number 19, p. 4071 (2023)
DOI: 10.3390/electronics12194071

311 Roelofs, F., et al. (includes Fuentes, A; Traianou, E)
"The ngEHT Analysis Challenges", *Galaxies,* Vol. 11.0, Number 12, p. 12 (2023)
DOI: 10.3390/galaxies11010012

312 Roelofs, F., et al. (includes Alberdi, A.; Cho, I.; Dahale, R.; Foschi, M.; Fuentes, A.; Gómez, J. L.; Lico, R.; Toscano, T.; Traianou, E.; Zhao, G.-Y.)
"Polarimetric Geometric Modeling for mm-VLBI Observations of Black Holes", *Astrophysical Journal Letters,* Vol. 957, p. L21 (2023)
DOI: 10.3847/2041-8213/acff6f

313 Rommel, F. L., et al. (includes Ortiz, J. L.Duffard, R.)
"A large topographic feature on the surface of the trans-Neptunian object (307261) 2002 MS4 measured from stellar occultations", *Astronomy and Astrophysics,* Vol. 678, p. A167 (2023)
DOI: 10.1051/0004-6361/202346892

314 Ronchini, S., et al. (includes Kann, D. A.)
"Combined X-ray and optical analysis to probe the origin of the plateau emission in γ-ray burst afterglows", *Astronomy and Astrophysics,* Vol. 675, p. A117 (2023)
DOI: 10.1051/0004-6361/202245348

315 Ror, A. K., et al. (includes Castro-Tirado, A. J.; Hu, Y. -D.; Fernández-García, E.; Caballero-García, M. D.; Pérez-García, I.; Rendon, F.)
"Prompt Emission and Early Optical Afterglow of Very-high-energy Detected GRB 201015A and GRB 201216C: Onset of the External Forward Shock", *Astrophysical Journal,* Vol. 942, p. 34 (2023)
DOI: 10.3847/1538-4357/aca414

316 Rosales-Guzmán, A., et al. (includes Alberdi, A.; Schödel, R.)
"Imaging the innermost gaseous layers of the Mira star R Car with GRAVITY-VLTI", *Astronomy and Astrophysics,* Vol. 674, p. A62 (2023)
DOI: 10.1051/0004-6361/202245370

317 Rożek, A., et al. (includes Kretlow, M.)
"Optical Monitoring of the Didymos-Dimorphos Asteroid System with the Danish Telescope around the DART Mission Impact", *The Planetary Science Journal,* Vol. 4, p. 236 (2023)
DOI: 10.3847/PSJ/ad0a64

318 Ruggeri, R., et al. (includes Prada, F.)
"A data compression and optimal galaxy weights scheme for Dark Energy Spectroscopic Instrument and weak lensing datasets", *Monthly Notices of the Royal Astronomical Society,* p. 3865 (2023)
DOI: 10.1093/mnras/stad1651

319 Saccardi, A., et al. (includes Kann, D. A.)
"Dissecting the interstellar medium of a z = 6.3 galaxy. X-shooter spectroscopy and HST imaging of the afterglow and environment of the Swift GRB 210905A", *Astronomy and Astrophysics,* Vol. 671, p. A84 (2023)
DOI: 10.1051/0004-6361/202244205

320 Saiz-Lopez, A., et al. (includes Gómez Martín, J. C.)
"Natural short-lived halogens exert an indirect cooling effect on climate", *Nature,* Vol. 618, p. 967 (2023)
DOI: 10.1038/s41586-023-06119-z

321 Sánchez, S. F., et al. (includes García-Benito, R.)
"The Calar Alto Legacy Integral Field Area survey: extended and remastered data release", *Monthly Notices of the Royal Astronomical Society,* Vol. 526, p. 5555 (2023)
DOI: 10.1093/mnras/stad3119

322 Sánchez-Alarcón, P. M., et al. (includes Román, J.; Verdes-Montenegro, L.; Garrido, J.; Sánchez-Exposito, S.)
"The AMIGA sample of isolated galaxies. XIV. Disc breaks and interactions through ultra-deep optical imaging", *Astronomy and Astrophysics,* Vol. 677, p. A117 (2023)
DOI: 10.1051/0004-6361/202346719

323 Saulder, C., et al. (includes Prada, F.)
"Target selection for the DESI peculiar velocity survey", *Monthly Notices of the Royal Astronomical Society,* p. 1106 (2023)
DOI: 10.1093/mnras/stad2200

324 Savolainen, T., et al. (includes Fuentes, A.; Gómez, J. L.)
"RadioAstron discovery of a mini-cocoon around the restarted parsec-scale jet in 3C 84", *Astronomy and Astrophysics,* Vol. 676, p. A114 (2023)
DOI: 10.1051/0004-6361/202142594

325 Schödel, R., et al. (includes Martínez Arranz, A.; Gardini, A.; Gallego-Cano, E.; Cano González, M.; Gallego-Calvente, A. T.)
"The formation history of our Galaxy's nuclear stellar disc constrained from HST observations of the Quintuplet field", *Astronomy and Astrophysics,* Vol. 672, p. L8 (2023)
DOI: 10.1051/0004-6361/202346335

326 Schou, J., et al. (includes Orozco Suárez, D.; del Toro Iniesta, J. C.; Balaguer Jiménez, M.; Bellot Rubio, L. R.; López Jiménez, A.; Moreno Vacas, A.; Strecker, H.)
"The ratio of horizontal to vertical displacement in solar oscillations estimated from combined SO/PHI and SDO/HMI observations", *Astronomy and Astrophysics,* Vol. 673, p. A84 (2023)
DOI: 10.1051/0004-6361/202345946

327 Schwanitz, C, et al. (includes Orozco Suárez, D; Moreno Vacas, A)
"Small-Scale Upflows in a Coronal Hole - Tracked from the Photosphere to the Corona", *Solar Physics,* Vol. 298, p. 129 (2023)
DOI: 10.1007/s11207-023-02216-4

328 Setton, D. J., et al. (includes Prada, F.)
"DESI Survey Validation Spectra Reveal an Increasing Fraction of Recently Quenched Galaxies at z 1", *Astrophysical Journal Letters,* Vol. 947, p. L31 (2023)
DOI: 10.3847/2041-8213/acc9b5

329 Silber, J. H., et al. (includes Azzaro, M.; Becerril, S.; Prada, F.; Sanchez, J.)
"The Robotic Multiobject Focal Plane System of the Dark Energy Spectroscopic Instrument (DESI)", *Astronomical Journal,* Vol. 165, p. 9 (2023)
DOI: 10.3847/1538-3881/ac9ab1

330 Singha, M., et al. (includes Perez Torres, M.)
"The Close AGN Reference Survey (CARS): An Interplay between Radio Jets and AGN Radiation in the Radio-quiet AGN HE0040-1105", *Astrophysical Journal,* Vol. 959, p. 107 (2023)
DOI: 10.3847/1538-4357/ad004d

331 Sinjan, J., et al. (includes Bellot Rubio, L. R.; Moreno Vacas, A.; Orozco Suárez, D.; Balaguer Jiménez, M.; Strecker, H.; del Toro Iniesta, J. C.)
"Magnetic fields inferred by Solar Orbiter: A comparison between SO/PHI-HRT and SDO/HMI", *Astronomy and Astrophysics,* Vol. 673, p. A31 (2023)
DOI: 10.1051/0004-6361/202245830

332 Skaf, N., et al. (includes Danielski, C.)
"The ß Pictoris system: Setting constraints on the planet and the disk structures at mid-IR wavelengths with NEAR", *Astronomy and Astrophysics,* Vol. 675, p. A35 (2023)
DOI: 10.1051/0004-6361/202245143

333 Stein, M., et al. (includes Wiegert, T.)
"CHANG-ES. XXVI. Insights into cosmic-ray transport from radio halos in edge-on galaxies", *Astronomy and Astrophysics,* Vol. 670, p. A158 (2023)
DOI: 10.1051/0004-6361/202243906

334 Stolzenbach, A., et al. L
"Three-dimensional modeling of Venus photochemistry and clouds", *Icarus,* Vol. 395, p. 115447 (2023)
DOI: 10.1016/j.icarus.2023.115447

335 Stolzenbach, A.; López Valverde, M. A.; Brines, A.; Modak, A.; Funke, B.; González-Galindo, F., et al. (includes Lopez Moreno, J. J.; Rodríguez Gómez, J.)

"Martian Atmospheric Aerosols Composition and Distribution Retrievals During the First Martian Year of NOMAD/TGO Solar Occultation Measurements: 1. Methodology and Application to the MY 34 Global Dust Storm", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2022JE007276 (2023)

DOI: 10.1029/2022JE007276

336 Stolzenbach, A.; López Valverde, M. A.; Brines, A.; Modak, A.; Funke, B.; González-Galindo, F., et al. (includes Lopez Moreno, J. J.; Rodríguez Gómez, J.)

"Martian Atmospheric Aerosols Composition and Distribution Retrievals During the First Martian Year of NOMAD/TGO Solar Occultation Measurements: 2. Extended Results, End of MY 34 and First Half of MY 35", *Journal of Geophysical Research E: Planets*, Vol. 128, p. e2023JE007835 (2023)

DOI: 10.1029/2023JE007835

337 Suárez Mascareño, A., et al. (includes Amado, P. J.; López-González, M. J.; Rodríguez, E.; Rodríguez-López, C.)

"Two temperate Earth-mass planets orbiting the nearby star GJ 1002", *Astronomy and Astrophysics,* Vol. 670, p. A5 (2023)

DOI: 10.1051/0004-6361/202244991

338 Suleimanov, V. F., et al. (includes Agudo, I.)

"X-ray polarimetry of the accreting pulsar GX 301–2", *Astronomy and Astrophysics,* Vol. 678, p. A119 (2023)

DOI: 10.1051/0004-6361/202346994

339 Surcis, G., et al. (includes Gómez, J. F.)

"Monitoring of the polarized H2O maser emission around the massive protostars W75N(B)-VLA 1 and W75N(B)-VLA 2", *Astronomy and Astrophysics,* Vol. 673, p. A10 (2023)

DOI: 10.1051/0004-6361/202245734

340 Szakáts, R., et al. (includes Ortiz, J. L.; Morales, N.; Santos-Sanz, P.; Duffard, R.)

"Tidally locked rotation of the dwarf planet (136199) Eris discovered via long-term ground-based and space photometry", *Astronomy and Astrophysics,* Vol. 669, p. L3 (2023)

DOI: 10.1051/0004-6361/202245234

341 Tagliacozzo, D., et al. (includes Agudo, I.)

"The geometry of the hot corona in MCG-05-23-16 constrained by X-ray polarimetry", *Monthly Notices of the Royal Astronomical Society,* Vol. 525, p. 4735 (2023)

DOI: 10.1093/mnras/stad2627

342 Tancredi, G.; L., et al. (includes Moreno, F.)

"Lofting of low-speed ejecta produced in the DART experiment and production of a dust cloud", *Monthly Notices of the Royal Astronomical Society,* Vol. 522, p. 2403 (2023)

DOI: 10.1093/mnras/stac3258

343 Tazaki, F., et al. (includes Cho, I.; Zhao, G.-Y.)

"Super-Resolved Image of M87 Observed with East Asian VLBI Network", *Galaxies,* Vol. 11, p. 39 (2023)

DOI: 10.3390/galaxies11020039

344 Teh, J. W., et al. (includes Vilchez, J. M.)

"Constraining the LyC escape fraction from LEGUS star clusters with SIGNALS H II region observations: a pilot study of NGC 628", *Monthly Notices of the Royal Astronomical Society,* Vol. 524, p. 1191 (2023)

DOI: 10.1093/mnras/stad1780

345 Teixeira-Gomes, M. B.; Gordillo-Vázquez, F. J.; Luque, A.

"Collective dynamics of a dense streamer front", *Plasma Sources Science and Technology,* Vol. 32, p. 095010 (2023)

DOI: 10.1088/1361-6595/acf730

346 Torne, P., et al. (includes Alberdi, A.; Cho, I.; Dahale, R.; Foschi, M.; Fuentes, A.; Gómez, J. L.; Lico, R.; Toscano, T.; Traianou, E.; Zhao, G.-Y.)

"A Search for Pulsars around Sgr A* in the First Event Horizon Telescope Data Set", *Astrophysical Journal,* Vol. 959, p. 14 (2023)

DOI: 10.3847/1538-4357/acf4f2

347 Torralba-Torregrosa, A., et al. (includes González Delgado, R. M.; Márquez, I.; Vílchez, J. M.; Benitez, N.)

"The miniJPAS and J-NEP surveys: Identification and characterization of the Lyα emitter population and the Lyα luminosity function at redshift 2.05 < z < 3.75", *Astronomy and Astrophysics,* Vol. 680, p. A14 (2023)

DOI: 10.1051/0004-6361/202347463

348 Tous, J. L.; Domínguez-Sánchez, H.; Solanes, J. M.; Perea, J. D.

"The Origin of Star-forming Rings in S0 Galaxies", *Astrophysical Journal,* Vol. 942, p. 48 (2023)

DOI: 10.3847/1538-4357/aca484

349 Traficante, A., et al. (includes Fuller, G. A.)

"The SQUALO project (Star formation in QUiescent And Luminous Objects) I: clump-fed accretion mechanism in high-mass star-forming objects", *Monthly Notices of the Royal Astronomical Society,* Vol. 520, Issue 2, p. 2306-2327 (2023)

DOI: 10.1093/mnras/stad272

350 Triaud, A. H. M. J., et al. (includes Pozuelos, F. J.)

"An M dwarf accompanied by a close-in giant orbiter with SPECULOOS", *Monthly Notices of the Royal Astronomical Society,* Vol. 525, p. L98 (2023)

DOI: 10.1093/mnrasl/slad097

351 Trógolo, N.; Campo Bagatin, A.; Moreno, F.; Benavidez, P. G.

"Lifted particles from the fast spinning primary of the Near-Earth Asteroid (65803) Didymos", *Icarus,* Vol. 397, p. 115521 (2023)

DOI: 10.1016/j.icarus.2023.115521

352 Trompet, L., et al. (includes López-Valverde, M. A.; Brines, A.; Lopez-Moreno, J. J.)

"Carbon Dioxide Retrievals From NOMAD-SO on ESA's ExoMars Trace Gas Orbiter and Temperature Profile Retrievals With the Hydrostatic Equilibrium Equation: 2. Temperature Variabilities in the Mesosphere at Mars Terminator", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2022JE007279 (2023)

DOI: 10.1029/2022JE007279

353 Trompet, L., et al. (includes López-Valverde, M. A.; Brines, A.; Lopez-Moreno, J. J.)

"Carbon Dioxide Retrievals From NOMAD-SO on ESA's ExoMars Trace Gas Orbiter and Temperature Profiles Retrievals With the Hydrostatic Equilibrium Equation: 1. Description of the Method", *Journal of Geophysical Research E: Planets,* Vol. 128, p. e2022JE007277 (2023)

DOI: 10.1029/2022JE007277

354 Trudu, M., et al. (includes Gardini, A.)

"Simultaneous and panchromatic observations of the fast radio burst FRB 20180916B", *Astronomy and Astrophysics,* Vol. 676, p. A17 (2023)

DOI: 10.1051/0004-6361/202245303

355 Tsygankov, S. S., et al. (includes Agudo, I.)

"X-ray pulsar GRO J1008–57 as an orthogonal rotator", *Astronomy and Astrophysics,* Vol. 675, p. A48 (2023)

DOI: 10.1051/0004-6361/202346134

356 Turolla, R., et al. (includes Agudo, I.)

"IXPE and XMM-Newton Observations of the Soft Gamma Repeater SGR 1806-20", *Astrophysical Journal,* Vol. 954, p. 88 (2023)

DOI: 10.3847/1538-4357/aced05

357 Ursini, F., et al. (includes Agudo, I.)

"X-ray polarimetry and spectroscopy of the neutron star low-mass X-ray binary GX 9+9: An in-depth study with IXPE and NuSTAR", *Astronomy and Astrophysics,* Vol. 676, p. A20 (2023)

DOI: 10.1051/0004-6361/202346541

358 Ursini, F., et al. (includes Agudo, I.)

"Mapping the circumnuclear regions of the Circinus galaxy with the Imaging X-ray Polarimetry Explorer", *Monthly Notices of the Royal Astronomical Society,* Vol. 519, p. 50 (2023)

DOI: 10.1093/mnras/stac3189

359 Uscanga, L., et al. (includes Gómez, J. F.)

"Evolution of the Outflow in the Water Fountain Source IRAS 18043-2116", *Astrophysical Journal,* Vol. 948, p. 17 (2023)

DOI: 10.3847/1538-4357/acc06f

360 Valori, G., et al. (includes Moreno Vacas, A.; Bellot Rubio, L. R.; Orozco Suárez, D.; Strecker, H.; del Toro Iniesta, J. C.)

"Stereoscopic disambiguation of vector magnetograms: First applications to SO/PHI-HRT data", *Astronomy and Astrophysics,* Vol. 677, p. A25 (2023)

DOI: 10.1051/0004-6361/202345859

361 Valtonen, M. J., et al. (includes Gomez, J. L.)

"Observational Implications of OJ 287's Predicted 2022 Disk Impact in the Black Hole Binary Model", *Galaxies,* Vol. 11, Number 4, p. 82 (2023)

DOI: 10.3390/galaxies11040082

362 Valtonen, M. J., et al. (includes Gomez, J. L.)

"Refining the OJ 287 2022 impact flare arrival epoch", *Monthly Notices of the Royal Astronomical Society,* Vol. 521, p. 6143 (2023)

DOI: 10.1093/mnras/stad922

363 Valtonen, M. J., et al. (includes Gomez, J. L.)

"On the need of an ultramassive black hole in OJ 287", *Monthly Notices of the Royal Astronomical Society,* p. 1153 (2023)

DOI: 10.1093/mnras/stad2249

364 van Leeuwen, J., et al. (includes Hess, K. M.)

"The Apertif Radio Transient System (ARTS): Design, commissioning, data release, and detection of the first five fast radio bursts", *Astronomy and Astrophysics*, Vol. 672, p. A117 (2023)

DOI: 10.1051/0004-6361/202244107

365 Vásquez-Bustos, P.; Argudo-Fernandez, M.; Grajales-Medina, D.; Duarte Puertas, S.; Verley, S.

"Understanding the role of morphology and environment in the dynamical evolution of isolated galaxy triplets", *Astronomy and Astrophysics,* Vol. 670, p. A63 (2023)

DOI: 10.1051/0004-6361/202245297

366 Veledina, A., et al. (includes Agudo, I.)

"Discovery of X-Ray Polarization from the Black Hole Transient Swift J1727.8-1613", *Astrophysical Journal Letters,* Vol. 958, p. L16 (2023)

DOI: 10.3847/2041-8213/ad0781

367 Venkattu, D., et al. (includes Pérez Torres, M.; Moldón, J.)
"Subarcsecond-resolution Imaging of M51 with the International LOFAR Telescope", *Astrophysical Journal,* Vol. 953, p. 157 (2023)
DOI: 10.3847/1538-4357/ace2c1

368 Victoria-Ceballos, C. I., et al. (includes Masegosa, J.)
"Testing Physical Scenarios for the Reflection Features of Type-1 AGNs using XMM-Newton and NuSTAR Simultaneous Observations", *Astrophysical Journal,* Vol. 954, p. 96 (2023)
DOI: 10.3847/1538-4357/ace785

369 Vink, J. S., et al. (includes Kehrig, C.)
"X-Shooting ULLYSES: Massive stars at low metallicity. I. Project description", *Astronomy and Astrophysics,* Vol. 675, p. A154 (2023)
DOI: 10.1051/0004-6361/202245650

370 Wang, J., et al. (includes Hess, K. M.)
"FEASTS: IGM Cooling Triggered by Tidal Interactions through the Diffuse H I Phase around NGC 4631", *Astrophysical Journal,* Vol. 944, p. 102 (2023)
DOI: 10.3847/1538-4357/acafe8

371 Winkel, N., et al. (includes Pérez-Torres, M. A.)
"The Close AGN Reference Survey (CARS). A parsec-scale multi-phase outflow in the super-Eddington NLS1 Mrk 1044", *Astronomy and Astrophysics,* Vol. 670, p. A3 (2023)
DOI: 10.1051/0004-6361/202244630

372 Yan, F., et al. (includes Shulyak, D.)
"CRIRES+ detection of CO emissions lines and temperature inversions on the dayside of WASP-18b and WASP-76b", *Astronomy and Astrophysics,* Vol. 672, p. A107 (2023)
DOI: 10.1051/0004-6361/202245371

373 Yang, D., et al. (includes Orozco Suárez, D.; del Toro Iniesta, J. C.; Balaguer Jiménez, M.; Bellot Rubio, L. R.; López Jiménez, A.; Moreno Vacas, A.; Strecker, H.)
"Direct assessment of SDO/HMI helioseismology of active regions on the Sun's far side using SO/PHI magnetograms", *Astronomy and Astrophysics,* Vol. 674, p. A183 (2023)
DOI: 10.1051/0004-6361/202346030

374 Yang, J., et al. (includes Prada, F.)
"DESI z ≳ 5 Quasar Survey. I. A First Sample of 400 New Quasars at z 4.7-6.6", *Astrophysical Journal Supplement Series,* Vol. 269, p. 27 (2023)
DOI: 10.3847/1538-4365/acf99b

375 Yao, J., et al. (includes Prada, F.)
"DESI and DECaLS (D&D): galaxy-galaxy lensing measurements with 1 % survey and its forecast", *Monthly Notices of the Royal Astronomical Society,* p. 6071 (2023)
DOI: 10.1093/mnras/stad2221

376 Yardley, S. L., et al. (includes del Toro Iniesta, J. C.; Orozco Súarez, D.)
"Slow Solar Wind Connection Science during Solar Orbiter's First Close Perihelion Passage", *Astrophysical Journal Supplement Series,* Vol. 267, p. 11 (2023)
DOI: 10.3847/1538-4365/acd24b

377 Yee, S. W., et al. (includes Pozuelos, F. J.)
"The TESS Grand Unified Hot Jupiter Survey. II. Twenty New Giant Planets", *Astrophysical Journal Supplement Series,* Vol. 265, p. 1 (2023)
DOI: 10.3847/1538-4365/aca286

378 Yeo, K. L., et al. (includes Orozco Suárez, D.; del Toro Iniesta, J. C.; Balaguer Jiménez, M.; Bellot Rubio, L. R.; Moreno Vacas, A.; Strecker, H.)
"Reconstruction of total solar irradiance variability as simultaneously apparent from Solar Orbiter and Solar Dynamics Observatory", *Astronomy and Astrophysics,* Vol. 679, p. A25 (2023)
DOI: 10.1051/0004-6361/202345872

379 Yuan, H. -B., et al. (includes Alfaro, E. J.; Benítez, N.)
"The miniJPAS survey: stellar atmospheric parameters from 56 optical filters", *Monthly Notices of the Royal Astronomical Society,* Vol. 518, p. 2018 (2023)
DOI: 10.1093/mnras/stac3155

380 Zakhozhay, O. V., et al. (includes Perez-Torres, M.)
"New constraints on the presence of debris disks around G 196-3 B and VHS J125601.92-125723.9 b", *Astronomy and Astrophysics,* Vol. 674, p. A66 (2023)
DOI: 10.1051/0004-6361/202345944

381 Zane, S., et al. (includes Agudo, I.)
"A Strong X-Ray Polarization Signal from the Magnetar 1RXS J170849.0-400910", *Astrophysical Journal Letters,* Vol. 944, p. L27 (2023)
DOI: 10.3847/2041-8213/acb703

382 Zaritsky, D., et al. (includes Karunakaran, A.)
"An enigmatic 380 kpc long linear collimated galactic tail", *Monthly Notices of the Royal Astronomical Society,* Vol. 524, p. 1431 (2023)
DOI: 10.1093/mnras/stad1964

383 Zaritsky, D., et al. (includes Karunakaran, A.)
"Systematically Measuring Ultra-diffuse Galaxies (SMUDGes). V. The Complete SMUDGes Catalog and the Nature of Ultradiffuse Galaxies", *Astrophysical Journal Supplement Series,* Vol. 267, p. 27 (2023)
DOI: 10.3847/1538-4365/acdd71

384 Zhou, P., et al. (includes ;Agudo, I.)
"Magnetic Structures and Turbulence in SN 1006 Revealed with Imaging X-Ray Polarimetry", *Astrophysical Journal,* Vol. 957, Issue 1, p. 55 (2023)
DOI: 10.3847/1538-4357/acf3e6

385 Zhou, R., et al. (includes Prada, F.)
"Target Selection and Validation of DESI Luminous Red Galaxies", *Astronomical Journal,* Vol. 165, p. 58 (2023)
DOI: 10.3847/1538-3881/aca5fb

386 Zhu, Z.-P., et al. (includes Agüí Fernández, J. F.; Kann, D. A.)
"Optical and Near-infrared Observations of the Distant but Bright "New Year's Burst" GRB 220101A", *Astrophysical Journal,* Vol. 959, p. 118 (2023)
DOI: 10.3847/1538-4357/ad05c8