

CAHA

Centro Astronómico
Hispano en Andalucía

Annual Report
2024



www.caha.es





CAHA Annual report 2024

May 2025

Editor: CAHA (info@caha.es)

Coordination: Jorge Iglesias-Páramo

Design: Tarma, estudio gráfico

Cover image: Samuel Góngora García

Printing: Lozano impresores

Legal dep.: AL 1469-2024



This work may be reproduced in whole or in part by any means or process, known or unknown, including reprography and computer processing, provided that the source and owners are properly acknowledged.

Index

- 5 Preface
- 6 CAHA Organizational chart
- 7 Internal organization
- 9 Main facilities
- 9 Instrumentation
- 10 Observing time
- 12 Publications
- 13 Press releases
- 18 Technological activities
- 20 Education and outreach
- 21 List of Publications

Preface

The Centro Astronómico Hispano en Andalucía (CAHA) is an Economic Interest Group (AIE) whose main goal is the management of the Calar Alto Astronomical Observatory, a key institution for the international astronomical community, hosting highly competitive facilities.

Being heir to the original Centro Astronómico Hispano Alemán (also called CAHA) that started its trajectory in 1973 after the signature of an international agreement between the German and Spanish governments, CAHA has gone through different legal statuses until nowadays.

Since 2019, CAHA is co-partnered by the Spanish National Research Council (CSIC), and the Junta de Andalucía (JdA).

The Instituto de Astrofísica de Andalucía (IAA-CSIC), accredited as a Severo Ochoa centre of excellence by the Spanish Ministry of Science and Innovation, plays the role of the reference institute of CAHA, advising on the scientific and technological strategy.

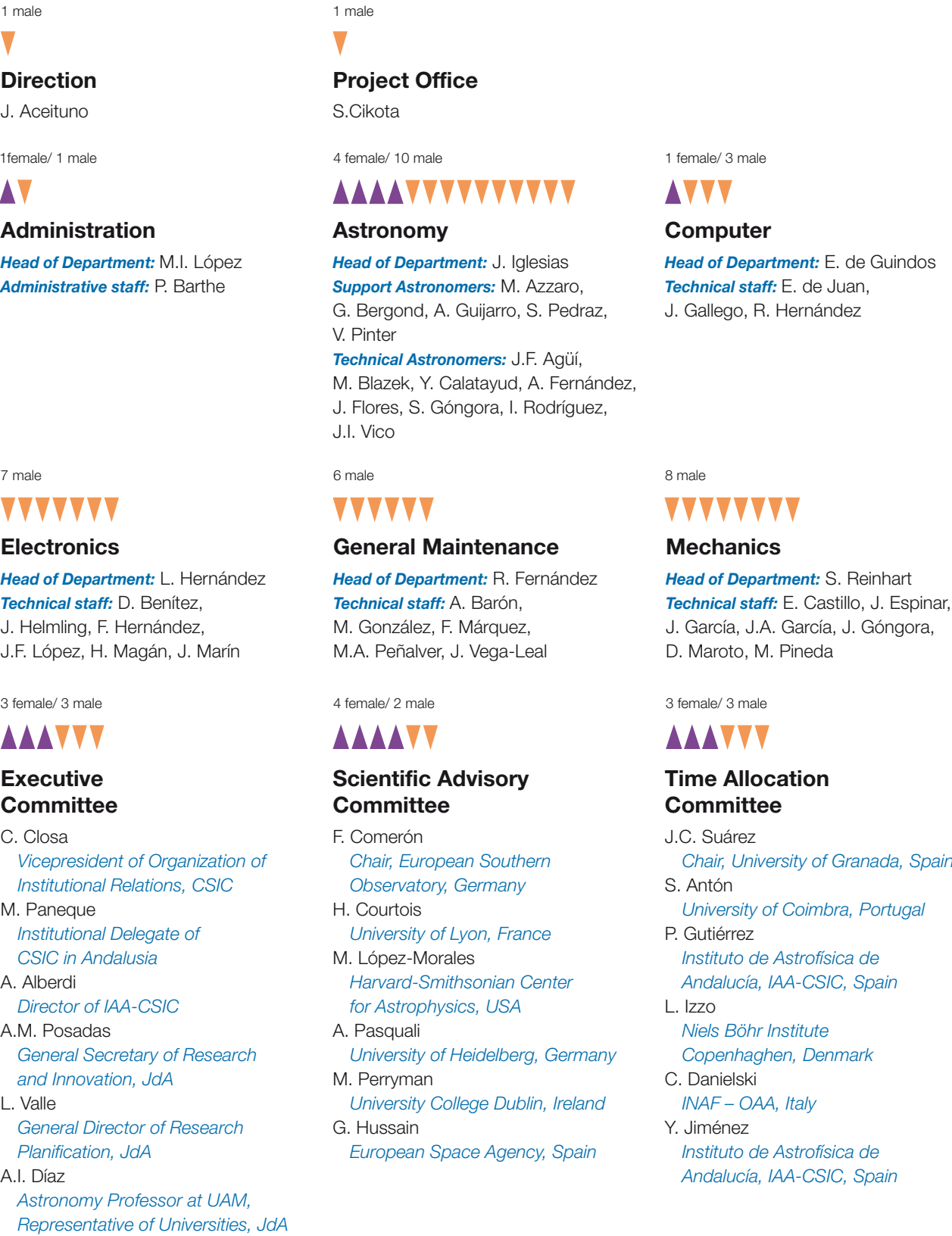
Calar Alto is located in the Sierra de los Filabres, in the province of Almería, at an altitude of 2168 m, and divides its land between the municipalities of Gérgal, Bacares and Serón.

CAHA is managed by an Executive Committee (EC), composed of three members of CSIC and three members of JdA, that designates the CAHA director and establishes the legal statute of the AIE. A Scientific Advisory Committee (SAC) composed of six international renowned astronomers provides advice on scientific and technological issues like the selection of new long-term legacy projects and new instrumentation. Finally, a Time Allocation Committee (TAC) composed of six senior international astronomers meets twice per year to evaluate the Open Time observing proposals.

The CAHA staff is organized in six departments that carry out all the tasks required for a regular and efficient operation of the observatory, and a Project Office, established in 2024, running through all CAHA departments.

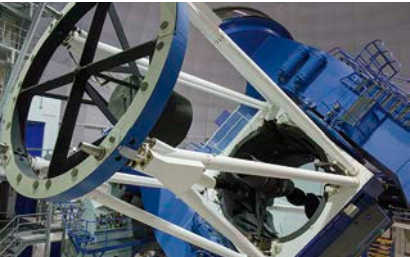
CAHA

Organizational chart *



Internal organization

Main tasks of the CAHA departments:



Astronomy department

Manage the schedule of the telescopes. Contact the astronomers to prepare the details of the observations. Setup the instruments and perform day-time calibrations. Perform the night-time observations in service mode or assist the visitor astronomers. Survey the small telescopes and monitors of the sky quality.



Computer department

Manage and maintain the computer systems and networks of the observatory. This involves ensuring the proper functioning of servers, workstations, and other equipment, as well as ensuring reliable and secure connectivity for data transfer. Implementation of security measures, such as firewalls, data encryption and access policies, to safeguard information and prevent cyberthreats.



Administration department

Management of the purchases, invoicing, payments, coordination of agreements and contracts, supervision of external catering, cleaning and human resources services, compliance of the hygiene plan; all this in close collaboration with the rest of the departments, to ensure a competent and efficient operation of the observatory.



Electronics department

Maintenance and repair of all electronic and electromechanical facilities of telescopes, domes and instruments, including uninterrupted power supplies, hydraulic systems, production of liquid nitrogen, telephone system and weather station.



Mechanics department

Maintenance, repair and update of the mechanical, hydraulic, pneumatic, electromechanical, cryogenic and vacuum parts of the CAHA facilities and instrumentation. Disassembly, cleaning, aluminization, and assembly processes of the optical elements of the telescopes and diverse equipment at CAHA.

General Maintenance department

Taking care of the heating and cooling rooms, the electrical transformation station, the diesel generator, the fire-prevention equipment, the snowplow and the photovoltaic panel park.

Project office

Coordination and management of the CAHA instrumental projects, including planning and proposal submission, execution and final reporting. It also coordinates activities with external partners, and is the main point of contact for handling administrative tasks associated to the projects.

* Composition of the CAHA active staff and committees as of December 31st 2024



Main facilities

CAHA owns four telescopes with primary mirror diameter larger than 1 m: the **1.23 m telescope** (1975), the **Schmidt camera** (1980), the **2.2 m telescope** (1979), and the **3.5 m telescope** (1984). Also present in the vicinities is a **1.52 m telescope**, owned by the Instituto Geográfico Nacional, and operated by the Observatorio Astronómico Nacional.

In addition to these large telescopes, CAHA hosts other **small telescopes** and a **weather station** devoted to monitor the sky and atmospheric quality at the observatory.

Instrumentation

CAHA offers a large variety of instruments for its telescopes, combining capacities for imaging and spectroscopy, in the visible and in the Near Infra-Red ranges.

Twice a year, a call for proposals is done to apply for observing time each semester, **semester A** from January 1st to June 30th and **semester B** from July 1st to December 31st.

3.5 m telescope

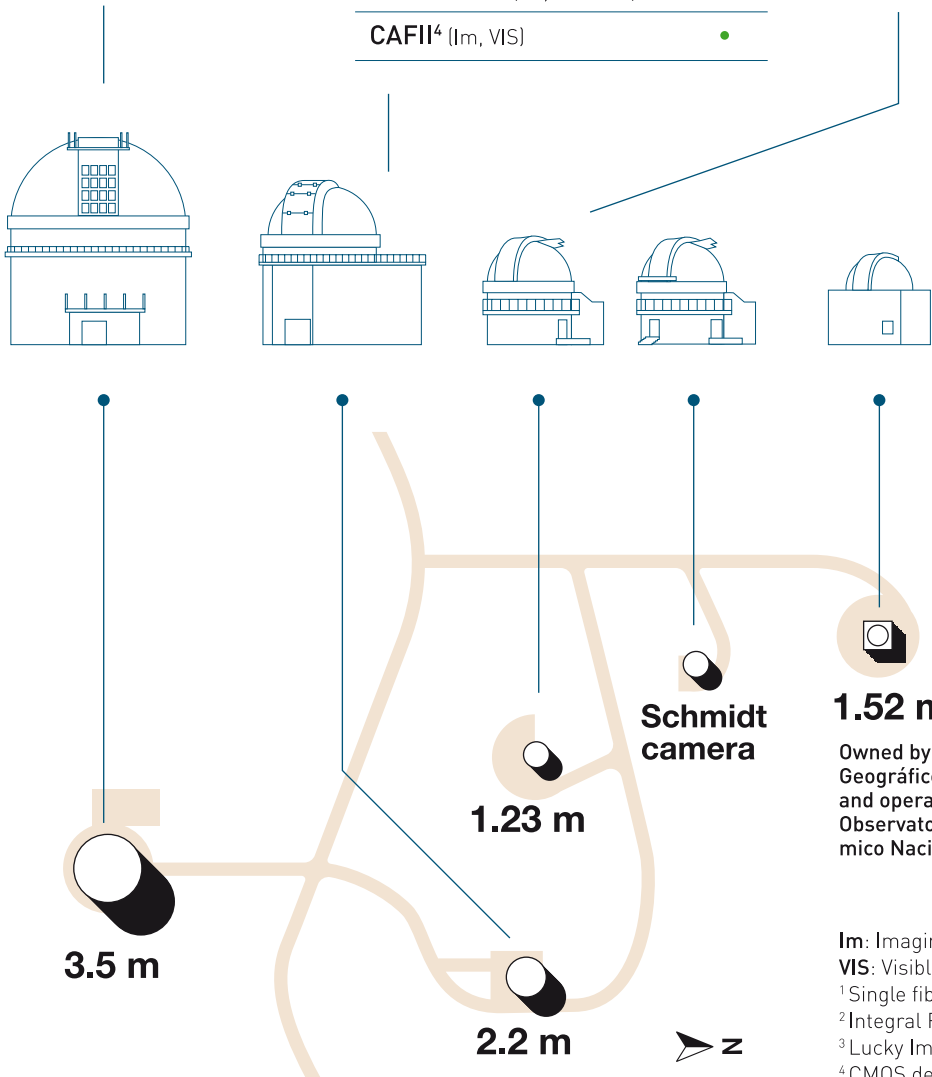
Semester	23A	23B
CARMENES ¹ (Sp, VIS+NIR)	●	●
PMAS ² (Sp, VIS)	●	●
Omega2000 (Im, NIR)	●	●

2.2 m telescope

Semester	23A	23B
CAFOS (Sp+Im, VIS)	●	●
CAFÉ ¹ (Sp, VIS)	●	●
Astralux ³ (Im, VIS)	●	●
Planetcam ³ (Im, VIS+NIR)	●	●
CAFII ⁴ (Im, VIS)		●

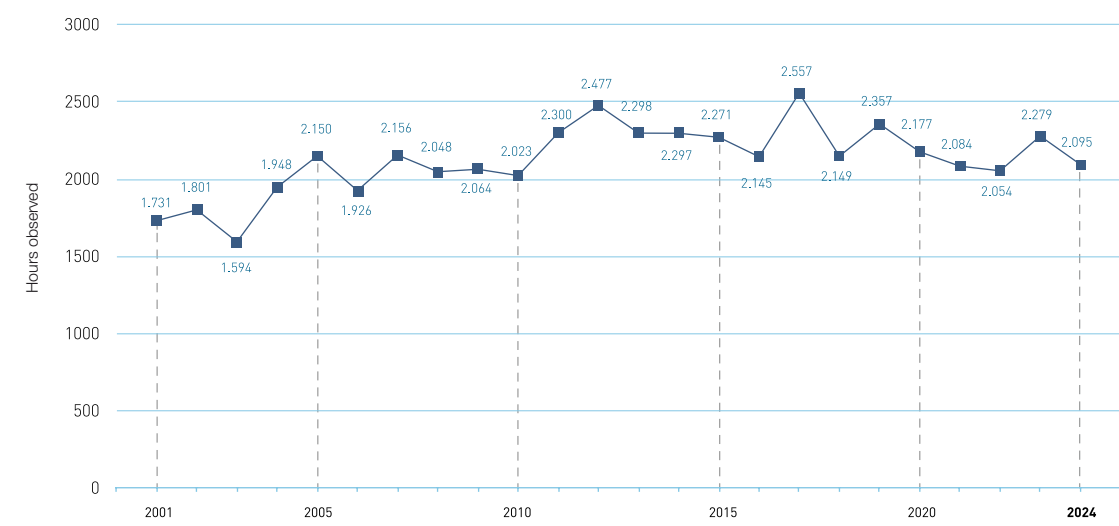
1.23 m telescope

Semester	23A	23B
iKon (Im, VIS)	●	
ASI461 ⁴ (Im, VIS)	●	●
Eyepiece (Eye, VIS)	●	●



Observing time

During 2024, a total of **2095 night hours** were observable in Calar Alto. The figure below shows the evolution of the number of useful hours since 2001.



Telescopes 1.23 m and Schmidt

The **1.23 m telescope** has allocated its observing time to several scientific programs, and to educational and outreach activities. This telescope is the largest in Europe offering the possibility to observe through an eyepiece.

The **Schmidt camera** is subject to an agreement with the European Spatial Agency (ESA) that uses this telescope to survey Solar System objects.

Telescopes 2.2 m and 3.5 m

The time lost due to technical problems in the two largest telescopes of Calar Alto was less than 3% in 2024. This shows that these two telescopes and their associated instrumentation are efficiently maintained by the CAHA technical staff. In addition to this, the availability of the CAHA astronomical staff to perform service observations in these telescopes results in a privileged exploitation of the weather conditions, allowing an optimal return of the astronomical observations.

The 2.2 m and 3.5 m telescopes have allocated part of their time to long-term projects, previously approved by the CAHA EC and SAC. The table below shows the details of the observations devoted to those projects.

Project	Nights (24A/24B)	Telescope	Instrument
BHOLE	110/110	2.2 m	CAFOS
CARMENES Legacy+	35/50	3.5 m	CARMENES
KOBE	35/35	3.5 m	CARMENES
CAVITY	36.3/11.5	3.5 m	PMAS

More nights were also allocated to proposals received from:

- the **general Call for Proposals** (Open Time), accesible to astronomers from Spanish institutions.
- the **ORP Call for Proposals**, supported via the Opticon Radionet Pilot Trans-national Access program, accesible to astronomers from any nation.
- the **Director's Discretionary Time** (DDT) program.
- the **Director's Guaranteed Time** (DGT) program.

On the right follows the distribution of proposals performed during 2024 separated by the different ways of access.

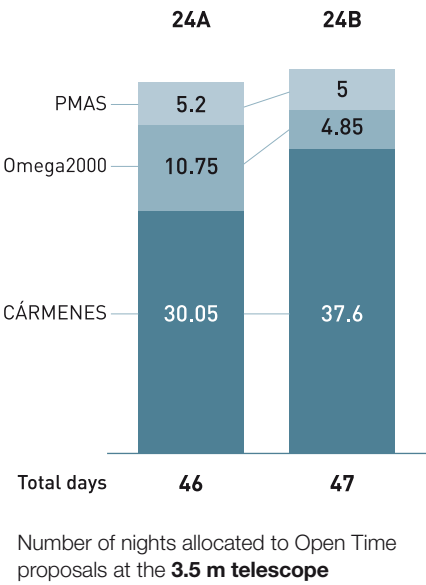
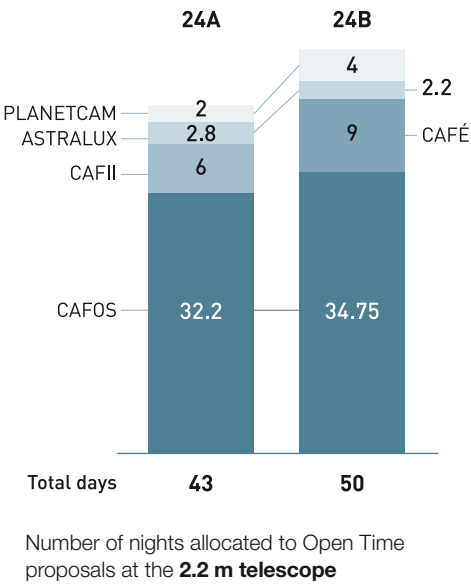
	24A		24B	
	2.2 m	3.5 m	2.2 m	3.5 m
Open Time	21	20	21	15
OPTICON	-	4	2	3
DDT	1	1	4	2
DGT	1	1	-	2

The remaining nights were devoted to aluminization of mirrors, academies of different universities and commissioning of the PANIC NIR camera (at the 2.2 m).

The table on the right shows the number of nights offered to **Open Time proposals** and the oversubscriptions for the 2.2 m and 3.5 m telescopes in semesters 24A and 24B.

	24A		24B	
	2.2 m	3.5 m	2.2 m	3.5 m
Nights offered	43	46	50	47
Over-subscription	1.8	2.0	1.3	2.1

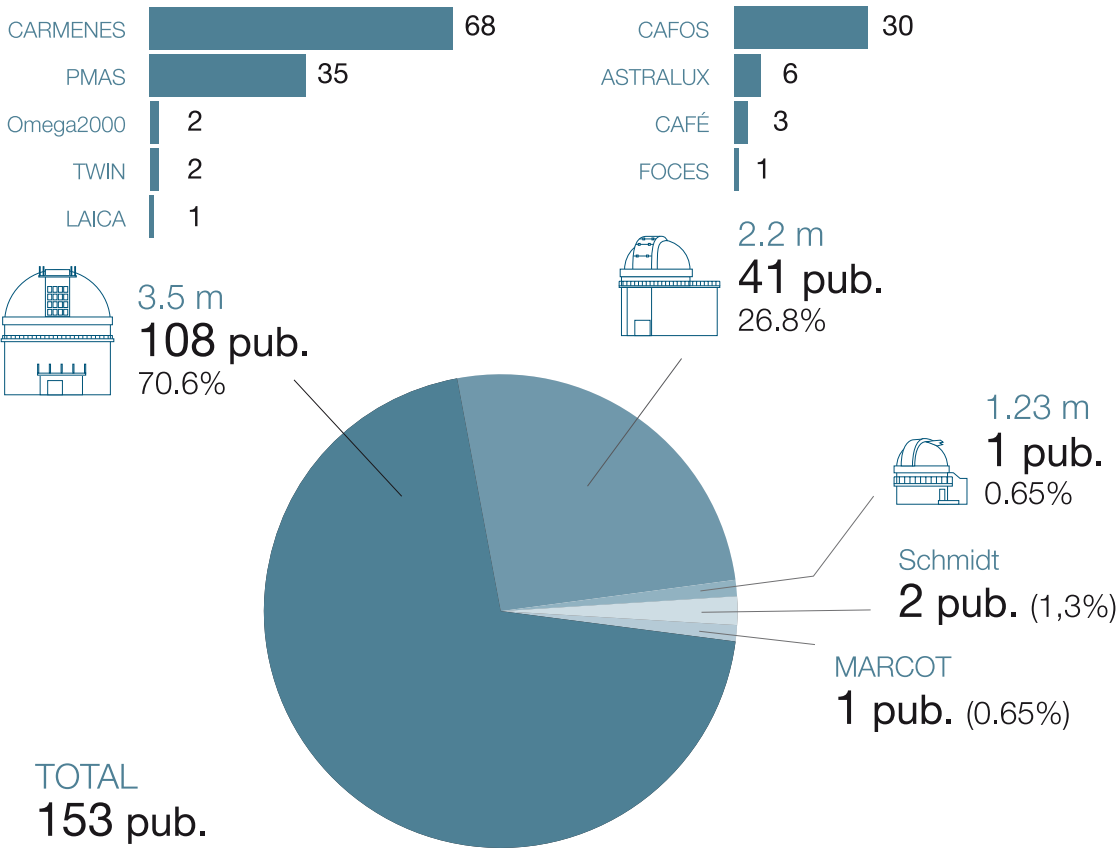
Below follows the distribution of nights allocated to Open Time proposals at both telescopes, **split by instrument**.



Publications

A total of **153 peer reviewed publications** have been published in different high impact scientific journals based on data obtained using the Calar Alto facilities. Below follow the details of those publications, split by telescopes and instruments.

A detailed list of publications is included at the end of this Annual.



Press releases

Strong solar storm from Calar Alto observatory



An impressive aurora borealis has been spotted in the Spanish skies on the night of May 10-11, 2024. From Calar Alto, despite the clouds, the intense reddish phenomenon has been captured by several webcams and even by the astronomers present there, who have been able to grab it with their cell phones. Other northern lights may well be seen on May 11th and 12th due to the power of the ongoing solar flares.

On May 9th, 2024, the American NOAA Space Weather Prediction Center's GOES-16 satellite observing the Sun detected strong coronal mass ejections from the giant sunspot called AR3664, the size of about 16 Earths. These ejections brought a solar wind that was directed right at our planet.

NOAA then warned of the strong geomagnetic storm that was going to hit us, raising the level to G5, the highest category, something that had not happened since 2003 and that entails potential risks for terrestrial communication and electricity transport networks, as well as for satellites in orbit. Visually, geomagnetic storms translate into spectacular aurora borealis or australis, phenomena quite common in polar areas where the Earth's magnetic field lines converge, but much less frequent at temperate latitudes like those of Andalusia.

From Calar Alto observatory, the phenomenon could be effectively seen, thru the clouds, from May 11, 2024 at twilight (22h15 local time) until almost three o'clock in the morning of May 12, with a northern horizon tinged with red, a color particularly intense around 22h30 (CEST). This color is due to the interaction of the strong solar wind with atoms of oxygen in the Earth's upper atmosphere, at about 250 km altitude, in the thermosphere.



Calar Alto, CSIC, and the University of Córdoba agree to collaborate in the field of Astronomy

The University of Córdoba (UCO), the state agency CSIC - through the Institute of Astrophysics of Andalusia, IAA-CSIC, in Granada - and the Hispanic Astronomical Center in Andalusia (CAHA) of Calar Alto have signed a general action protocol to promote a common plan of academic, scientific-technical and social activities. The aim is to promote the dissemination and development of Astronomy and related fields. Calar Alto observatory thus confirms its commitment with the dissemination of Astronomy and Astrophysics in the academic community and Andalusian society.

The tripartite agreement involves scientific-technical collaboration in the field of engineering and astrophysics; activities aimed at the participation of students from the University of Córdoba in technical developments and advanced astronomical instrumentation projects; activities aimed at academic collaboration; and activities aimed at disseminating Astronomy (guided tours of the observatory, talks and courses on astronomy, etc.).

At the scientific level, a recent example of collaboration between UCO, CAHA and IAA is the University of Córdoba project (EU-funded recovery and resilience mechanism) *“Analysis of the statistics of the distribution of galaxies in the large-scale structure using large astronomical surveys”*. Several astronomical survey projects have been carried out at Calar Alto, such as Alhambra, CALIFA, CAVITY (ongoing), or CATARSIS in the future – all with a strong participation of researchers from Andalusian universities and the IAA-CSIC.



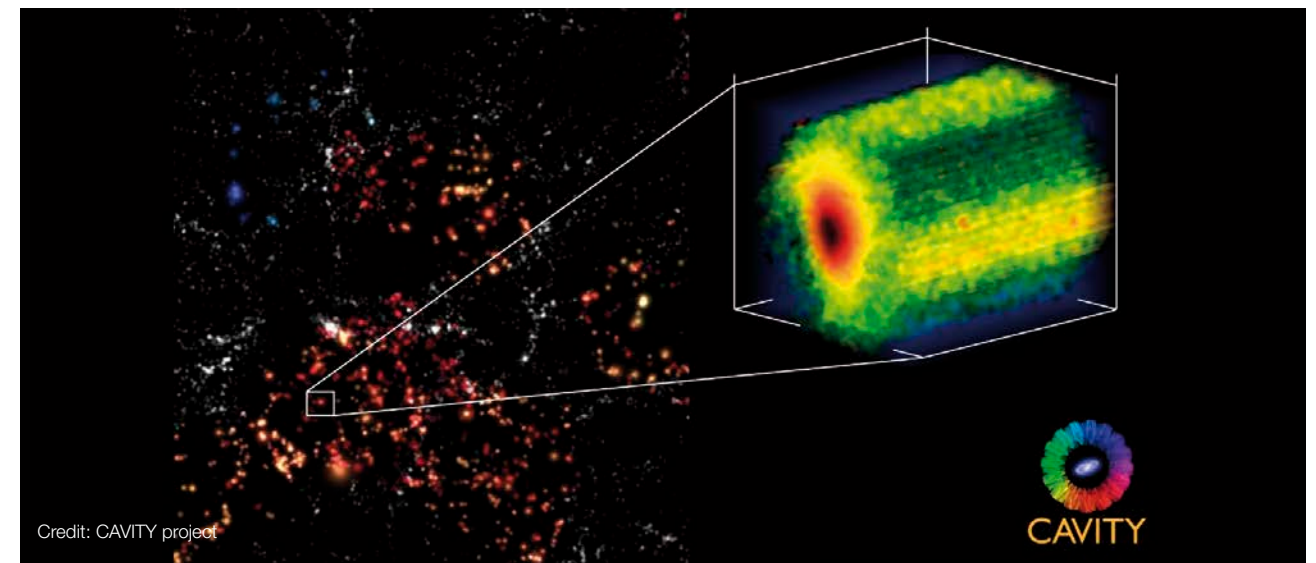
Credit: NASA/JPL-Caltech/R. Hurt (Caltech-IPAC)

Discovery of a transiting “exo-Venus” transiting 40 light years away

Combining data obtained from space and ground-based telescopes, an international research team has discovered an exoplanet, a priori temperate and nearly Earth-sized, very similar to Venus. It is the closest “exo-Venus” detected to date by the transit method i.e., by observing the periodic mini-eclipses (transits) of its star caused by the passage of the planet in front of it.

The new world, called Gliese 12 b, has a diameter slightly smaller than our planet, comparable to the one of Venus (about 12,000 km). The spectra from CARMENES, among others, have made it possible to estimate the planet’s mass at about 1.5 times that of the Earth, implying it is a rather dense, rocky planet. The surface equilibrium temperature of the exoplanet would be about 42°C. The final temperature, however, will depend on whether this planet has been able to retain an atmosphere (and its composition) from the time of its formation to the present. If Gliese 12 b also had a very dense atmosphere, temperatures could reach hundreds of degrees in case of a strong greenhouse effect, as in the case of Venus, capable of melting lead (about 450°C).

The exoplanet orbits in less than 13 days around its host star, Gliese 12, a cool red dwarf located 39 light-years away in the Pisces constellation. This star has only 27% the size of the Sun and 60% of its surface temperature. The distance separating Gliese 12 from the exoplanet is only 7% of the Earth-Sun distance, so it receives from its star 1.6 times more energy than our planet, explaining its warmer equilibrium temperature (the one of a summer in Andalusia!) than that of the Earth, only -18°C, although the average surface temperature is 15°C thanks to our atmosphere.



Credit: CAVITY project

CAVITY publishes 3D data of 100 galaxies in voids of the Universe observed from Calar Alto

In 2020, the Calar Alto Observatory Scientific Advisory Committee selected three major observational programs to be carried out with the 3.5-meter telescope, the largest of its kind in European mainland. The idea was to offer hundreds of observing nights so as to complete ambitious projects aiming at answering major questions of modern astrophysics, such as the omnipresence of (habitable?) planets around dwarf stars other than the Sun (KOBÉ and CARMENES-LEGACY+ projects) as well as the formation and evolution of galaxies in the Universe (CAVITY project).

CAVITY (Calar Alto Void Integral-field Treasury survey) is dedicated to scrutinize in detail hundreds of galaxies located in the less dense areas of the local universe, i.e., less populated in other galaxies. Galaxies are gigantic concentrations of stars, as our Sun is a small star among the hundred billion(s) of the Milky Way. They are usually surrounded, a few million light-years away, by other galaxies in the large-scale “sponge-like” distribution in the Universe of both visible and invisible (the so-called dark) matter inherited from the Big Bang.

Indeed, galaxies are not randomly distributed in the Universe, but they form a huge structure with sponge-like filaments, following the distribution of dark matter. This gives rise to large clusters of galaxies, in which the density is such that interactions and collisions between galaxies are frequent. There are also regions, the “bubbles” of the sponge, where there is hardly any mass concentration and which present a more pristine environment, free from the large interactions of the clusters.

These cosmic voids, little studied so far, nonetheless represent the ideal environment to better understand how galaxies evolve on their own, making easier to understand their formation, which are two of the great questions of modern cosmology. CAVITY is a pioneering project that aims at understanding the role of the large-scale structure of the Universe in the formation and evolution of galaxies, by studying in detail the systems that inhabit those cosmic voids.

The essential source of data for the CAVITY project comes from Calar Alto observatory, where thousands of two-dimensional spectra from PMAS, an instrument of the 3.5 m telescope, are being obtained, in addition to data taken at other large astronomical infrastructures. PMAS is a large integral-field unit spectrograph, developed 20 years ago at the *Leibniz-Institut für Astrophysik Potsdam (AIP)* and still very competitive thanks to its wide field-of-view that allows us to study in detail the galaxies in the local universe, from their central to their outer regions: in a single exposure, spectra covering the entire visible range of more than 300 regions of a galaxy are taken. The PMAS observations of more than a hundred void galaxies have already been successfully completed for CAVITY.

On July 15th, 2024, CAVITY published its first data release or “DR1” (for Data Release 1) making available to the entire scientific community the two-dimensional spectra of a first sample of 100 galaxies observed at the 3.5 m telescope with PMAS, data ready for an immediate use. These PMAS data cubes can be download at <https://cavity.caha.es>.



K2-399b it was no planet

A new research led from the Centro de Astrobiología in Madrid (CAB, INTA-CSIC) has revised a previous study from NASA that had claimed the discovery, by the transit method alone, of an exoplanet orbiting the star K2-399.

Using more complete observations, including those taken from Calar Alto with CARMENES, the new research concludes that the detected transits, those mini-eclipses, are not due to a planet but to a pair of red dwarf stars orbiting K2-399, while eclipsing each other, which perfectly mimics a typical exoplanetary transit. This case reminds us that revision based on new data, and where appropriate, correction of previous results, is the basis of the scientific method.

In February 2018, the TESS space telescope launched by NASA observed that the Sun-like star K2-399 dimmed for a little more than an hour and a half before recovering its brightness. Eighteen hours later, the same phenomenon repeated: the star dimmed slightly again, only to regain its brightness shortly thereafter. All this pointed to a planetary transit: when passing in front of its star, from our point of view, the planet (a dark body with no own light) blocks part of the star light, which then appears a bit less bright. As it completes one full orbit and returns to the same position, the phenomenon repeats itself, like periodic mini-eclipses. And so on for the life of that planetary system.

The transits of K2-399 were analyzed by a group of researchers from the NASA Exoplanet Science Institute (NExSCI) at the California Institute of Technology (Caltech). In their analysis, the researchers concluded that these transits must indeed come from a planet. In their work, they ruled out other possibilities that could also have caused the star to dim... or appear to do so.

Nevertheless, since we do not see the planet itself but its indirect effects (the dimming of light as it passes in front of its star), Nature may be fooling us with other phenomena that would produce the same effect.

For example, we can imagine a Sun-like star aligned almost perfectly in our sky with a pair of very faint stars eclipsing each other. In that case, and since we cannot see the stars individually, we would see a small eclipse that might appear to come from a planet around the star K2-399.

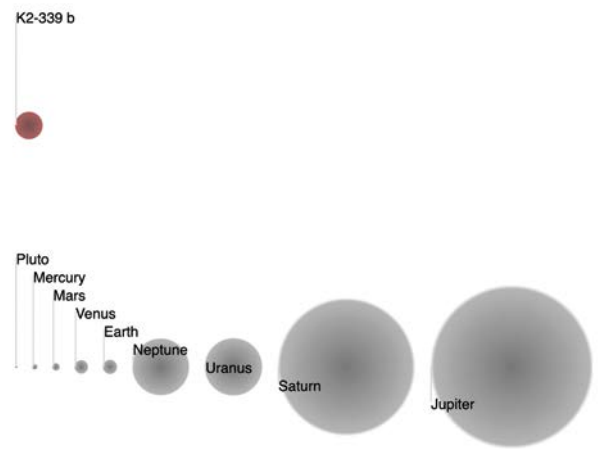
What the NExSCI researchers did was to statistically rule out any scenario other than a planet and they concluded that the probability that the signal was due to a planet was over 99.9995%. Then they considered the planet as confirmed and published the discovery in The Astronomical Journal.

But this supposed exoplanet was not just any exoplanet. Its characteristics made it extremely interesting: it was a very exotic type of planet, the one we know as a “hot Neptune”.

Indeed, we know dozens of “hot Jupiters”, planets like Jupiter (larger than Neptune) that orbit very close to their stars, with years that last only a few days. We also know of rocky planets like ours (smaller than Neptune) that also orbit this close to their stars. Still, there is a desert of planets like Saturn or Neptune very close to their parent stars. It is what we call “Neptune desert”. We do not yet know exactly its origin, but the fact that it exists gives us a lot of information about how planets form and what processes they undergo during their lifetime. In particular, how their atmospheres are volatilized (or evaporated) when they get so close to their parent stars.

However, K2-399 b was there, in the middle, wandering in the Neptune desert, undeterred by the very high radiation from its star which should have evaporated its entire atmosphere. How had K2-399b managed to retain its gas envelope? It was a real mystery and several groups of researchers requested observation time on both ground- and space-based telescopes equipped with state-of-the-art instruments.

A research team led by Jorge Lillo-Box, from Centro de Astrobiología (INTA-CSIC) in Madrid, realized that, despite being a planet for which we could measure its mass very well, no one seemed to have been able to obtain it. So, they requested observing time on the CARMENES instrument at the 3.5 meter Calar Alto telescope. The observations gave very strange results, which seemed inconsistent with the presence of a planet in the system.



The following plot shows the approximate sizes of the planets in this system. The Solar System planets are shown as a comparison. Note that unless the radius has been determined through a transit observation, this is only an approximation (see Lissauer et al. 2011b). Source: www.openexoplanetcatalogue.com

So they asked other colleagues in the United States, Italy and England, who had also obtained data on K2-399 but had never published them. Putting all the data together, the reality quickly emerged: K2-399b was not a planet but a triple star system. Three stars whose configuration perfectly mimicked that of a planet.

In reality, the system was made of a Sun-like star (although somewhat hotter) around which orbit, with a very long period, two very cold stars very close to each other, with a period of a few days. These two cool stars eclipse each other, producing the transits observed by the TESS mission: they do not correspond to an exoplanet transit but to a pair of red dwarf stars eclipsing each other while orbiting with a long period (more than two years) around the main star, the sun of the triple system.

Technological activities



CARMENES+

In 2024, the CARMENES+ project advanced significantly as a major technical upgrade to the highly successful CARMENES instrument at the 3.5-m telescope. Led by IAA-CSIC in close cooperation with ICE-CSIC and the engineering team at CAHA, the central engineering effort has been the redesign of the NIR cryogenic system. The original setup, based on an intermittent liquid nitrogen supply, has been replaced with a continuous flow system aimed at providing exceptional thermal stability. This improvement is critical to maintaining and enhancing the already remarkable radial velocity precision, currently capable of detecting stellar motions on the order of one meter per second. The upgrade will not only improve the precision of exoplanet detection but will also open the door to the atmospheric characterization of rocky exoplanets - a frontier objective in the search for life beyond the Solar System.

This instrumental enhancement complements the broader CARMENES Legacy+ scientific campaign, which is now extending the observational archive with an additional 300 nights of high-quality data, reinforcing Calar Alto's role at the forefront of exoplanetary science.

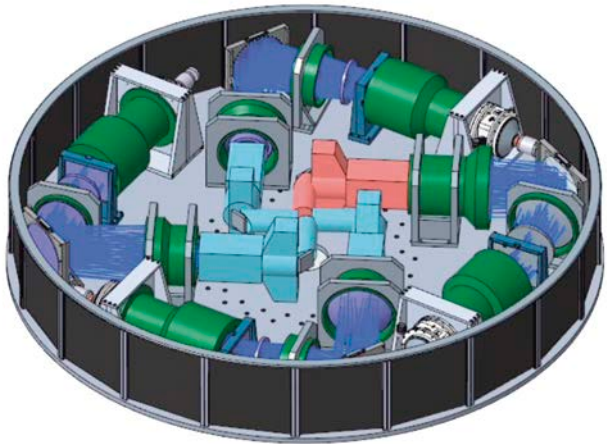


MARCOT

The Multi-Array of Combined Telescopes (MARCOT), is a modular astronomical infrastructure facility for high resolution spectroscopy and large field of view, high dynamic range imaging at subarcsec spatial resolution. The primary objective of the MARCOT 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 optical elements (identical mirrors or optical assemblies within manufacturing tolerances) resulting in a new infrastructure facility with a large effective aperture. This technique would allow the development of the next generation of very large effective-aperture telescopes with substantially reduced budget, serving two main purposes: high-resolution spectroscopy and large field of view seeing-limited high dynamic range imaging, also capable of achieving very fast cadences. The project has already developed a prototype unit of the array at Calar Alto observatory, and is being developed by researchers from CAHA, IAA-CSIC and AIP.

Throughout 2024, project MARCOT advanced steadily, supported by consistent coordination and follow-up. Significant progress was achieved in the imaging mode, including successful showcase observations of exoplanet transit light curves and asteroid



occultations. These efforts culminated in the complete setup of the data reduction pipeline for the imaging mode, confirming its readiness for scientific use.

In parallel, preparations for the system-level integration of the spectroscopic mode were initiated, marking a significant step toward enhancing the instrument's capabilities. Weekly project meetings ensured close alignment among the expanding network of partners and enabled the timely resolution of technical challenges, maintaining strong project momentum.

TARSIS

The Tetra-ARmed Super-Ifu Spectrograph (TARSIS), is a wide-FoV, integral field unit spectrograph with intermediate spectral resolution and optimized for the blue range for the 3.5 m telescope of Calar Alto. This will be a unique instrument that is able to explore large areas of the sky ($\sim 8 \text{ arcmin}^2$) reaching relatively unexplored wavelengths as blue as 320 nm and until 810 nm.

CATARSIS, the scientific project associated to TARSIS, will occupy most of the nights of the 3.5 m telescope during the first years of TARSIS operations. It will observe a sample of 16 cluster galaxies, some of them with known filaments, in the redshift range $0.15 < z < 0.23$ up to a distance of several virial radii, which will allow to answer questions related to the

mass profile of the cluster, as well as the nature of the physical processes acting on the evolution of galaxies not only within the clusters, but also in the connecting filaments.

In 2024, TARSIS achieved an important milestone with the reception of the fused silica optical blanks for its lens elements. These components were successfully delivered and verified, marking the transition into the critical optical fabrication phase. The calcium fluoride (CaF_2) blanks are still pending delivery and will require a validation process upon arrival. These materials are essential to achieving the spectrograph's full performance specifications.

The project remains on track as it advances toward the next stages of instrumental assembly and integration. In parallel, the project team continues to address and resolve administrative issues related to coordination among partners. These efforts are progressing steadily and are expected to clear the path for the timely continuation of technical work. Overall, the project is maintaining its momentum and preparing for a pivotal year of fabrication and early-stage integration activities.

The TARSIS project, is co-led by the IAA-CSIC and the UCM, and participated by UAL, US, CAB-INTA/CSIC, INAOE, Fractal S.L.N.E. and CAHA.

Education and outreach

Calar Alto Academy

CAHA continues with its Academy program, playing an important role in the education of the future astronomers. In 2024, students from **8 European universities** (UAM, UCM, UB, UCDublin, UGr, UJaén, VIU, UNIR) had the possibility to observe with the 2.2 m and 1.23 m telescopes in the same conditions as the professional astronomers.

Calar Alto and the society

During 2024 the observatory has been present in several activities in collaboration with the **Universidad de Almería**: Summer courses program, European researchers' night, and Adult education center, among others.

Also Calar Alto continued to host several observing campaigns at the 1.23 m telescope for the **SEA ProAm** collaboration, and the international network **Europlanet**.

In addition to this, several members of the Calar Alto staff have been involved in **outreach activities and talks** in educational, social, amateur astronomy centers, as well as inclusive associations. Some of these activities were part of the gender actions related to the **International day of women and girls in science** (February 11th) and to the **International women's day** (March 8th).

Visits to Calar Alto

The flagship that best represents the commitment of Calar Alto with the spread of the Astronomy is the program of visits open to the general public. During 2024, a large number of people had the opportunity to enjoy visiting the main facilities of Calar Alto, guided by the staff of **Azimuth Spain – Turismo astronómico y científico**, a company intimately linked to the outreach plan of the observatory.

4254

visitors to Calar Alto

179

outreach activities

52 educational

127 tourist



Credit: Granadown



Credit: Azimuth



Social Networks.

X, facebook and Instagram profiles managing.

<https://www.facebook.com/ObsCalarAlto>
<https://www.instagram.com/obsalaralto>
<https://x.com/ObsCalarAlto>

List of Publications

A total of **153 peer reviewed publications** have been published in different high impact scientific journals based on data obtained using the Calar Alto facilities in 2024. These publications are listed below, with indication of telescope (*Tlspe*) and instruments.

1. Title: Influence of departures from LTE on determinations of the scandium abundances in A-B-type stars

Authors: Mashonkina, Lyudmila

DOI: 10.1093/mnras/stad3687

Tlspe: 2.2m FOCES

2. Title: Machine-learning enhanced photometric analysis of the extremely bright GRB 210822A

Authors: Angulo-Valdez, Camila; Becerra, Rosa L.; Pereyra, Margarita; et al.

DOI: 10.1093/mnras/stad3624

Tlspe: 2.2m CAFOS

3. Title: The PEPSI Exoplanet Transit Survey (PETS) - IV. Assessing the atmospheric chemistry of KELT-20b

Authors: Petz, Sydney; Johnson, Marshall C.; Asnodkar, Anusha Pai; et al.

DOI: 10.1093/mnras/stad3481

Tlspe: 3.5m CARMENES

4. Title: Discovery of a Large-scale H I Plume in the NGC 7194 Group

Authors: Pak, Mina; Baek, Junhyun; Lee, Joon Hyeop; et al.

DOI: 10.3847/2041-8213/ad0ed2

Tlspe: 3.5m PMAS

5. Title: WASP-69b's Escaping Envelope Is Confined to a Tail Extending at Least 7 Rp

Authors: Tyler, Dakotah; Petigura, Erik A.; Oklopčić, Antonija; David, Trevor J.

DOI: 10.3847/1538-4357/ad11d0

Tlspe: 3.5m CARMENES

6. Title: Strong Carbon Features and a Red Early Color in the Underluminous Type Ia SN 2022xkq

Authors: Pearson, Jeniveve; Sand, David J.; Lundqvist, Peter; et al.

DOI: 10.3847/1538-4357/ad0153

Tlspe: 3.5m Omega2000

7. Title: High-resolution Transmission Spectroscopy of Ultrahot Jupiter WASP-33b with NEID

Authors: Yang, Yuanheng; Chen, Guo; Wang, Songhu; Yan, Fei

DOI: 10.3847/1538-3881/ad10a3

Tlspe: 3.5m CARMENES

8. Title: Quantifying the stellar ages of dynamically separated bulges and disks of CALIFA spiral galaxies

Authors: Jin, Yunpeng; Zhu, Ling; Zibetti, Stefano; et al.

DOI: 10.1051/0004-6361/202347197

Tlspe: 3.5m PMAS

9. Title: Magnetic field properties inside the jet of Mrk 421. Multiwavelength polarimetry, including the Imaging X-ray Polarimetry Explore

Authors: Kim, Dawoon E.; Di Gesu, Laura; Liodakis, Ioannis; et al.

DOI: 10.1051/0004-6361/202347408

Tlspe: 2.2m CAFOS

10. Title: The stellar occultation by (319) Leona on 2023 September 13 in preparation for the occultation of Betelgeuse

Authors: Ortiz, J. L.; Kretlow, M.; Schnabel, C.; et al.

DOI: 10.1093/mnras/slad179

Tlspe: MARCOT

11. Title: The interplay between feedback, accretion, transport, and winds in setting gas-phase metal distribution in galaxies

Authors: Sharda, Piyush; Ginzburg, Omri; Krumholz, Mark R.; et al.

DOI: 10.1093/mnras/stae088

Tlspe: [3.5m PMAS](#)

12. Title: X-ray properties of reverberation-mapped AGNs with super-Eddington accreting massive black holes

Authors: Maithil, Jaya; Brotherton, Michael S.; Shemmer, Ohad; et al.

DOI: 10.1093/mnras/stae115

Tlspe: [2.2m CAFOS](#)

13. Title: The EDGE-CALIFA Survey: Molecular Gas and Star Formation Activity across the Green Valley

Authors: Villanueva, Vicente; Bolatto, Alberto D.; Vogel, Stuart N.; et al.

DOI: 10.3847/1538-4357/ad1387

Tlspe: [3.5m PMAS](#)

14. Title: AGN STORM 2. VI. Mapping Temperature Fluctuations in the Accretion Disk of Mrk 817

Authors: Neustadt, Jack M. M.; Kochanek, Christopher S.; Montano, John; et al.

DOI: 10.3847/1538-4357/ad1386

Tlspe: [2.2m CAFOS](#)

15. Title: The Strength and Variability of the Helium 10830 Å Triplet in Young Stars, with Implications for Exosphere Detection

Authors: Krolikowski, Daniel M.; Kraus, Adam L.; Tofflemire, Benjamin M.; et al.

DOI: 10.3847/1538-3881/ad0f22

Tlspe: [3.5m CARMENES](#)

16. Title: TESS Hunt for Young and Maturing Exoplanets (THYME). XI. An Earth-sized Planet Orbiting a Nearby, Solar-like Host in the 400 Myr Ursa Major Moving Group

Authors: Capistrant, Benjamin K.; Soares-Furtado, Melinda; Vanderburg, Andrew; et al.

DOI: 10.3847/1538-3881/ad1039

Tlspe: [3.5m CARMENES](#)

17. Title: Star formation in outer rings of S0 galaxies. VI. NGC 1211: Bar resonance versus accretion

Authors: Tsvetkov, N.; Moiseev, A.; Sil'chenko, O.; et al.

DOI: 10.1051/0004-6361/202348437

Tlspe: [3.5m PMAS](#)

18. Title: Ready for O4 II: GRANDMA observations of Swift GRBs over eight weeks in spring 2022

Authors: Tosta e Melo, I.; Ducoin, J. -G.; Vidadi, Z.; et al.

DOI: 10.1051/0004-6361/202347938

Tlspe: [2.2m CAFOS](#)

19. Title: Self-consistent modeling of metastable helium exoplanet transits

Authors: Biaassoni, Federico; Caldioli, Andrea; Gallo, Elena; et al.

DOI: 10.1051/0004-6361/202347517

Tlspe: [3.5m CARMENES](#)

20. Title: Repeating flaring activity of the blazar AO 0235+164

Authors: Escudero Pedrosa, J.; Agudo, I.; Tramacere, A.; et al.

DOI: 10.1051/0004-6361/202346885

Tlspe: [2.2m CAFOS](#)

21. Title: WHaD diagram: Classifying the ionizing source with one single emission line

Authors: Sánchez, S. F.; Lugo-Aranda, A. Z.; Sánchez Almeida, J.; et al.

DOI: 10.1051/0004-6361/202347711

Tlspe: [3.5m PMAS](#)

22. Title: Characterising TOI-732 b and c: New insights into the M-dwarf radius and density valley

Authors: Bonfanti, A.; Brady, M.; Wilson, T. G.; et al.

DOI: 10.1051/0004-6361/202348180

Tlspe: [3.5m CARMENES](#)

23. Title: Comparing the Structural Parameters of the Milky Way to Other Spiral Galaxies

Authors: Guerrette, Jacob A.; Mosenkov, Aleksandr V.; Spencer, Dallin; Shakespear, Zacory D.

DOI: 10.1088/1674-4527/ad1a06

Tlspe: [3.5m PMAS](#)

24. Title: TONGS: A Treasury of Nearby Galaxy Surveys

Authors: Christie, Hannah S.; Hélias, Adrien; Carmo Carvalho, Matheus do; Barnby, Pauline

DOI: 10.1088/1538-3873/ad26a1

Tlspe: [3.5m PMAS](#)

25. Title: On the ocean conditions of Hycean worlds

Authors: Rigby, Frances E.; Madhusudhan, Nikku

DOI: 10.1093/mnras/stae413

Tlspe: [3.5m CARMENES](#)

26. Title: Kepler main-sequence solar-like stars: surface rotation and magnetic-activity evolution

Authors: Santos, Ângela R. G.; Godoy-Rivera, Diego; Finley, Adam J.; et al.

DOI: 10.3389/fspas.2024.1356379

Tlspe: [3.5m CARMENES](#)

27. Title: The EDGE-CALIFA Survey: An Extragalactic Database for Galaxy Evolution Studies

Authors: Wong, Tony; Cao, Yixian; Luo, Yufeng; et al.

DOI: 10.3847/1538-4365/ad20c9

Tlspe: [3.5m PMAS](#)

28. Title: Recovering Lost Light: Discovery of Supernova Remnants with Integral Field Spectroscopy

Authors: Martínez-Rodríguez, Héctor; Galbany, Lluís; Badenes, Carles; et al.

DOI: 10.3847/1538-4357/ad1bcf

Tlspe: [3.5m PMAS](#)

29. Title: Detection of X-Ray Polarization from the Blazar 1ES 1959+650 with the Imaging X-Ray Polarimetry Explorer

Authors: Errando, Manel; Liodakis, Ioannis; Marscher, Alan P.; et al.

DOI: 10.3847/1538-4357/ad1ce4

Tlspe: [2.2m CAFOS](#)

30. Title: The elusive atmosphere of WASP-12 b. High-resolution transmission spectroscopy with CARMENES

Authors: Czesla, S.; Lampón, M.; Cont, D.; et al.

DOI: 10.1051/0004-6361/202348107

Tlspe: [3.5m CARMENES](#)

31. Title: The Rossiter-McLaughlin effect and exoplanet transits: A delicate association at medium and low spectral resolution

Authors: Carteret, Yann; Bourrier, Vincent; Dethier, William

DOI: 10.1051/0004-6361/202348328

Tlspe: [3.5m CARMENES](#)

32. Title: The Calar Alto Legacy Integral Field Area Survey: Spatial Resolved Properties

Authors: Sánchez, S. F.; Barrera-Ballesteros, J. K.; Galbany, L.; et al.

DOI: 10.22201/ia.01851101p.2024.60.01.04

Tlspe: [3.5m PMAS](#)

33. Title: Search for Stellar Companions of Exoplanet Host Stars with AstraLux/CAHA 2.2 m

Authors: Schlagenhauf, Saskia; Mugrauer, Markus; Ginski, Christian; et al.

DOI: 10.1093/mnras/stae520

Tlspe: [2.2m Astralux](#)

34. Title: A Formally Motivated Retrieval Framework Applied to the High-resolution Transmission Spectrum of HD 189733 b

Authors: Blain, Doriann; Sánchez-López, Alejandro; Mollière, Paul

DOI: 10.3847/1538-3881/ad2c8b

Tlspe: [3.5m CARMENES](#)

35. Title: A Self-consistent Data-driven Model for Determining Stellar Parameters from Optical and Near-infrared Spectra

Authors: Sizemore, Logan; Llanes, Diego; Kounkel, Marina; et al.

DOI: 10.3847/1538-3881/ad291d

Tlspe: [3.5m CARMENES](#)

36. Title: First characterization of the emission behavior of Mrk 421 from radio to very high-energy gamma rays with simultaneous X-ray polarization measurements

Authors: Abe, S.; Abhir, J.; Acciari, V. A.; et al.

DOI: 10.1051/0004-6361/202347988

Tlspe: [2.2m CAFOS](#)

37. Title: Teegarden’s Star revisited. A nearby planetary system with at least three planets

Authors: Dreizler, S.; Luque, R.; Ribas, I.; et al.

DOI: 10.1051/0004-6361/202348033

Tlspe: [3.5m CARMENES](#)

38. Title: Wolf 327b: A new member of the pack of ultra-short-period super-Earths around M dwarfs

Authors: Murgas, F.; Pallé, E.; Orell-Miquel, J.; et al.

DOI: 10.1051/0004-6361/202348813

Tlspe: [3.5m CARMENES](#)

39. Title: CARMENES input catalog of M dwarfs. VII. New rotation periods for the survey stars and their correlations with stellar activity

Authors: Shan, Y.; Revilla, D.; Skrzypinski, S. L.; et al.

DOI: 10.1051/0004-6361/202346794

Tlspe: [3.5m CARMENES](#)

40. Title: Detection of an Earth-sized exoplanet orbiting the nearby ultracool dwarf star SPECULOOS-3

Authors: Gillon, Michaël; Pedersen, Peter P.; Rackham, Benjamin V.; et al.
DOI: 10.1038/s41550-024-02271-2
Tlspe: [3.5m CARMENES](#)

41. Title: Baryonic properties of nearby galaxies across the stellar-to-total dynamical mass relation

Authors: Scholz-Díaz, Laura; Martín-Navarro, Ignacio; Falcón-Barroso, Jesús; et al.
DOI: 10.1038/s41550-024-02209-8
Tlspe: [3.5m PMAS](#)

42. Title: Constraints on atmospheric water abundance and cloud deck pressure in the warm Neptune GJ 3470 b via CARMENES transmission spectroscopy

Authors: Dash, Spandan; Brogi, Matteo; Gandhi, Siddharth; et al.
DOI: 10.1093/mnras/stae997
Tlspe: [3.5m CARMENES](#)

43. Title: Revealing H2O dissociation in WASP-76 b through combined high- and low-resolution transmission spectroscopy

Authors: Gandhi, Siddharth; Landman, Rico; Snellen, Ignas; et al.
DOI: 10.1093/mnras/stae1048
Tlspe: [3.5m CARMENES](#)

44. Title: Looking for timing variations in the transits of 16 exoplanets

Authors: Yalçinkaya, S.; Esmer, E. M.; Baştürk, Ö.; et al.
DOI: 10.1093/mnras/stae854
Tlspe: [2.2m CAFOS](#); [1.23m DLR](#)

45. Title: Multiband analyses of the bright GRB 230812B and the associated SN2023pel

Authors: Hussenot-Desenonges, T.; Wouters, T.; Guessoum, N.; et al.
DOI: 10.1093/mnras/stae503
Tlspe: [2.2m CAFOS](#)

46. Title: UPCluster-SZ: The Updated Catalog of Galaxy Clusters from the List of Planck Sunyaev–Zel’dovich Sources

Authors: Bahk, Hyeonguk; Hwang, Ho Seong
DOI: 10.3847/1538-4365/ad323f
Tlspe: [3.5m MOSCA](#)

47. Title: The TESS-Keck Survey. XVIII. A Sub-Neptune and Spurious Long-period Signal in the TOI-1751 System

Authors: Desai, Anmol; Turtelboom, Emma V.; Harada, Caleb K.; et al.
DOI: 10.3847/1538-3881/ad29ee
Tlspe: [2.2m Astralux](#)

48. Title: TOI-4438 b: a transiting mini-Neptune amenable to atmospheric characterization

Authors: Goffo, E.; Chaturvedi, P.; Murgas, F.; et al.
DOI: 10.1051/0004-6361/202349133
Tlspe: [3.5m CARMENES](#)

49. Title: Insights into the broadband emission of the TeV blazar Mrk 501 during the first X-ray polarization measurements

Authors: MAGIC Collaboration; Abe, S.; Abhir, J.; Acciari, V. A.; et al.
DOI: 10.1051/0004-6361/202348709
Tlspe: [2.2m CAFOS](#)

50. Title: Quasar 3C 47: Extreme Population B jetted source with double-peaked profiles

Authors: Mengistue, Shimeles Terefe; Marziani, Paola; del Olmo, Ascensión; et al.
DOI: 10.1051/0004-6361/202348800
Tlspe: [3.5m TWIN](#)

51. Title: TOI-1135 b: A young hot Saturn-size planet orbiting a solar-type star

Authors: Mallorquín, M.; Lodieu, N.; Béjar, V. J. S.; et al.
DOI: 10.1051/0004-6361/202349016
Tlspe: [3.5m CARMENES](#)

52. Title: A 500 pc volume-limited sample of hot subluminoous stars. I. Space density, scale height, and population properties

Authors: Dawson, H.; Geier, S.; Heber, U.; et al.
DOI: 10.1051/0004-6361/202348319
Tlspe: [3.5m PMAS](#)

53. Title: Short-period pulsating hot subdwarf stars observed by TESS. II. Northern ecliptic hemisphere

Authors: Baran, A. S.; Charpinet, S.; Ostensen, R. H.; et al.
DOI: 10.1051/0004-6361/202348571
Tlspe: [3.5m CARMENES](#)

54. Title: The AstraLux-TESS high spatial resolution imaging survey. Search for stellar companions of 215 planet candidates from TESS

Authors: Lillo-Box, J.; Morales-Calderón, M.; Barrado, D.; et al.
DOI: 10.1051/0004-6361/202449687
Tlspe: [2.2m Astralux](#)

55. Title: Feasibility of High-resolution Transmission Spectroscopy for Low-velocity Exoplanets

Authors: Cheverall, C. J.; Madhusudhan, N.
DOI: 10.3847/1538-3881/ad380c
Tlspe: [3.5m CARMENES](#)

56. Title: An Eccentric Planet Orbiting the Polar V808 Aurigae

Authors: Leichty, M.; Garnavich, P.; Littlefield, C.; et al.
DOI: 10.3847/1538-4357/ad3bac
Tlspe: [Schmidt](#)

57. Title: Gliese 12 b: A Temperate Earth-sized Planet at 12 pc Ideal for Atmospheric Transmission Spectroscopy

Authors: Kuzuhara, M.; Fukui, A.; Livingston, J. H.; et al.
DOI: 10.3847/2041-8213/ad3642
Tlspe: [3.5m CARMENES](#)

58. Title: On the Origin of the Variety of Velocity Dispersion Profiles of Galaxies

Authors: Han, S.; Yi, S. K.; Oh, S.; et al.
DOI: 10.3847/1538-4357/ad43dc
Tlspe: [3.5m PMAS](#)

59. Title: The TESS-Keck Survey. XX. 15 New TESS Planets and a Uniform RV Analysis of All Survey Targets

Authors: Polanski, A. S.; Lubin, J.; Beard, C.; et al.
DOI: 10.3847/1538-4365/ad4484
Tlspe: [2.2m Astralux](#)

60. Title: Potential climates and habitability on Gl 514 b: a super-Earth exoplanet with high eccentricity

Authors: Biasiotti, L.; Simonetti, P.; Vladilo, G.; et al.
DOI: 10.1093/mnras/stae1124
Tlspe: [3.5m CARMENES](#)

61. Title: Chemical abundances of LINER galaxies - nitrogen abundance estimations

Authors: Oliveira, C. B.; Krabbe, A. C.; Dors, O. L.; et al.
DOI: 10.1093/mnras/stae1172
Tlspe: [3.5m PMAS](#)

62. Title: Nodal precession of a hot Jupiter transiting the edge of a late A-type star TOI-1518

Authors: Watanabe, N.; Narita, N.; Hori, Y.
DOI: 10.1093/pasj/psae019
Tlspe: [3.5m CARMENES](#)

63. Title: The CAVITY project: The spatially resolved stellar population properties of galaxies in voids

Authors: Conrado, A. M.; González Delgado, R. M.; García-Benito, R.; et al.
DOI: 10.1051/0004-6361/202449414
Tlspe: [3.5m PMAS](#)

64. Title: Detection of Fe and Ti on the dayside of the ultrahot Jupiter MASCARA-1b with CARMENES

Authors: Guo, B.; Yan, F.; Nortmann, L.; et al.
DOI: 10.1051/0004-6361/202449890
Tlspe: [3.5m CARMENES](#)

65. Title: Archives of Photographic PLates for Astronomical USE (APPLAUSE). Digitisation of astronomical plates and their integration into the International Virtual Observatory

Authors: Enke, H.; Tuvikene, T.; Groote, D.; et al.
DOI: 10.1051/0004-6361/202348793
Tlspe: [Schmidt](#)

66. Title: Using autoencoders and deep transfer learning to determine the stellar parameters of 286 CARMENES M dwarfs

Authors: Mas-Buitrago, P.; González-Marcos, A.; Solano, E.; et al.
DOI: 10.1051/0004-6361/202449865
Tlspe: [3.5m CARMENES](#)

67. Title: OCCASO. V. Chemical-abundance trends with Galactocentric distance and age

Authors: Carbajo-Hijarrubia, J.; Casamiquela, L.; Carrera, R.; et al.
DOI: 10.1051/0004-6361/202347648
Tlspe: [2.2m CAFE](#)

68. Title: The miniJPAS Survey: The radial distribution of star formation rates in faint X-ray active galactic nuclei

Authors: Acharya, N.; Bonoli, S.; Salvato, M.; et al.
DOI: 10.1051/0004-6361/202449287
Tlspe: [3.5m PMAS](#)

69. Title: Structure and Kinematics of Star-forming Elliptical Galaxies in SDSS-MaNGA

Authors: Biswas, P.; Wadadekar, Y.
DOI: 10.3847/1538-4357/ad4ee3
Tlspe: 3.5m PMAS

70. Title: 1991T-like Supernovae

Authors: Phillips, M. M.; Ashall, C.; Brown, P. J.; et al.
DOI: 10.3847/1538-4365/ad4f7e
Tlspe: 3.5m PMAS

71. Title: Detection of an Earth-sized exoplanet orbiting the nearby ultracool dwarf star SPECULOOS-3

Authors: Gillon, M.; Pedersen, P. P.; Rackham, B. V.; et al.
DOI: 10.1038/s41550-024-02271-2
Tlspe: 3.5m CARMENES

72. Title: The CARMENES search for exoplanets around M dwarfs. Revisiting the GJ 581 multi-planetary system with new Doppler measurements from CARMENES, HARPS, and HIRES

Authors: von Stauffenberg, A.; Trifonov, T.; Quirrenbach, A.; et al.
DOI: 10.1051/0004-6361/202449375
Tlspe: 3.5m CARMENES

73. Title: Exploring galaxy properties of eCALIFA with contrastive learning

Authors: Martínez-Solaeche, G.; García-Benito, R.; González Delgado, R. M.; et al.
DOI: 10.1051/0004-6361/202450074
Tlspe: 3.5m PMAS

74. Title: Probing atmospheric escape through metastable He I triplet lines in 15 exoplanets observed with SPIRou

Authors: Masson, A.; Vinatier, S.; Bézard, B.; et al.
DOI: 10.1051/0004-6361/202449608
Tlspe: 3.5m CARMENES

75. Title: Characterising planetary systems with SPIRou: Temperate sub-Neptune exoplanet orbiting the nearby fully convective star GJ 1289 and a candidate around GJ 3378

Authors: Moutou, C.; Ould-Elhkim, M.; Donati, J.-F.; et al.
DOI: 10.1051/0004-6361/202450466
Tlspe: 3.5m CARMENES

76. Title: Towards characterising rocky worlds: Trends in chemical make-ups of M dwarfs versus GK dwarfs

Authors: Wang, H. S.; Quanz, S. P.; Mahadevan, S.; Deal, M.
DOI: 10.1051/0004-6361/202449467
Tlspe: 3.5m CARMENES

77. Title: Exoplanet Aeronomy: A Case Study of WASP-69 b's Variable Thermosphere

Authors: Levine, W. G.; Vissapragada, S.; Feinstein, A. D.; et al.
DOI: 10.3847/1538-3881/ad5354
Tlspe: 3.5m CARMENES

78. Title: IOP4, the Interactive Optical Photo-Polarimetric Python Pipeline

Authors: Escudero Pedrosa, J.; Agudo, I.; Morcuende, D.; et al.
DOI: 10.3847/1538-3881/ad5a80
Tlspe: 2.2m CAFOS

79. Title: Evidence for Nightside Water Emission Found in Transit of Ultra-hot Jupiter WASP-33 b

Authors: Yang, Y.; Chen, G.; Yan, F.; et al.
DOI: 10.3847/2041-8213/ad65cf
Tlspe: 3.5m CARMENES

80. Title: TOI-1685 b Is a Hot Rocky Super-Earth: Updates to the Stellar and Planet Parameters of a Popular JWST Cycle 2 Target

Authors: Burt, J. A.; Hooton, M. J.; Mamajek, E. E.; et al.
DOI: 10.3847/2041-8213/ad5b52
Tlspe: 3.5m CARMENES

81. Title: TOI-1408: Discovery and Photodynamical Modeling of a Small Inner Companion to a Hot Jupiter Revealed by Transit Timing Variations

Authors: Korth, J.; Chaturvedi, P.; Parviainen, H.; et al.
DOI: 10.3847/2041-8213/ad65fd
Tlspe: 2.2m CAFE

82. Title: Radial velocity homogeneous analysis of M dwarfs observed with HARPS: I. Exoplanet detection and candidates

Authors: Mignon, L.; Delfosse, X.; Bonfils, X.; et al.
DOI: 10.1051/0004-6361/202346570
Tlspe: 3.5m CARMENES

83. Title: The R project: III. Exploring co-orbitals around low-mass stars

Authors: Balsalobre-Ruza, O.; Lillo-Box, J.; Barrado, D.; et al.
DOI: 10.1051/0004-6361/202450717
Tlspe: 3.5m CARMENES

84. Title: The flaring activity of blazar AO 0235+164 in 2021

Authors: Escudero Pedrosa, J.; Agudo, I.; Moritz, T.; et al.
DOI: 10.1051/0004-6361/202449726
Tlspe: 2.2m CAFOS

85. Title: A study of centaur (54598) Bienor from multiple stellar occultations and rotational light curves

Authors: Rizos, J. L.; Fernández-Valenzuela, E.; Ortiz, J. L.; et al.
DOI: 10.1051/0004-6361/202450833
Tlspe: 2.2m CAFOS

86. Title: Non-radial oscillations mimicking a brown dwarf orbiting the cluster giant NGC 4349 No. 127

Authors: Spaeth, D.; Reffert, S.; Hunt, E. L.; et al.
DOI: 10.1051/0004-6361/202450163
Tlspe: 3.5m CARMENES

87. Title: IXPE observation of PKS 2155-304 reveals the most highly polarized blazar

Authors: Kouch, P. M.; Liodakis, I.; Middei, R.; et al.
DOI: 10.1051/0004-6361/202449166
Tlspe: 2.2m CAFOS

88. Title: Revisiting the dynamical masses of the transiting planets in the young AU Mic system: Potential AU Mic b inflation at 20 Myr

Authors: Mallorquín, M.; Béjar, V. J. S.; Lodieu, N.; et al.
DOI: 10.1051/0004-6361/202450047
Tlspe: 3.5m CARMENES

89. Title: The MOPYS project: A survey of 70 planets in search of extended He I and H atmospheres: No evidence of enhanced evaporation in young planets

Authors: Orell-Miquel, J.; Murgas, F.; Pallé, E.; et al.
DOI: 10.1051/0004-6361/202449411
Tlspe: 3.5m CARMENES

90. Title: Testing particle acceleration in blazar jets with continuous high-cadence optical polarization observations

Authors: Liodakis, I.; Kiehlmann, S.; Marscher, A. P.; et al.
DOI: 10.1051/0004-6361/202451037
Tlspe: 2.2m CAFOS

91. Title: CAVITY, Calar Alto Void Integral-field Treasury surveY and project extension

Authors: Pérez, I.; Verley, S.; Sánchez-Menguiano, L.; et al.
DOI: 10.1051/0004-6361/202449749
Tlspe: 3.5m PMAS

92. Title: The CARMENES search for exoplanets around M dwarfs: Magnesium and silicon abundances of K7-M5.5 stars

Authors: Tabernero, H. M.; Shan, Y.; Caballero, J. A.; et al.
DOI: 10.1051/0004-6361/202450054
Tlspe: 3.5m CARMENES

93. Title: Multiplicity of stars with planets in the solar neighbourhood

Authors: González-Payo, J.; Caballero, J. A.; Gorgas, J.; et al.
DOI: 10.1051/0004-6361/202450048
Tlspe: 3.5m CARMENES

94. Title: The MAGPI survey: The interdependence of the mass, star formation rate, and metallicity in galaxies at $z \sim 0.3$

Authors: Koller, M.; Ziegler, B.; Ciocan, B. I.; et al.
DOI: 10.1051/0004-6361/202450715
Tlspe: 3.5m PMAS

95. Title: K2-399 b is not a planet: The Saturn that wandered through the Neptune desert is actually a hierarchical eclipsing binary

Authors: Lillo-Box, J.; Latham, D. W.; Collins, K. A.; et al.
DOI: 10.1051/0004-6361/202451398
Tlspe: 3.5m CARMENES

96. Title: An Earth-sized Planet on the Verge of Tidal Disruption

Authors: Dai, F.; Howard, A. W.; Halverson, S.; et al.
DOI: 10.3847/1538-3881/ad5a7d
Tlspe: 3.5m CARMENES

97. Title: Evidence of Water Vapor in the Atmosphere of a Metal-rich Hot Saturn with High-resolution Transmission Spectroscopy

Authors: Rafi, S. A.; Nugroho, S. K.; Tamura, M.; et al.
DOI: 10.3847/1538-3881/ad5be9
Tlspe: 3.5m CARMENES

98. Title: The TESS-Keck Survey. XXII. A Sub-Neptune Orbiting TOI-1437

Authors: Pidhorodetska, D.; Gilbert, E. A.; Kane, S. R.; et al.
DOI: 10.3847/1538-3881/ad6901
Tlspe: 2.2m Astralux

99. Title: Observations of Low and Intermediate Spectral Peak Blazars with the Imaging X-Ray Polarimetry Explorer

Authors: Marshall, H. L.; Liodakis, I.; Marscher, A. P.; et al.
DOI: 10.3847/1538-4357/ad5671
Tlspe: 2.2m CAFOS

100. Title: A Comparative Simulation Study of Hot and Ultrahot Jupiter Atmospheres Using Different Ground-based High-resolution Spectrographs with Cross-correlation Spectroscopy
Authors: Dubey, D.; Majumdar, L.
DOI: 10.3847/1538-4357/ad5a97
Tlspe: 3.5m CARMENES

101. Title: Results of the follow-up of ANTARES neutrino alerts
Authors: Albert, A.; Alves, S.; André, M.; et al.
DOI: 10.1088/1475-7516/2024/09/042
Tlspe: 2.2m CAFOS

102. Title: Exploring the impact of galactic interactions and mergers on the central oxygen abundance of APEX/EDGE-CALIFA galaxies
Authors: Garay-Solis, Y.; Barrera-Ballesteros, J. K.; Carigi, L.; et al.
DOI: 10.1093/mnras/stae1876
Tlspe: 3.5m PMAS

103. Title: One-sided H ? excess before the first pericentre passage in galaxy pairs
Authors: Chung, J.; Lee, J. H.; Jeong, H.
DOI: 10.1093/mnras/slaf053
Tlspe: 3.5m PMAS

104. Title: Characterizing chemical abundance ratios in extremely metal-poor star-forming galaxies in DESI EDR
Authors: Zinchenko, I. A.; Sobolenko, M.; Vílchez, J. M.; Kehrig, C.
DOI: 10.1051/0004-6361/202450232
Tlspe: 3.5m PMAS

105. Title: An in-depth analysis of the differentially expanding star cluster Stock 18 (Villafranca O-036) using Gaia DR3 and ground-based data
Authors: Maíz Apellániz, J.; Youssef, A. R.; El-Nawawy, M. S.; et al.
DOI: 10.1051/0004-6361/202450448
Tlspe: 2.2m Astralux

106. Title: ODUSSEAS: Upgraded version with new reference scale and parameter determinations for 82 planet-host M dwarf stars in SWEET-Cat
Authors: Antoniadis-Karnavas, A.; Sousa, S. G.; Delgado-Mena, E.; et al.
DOI: 10.1051/0004-6361/202450722
Tlspe: 3.5m CARMENES

107. Title: The host of GRB 171205A in 3D: A resolved multiwavelength study of a rare grand-design spiral GRB host
Authors: Thöne, C. C.; de Ugarte Postigo, A.; Izzo, L.; et al.
DOI: 10.1051/0004-6361/202348141
Tlspe: 3.5m PMAS

108. Title: A sub-Earth-mass planet orbiting Barnard’s star
Authors: González Hernández, J. I.; Suárez Mascareno, A.; Silva, A. M.; et al.
DOI: 10.1051/0004-6361/202451311
Tlspe: 3.5m CARMENES

109. Title: Varying linear polarisation in the dust-free gamma-ray burst 210610B
Authors: Agüí Fernández, J. F.; de Ugarte Postigo, A.; Thöne, C. C.; et al.
DOI: 10.1051/0004-6361/202348572
Tlspe: 2.2m CAFOS

110. Title: RedDots: Limits on habitable and undetected planets orbiting nearby stars GJ 832, GJ 674, and Ross 128
Authors: Liebing, F.; Jeffers, S. V.; Gorrini, P.; et al.
DOI: 10.1051/0004-6361/202347902
Tlspe: 3.5m CARMENES

111. Title: The GAPS Programme at TNG: LIX. Characterisation study of the ~300 Myr-old multi-planetary system orbiting the star BD+40 2790 (TOI-2076)
Authors: Damasso, M.; Locci, D.; Benatti, S.; et al.
DOI: 10.1051/0004-6361/202450366
Tlspe: 3.5m CARMENES

112. Title: The GAPS programme at TNG: LX. Atmospheric characterisation of KELT-9 b via single-line analysis: Detection of six H I Balmer lines, Na I, Ca I, Ca II, Fe I, Fe II, Mg I, Ti II, Sc II, and Cr II
Authors: D’Arpa, M. C.; Saba, A.; Borsa, F.; et al.
DOI: 10.1051/0004-6361/202449341
Tlspe: 3.5m CARMENES

113. Title: Clues of the restarting active galactic nucleus activity of Mrk 1498 from GTC/ MEGARA integral field spectroscopy data
Authors: Cazzoli, S.; Hernández-García, L.; Márquez, I.; et al.
DOI: 10.1051/0004-6361/202450045
Tlspe: 2.2m CAFOS

114. Title: A spectroscopic and kinematic survey of fast hot subdwarfs
Authors: Geier, S.; Heber, U.; Irrgang, A.; et al.
DOI: 10.1051/0004-6361/202450778
Tlspe: 3.5m TWIN

115. Title: Gaussian Process Models Impact the Inferred Properties of Giant Planets around Active Stars
Authors: Tran, Q. H.; Bowler, B. P.
DOI: 10.3847/1538-3881/ad698b
Tlspe: 2.2m CAFE

116. Title: Stellar Characterization and Chemical Abundances of Exoplanet-hosting M Dwarfs from APOGEE Spectra: Future JWST Targets
Authors: Melo, E.; Souto, D.; Cunha, K.; et al.
DOI: 10.3847/1538-4357/ad5004
Tlspe: 3.5m CARMENES

117. Title: X-Ray and Multiwavelength Polarization of Mrk 501 from 2022 to 2023
Authors: Chen, C.-T. J.; Liodakis, I.; Middei, R.; et al.
DOI: 10.3847/1538-4357/ad63a1
Tlspe: 2.2m CAFOS

118. Title: Spectroastrometry and Reverberation Mapping of Active Galactic Nuclei. I. The Hbeta Broad-line Region Structure and Black Hole Masses of Five Quasars
Authors: Li, Y.-R.; Hu, C.; Yao, Z.-H.; et al.
DOI: 10.3847/1538-4357/ad6906
Tlspe: 2.2m CAFOS

119. Title: Host Galaxy Properties of Gamma-Ray Bursts Involving Neutron Star Binary Mergers and Their Impact on Kilonovae Rates
Authors: Jeong, M.; Im, M.
DOI: 10.3847/1538-4357/ad6b2a
Tlspe: 3.5m Omega2000

120. Title: Unveiling the Multifaceted GRB 200613A: Prompt Emission Dynamics, Afterglow Evolution, and the Host Galaxy’s Properties
Authors: Fu, S.-Y.; Xu, D.; Lei, W.-H.; et al.
DOI: 10.3847/1538-4357/ad6306
Tlspe: 2.2m CAFOS

121. Title: AGN STORM 2. VII. A Frequency-resolved Map of the Accretion Disk in Mrk 817: Simultaneous X-Ray Reverberation and UVOIR Disk Reprocessing Time Lags
Authors: Lewin, C.; Kara, E.; Barth, A. J.; et al.
DOI: 10.3847/1538-4357/ad6b08
Tlspe: 2.2m CAFOS

122. Title: The Initial-Final Mass Relation from Carbon Stars in Open Clusters
Authors: Abia, C.; Domínguez, I.; Marigo, P.; et al.
DOI: 10.3390/galaxies12060067
Tlspe: 3.5m CARMENES

123. Title: An optical gamma-ray burst catalogue with measured redshift - I. Data release of 535 gamma-ray bursts and colour evolution
Authors: Dainotti, M. G.; De Simone, B.; Mohideen Malik, R. F.; et al.
DOI: 10.1093/mnras/stae1484
Tlspe: 2.2m CAFOS

124. Title: The circular velocity and halo mass functions of galaxies in the nearby Universe
Authors: Ristea, A.; Cortese, L.; Groves, B.; et al.
DOI: 10.1093/mnras/stae2085
Tlspe: 3.5m PMAS

125. Title: Identifying activity induced RV periodicities and correlations using central line moments
Authors: Barnes, J. R.; Jeffers, S. V.; Haswell, C. A.; et al.
DOI: 10.1093/mnras/stae2125
Tlspe: 3.5m CARMENES

126. Title: CLOUDY modeling suggests a diversity of ionization mechanisms for diffuse extraplanar gas
Authors: Rautio, R. P. V.; Salo, H.; Watkins, A. E.; et al.
DOI: 10.1051/0004-6361/202450762
Tlspe: 3.5m PMAS

127. Title: A Virgo Environmental Survey Tracing Ionised Gas Emission (VESTIGE): XVI. The ubiquity of truncated star-forming discs across the Virgo cluster environment
Authors: Morgan, C. R.; Balogh, M. L.; Boselli, A.; et al.
DOI: 10.1051/0004-6361/202449225
Tlspe: 3.5m PMAS

128. Title: Bidimensional Exploration of the warm-Temperature Ionised gaS (BETIS): II. Revisiting the ionisation mechanism of the extraplanar diffuse ionised gas

Authors: González-Díaz, R.; Rosales-Ortega, F. F.; Galbany, L.
DOI: 10.1051/0004-6361/202451240
Tlspe: 3.5m PMAS

129. Title: Physical properties of trans-Neptunian object (143707) 2003 UY117 derived from stellar occultation and photometric observations

Authors: Kretlow, M.; Ortiz, J. L.; Desmars, J.; et al.
DOI: 10.1051/0004-6361/202451329
Tlspe: 2.2m CAFOS

130. Title: Polarization of active galactic nuclei with significant VLBI-Gaia displacements

Authors: Blinov, D.; Arshinova, A.
DOI: 10.1051/0004-6361/202451186
Tlspe: 2.2m CAFOS

131. Title: The ANTARESS workflow: I. Optimal extraction of spatially resolved stellar spectra with high-resolution transit spectroscopy

Authors: Bourrier, V.; Delisle, J.-B.; Lovis, C.; et al.
DOI: 10.1051/0004-6361/202449203
Tlspe: 3.5m CARMENES

132. Title: CAVITY: Calar Alto Void Integral-field Treasury surveyY: I. First public data release

Authors: García-Benito, R.; Jiménez, A.; Sánchez-Menguiano, L.; et al.
DOI: 10.1051/0004-6361/202451400
Tlspe: 3.5m PMAS

133. Title: Coronal and chromospheric activity of Teegarden’s star

Authors: Fuhrmeister, B.; Schmitt, J. H. M. M.; Reiners, A.; et al.
DOI: 10.1051/0004-6361/202451697
Tlspe: 3.5m CARMENES

134. Title: Long- and short-term variability of the possible nascent planetary nebula IRAS 22568+6141: A late thermal pulse?

Authors: Cala, R. A.; Miranda, L. F.; Gómez, J. F.; et al.
DOI: 10.1051/0004-6361/202451719
Tlspe: 2.2m CAFOS

135. Title: The HD 191939 Exoplanet System is Well Aligned and Flat

Authors: Lubin, J.; Petigura, E. A.; Van Zandt, J.; et al.
DOI: 10.3847/1538-3881/ad79ed
Tlspe: 3.5m CARMENES

136. Title: Broad-line Region of the Quasar PG 2130+099. II. Doubling the Size Over Four Years?

Authors: Yao, Z.-H.; Yang, S.; Guo, W.-J.; et al.
DOI: 10.3847/1538-4357/ad72ef
Tlspe: 2.2m CAFOS

137. Title: Chromospheric Modeling of the Active M3V Star G 80-21 with RH1.5D

Authors: Liu, S.; Wei, H.; Shi, J.; et al.
DOI: 10.3847/1538-4357/ad7f55
Tlspe: 3.5m CARMENES

138. Title: PGC 44685: A Dwarf Star-forming Lenticular Galaxy with a Wolf-Rayet Population

Authors: Lu, S.; Gu, Q.; Gao, Y.; et al.
DOI: 10.3847/1538-4357/ad8349
Tlspe: 3.5m PMAS

139. Title: Model independent approach for calculating galaxy rotation curves for low S/N MaNGA galaxies

Authors: Park, S.; Shafieloo, A.; Bag, S.; et al.
DOI: 10.1088/1475-7516/2024/11/037
Tlspe: 3.5m PMAS

140. Title: The mystery of water in the atmosphere of ? Boötis b continues: Insights from revisiting archival CRIRES observations

Authors: Panwar, V.; Brogi, M.; Gandhi, S.; et al.
DOI: 10.1093/mnras/stae2361
Tlspe: 3.5m CARMENES

141. Title: Radio signatures of star-planet interactions, exoplanets and space weather

Authors: Callingham, J. R.; Pope, B. J. S.; Kavanagh, R. D.; et al.
DOI: 10.1038/s41550-024-02405-6
Tlspe: 3.5m CARMENES

142. Title: Early photometric and spectroscopic observations of the extraordinarily bright INTEGRAL-detected GRB 221009A

Authors: Sánchez-Ramírez, R.; Lang, R. G.; Pozanenko, A.; et al.
DOI: 10.1051/0004-6361/202449783
Tlspe: 2.2m CAFOS

143. Title: Probing Na in giant exoplanets with ESPRESSO and 3D NLTE stellar spectra

Authors: Canocchi, G.; Morello, G.; Lind, K.; et al.
DOI: 10.1051/0004-6361/202451972
Tlspe: 3.5m CARMENES

144. Title: A wiggling filamentary jet at the origin of the blazar multi-wavelength behaviour

Authors: Raiteri, C. M.; Villata, M.; Carnerero, M. I.; et al.
DOI: 10.1051/0004-6361/202452311
Tlspe: 2.2m CAFOS

145. Title: CO-CAVITY project: Molecular gas and star formation in void galaxies

Authors: Rodríguez, M. I.; Lisenfeld, U.; Duarte Puertas, S.; et al.
DOI: 10.1051/0004-6361/202451482
Tlspe: 3.5-m PMAS

146. Title: The CARMENES search for exoplanets around M dwarfs: The impact of rotation and magnetic fields on the radial velocity jitter in cool stars

Authors: Ruh, H. L.; Zechmeister, M.; Reiners, A.; et al.
DOI: 10.1051/0004-6361/202450836
Tlspe: 3.5m CARMENES

147. Title: CARMENES input catalogue of M dwarfs: VIII. Kinematics in the solar neighbourhood

Authors: Cortés-Contreras, M.; Caballero, J. A.; Montes, D.; et al.
DOI: 10.1051/0004-6361/202451585
Tlspe: 3.5m CARMENES

148. Title: Characterisation of TOI-406 as a showcase of the THIRSTEE program: A two-planet system straddling the M-dwarf density gap

Authors: Lacedelli, G.; Pallé, E.; Luque, R.; et al.
DOI: 10.1051/0004-6361/202452244
Tlspe: 3.5m CARMENES

149. Title: Stellar occultations by trans-Neptunian objects: Stellar occultations by trans-Neptunian objects

Authors: Sicardy, B.; Braga-Ribas, F.; Buie, M. W.; et al.
DOI: 10.1007/s00159-024-00156-x
Tlspe: 1.23m DLR

150. Title: Measuring Sub-Kelvin Variations in Stellar Temperature with High-resolution Spectroscopy

Authors: Artigau, É.; Cadieux, C.; Cook, N. J.; et al.
DOI: 10.3847/1538-3881/ad7b30
Tlspe: 3.5m CARMENES

151. Title: Constraining Quasar Feedback from Analysis of the Hydrostatic Equilibrium of the Molecular Gas in Their Host Galaxies

Authors: Fei, Q.; Wang, R.; Molina, J.; et al.
DOI: 10.3847/1538-4357/ad7e26
Tlspe: 3.5m PMAS

152. Title: Rotation at the Fully Convective Boundary: Insights from Wide WD + MS Binary Systems

Authors: Chiti, F.; van Saders, J. L.; Heintz, T. M.; et al.
DOI: 10.3847/1538-4357/ad856c
Tlspe: 3.5m CARMENES

153. Title: PEPsi’s non-detection of escaping hydrogen and metal lines adds to the enigma of WASP-12 b

Authors: Pai Asnodkar, A.; Wang, J.; Broome, M.; et al.
DOI: 10.1093/mnras/stae2441
Tlspe: 3.5m CARMENES