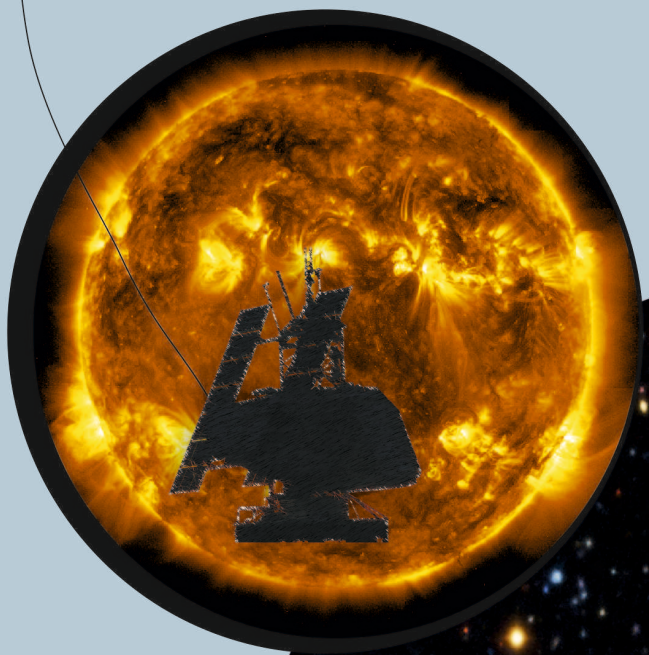
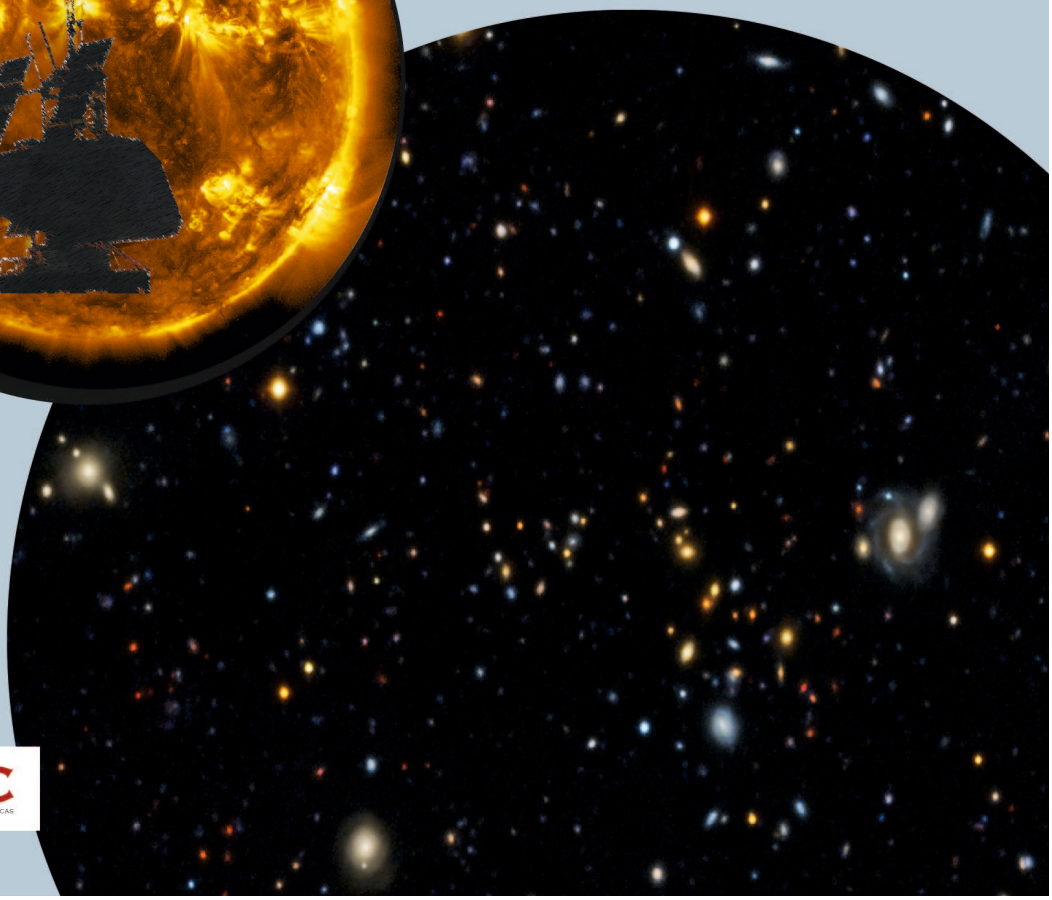
Instituto de Astrofísica de Andalucía

IAA-CSIC

ANNUAL REPORT 2013





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Cover Pictures:

Artistic view of the SUNRISE experiment attached to its stratospheric balloon. The IAA experiment IMaX, a magnetograph on-board SUNRISE, has revealed spectacular solar activity in areas of the Sun surface considered to be in quiescence.

Multi-wavelength picture of one of the deep fields imaged by the ALHAMBRA survey obtained from the CAHA observatory. These observations allow IAA scientists to trace the evolution of the Universe in the last 10,000 million years.

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RESEARCH ACTIVITY

The research activity of the Instituto de Astrofísica de Andalucía IAA-CSIC is carried out in the framework of four different departments:

1. Extragalactic Astronomy.

2. Radioastronomy and Galactic Structure.

3. Solar System.

4. Stellar Physics.

Furthermore, research and technical activities are carried out by different units and astronomical observatories, including the Instrumental and Technological Development Unit (UDIT), the Computer Center (CC), and the Obvervatory of Sierra Nevada (OSN).

The description and 2013 highlights of these research departments, units and observatory are presented on the following pages. Additional information on the Observatory of Calar Alto is included in this document because the IAA-CSIC administrates this astronomical observatory within the CSIC.

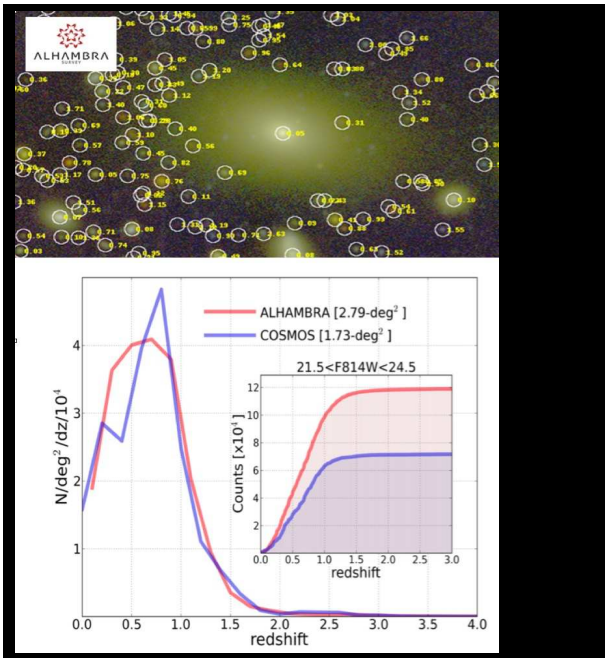
EXTRAGALACTIC ASTRONOMY

Overview

Research in extragalactic astronomy at the IAA is focused on two broad avenues: structure and evolution of galaxies, and quantum and classic gravity. Galaxies are the main focus of study from three different perspectives: (i) in themselves, understanding their dynamics, insterstellar medium, and the evolution of their star formation, chemistry, and stellar populations; (ii) how these properties change as a function of their environment, as isolated, groups, and clusters of galaxies; and (iii) their role as tracers of the structure and evolution of the universe, including GRBs as cosmic lighthouses. Many of these studies take advantage of access to multiwavelength data (ground based and space borne), or are performed in the context of large surveys, some lead from our Department, such as ALHAMBRA and CALIFA, both carried out at Calar Alto. A group of theoreticians work on Gravitation and its quantum modifications.

Highlights in 2013

- IFS data of Mrk178 reveal multiple WR clusters in different positions and levels of ISM pollution, demonstrating that the high equivalent widths seen by the SDSS are due to aperture effects.
- VLT zCOSMOS spectroscopy of the evolution of the mass-metallicity relation up to z=1.4 shows a decrease even removing the star formation rate dependency.
- AMIGA galaxies follow the outskirts of the large scale structure. The stellar mass-size relation of AMIGA spirals reveals a larger size for disks in low-density environments, and a dependence of disk size on the number of satellites. Development of web services for 3D radio data analysis in the cluster at FCSCL.
- CALIFA results include: the spatially preserved signal of downsizing, with inner and outer regions growing faster for more massive galaxies, and a maximum 6 Gyr ago at 7×10^{10} $M_{\odot}$; the development of the PyCASSO pipeline; the mass-metallicity relation from 3000 HII regions, with no sign of dependence with the star formation rate; and the computation of aperture corrections for the Hα emission.
- The spectral variability of LINERs from Chandra, XMM-Newton, and UV data shows 10 out of 13 LINERs to vary at X-ray or UV, driven by changes in the nuclear power, akin to more powerful AGN at X-rays.
- The ALHAMBRA survey Gold Catalogue provides redshifts and photometry in 20+4 bands for 10^5 galaxies, 20000 stars, and 1000 AGN candidates, spread over seven sky regions.
- The theoretical group in analogue gravity has applied gravitational techniques to the design of devices such as an acoustic compressor or a carpet cloak.



Results of the ALHAMBRA survey.

MEMBERS

V. Aldaya, R.O. Amorín, M.C. Argudo Fernández, B. Ascaso, C. Barceló, N. Benítez, J. Blasco Herrera, M. Calixto, R. Carballo Rubio, M. Cerviño, L. Cortés Barbado, C. Cortijo, A. del Olmo, G. Favole, M. Fernández Lorenzo, R. García Benito, J. Garrido Sánchez, R.M. González Delgado, L. Hernández García, J. Iglesias, Y. Jiménez Teja, C. Kehrig, R. López Fernández, I. Márquez, M.A. Martínez Carballo, J. Masegosa, M.J. Moles, A. Molino, A. Monreal Ibero, J.D. Perea, E. Pérez, E. Pérez Montero, M. Povic, F. Prada, P. Ramírez Moreta, J.E. Ruiz del Mazo, S. Sánchez Expósito, S.F. Sánchez Sánchez, J.D. Santander Vela, W. Schönell, J. Sulentic, C. Thöne, L. Verdes-Montenegro, J.M. Vílchez.

INVITED RESEARCHERS

Cid Fernandes, R. (Univ. Federal de Santa Catarina)
Darriba, L. (Univ. Barcelona)
Durrett, F. (Inst. d'Astrophysique de Paris)
González Martín, O. (Inst. de Astrofísica de Canarias)
Marziani, P. (INAF-Osservatorio Astronomico di Padova)

LINES OF RESEARCH

Violent star formation.
Star formation in galaxies.
The effects of interaction in the evolution of galaxies.
Modelling the evolution of galaxies in groups.
Active Galactic Nuclei.
Physics of Quasars.
Cosmic evolution of galaxies.
Galactic clustering and physics of the dark universe.
Observational cosmology and large surveys.
Quantum and classic gravity in the physics of black holes and Cosmology.

RADIOASTRONOMY AND GALACTIC STRUCTURE

The Radioastronomy and Galactic Structure department studies the formation, evolution and death of stars at different mass and spatial scales, as well as in distinct environments.

The early stages of the star and planet formation are studied observationally, mainly through interferometric radio observations, and theoretically, through the modelling of the observed emission.

Considering that star formation is a multi-scale process, whose spatial pattern mimics the internal structure of the parental clouds, stellar clusters represent the probes for the analysis of the initial physical conditions and early dynamical evolution of recently born stars. To this aim, we observe and compile large cluster catalogues and develop new data-mining tools for their study.

Massive stars play a fundamental role in shaping and driving the energetic balance of Interstellar Medium (ISM). Cataloguing these stars and their physical properties is one of our main researches, providing information not only about the stars, but also on the characteristics of the surrounding ISM. High angular resolution observations are being used for analysing the multiplicity of massive objects.

The centre of the Milky Way is of fundamental interest for astrophysics because it is the only galaxy nucleus that we can resolve on milliparsec scales to study its interstellar medium, stellar population, massive black hole, and the interplay between these components. We study the Galactic Centre on large scales via high-angular resolution observations in the near-infrared.

The final stages of a star's life 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, as well as by the radio astrometric monitoring of supernova explosions and their distribution in Ultra Luminous Infrared Galaxies (ULIRGs) to determine the supernova and star formation rates.

High-energy phenomena at different spatial scales are also part of our scientific objectives: in particular, we study relativistic jets, which are highly collimated fluids with relativistic energies and velocities present in multiple astrophysical sites, from active galactic nuclei to GRBs.

To summarise, we observe the whole electromagnetic wavelength range, from radio to X-rays, at different spatial scales, from a few astronomical units to tens of kiloparsecs, using a wide variety of observational techniques at their highest limits in sensitivity, spectral resolution, angular resolution, and field of view. We complement the observations with the development of modelling and statistical tools.

Colour-composite *HST* optical (red, green, and blue) and *Chandra* X-ray (pink) picture of the planetary nebula NGC 2392, the Eskimo Nebula.

MEMBERS

I. Agudo, A. Alberdi, E.J. Alfaro, G. Anglada, T. Aparicio-Villegas, M.W. Blanco-Cárdenas, C. Casadio, M.T. Costado, F. Costagliola, A.J. Delgado, M.C. Durán-Rojas, A.K. Díaz-Rodríguez, X. Fang, A.T. Gallego, J.F. Gómez, J.L. Gómez, M.A. Guerrero, R. Herrero-Illana, E. Macías, J. Maíz Apellániz, G. Manjárrez, J.M. Masqué, J.M. Mayen-Gijón, L.F. Miranda, S.N. Molina, M. Osorio, J. Peñarrubia, M.A. Pérez-Torres, N. Ramírez, M.I. Rodríguez-Martínez, L. Sampedro, J. Sánchez-Bermúdez, R. Schödel, J.A. Toalá.

LINES OF RESEARCH

Modelling and observation of star and planet formation

Formation and disruption of stellar clusters

Massive stars and their surroundings

Stellar populations and gas in the Galactic centre

Multi-wavelength studies of planetary nebulae and their immediate precursors

Supernovae and their distribution in ULIRGs

Relativistic jets in active galaxies

SOLAR SYSTEM

Solar System research at the IAA covers a broad range of topics, from the Sun and planetary atmospheres to comets, asteroids, and trans-neptunian objects.

Solar physics studies have focused on the emergence of magnetic flux on the quiet solar surface at high spatial resolution, using data from IMaX aboard SUNRISE and Hinode. IAA is now a co-PI institution for the PHI instrument on ESA's Solar Orbiter mission.

In Venus, atmospheric waves have been characterized, most of them above Ishtar Terra. This represents the best confirmation of surface generated waves to date.

The production of NO_y by solar energetic particle precipitation in the middle Earth's atmosphere has been determined using data taken by MIPAS on ENVISAT, with a complete spatial (pole-to-pole) and temporal (2002-2012) coverage.

In August 2013, the *GRAnada Sprite Spectrograph and Polarimeter* was completed and is now operational in imaging and spectroscopic mode for the study of transient luminous events in the Earth's atmosphere.

Vigorous investigation on the Mars atmosphere has been pursued, achieving the first 3D simulation of the Martian thermosphere/ionosphere during a full year.

The atmosphere of Titan has been analyzed in detail, leading to the discovery and characterization of polyciclic aromatic hidrocarbons at altitudes between 900 and 1300 km.

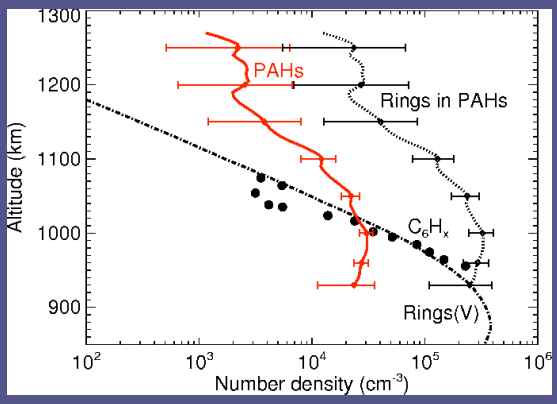
A survey of the trans-neptunian region has been completed in the framework of *Herschel Space Observatory*'s "TNOS are cool" program. Sizes and albedos have been determined for 111 objects.

The Solar System Department is deeply involved in the development of instrumentation for space missions. In 2013, the IAA was responsible for the design, development, and/or delivery of different subsystems (main electronics, control boards, control and data adquisition software) of BeLA (BepiColombo), IMaX (SUNRISE), GALA and JANUS (Juice), NOMAD (ExoMars), and PHI (Solar Orbiter).

The Department also operates a *Cosmic Dust Laboratory* devoted to the experimental study of the scattering properties of dust samples, to facilitate the interpretation of remote and in situ dust observations.

MEMBERS

L.R. Bellot Rubio, A.D. Benítez Yáñez, D. Dabrovska, R. Duffard, S. Esteban Pozuelo, B. Funke, M. García Comas, F. González Galindo, A. Luque Estepa, F. Gordillo Vázquez, D. Guirado, P.J. Gutiérrez, A.A. Jurado Navarro, L.M. Lara, M.J. López González, A. López Jiménez, J.J. López Moreno, M. López Puertas, M.A. López Valverde, A. Molina, F. Moreno, O. Muñoz, J.L. Ortiz, F.C. Parra Rojas, F. Peralta, J. Ruiz Madrona, P. Santos, A. Thirouin, M.F. Herrera Gómez, M. González García, M. Gosic, F. J. Pozuelos Romero, I.S. Requerey, J.C. del Toro Iniesta, D. Utz.



Discovery of large abundance of polyciclic aromatic hidrocarbons (PAHs) in Titan's upper atmosphere, using data taken by the VIMS instrument aboard Cassini (López-Puertas et al. 2013).

Second scientific flight of the balloon-borne 1m SUNRISE solar telescope and the IMaX magnetograph (12-17 June 2013)

INVITED RESEARCHERS

A. Álvarez-Candal (ESO), F. Fabiano (U. Pisa, Italy), M. Franz (KIS, Germany), R. García (NCAR, USA), F. Giannattasio (U. di Roma Tor Vergata, Italy), A. Ortiz (U. Oslo, Norway), A. Smith (NCAR, USA), H. Watanabe (Kyoto U., Japan).

LINES OF RESEARCH

Solar physics

Solar system minor bodies

Terrestrial and planetary atmospheres

Space instrumentation

STELLAR PHYSICS

The research activity of the department can be divided in two main thematic blocks. In the first block several aspects of the stellar physics are studied: the stellar variability due to the star itself or to its planet companions, the stellar statistics, the stellar clusters, the stellar atmospheres, the stellar evolution, the stellar pulsations or asteroseismology. The second research area is focused on the study of transient objects, ranging from close meteors to distant Gamma-Ray Bursts (GRBs). Most of the studies carried out for these transients deal with the final stages of the stellar evolution, i.e, neutron stars, magnetars, and very specially GRBs, for which an intense research activity is ongoing.

Both thematic blocks are supported by solid instrumental projects, either for ground-based telescopes (CARMENES, T35, BOOTES, OCTOCAM, EDIPO) or for space observatories (COROT, Kepler,UFFO-p).

In February, the final design of the spectrograph CARMENES was successfully reviewed and the team started the construction phase of the instrument.

One of the major results achieved this year has been the completion of a systematic study for detection of pulsations on a complete sample of northern field pre-main sequence stars, with spectral types B-F, which has led to the increase the number of such pulsators on about 1/3 of them among the field objects. A detailed catalogue with these objects has been created and updated (Díaz-Fraile, Rodríguez and Amado).

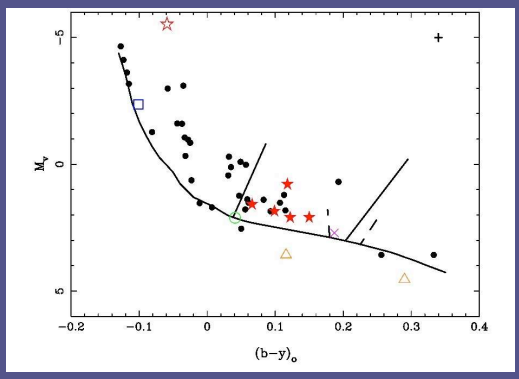
Another research line is asteroseismology of M dwarf stars, from a theoretical and observational point of view. The observational search for the first pulsating M dwarf is under way: this is done through high precision fast photometry with Kepler spacecraft data and with ground-search observations using the high-resolution spectrographs HARPS and HARPS-N to gather high-cadence radial velocity data of extraordinary precision.

MEMBERS

P. Amado, E. Casal López, J.A. Castro-Tirado, V. Costa, R. Cunniffe, A. de Ugarte Postigo, M. Fernández, R. Garrido, J. Gorosabel, M. Jelinek, S. Jeong, O. Lara-Gil, P. López de Coca, S. Martín, Z. Modroño, S. Ocando, J.I. Olivares, J. Pascual, C. Rodríguez López, E. Rodríguez, A. Rolland, R. Sánchez-Ramírez, J.C. Suárez, J.C. Tello, M. Villaverde.

INVITED RESEARCHERS

J. Aceituno (CAHA), C. Díaz Cano (CAB), H.R.A. Jones (Univ. Hertfordshire, UK), B. Lefort (CERN, Switzerland), J.L. Lizon (ESO), J. MacDonald (Univ. Delaware, USA), A.G. Moral (INTA), L. Pasquini (ESO), A. Quirrenbach (LSW, Germany), L.W. Ramsey (Penn. State Univ, USA), G. Raskin (Katholieke Universiteit Leuven, Belgium), D.L. Terrett (Rutherford Appleton Lab., UK), A. Tieftrunk (DFG , Germany), E.M. Vázquez Sánchez (Junta de Andalucía)



Colour–magnitude diagram of the sample of B-F pre-main sequence stars. The solid and dashed lines are the observational edges for the MS δ Scuti instability region for the γ Dor region, respectively. The red solid asterisks are PMS δ Scuti-type stars, the red open asterisk is VV Ser, a δ Scuti-type star, the green open circle V350 Ori, a δ Scuti-type Am star, the blue open square HD 174571, a probable β Cephei-type pulsator, the magenta cross HD 36910, an Am star, and the orange open triangles are the subluminous stars HD 290500 and PX Vul. The black solid circles are constant stars. Upper right: error bars.

LINES OF RESEARCH

- *The physics of very low-mass stars and their exoplanets*
- *Pulsation and stellar evolution of main sequence and pre-main sequence stars of intermediate mass. Stellar clusters.*
- *Asteroseismology of low mass stars along the HR diagram: theoretical models and observations from CoRoT and Kepler, as well as from HARPS y HARPS-N*
- *Gamma-ray bursts*

CALAR ALTO OBSERVATORY

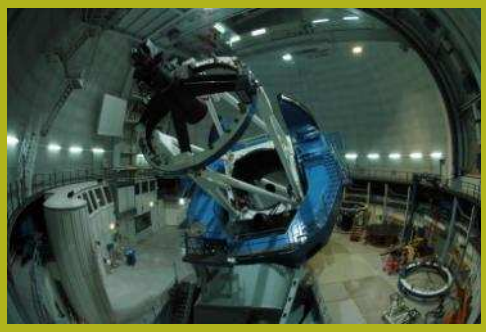
THE ALHAMBRA SURVEY, COMPLETED THIS YEAR AT CALAR ALTO OBSERVATORY, GIVES ACCESS TO TEN BILLION YEARS OF COSMIC EVOLUTION

The IAA is also the reference institute for the **C**alar **A**lto **H**ispano-**A**lemán observatory (CAHA). The German-Spanish Astronomical Center at Calar Alto is located on the mountain range of Los Filabres, in Almería, at a height of 2167m. CAHA is operated jointly by the Max-Planck-Institut für Astronomie (MPIA, Heidelberg, Germany) and the IAA. Calar Alto provides three telescopes with apertures of 1.23m, 2.2m and 3.5m to the general community. A 1.5m-telescope, also located on the mountain, is operated under the control of the Observatory of Madrid. The ideal atmospheric conditions for astronomical observations and aperture size of the telescopes at CAHA make of it the most important astronomical observatory in the continental Europe.

The CAHA telescopes are equipped with state-of-the-art astronomical instrumentation including direct imaging optical and near-infrared cameras, and intermediate- and high-dispersion spectrographs. The observatory itself has its own technical installations: clean rooms, electronic, mechanic and computing facilities, and all-sky cameras and sensors to monitor the quality of the night sky.

The observatory offers aluminizing services as it has the largest aluminizing chamber in Europe, which can host mirrors with diameters up to 4m.

This year CAHA has achieved the record of observing nights in its whole 38-year history. The 193 clear nights in 2013 and 2477 observation hours make a strong argument in support of the excellent quality of the sky where the observatory is located.



The 3.5m telescope at Calar Alto.

CALIFA First Data Release: Color-Magnitud Diagram for 151 galaxies.

Colour-composite picture made of a set of deep images taken by the Alhambra Survey.

SCIENTIFIC RESULTS

CALIFA SURVEY: FIRST DATA RELEASE

Galaxies are the result of an evolutionary process started thousands of million years ago, and their history is coded in their distinct components. The CALIFA project is intended to decode the galaxies' history in a sort of galactic archaeology, through the 3D observations of a sample of six hundred galaxies.

The CALIFA Project, conceived at the IAA-CSIC and carried out at Calar Alto observatory, combines the advantages of two observational techniques: imaging -providing detailed information on galactic structure- and spectroscopy -revealing the physical properties of galaxies (kinematics, mass, chemical composition, age, etc).

CALIFA makes use of the IFS technology - Integral Field Spectroscopy - that allows obtaining about one thousand spectra per galaxy, what results in a panoramic view of galaxies. It is the first IFS study explicitly designed as a legacy project, and after completion it will be the greatest IFS study ever accomplished.

The first CALIFA Data Release (DR1) provided to the public the fully reduced and quality control tested data-cubes of 100 objects.

A HOT JUPITER DEFYING PLANET FORMATION THEORIES

A research team from the Centro de Astrobiología (CAB-CSIC) discovered WST-1b, a hot Jupiter exoplanet using the the CAFE spectrograph at the 2.2m telescope of the CAHA observatory. This exoplanet is located at a distance of only 0.047 astronomical units from its host star.

Theories predict that the sizes of newborn planets shrink with time, as these bodies radiate out their internal energy. However, if we take into account that the just discovered exoplanet (named WTS-1b) and its parent star were born 600 million years ago, this body should have a radius 20% larger than Jupiter, Instead, its size is 50% larger than that of Jupiter.

THE SMALLEST EXOPLANET KNOWN

The ASTRALUX instrument, also at the 2.2m telescope, contributed in the discovery of Kepler 37b, the smallest exoplanet known to date. The object, smaller than Mercury, is the innermost of three that orbit the host star.

According to D. Barrado, Director of CAHA, and one of the discoverers “Due to its extremely small size, similar to the Moon, and to its intensely irradiated surface, Kepler-37b is most probably a rocky planet devoid of atmosphere.”

TEN BILLION YEARS OF COSMIC EVOLUTION AT HAND

After seven years of precise observations from Calar Alto Observatory, the ALHAMBRA project has been able to identify, classify, and even compute the distance to more than half million galaxies. The unprecedented accuracy achieved by the ALHAMBRA survey has been made possible by a technique that decomposes stellar energy into its constituent colors by means of a tailored set of astronomical filters.

As a result, the ALHAMBRA survey allows reconstructing the most realistic tridimensional view of the universe up to date. The whole ALHAMBRA data yield is already available to the scientific community.

THE SECOND TRIPLE QUASAR KNOWN TO DATE

Looking far in space means seeing the remote past, because the light coming from those objects needed a long time to reach us. Thus by studying remote quasars we are sounding the conditions and processes that ruled in the ancient universe. Modern astrophysics considers galaxy mergers and interactions as a major route to galaxy formation. Not every distant galaxy displays an active nucleus but, if three physically distinct such objects would be found, this would represent a key observational test of this evolutionary scenario. The analysis of such a process would shed light on the mechanisms regulating quasar activity and the co-evolution of supermassive black holes within their host galaxies.

A physical system of three quasars has just been discovered, QQQ J1519+0627, the second of this kind up to date.

IN SEARCH FOR THE FURTHEST GALAXIES

An international research team is performing a program in search for the furthest galaxies in the universe. But distant objects are also very faint. For this reason, the search relies upon one of the strangest implications of general relativity: the amplification of light coming from remote bodies due to the gravitational effects of closer ones, the gravitational lensing effect.

Recent data have led to several promising candidates, thanks to observations performed at Calar Alto with the 3.5m telescope and the infrared camera Omega 2000. The results indicate that some targets may be placed really far away, with redshift larger than 6, meaning distances larger than ten billion light-years.

INSTRUMENT DEVELOPMENT

A new instrument has been developed for its use at the 1.23m and 2.2m telescopes of the observatory. The so-called PlanetCam is a Lucky Imaging system developed by the University of the Basque Country (UPV).

Professor Sánchez Lavega (UPV) points out that ”the first results are very promising, showing that the camera is able to produce excellent images that will be useful to study diverse atmospheric phenomena at planets, and to follow up rapidly changing processes such as impacts due to meteoroids, asteroids or comets on different bodies, specially on Jupiter”.

SIERRA NEVADA OBSERVATORY

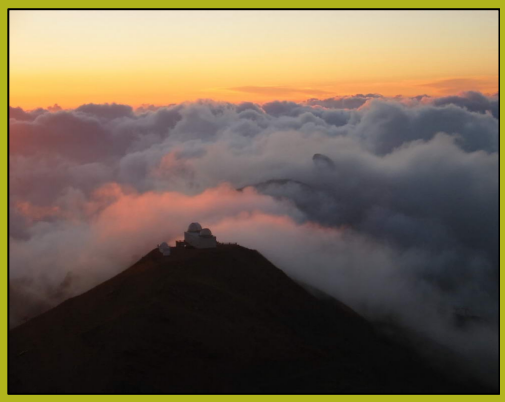
AN OBSERVATORY AT 3000M TO SUPPORT THE IAA SCIENTIFIC RESEARCH AND THE FORMATION OF ITS STUDENTS

The Sierra Nevada Observatory (OSN) is a high mountain observatory located at Loma de Dílar (2896m altitude) within the Sierra Nevada National Park (Granada, Spain). It consists of a main building which hosts two Nasmyth optical telescopes of 90-cm and 1.50-m diameter each (hereafter T90 and T150). The astronomical instruments attached to those telescopes are Strömgren-Crawford six-channel spectrophotometer, two similar 2048x2048 CCD cameras, and Albireo, a low- and intermediate-resolution optical spectrograph.

The astronomical observations carried out at OSN respond to proposals submitted by IAA research groups, although the number of observing requests by external collaborators is growing with time. In addition to the typical visitor and service observing modes, the OSN offers the possibility to carry out observations in remote mode. The number of observing proposals accepted for the T90 and T150 telescopes has been 17 and 15 for semesters 2013A and 2013B, respectively.

Besides the main telescopes, there are secondary astronomical facilities carrying out observations for specific projects: the 60-cm IR semi-automated telescope (T60) for early follow-up of gamma-ray bust (GRB), the 35-cm telescope (T35) for the observation of variable stars, and the Spectral Airglow Temperature Imager (SATI), a Fabry-Perot spectrometer dedicated to the study of the high layers of the Earth's atmosphere. Moreover, two seeing-monitors take continuously dome and open-sky measurements in order to characterize the quality of the Sierra Nevada sky. Due to the size of their telescopes, the OSN is especially suited for projects requiring a prompt response (Target of Opportunity) and/or monitoring observations during long periods of time.

OSN observations are to be used frequently by the IAA PhD students to support their work. The most relevant scientific results of the observations are published in international journals. During 2013, observations obtained at OSN have been used in one doctoral thesis and 21 publications (12 ISI publications and 9 proceedings).



The Sierra Nevada Observatory, sunset view from the 3,394 m Veleta peak.

The OSN does not only contribute to the scientific production of the IAA and to the formation of its students, but it also participates in multiple outreach activities. It must be particularly emphasized the guided visits, public observations, and talks organized at OSN every summer since 2006.

www.osn.iaa.es/content/visita-los-observatorios-de-sierra-nevada

In this year, an agreement has been signed with the Valencia International University to carry out observing practices of the Master in Astronomy and Astrophysics at the OSN during the years 2014 and 2015.

MEMBERS

OSN Director: S. Martín Ruiz.

OSN Technical Support Head: L. Costillo Iciarra.

OSN Team: F.J. Aceituno Castro, V.M. Casanova Escurín, J.L. de la Rosa Álvarez, J.A. Mirasol Junco, T. Pérez Silvente, J.A. Ruiz Bueno, A. Sota Ballano.

COMPUTER CENTER

THE COMPUTER CENTER GRANTS THE TECHNICAL RESOURCES DEMANDED BY THE IAA RESEARCH ACTIVITY AND ITS TECHNOLOGICAL PROJECTS.

The IAA Computer Center (CC – *Centro de Cálculo*) is responsible to service and manage all IAA computers, proving support to all IAA computer users. It also provides communication services. The IAA is an important node of RedIRIS-NOVA, the fast, high capacity optical fiber network connecting all regional communication networks and most important research center in Spain with international academic networks. The IAA CC provides communication services to all CSIC centers in Granada and to the Sierra Nevada Observatory. These are essential services for research projects, management services, and collaboration with enterprises.

In the last year, the technological and scientific challenges afforded by the CC have allowed the IAA to consolidate its communication and scientific computing facilities. Two important milestones have been achieved in this last year:

- Implementation of a statistical system to control users' incidences and communication networks.
- Achievement of the PdP credential for the IRIS-NOVA communication network.
- Starting operations of the new supercomputing facility. This new service has demonstrated a high performance, covering the computing needs of the IAA users.

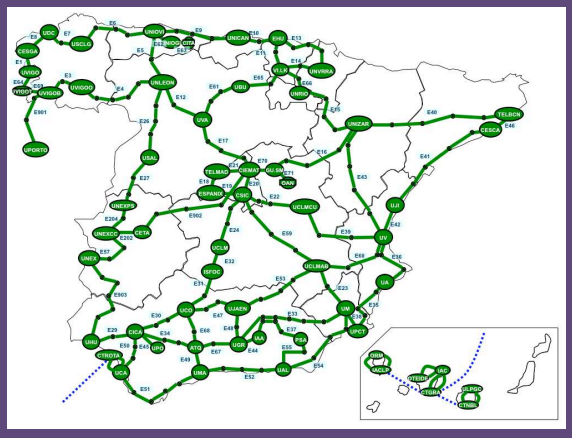
Members of the CC are also involved in the research projects AYA2013-48623-C2-1-P "Javalambre - Physics of the accelerated universe astrophysical survey" (J. Ruedas) and TIC-2839 "La red de Telescopios de Robóticos en Andalucía como parte de una Red a escala planetaria" (R. Parra).

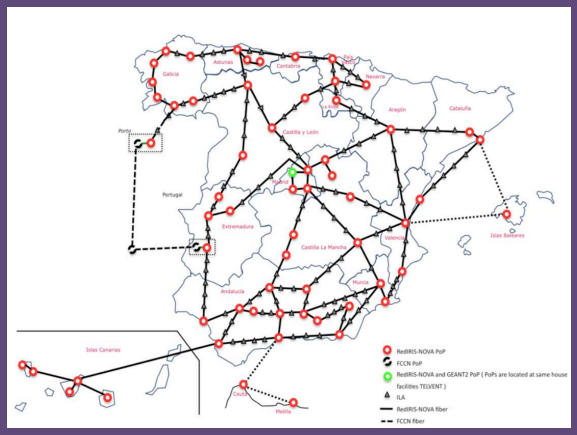
MEMBERS

Service Head: J. Ruedas Sánchez.

Members: F.M. Bayo Muñoz, B. Cantero Rus, J.J. Guijarro Jiménez, R. Parra Garófano.

New IAA supercomputing facility.





RedIRIS-NOVA PdP credential and network maps.

UDIT
INSTRUMENTAL AND TECHNOLOGICAL DEVELOPMENT UNIT

THE **UDIT** PRIME OBJECTIVES ARE THE TECHNOLOGICAL DEVELOPMENT OF SCIENTIFIC INSTRUMENTATION AND TECHNICAL SUPPORT TO THE IAA SCIENTISTS AND OBSERVATORIES.

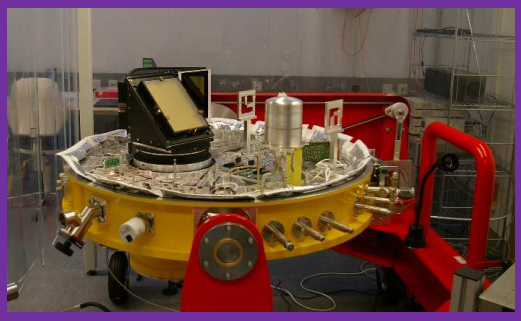
The Instrumental and Technological Development Unit (Unidad de Desarrollo Instrumental y Tecnológico – UDIT) has been in operation at the IAA since its foundation in 1975. State-of-the-art instruments designed and built at the UDIT for balloon and terrestrial rocket payloads in early times and for space missions and ground-based observatories nowadays have put the IAA on the map as a reference center for technological-challenging 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, especially for the telescopes at Calar Alto Observatory (CAHA) and Sierra Nevada Observatory (OSN).
- Analysis, design, integration, and verification of astronomical instruments for interplanetary scientific missions.

In this chapter we report on a selection of instrumentation projects and their associated technical development.

GROUND BASED INSTRUMENTS:

PANIC is a general purpose Panoramic Near Infrared camera for the 2.2m and 3.5m telescopes at CAHA. During 2013 the Assembly, Integration, and Verification (AIV) has taken place at the Max Planck Institute für Astronomy (MPIA). PANIC is being developed as a 50:50 partnership between the IAA and MPIA. The responsibilities of the IAA UDIT are focused on Optics and high-level Software packages, particularly on:
(i) Optics design and optimization for the 2.2m and 3.5m CAHA telescopes,
(ii) Development of manufacturing drawings and leadership of the optical system AIV,
(iii) Software observation tool,
(iv) Data reduction pipeline.
After the promising first steps of the AIV we are looking forward to obtaining the first light at CAHA at the end of 2014.



PANIC AIV taking place at MPIA, Heidelberg.

Everything ready for CARMENES at the IAA labs.

Sunrise just before its launch on June 2013.

CARMENES (Calar Alto high-resolution search for M dwarfs with Exoearths with Near-infrared and optical Echelle Spectrographs) is being developed by a consortium of 11 partners, led by LSW (Heidelberg) and IAA. The near-IR (NIR) spectrograph has been designed by the IAA and will be fully assembled at its clean rooms during 2014-2015. IAA is responsible for the (i) NIR/Opto mechanics, (ii) Cooling System, (iii) Control Software and (iv) electronics and exposure meter for the NIR channel. The arrival of the echelle to our laboratories in 2013 marked the AIV start.

SPACE PROJECTS

IMaX (Imaging Magnetograph eXperiment) is a solar spectropolarimeter built by five Spanish institutions (IAC, IAA, INTA, UPM, and GACE at Univ. Valencia). It performed its 2nd successful flight on-board the Sunrise balloon-borne solar Observatory on June 2013.

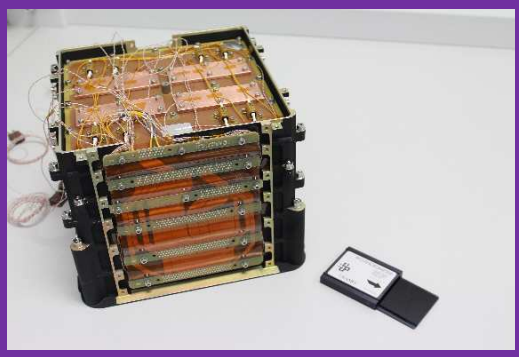
Whereas IMaX is the present of the solar physics space research, the IAA works simultaneously on its future, **PHI**, a Polarimetric and Helioseismic Imager that will flight onboard the ESA Solar Orbiter mission. The IAA is the PHI co-PI institution and its Solar Physics group coordinates the Spanish teams involved in PHI. The IAA is also responsible for the electronics unit and the harness work packages. The STM model has been developed, tested and delivered to ESA in 2013.

NOMAD (Nadir and Occultation for Mars Discovery) is a 3-channel spectrometer that will fly on-board the ESA ExoMars-TGO mission. IAA is the co-PI institution of the international consortium led by IASB-BIRA (Belgium) also including the Open University (UK) and IFSI (Italy). The IAA is responsible for SINBAD, the Spacecraft INterface BoArD with the Power Distribution, CPU and NOMAD onboard SW. After passing the CDR in 2013, the manufacture of the flight model has begun.

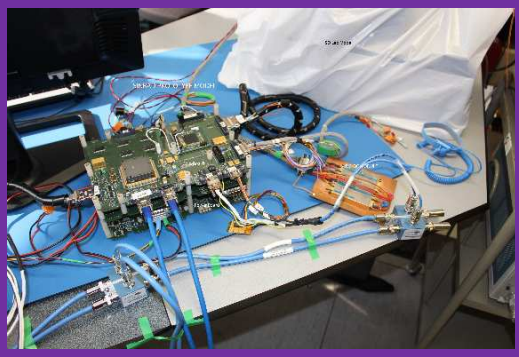
GALA (GAnymede Laser Altimeter) and **JANUS** (Jovis, Amorum ac Natorum Undique Scrutator) will fly on-board JUICE, an ESA mission that will study the Jovian system. The IAA is responsible for the power supply modules of both instruments, and the filter wheel and mechanism controller module (FWM-MCM) of the camera JANUS. In 2013, the Instrument Preliminary Readiness Review (IPRR) has been delivered to ESA, and the development models for the power supply of GALA and JANUS and the filter wheel and electronic controller for JANUS have been built.

Members:

Electronics: M. Abril, D. Álvarez, B. Aparicio, G.P. Candini, J.P. Cobos, L.P. Costillo, J.J. España, F.J. Girela, M. Herranz, J.M. Jerónimo, J. Jiménez, P. Labrousse, H. Magán, I. Martínez, J.L. Ramos, N. Robles, J. Rodrigo, J. Sánchez, M. R., Sanz.



SO/PHI E-UNIT STM model during assembly phase.



Highly successful first test of the SINBAD prototype.

JANUS PSM at the IAA laboratories.

More exciting news @:
https://udit.iaa.csic.es/

Mechanics: S. Becerril, I. Bustamante, E. Mirabet, E. Rodríguez, M.A. Sánchez.
Optics: C. Cárdenas, I. Ferro, D. Pérez, A. Ramón Ballesta.
Project Management: M. Balaguer, J.M. Castro, A. López, B. Molina, J. Rodríguez.
Software: A. García, J.M. Gómez, C. Husillos, J.M. Ibáñez, I. Morales, R. Morales, M. Passas, C. Pastor, V. Terrón.

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"Discovery of the broad-lined type Ic SN 2013cq associated with the very energetic GRB 130427A", The Astrophysical Journal, Vol. 776, p. 98 (2013)

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"An observational and theoretical study of the longitudinal variation in neutral temperature induced by aurora heating in the lower thermosphere", Journal of Geophysical Research-Space Physics, Vol. 118, p. 7410 (2013)

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"Kinematics of Arp 270: gas flows, nuclear activity and two regimes of star formation", Monthly Notices of the Royal Astronomical Society, Vol. 432, p. 998 (2013)

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"Illuminating the darkest gamma-ray bursts with radio observations", The Astrophysical Journal, Vol. 767, p. 161 (2013)

229. Zheng, W, Bradley, L, Zitrin, A, Moustakas, J, Postman, M, Ford, H, Shu, X, Coe, D, Moustakas, LA, Koekemoer, A, **Milino, A**, Jouvel, S, Host, O, Broadhurst, T, & Kelson, DD
"Progress in search for high-redshift galaxies magnified by gravitational lensing", Astronomische Nachrichten, Vol. 334, p. 474 (2013)

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"Light scattering by feldspar particles: Comparison of model agglomerate debris particles with laboratory samples", Journal of Quantitative Spectroscopy & Radiative Transfer, Vol. 131, p. 175 (2013)

EDUCATION

THESES

PhD Theses

"*Modelo termofísico de transporte de masa y energía en medios porosos y helados. Evolución de núcleos cometarios*"
Author: Marta González García
Supervisors: **Pedro J. Gutiérrez , Luisa M[a] Lara**
Universidad de Granada
Defense Date: February 22, 2013

"*Estudio de los objetos Trans-Neptunianos mediante técnicas fotométricas y simulaciones numéricas*"
Author: Audrey Thirouin
Supervisors: **José L. Ortíz** , Adriano Campo Bagatin
Universidad de Granada
Defense Date: July 9, 2013

"*Estructura de Ionización y Composición Química de Nebulosas Galácticas*"
Author: Alba Fernández Martín
Supervisors: **José M. Vílchez , Enrique Pérez Montero**
Universidad de Granada
Defense Date: October 10, 2013

"*Formation and Dynamics of Groups of Galaxies in the Local Universe*"
Author: Laura Darriba Pol
Supervisors: Josep María Solanes Majúa, **Jaime D. Perea,** Evangelina Athanassoula
Universidad de Barcelona
Defense Date: October 31, 2013

"*Characterisation of an Isolated Galaxy Sample: Astrophysical Implications*"
Author: Mª del Carmen Argudo Fernández
Supervisors: Simon Verley, Gilles Bergond, **Jack Sulentic**
Universidad de Granada
Defense Date: November 8, 2013

Master Theses

"*Modelización del espectro de estrellas jóvenes de luminosidad intermedia en la región de OMC-2*"
Author: Enrique Macías Quevedo
Supervisors: **Mayra Osorio, Guillem Anglada**
Defense Date: July 12, 2013

"*Desarrollos Tecnológicos para la Caracterización de Materiales Ópticos a Bajas Temperaturas y Evaluación de Espejos de Aluminio para su Uso en Sistemas Ópticos*"
Author: Irene María Ferro Rodríguez
Supervisors: **Julio F. Rodríguez, M. Concepción Cárdenas**
Defense Date: September 2013

"*Estudio del flujo y de la variabilidad espectral tardía del tidal disruption flare SW J1644+57 con datos del satélite XMM-Newton*"
Author: Ángela González Rodríguez
Supervisors: **Alberto J. Castro Tirado, Martín A. Guerrero**
Defense Date: September 2013

"*Simetrías desde la variedad de soluciones*"
Author: Jesús Molina
Supervisors: **Víctor Aldaya, Julio Guerrero**
Defense Date: September 12, 2013

"*A pipe-line for WFC data reduction and automatic galaxy classificacion*"
Autor: Miguel Figueira Sebastiao
Supervisors: **José M. Vílchez , Jorge Iglesias Páramo**
Defense Date: September 2013

TEACHING

Master and PhD Programs

Title: *Radioastronomía e Interferometría*
Authors: **Guillem J. Anglada, Antxon Alberdi, José F. Gómez**
Program: Física y Matemáticas – FISYMAT
University: Universidad de Granada
Hours: 60
Date: January 29, 2013

Title: *Astrofísica de Altas Energías*
Authors: **Javier Gorosabel, Martín A. Guerrero, Alberto J. Castro Tirado**
Program: Física y Matemáticas – FISYMAT
University: Universidad de Granada
Hours: 60
Date: January 29, 2013

Title: *El Observatorio Virtual*
Authors: **Juan de Dios Santander Vela**, Enrique Solano Márquez
Program: Métodos y Técnicas Avanzadas en Física – MTAF
University: Universidad de Granada
Hours: 30
Date: March 18, 2013

Title: *Física de Galaxias*
Authors: **Emilio J. Alfaro, Enrique Pérez**
Program: Métodos y Técnicas Avanzadas en Física – MTAF
University: Universidad de Granada
Hours: 60
Date: April 8, 2013

Title: *Módulo 1: Sistemas de Control Distribuido: Sistemas de control en misiones aeroespaciales / Control Systems in Aerospace Missions*
Authors: **Luis P. Costillo, Julio F. Rodríguez**
Program: Máster Universitario en Ingeniería de Computadores y Redes
University: Universidad de Granada
Hours: 20
Date: June 11, 2013

Title: *Astrofísica de Altas Energías*
Authors: **Javier Gorosabel, Martín A. Guerrero, Alberto J. Castro Tirado**
Program: Física y Matemáticas – FISYMAT
University: Universidad de Granada
Hours: 60
Date: December 4, 2013

Other Programs

Title: *History of Astronomy, Solar System, Astronomy Beyond the Visible, Expansion of the Universe, and Astronomy and Culture*
Author: **Mirjana Povic**
Hours: 28
Program: 26th International NASE-IAU Astronomy Course
Organizer: GAEC, Ghana & IAU
Place: Accra, Ghana
Date: January 8, 2013

Title: *Iniciación a Python (Dirigido)*
Authors: **Victor F. Terrón, César Husillos**
Hours: 20
Program: Curso del Gabinete de Formación de la Agencia Estatal Consejo Superior de Investigaciones Científicas
Organizer: Instituto de Astrofísica de Andalucía
Place: Granada, Spain
Date: April 8, 2013

Title: *Photometric data reduction*
Author: **Mirjana Povic**
Hours: 40
Program: Workshop on astronomical data reduction
Organizer: Kigali Institute of Education (KIE)
Place: Kigali, Ruanda
Date: May 6, 2013

Title: *Python científico dirigido*
Authors: **Victor F. Terrón, César Husillos**
Hours: 20
Program: Curso del Gabinete de Formación de la Agencia Estatal Consejo Superior de Investigaciones Científicas
Organizer: Instituto de Astrofísica de Andalucía
Place: Granada, Spain
Date: September 23, 2013

Title: *Astronomy Beyond the Visible, Evolution of the Stars, Expansion of the Universe, Preparing the Observations: Software and telescopes, Solar Spectrum and Sunspots, Solar System, and Stellar Lives*
Authors: **Mirjana Povic**
Hours: 24 hours
Program: 39th International NASE-IAU Astronomy Course
Organizers: University of Nairobi & IAU
Place: Nairobi, Kenia
Date: October 24, 2013

Title: *Cómo escribir y publicar un artículo científico en inglés*
Author: **Miguel A. Pérez Torres**
Hours: 20 hours
Program: Curso del Gabinete de Formación de la Agencia Estatal Consejo Superior de Investigaciones Científicas
Organizer: Instituto de Astrofísica de Andalucía
Place: Granada, Spain
Date: November 12, 2013

SCIENTIFIC ACTIVITIES

IAA SEMINARS

The IAA celebrates periodic seminars at its auditorium. Local scientists, post-docs, and PhD students share their latest results in an *"international workshop-like environment"*. Visiting scientists and external collaborators, highlighted by a "★" in the following list, are very welcomed to contribute to these seminars.

Dr. José Luis Ortiz (IAA-CSIC)
"Results from a stellar occultation by the dwarf planet Makemake"
January 17, 2013

★ **James MacDonald** (University of Delaware)
"Magnetic Effects and ovsersized M Dwarfs in the Young Open Cluster NGC 2516"
January 24, 2013

Dr. Matilde Fernández Hernández (IAA-CSIC)
"IAA: its Structure, Failures and Potential"
January 31, 2013

William Schönell (IAA-CSIC)
"Bajo un mismo cielo"
February 7, 2013

Dr. Matilde Fernández Hernández (IAA-CSIC)
"Our Central Organization: Structure and Duties"
February 14, 2013

★ **Dr. Jorge Sánchez Almeida** (Instituto de Astrofísica de Canarias)
"Local tadpole galaxies and cold-flows"
February 21, 2013

★ **Dr. Rodolfo Montez** (Bridge Post-Doctoral Fellow Vanderbilt University in Nashville, TN)
"Mysteries and Discoveries from the Chandra Planetary Nebulae Suvery (ChanPlaNS)"
February 27, 2013

★ **Prof. Rashid Sunyaev** (Max-Planck-Institut für Astrophysik)
"Hot Intergalactic Gas in Clusters of Galaxies"
March 6, 2013

Dr. Javier Peralta Calvillo (IAA-CSIC)
"Towards a general classification of atmospheric waves on Venus"
March 14, 2013

Dr. Narciso Benitez (IAA-CSIC)
"The Javalambre-PAU Astrophysical Survey"
March 21, 2013

★ **Dr. Ami Choi** (Royal Observatory, Edinburgh)
"Probing Galaxy-Scale Halos and Large-Scale Structure with Weak Gravitational Lensing"
April 4, 2013

Dr. Rosa M. González Delgado (IAA-CSIC)
"CALIFA: The spatially resolved Star Formation History of Galaxies"
April 11, 2013

Dr. Rainer Schödel (IAA-CSIC)
"The Shortest-Known–Period Star Orbiting Our Galaxy's Supermassive Black Hole"
April 18, 2013

Dr. Martín A. Guerrero (IAA-CSIC)
"X-raying born-again planetary nebulae"
April 25, 2013

Dr. Olga Muñoz (IAA-CSIC)
"The IAA COsmic DUst LABoratory, a lab next door (building)."
May 9, 2013

★ **Dr. P. Horvathy** (Lab. Math. Phys. Theor. Univ. Tours (France))
"Hall motions and star escape in galactic dynamics in the Hill approach"
May 16, 2013

Dr. Ricardo Amorín (IAA-CSIC)
"Extreme emission-line galaxies: New light on the mass assembly and chemical enrichment of low-mass galaxies"
May 23, 2013

Prof. Manuel López-Puertas (IAA-CSIC)
"PAH's in Titan's Upper Atmosphere"
June 6, 2013

Dr. Lourdes Verdes-Montenegro (IAA-CSIC)
"Love for Science or 'Academic Prostitution'?"
June 13, 2013

★ **Prof. Eduardo Battaner** (UGR)
"El Universo de Planck"
June 20, 2013

Dr. Sebastián Sánchez (IAA-CSIC)
"CALIFA"
June 27, 2013

Alberto Molino (IAA-CSIC)
"The ALHAMBRA survey: First Data Release."
July 04, 2013

★ **Prof. Robertus von Fay-Siebenberg** (Univ. Sheffield)
"Can we solve by solar magneto-seismology one of astrophysics great problems: Coronal heating enigma?"
July 18, 2013

Prof. Antxon Alberdi (IAA-CSIC)
"SN 1993J and M81: a fruitful astrophysical collaboration"
September 05, 2013

★ **Dr. Chris Brook** (Universidad Autónoma de Madrid)
"Cosmological Simulations of Galaxy Formation"
September 12, 2013

★ **Dr. Omaira González Martín** (Instituto de Astrofísica de Canarias)
"AGN synapses"
September 19, 2013

Dr. Fernando Moreno (IAA-CSIC)
"Main-Belt Comets"
September 26, 2013

Dr. Antonio de Ugarte Postigo (IAA-CSIC)
"Spectroscopy of the short GRB 130603B: The host galaxy and environment of a compact object merger "
October 3, 2013

Dr. Francesco Costagliola (IAA-CSIC)
"Hot potatoes: the compact obscured nuclei of dusty IR galaxies"
October 10, 2013

Dr. Francisco González Galindo (IAA-CSIC)
"The Martian ionosphere"
October 17, 2013

★ **Dr. Julia Scharwächter** (Observatoire de Paris, LERMA)
"AGN feedback and accretion in Perseus A"
October 24, 2013

J. E. Ruiz (IAA-CSIC)
"Digital Science: towards the executable paper"
October 31, 2013

Dr. Miguel Angel Pérez-Torres (IAA-CSIC)
"Proposing observations with the European VLBI Network"
November 7, 2013

Dr. Begoña Ascaso (IAA-CSIC)
"Galaxy clusters: galaxy laboratories and cosmological probes. A see you later seminar."
November 28, 2013

Dr. José Francisco Gómez (IAA-CSIC)
"Stellar water fountains: planetary nebulae in the making"
December 5, 2013

VISITING SCIENTISTS

Álvaro Álvarez-Candal
European Southern Observatory (ESO)
01/03/2012 - 01/03/2013

Arnaud Mahieux
Belgian Institute for Space Aeronomy (BISA)
15/09/2012 - 31/01/2013

Rolando Garcia
NCAR, Boulder, EE.UU.
05/01/2013 - 27/03/2013

Anne Smith
NCAR, Boulder, CO, EE.UU.
05/01/2013 - 27/03/2013

Roberto Cid Fernandes
Univ. Federal de Santa Catarina
07/01/2013 – 06/02/2013

Aram Markosyan
CWI, Amsterdam
14/01/2013 - 18/01/2013

James MacDonald
Dept. of Physics and Astronomy. University of Delaware, USA
21/01/2013 - 30/01/2013

José M. Torrelles
ICE-CSIC
29/01/2013 - 29/01/2013

Paola Marziani
Osservatorio Astronomico di Padova - INAF
17/02/2013 - 24/02/2013

Jorge Sánchez Almeida
Instituto de Astrofísica de Canarias (IAC)
18/02/2013 - 22/02/2013

Carlos Carrasco Gonzalez
Max-Planck-Institut fuer Radioastronomie
21/02/2013 - 23/02/2013

Rudy Montez
Vanderbilt University, TN, USA
24/02/2013 - 02/03/2013

Antonio García Hernández
Centro de Astrofisica (Univ. Porto)
04/03/2013 - 08/03/2013

Fabio Giannattasio
Università di Roma Tor Vergata
04/03/2013 - 03/04/2013

Priscila Freitas Lemes
Universidade do Vale do Paraibo (Brasil)
04/03/2013 - 08/03/2013

Itziar de Gregorio Monsalvo
European Southern Observatory
08/03/2013 - 12/03/2013

Aram Markosyan
CWI, Amsterdam
11/03/2013 - 15/03/2013

Yajun Zhu
Forschungszentrum Juelich, Alemania
19/03/2013 - 25/03/2013

Andrés Moya Bedón
CAB-CSIC
19/03/2013 - 22/03/2013

Martin Kaufmann
Forschungszentrum Juelich, Alemania
19/03/2013 - 25/03/2013

Lucero Uscanga
Observatorio Nacional de Atenas
26/03/2013 - 06/04/2013

Ada Ortiz
Institute of Theoretical Physics, University of Oslo
01/04/2013 - 31/05/2013

Federico Fabiano
Universidad de Pisa
08/04/2013 – 08/07/2013

Eva Villaver
Universidad Autónoma de Madrid (UAM)
12/04/2013 - 13/04/2013

Gil Jannes
Low temperature lab, Helsinki
22/04/2013 - 26/04/2013

Joseph J Booker
University of Toledo, USA
22/04/2013 - 26/04/2013

Amelia Stutz
Max Planck Institute for Astronomy
22/04/2013 - 26/04/2013

Thomas Stanke
European Southern Observatory (OAN)
22/04/2013 - 26/04/2013

Thomas Megeath
Department of Physics and Astronomy, University of Toledo, USA
22/04/2013 - 26/04/2013

William J. Fischer
Department of Physics and Astronomy, University of

Toledo, USA
22/04/2013 - 26/04/2013

Puravankara Manoj
Department of Physics and Astronomy, University of Toledo, USA
22/04/2013 - 26/04/2013

Joachim Stock
Technical Unversity of Berlin
25/04/2013 - 30/04/2013

Beatriz González
European Space Agency
26/04/2013 - 26/04/2013

Roland Vavrek
European Space Agency (ESA)
26/04/2013 - 26/04/2013

Morten Franz
Kiepenheuer Institut für Sonnenphysik
02/05/2013 - 02/06/2013

Aram Markosyan
CWI, Amsterdam
06/05/2013 - 10/05/2013

Laura Darriba
Departamento de Astronomía y Meteorología, Univ. Barcelona
06/05/2013 - 10/05/2013

Josep Maria Solanes
Departamento de Astronomía y Meteorología, Univ. Barcelona
07/05/2013 - 07/05/2013

Viggo Hansteen
Institute of Theoretical Physics, University of Oslo
09/05/2013 - 13/05/2013

Rocco Lico
University of Bologna and INAF, Italy
15/05/2013 - 24/05/2013

Jozef Skakala
Centro de Matemática, Computação e Cognição, UFABC, Santo André, SP, Brazil
20/05/2013 - 24/05/2013

Prof. Martin Fullekrug
University of Bath, UK
06/2013

Jean Carlos Rivera
Univ. de Puerto Rico
03/06/2013 - 31/07/2013

Michal Sobotka
Astronomical Institute, Academy of Sciences of the Czech Republic
04/06/2013 - 15/06/2013

Carlos Carrasco González
MPIfR, Germany
10/06/2013 - 14/06/2013

Cristina Elisabet Cappa
Instituto Argentino de Radioastronomía
17/06/2013 - 20/06/2013

Alvaro Sanchez Monge
Osservatorio Astrofisico di Arcetri
17/06/2013 - 19/06/2013

Juan Carlos Algaba Marcos
Korea Astronomy and Space Science Institute
17/06/2013 - 22/06/2013

Hiroko Watanabe
University of Kyoto
19/06/2013 - 28/07/2013

Shogo Nishiyama
National Astronomical Observatory of Japan
20/06/2013 - 24/07/2013

Aram Markosyan
CWI, Amsterdam
24/06/2013 - 28/06/2013

Luis Felipe Miranda Palacios
CSIC / Universidad de Vigo
24/06/2013 - 28/06/2013

Pau Frau
Observatorio Astronómico Nacional (OAN)
02/07/2013 - 04/07/2013

Claudio Vuerli
INAF
16/07/2013 - 17/07/2013

Giuliano Castelli
INAF
16/07/2013 - 17/07/2013

Frederic Vogt
Mt Stromlo Observatory Research School of Astronomy & Astrophysics ANU College of Physical & Mathematical Sciences
29/07/2013 - 02/08/2013

Omaira González Martín
Instituto de Astrofísica de Canarias (IAC)
15/09/2013 - 22/09/2013

Luis F. Miranda
CSIC / Universidad de Vigo
23/09/2013 - 27/09/2013

Lucky Puspitarini
Observatoire de Paris
01/10/2013 - 04/10/2013

Gonzalo Tancredi
Universidad de Montevideo
14/10/2013 - 19/10/2013

Adriano Campo Bagatin
Universidad de Alicante
14/10/2013 - 18/10/2013

Faustino Organero
Fundación Astrohita
21/10/2013 - 22/10/2013

Fernando Fonseca
Fundación Astrohita
21/10/2013 - 22/10/2013

Leonor Ana Hernández
Fundación Astrohita
21/10/2013 - 22/10/2013

Paula Benavidez
Universidad de Alicante
28/10/2013 - 31/10/2013

Jose Sabater Montes
University of Edinburgh
04/11/2013 - 11/11/2013

Antonio García Hernández
CAUP (Portugal)
11/11/2013 - 15/11/2013

Lorena Muñoz Vivas
EFFECTIA INNOVATION SOLUTIONS SL
12/11/2013 - 14/11/2013

Gabriele Stiller
Karlsruhe Institute for Technology
18/11/2013 - 21/11/2013

Thomas von Clarmann
Karlsruhe Institute of Technology
18/11/2013 - 21/11/2013

Rohan Louis
Astrophysical Institute Potsdam (AIP)
19/11/2013 - 05/12/2013

You-Hua Chu
Univ. Illinois at Urbana-Champaign (UIUC)
24/11/2013 - 27/11/2013

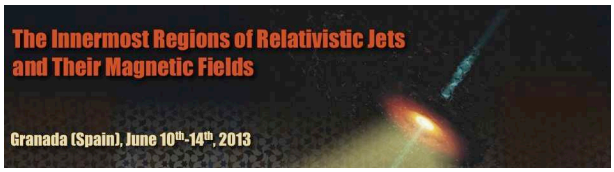
Tomas Hoder
Institute of Plasma Physics (IPP, Czech Academy of Sciences)
01/12/2013 - 03/12/2013

Milan Simek
Institute of Plasma Physics (IPP, Czech Academy of Sciences)
01/12/2013 - 03/12/2013

WORKSHOPS AND MEETINGS

HOPS Spring Meeting
International Meeting
Granada, Spain April 22 - 26, 2013
IAA members of the Organizing Committee: **G. Anglada, M. Osorio**
http://congresos.iaa.es/sites/default/files/hops_agenda.pdf

Jets 2013: The Innermost Regions of Relativistic Jets and Their Magnetic Fields
International Meeting
Granada, Spain June 10 - 14, 2013
IAA members of the Scientific Organizing Committee: **I. Agudo, J.L. Gómez**
Local Organizing Committee: **I. Agudo (co-chair), C. Casadio, J.L. Gómez (co-chair), S.N. Molina, E. Sánchez, p. Brañas**
http://jets2013.iaa.es



ICPIG - 2013: International Conference on Phenomena in Ionized Gases
International Conference
Granada, Spain July 14 - 19, 2013
Local Organizing Committee: **F.J. Gordillo-Vázquez (Chair), A. Luque, M. Passas, F.C. Parra-Rojas**
http://www.icpig2013.net

XXXI ICPIG
GRANADA 2013
INTERNATIONAL CONFERENCE ON PHENOMENA IN IONIZED GASES

Galaxies meet GRBs at Cabo de Gata
International Meeting
Las Negras (Almería), Spain September 23 - 27, 2013
IAA members of the Organizing Committee: C. **Thöne (chair), A. de Ugarte Postigo (co-chair), R. Amorín, J. Gorosabel, C. Kehrig, S. Sánchez, J.M. Vílchez**
http://www.iaa.es/cabodegata2013/

Third Workshop on Robotic Autonomous Observatories
International Workshop
Torremolinos (Málaga), Spain October 7 - 11, 2013
IAA members of the Scientific Organizing Committee: A.J. Castro-Tirado
Local Organizing Committee: **R. Cunniffe, J. Gorosabel, M. Jelinek, S. Jeong, O. Lara-Gil, J.C. Tello**
http://astrorob.iaa.es

ALHAMBRA in the Alhambra
National Meeting
Granada, Spain November 12 - 14, 2013
IAA members of the Scientific Organizing Committee: **N. Benítez, R. González-Delgado**
Local Organizing Committee: **B. Ascaso, N. Benítez, Y. Jiménez-Teja, A. Molino**
http://alhambra2013.iaa.es

The Galactic Center Black Hole Laboratory
International Meeting
Granada, Spain November 19 - 22, 2013
IAA members of the Scientific Organizing Committee: **A. Alberdi, R. Schödel**
Local Organizing Committee: **A. Alberdi (co-chair), F. Costagliola, R. Herrero-Illana, M. Rodríguez, R. Schödel (co-chair)**
http://galacticcenter.iaa.es

STAFF

RESEARCHERS

Permanent Staff

Alberdi Odriozola, Antonio María
Aldaya Valverde, Víctor
Alfaro Navarro, Emilio Javier
Anglada Pons, Guillem Josep
Barceló Serón, Carlos
Bellot Rubio, Luis Ramón
Benítez Lozano, Narciso
Castro Tirado, Alberto Javier
Cerviño Saavedra, Miguel Antonio
Del Toro Iniesta, José Carlos
Claret do Santos, Antonio
Delgado Sánchez, Antonio Jesús
Fernández Hernández, Matilde
Funke, Bernd Rainer
Garrido Haba, Rafael
Gómez Fernández, José Luis
Gómez Rivero, José Francisco
González Delgado, Rosa María
Gordillo Vázquez, Francisco José
Gorosabel Urquía, Javier María
Guerrero Roncel, Martín Antonio
Gutiérrez Buenestado, Pedro José
Iglesias Páramo, Jorge
Lara López, Luisa María
López González, María Josefa
López Jiménez, Antonio Carlos
López Moreno, José Juan
López Puertas, Manuel
López Valverde, Miguel Ángel
López de Coca Castañer, María Pilar
Maíz Apellániz, Jesús
Márquez Pérez, Isabel
Martín Ruíz, Susana
Masegosa Gallego, Josefa
Miranda Palacios, Luis Felipe
Moles Villamate, Mariano Jesús
Moreno Danvila, Fernando
Muñoz Gómez, Olga
Olivares Martín, José Ignacio
del Olmo Orozco, Ascensión
Ortiz Moreno, José Luis
Osorio Gutiérrrez, Mayra Carolina
Perea Duarte, Jaime David
Pérez Jiménez, Enrique
Pérez Montero, Enrique
Pérez Torres, Miguel Ángel
Prada Martínez, Francisco
Rodríguez Gómez, Julio Federico
Rodríguez Martínez, Eloy
Ruedas Sánchez, José
Verdes-Montenegro Atalaya, Lourdes
Vílchez Medina, José Manuel

Ramón y Cajal Members

Duffard, René Damián
García Comas, Maya Leire
Luque Estepa, Alejandro
Sánchez Sánchez, Sebastián Francisco
Schödel, Rainer
Peñarrubia Garrido, Jorge Miguel

Juan de la Cierva Members

de Ugarte Postigo, Antonio
Thöne, Christina

JAE-Doc Fellows

González Galindo, Francisco
Povic, Mirjana
Rodriguez López, Cristina Teresa
Santander Vela, Juan de Dios

Postdoc Fellows

Amado González, Pedro Jose
Anton Castillo, Sonia
Ascaso Anglés, Begoña
Blasco Herrera, Javier
Costado Dios, Maria Teresa
Costagliola, Francesco
Díaz Fraile, Darío
Egea González, Maria Isabel
Fang, Xuan
Fernández Lorenzo, Mirian
García Benito, Rubén
Gardini, Angela
Garrido Sánchez, Julián
Jeong, Soomin
Jiménez Teja, Yolanda
Kehrig, Carolina
Martínez Carballo, María Ángeles
Mendoza Pérez, María Ángeles
Molino Benito, Alberto
Peralta Calvillo, Javier
Santos Sanz, Pablo
Stock, Joachim W.
Suárez Yanes, Juan Carlos
Venegas Ortiz, Juan
Villaverde Aparicio, Marcos

PhD Students

Argudo Fernández, Mª del Carmen
Blanco Cárdenas, Mónica Wendolin
Carballo Rubio, Raúl
Casadio, Carolina
Casal López Estefania
Cortés Barbado, Luis
Cortijo Ferrero, Clara
Dabrowska, Dominika
Díaz Rodríguez, Ana Karla
Esteban Pozuelo, Sara
Favole, Ginevra
Fernández Valenzuela, Estefania
Gallego Calvente, Aurelia Teresa
González García, Marta
Gosic, Milan
Hernández García, Lorena
Herrero Illana, Rubén
Jelinek, Martin
Jurado Navarro, Ángel Aythami
López Fernández, Rafael
Macías Quevedo, Enrique
Modroño Berdiñas, Zaira
Molina, Sol Natalia
Ocando Barrios, Sandra M.
Parra Rojas, Francisco Carlos
Pozuelos Romero, Francisco José
Ramírez Moreta, Pablo
Ruiz Madrona, Javier
Sampedro Hernández, Laura María
Sanchez Bermudez, Joel
Sánchez Ramírez, Rubén
Sánchez Requerey, Iker
Schönell, Willian
Tello Salas, Juan Carlos
Thirouin, Audrey
Toalá Sanz, Jesús Alberto

Invited Researchers

Alvarez Candal, Alvaro Augusto (Consejo Nacional de Desenvolvimiento Cientifico y Tecnologico, Brasil)
Duran Rojas, María Carolina (CONACYT, Mexico)
De Amorim, Andre Luiz (ESO, European Southern Observatory)
Manjarrez Esquivel, Guillermo (CONACYT, Mexico)
Rodríguez Martínez, Mónica Ivette (CONACYT, Mexico)
Sulentic, Jack (Junta de Andalucía, Spain)
Utz, Dominik (University of Graz, Austria)

ENGINEERS AND TECHNICIANS

Abril Martí, Miguel
Aceituno Castro, Francisco José
Álvarez García, Daniel
Aparicio del Moral, Beatriz
Balaguer Jiménez, María
Becerril Jarque, Santiago
Benítez Yáñez, Alicia Desireé
Benítez Yáñez, José Antonio
Bustamante Díaz, Isabel
Candini, Gian Paolo
Cárdenas Vázquez, María Concepción
Casanova Escurín, Víctor Manuel
Castro Marín, José María
Cobos Carrascosa, Juan Pedro
Costillo Iziarra, Luis Pedro
Cunniffee, Ronan
de la Rosa Álvarez, José Luis
España Navarro, Joaquín José
García Segura, Antonio Jesús
Girela Rejón, Fernando Javier
Gómez López, Juan Manuel
Ferro Rodríguez, Irene María
Herranz de la Revilla, Miguel
Husillos Rodríguez, César
Ibáñez Mengual, José Miguel
Jerónimo Zafra, José María
Jiménez Ortega, Jaime
Labrousse, Pierre
Lara Gil, Óscar
Magán Madinabeitia, Héctor
Martínez Navajas, Ignacio
Mirabet Puig, Eduard
Mirasol Junco, José Alberto
Molina Farrugia, Berta
Morales Durán, Isaac
Morales Muñoz, Rafael
Passas Varo, María
Pastor Morales, María del Carmen
Pérez Silvente, Tomás
Ramón Ballesta, Alejandro
Ramos Más, José Luis
Robles Muñoz, Nicolás Francisco
Rodón Ortiz, José Ramón
Rodrigo Campos, Julio
Rodríguez Pérez, Emilio
Ruiz Bueno, José Antonio
Ruiz del Mazo, José Enrique

Sánchez Expósito, Susana
Sota Ballano, Alfredo
Pérez Medialdea, David
Terrón Salas, Víctor Francisco
Sánchez Carrasco, Miguel Andrés
Sánchez del Río, Justo
Sanz Mesa, María del Rosario

SERVICES AND ADMINISTRATION

Administration Services

Bordons Mesonero, Fernando
de Castro Díaz, Rosa Irene
Cortés Guerrero, Maria Ángeles
Gómez Finnet, Susana Alicia
Heredia Maldonado, Maria José
Madrid Gómez, Carmen Elisa
Molina Guerrero, Josefa
Rodríguez Hernández, Adrián
Tapia Ruiz, Francisco José
Torrededia Rodrigo, Cristina

Computer Center

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

General Services

Molero Delgado, José Francisco
Molina Rodrigo, Antonio
Navarro Ayala, Francisco
Rendón Martos, Francisco

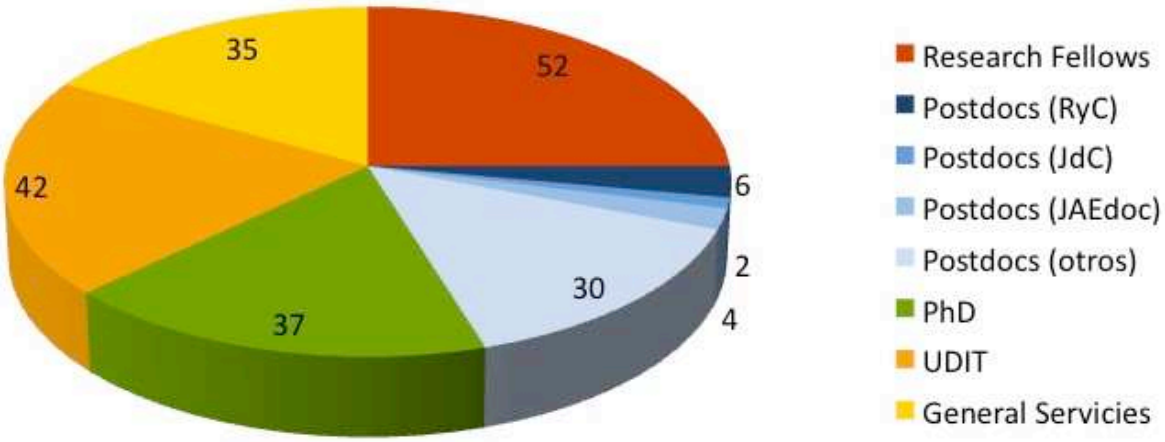
Library

Arco Sarmiento, María Ángeles
Romero Vílchez, María Carmen

Outreach and Communication Unit

García Gómez-Caro, Emilio José
López de la Calle, Silbia

Distribution IAA personnel 2013



PUBLIC OUTREACH

PROJECTS HELD DURING 2013 BY THE IAA-CSIC COMMUNICATION, EDUCATION AND PUBLIC OUTREACH UNIT

- *"Información y Actualidad Astronómica"*, a popular science journal published once every four months. It is devoted to high school and university students, as well as to general public interested in astronomy. In 2013, the volumes 39, 40, and 41 have been issued.
http://www-revista.iaa.es

- *"El Radioscopio"*, a weekly popular science radio program made in collaboration with Canal Sur Radio and broadcasted by *Radio Andalucía Información*.
http://radioscopio.iaa.es

- *"Lucas Lara"* popular talks, a cycle of science conferences initiated in 1995. Nine talks are celebrated every year.
http://www-divulgacion.iaa.es/ciclo-lucas-lara

- "*¿Eres de óptico o de radio?*", a summer astronomical and touristical event that includes a visit to the observatory of Sierra Nevada (OSN) and to the IRAM 30m radio antenna in Sierra Nevada (Granada).
http://www.iaa.es/visitas-OSN-IRAM

- *PIIISA* ("*Proyecto de Iniciación a la Investigación de Innovación en Secundaria*"), a multidisciplinary project designed to allow high school students to work together with scientists. The IAA-CSIC is the founder of the project and takes part in it every year.
http://www.piiisa.es

- *The European Researchers' Night* takes place every year all over Europe and beyond the last Friday of September. The IAA-CSIC took part in the event in Granada on Friday 27.
http://www.iaa.es/la-noche-más-astronómica

- ISON special issue. Website devoted to the 2013 cometary hit: the approach to the Sun of the ISON comet, nicknamed "comet of the century".
http://ison.iaa.es.

- *She is an astronomer* exhibition. Held at the Parque de las Ciencias (Granada), the exhibition depicts the life and trajectory of woman astronomers along history.

- Educational activities. Every month, the IAA is visited by two student groups. This year we have started the project *Misiones Pedagógicas 2.0* to take astronomical outreach to small villages.

- Collaboration with the newspaper "Granada Hoy". Since 2004 we have a permanent section in this local paper, now issued monthly.

ACTIVITIES OF THE COMMUNICATION, EDUCATION AND PUBLIC OUTREACH UNIT

- *"Antes de que anochezca"*. Monthly collaboration with the TV program ConCiencia (Canal Sur Television).
http://www-divulgacion.iaa.es/antes-de-que-anochezca

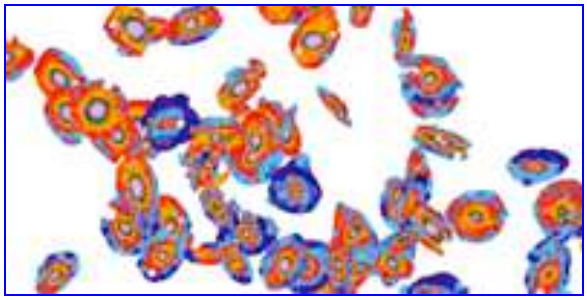
- *"El extraño caso de Henrietta Leavitt y Erasmus Cefeido"*. An impossible videoblog where the astronomer Henrietta Swan Leavitt accounts her life history and explains fundamental astronomical concepts.
http://henrietta.iaa.es

- Social Networks. Twitter and facebook profiles managing.
facebook.com/iaa.comunicacion

twitter.com/iaaucc

PRESS RELEASES

IAA SCIENTIFIC HIGHLIGHTS DISTRIBUTED TO THE MEDIA.



THE PIONNER GALAXY MAPPING SURVEY CALIFA UNVEILS THE EVOLUTION OF GALAXIES IN SPACE AND TIME

January 31, 2013

CALIFA has traced for the first time the whole stellar formation history across 100 galaxies. It is found that massive galaxies evolved faster than smaller ones, with their central regions forming earlier in time.

TIMED THE EXACT MOMENT WHEN ASTEROID P/2012 F5 (GIBBS) DEVELOPED ITS TAIL

February 20, 2013

Asteroids do not have tails, but a few do. Spanish astronomers, by observing one of those rare objects, have revealed that an internal break-up or a collision produced a tail at some moment around July 1, 2011.

ASTEROID 2012 DA14 IMAGED FROM SIERRA NEVADA OBSERVATORY

February 20, 2013

Observations of the asteroid 2012 DA14 obtained at the 1.5m OSN telescope.

KICK OFF FOR CARMENES, THE INSTRUMENT THAT WILL SEARCH EXO-EARTHS

February 21, 2013

An expert committee has endorsed CARMENES final design this week, marking the start of its building phase.

TITAN'S ATMOSPHERE ENIGMATIC GAS DETECTED

March 18, 2013

The Earth and Titan are the only bodies in the Solar System with dense atmospheres and liquid material at their surfaces. Analysis of Cassini-VIMS data has unveiled chemicals not detected before in Titan's atmosphere.

YOUNG SUNS SHINE WITH X-RAY EMISSION IN THE SMALL MAGELLANIC CLOUD

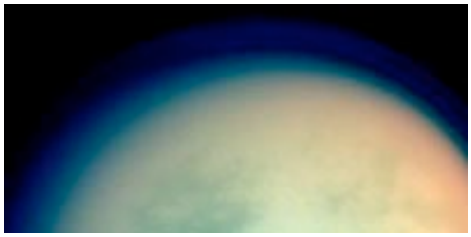
April 4, 2013

Chandra observations have allowed the first detection of X-rays from young low-mass stars outside our galaxy.

CLOSING CEREMONY OF PIIISA, A PROJECT TO INTRODUCE STUDENTS TO SCIENCE

May 21, 2013

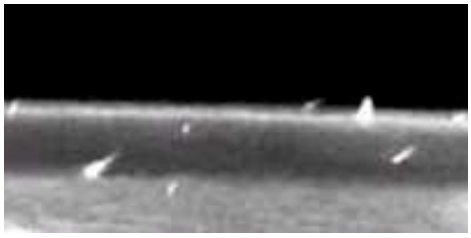
PIIISA (*Proyecto de Iniciación a la Investigación de Innovación en Secundaria en Granada*) teaches High School students to do science together with scientists.



IDENTIFIED THE CHEMICALS OF TITAN'S FOG RESPONSIBLE OF ITS ATMOSPHERE STABILITY

June 5, 2013

IAA astronomers have identified large amounts of polycyclic aromatic hydrocarbons (PAH) in Titan's fog. These chemicals heat Titan's atmosphere, preventing it to condensate.



THE 2011 DRACONIDS: A TON OF COMET FRAGMENTS HIT THE EARTH ATMOSPHERE AT 83.000 KILOMETERS PER HOUR

June 7, 2013

The Earth crossed the gas and dust tail of comet 21P/Giacobini-Zinner during October 8 and 9, 2011, giving raise to an intense Draconids meteor shower.

RELATIVISTIC JETS, ONE OF THE MOST ENERGETIC PHENOMENON IN THE UNIVERSE, GATHERS SCIENTISTS ALL OVER THE WORLD IN GRANADA

June 10, 2013

Relativistic jest are high-velocity collimated outflows produced in the close proximity of supermassive black holes at the core of active galactic nuclei.

THE SUNRISE SOLAR TELESCOPE CRUISES THE ARTIC SKIES AGAIN ON BOARD OF A BALLOON

June 12, 2013

SUNRISE, a solar telescope on board a stratospheric balloon that will investigate the Sun magnetic field, has been launched today from the Esrange Space Center, near the Swedish city of Kiruna.

ALHAMBRA GOLD, A DEFINITIVE CATALOGUE FOR THE STUDY OF UNIVERSE EVOLUTION

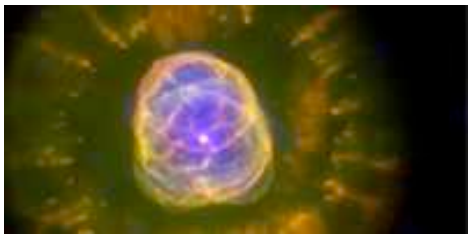
June 24, 2013

The unprecedented quality of the ALHAMBRA survey, which studies in detail eight deep fields located at different positions in the sky, make it the best tool ever to investigate the recent history of the Universe.

A STEP FORWARD IN THE STUDY OF EXTREME MASSIVE STARS: DETECTION OF THE THIRD COMPONENT IN THE HD150136 SYSTEM

July 4, 2013

Despite their scarcity, massive stars strongly influence the structure and chemical evolution of galaxies.



IS THE CENTRAL STAR OF THE ESKIMO NEBULA A BINARY SYSTEM?

July 12, 2013

X-ray observations of the Eskimo Nebula point out to a binary nature for its central star. This study also reveals a conduction layer between the hot bubble and the optical emission in this planetary nebula.

GRANADA HOSTS AN INTERNATIONAL SCIENTIFIC SUMMIT ON LOW-TEMPERATURE PLASMA

July 15, 2013

The International Conference on Phenomena in Ionized Gases (ICPIG) is bringing together over five hundred researchers in Granada this week.

THE IAA OPENS ITS DOORS TO CELEBRATE THE EUROPEAN RESEARCHERS NIGHT

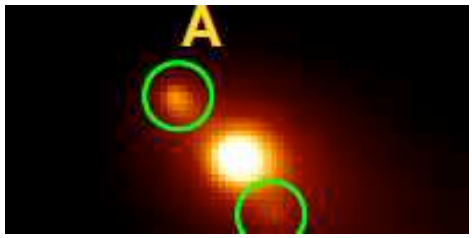
September 26, 2013

The IAA opens its doors the last September's Friday during the European Researchers Night celebration. A unique opportunity to learn about the Universe from the astronomers' mouth.

TELESCOPES THAT DO EVERYTHING

October 9, 2013

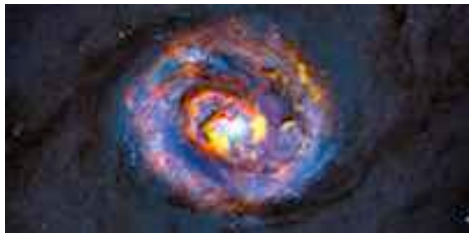
Robotic telescopes study everything –from objects in our Solar System up to galactic nuclei and transitory phenomena such as gamma-ray explosions– without human intervention.



FIRST TIME OBSERVATION OF THE FRAGMENTATION OF A MAIN-BELT COMET

October 17, 2013

P/2013 R3 (CATALINA/PANSTARRS), classified as a "main-belt comet", is an unusual asteroid that exhibits comet-like features.



DOES THE DIET OF A SUPERMASSIVE BLACK HOLE AFFECT ITS HOST GALAXY?

October 24, 2013

Using the ALMA telescope, it has been possible to observe the complex system of rings, bars and spirals that guide gas toward NGC 1433 central super-massive black hole.

SPANISH COMPANIES AND RESEARCH CENTRES JOIN THE SKA PROJECT

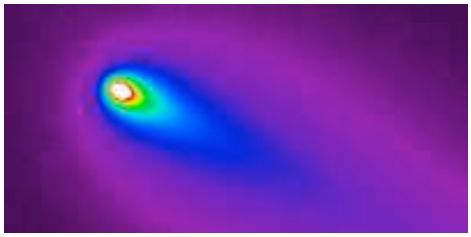
November 4, 2013

Spanish researchers and engineers will participate in the final design of antennas, data transmission, and telescope management and monitoring software for the Square Kilometre Array (SKA), the largest and most sensitive radio telescope in the world.

TEN BILLION YEARS OF COSMIC EVOLUTION WITHIN ARM'S REACH

November 13, 2013

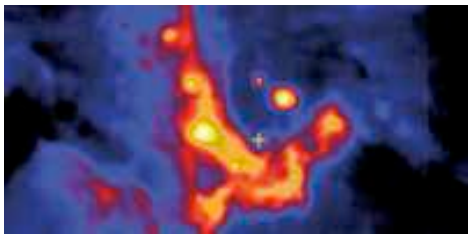
Developed at the Calar Alto Observatory, ALHAMBRA has identified, classified and calculated the distance of more than half a million galaxies distributed in eight different celestial regions.



ISON COMET UNDERGOES ACTIVITY BURST AND BECOMES VISIBLE TO THE NAKED EYE

November 14, 2013

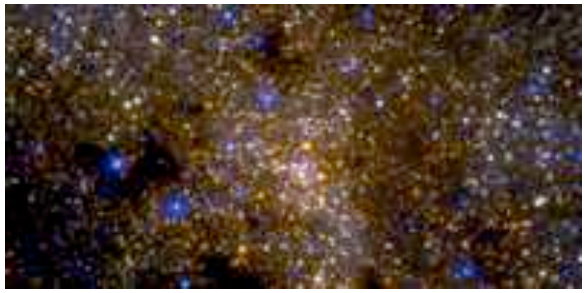
ISON will graze the Sun on November 28. Researchers at the IAA report a sudden brightness increase associated to the gas production of this comet recently arrived from the outer boundaries of the Solar System.



BLACK HOLE IN CENTRE OF MILKY WAY SERVES AS EXPERIMENTAL LABORATORY

November 18, 2013

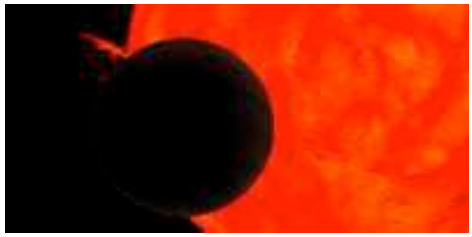
Experts from around the world meet this week at the IAA to discuss the progress made on the study of the centre of our galaxy.



IAA RESEARCHER AWARDED AN EUROPEAN RESEARCH COUNCIL CONSOLIDATOR GRANT TO STUDY THE CENTER OF THE MILKY WAY

December 11, 2013

This highly prestigious grant offers attractive long-term funding for projects with potential groundbreaking character led by young, promising researchers.



DOOMED PLANET FORESHADOWS EARTH'S FATE

December 13, 2013

A group of astronomers has found a doomed planet that within 55 million years - a mere eye blink, on astronomical scales - will be swallowed by its host star.

LIFTOFF FOR ESA'S BILLION-STAR SURVEYOR

December 18, 2013

By making accurate measurements of the positions and motions of 1% of the total population of roughly 100 billion stars, it will answer questions about the origin and evolution of our home Galaxy.

THE IAA IN THE MEDIA

A FULL YEAR OF AMAZING SCIENTIFIC AND TECHNOLOGICAL RESULTS. MANY OF THEM HAVE BEEN ECHOED IN THE MEDIA.

Científicos andaluces analizarán datos del satélite Gaia para hacer el mapa 3D de la galaxia
granadaenlared.com December 26, 2013

"Gaia nos dará la mejor regla para medir el Universo que jamás hayamos tenido"
granadaenlared.com December 19, 2013

Despega la misión Gaia, que proporcionará el primer mapa en 3D de la Vía Láctea
granadaenlared.com December 18, 2013

Descubren un exoplaneta que morirá como la Tierra
La Información December 16, 2013

¿Cómo es el ocaso y muerte de un planeta?
El Economista December 16, 2013

Ocaso y muerte de un planeta
granadaenlared.com December 16, 2013

Kepler-91 b, el planeta que acabará siendo devorado por una estrella gigante roja
RTVE December 16, 2013

Descubren un exoplaneta que morirá como la Tierra
La Información December 16, 2013

Un investigador del IAA recibe una prestigiosa ayuda internacional para el estudio del centro de la Vía Láctea
Radio Granada (SER) December 11, 2013

Rainer Schödel, del IAA, lidera una investigación del centro galáctico
Granada Hoy December 11, 2013

Un investigador del IAA recibe una prestigiosa ayuda internacional para el estudio del centro de la Vía Láctea
granadaenlared.com December 11, 2013

De Holanda o Italia salen investigadores con estrategia. De España, en estampida
Granada Hoy December 9, 2013

La evolución del universo en 10.000 millones de años
Europa Press December 3, 2013

Un catálogo de galaxias del espacio profundo traza la evolución del universo
laverdad.es December 2, 2013

Un catálogo de galaxias del espacio profundo traza la evolución del universo
EFE December 2, 2013

Un catálogo de galaxias del espacio profundo traza la evolución del universo
laverdad.es December 2, 2013

Un catálogo de galaxias del espacio profundo traza la evolución del universo
EFE December 2, 2013

El Sol, en su máximo de actividad pero "prudente"
Diario de Navarra November 30, 2013

El Sol se encuentra en su máximo de actividad magnética, pero «prudente»
Diario Información November 29, 2013

El Sol, en su máximo de actividad pero "prudente"
EFE November 29, 2013

El Sol, en su máximo de actividad pero "prudente"
Terra.es November 29, 2013

El Sol, en su máximo de actividad pero 'prudente'
La Vanguardia November 29, 2013

La mejor foto de familia del universo
El País November 24, 2013

Arranca la segunda edición de Famelab en España
granadaenlared.com November 21, 2013

UNIA organiza desde este miércoles el taller de divulgación científica 'Ciencia para todos los públicos'
La Información November 20, 2013

Granada no es un agujero negro para la investigación astrofísica
La Información November 19, 2013

El cometa Ison se despliega
El País November 19, 2013

Granada no es un agujero negro para la investigación astrofísica
Radio Granada (SER) November 19, 2013

Ver un cometa a simple vista
El Faro de Vigo November 15, 2013

El cometa ISON ya es observable a simple vista
Muy Interesante November 15, 2013

'El cometa del siglo', a simple vista
Noticias Cuatro November 15, 2013

Ison, el cometa del siglo, ya es visible a simple vista
La Gaceta (Argentina) November 15, 2013

Aumento de brillo de ISON: ¿Intensificación de actividad o indicio de fragmentación?
El Nacional (Venezuela) November 15, 2013

Ison, el cometa del siglo, ya es visible a simple vista
El Esquiú November 15, 2013

ISON: El cometa ya se puede ver a simple vista
La Voz de Galicia November 15, 2013

'El cometa del siglo', a simple vista
TeleCinco November 15, 2013

El cometa ISON sufre un estallido de actividad y se hace visible
La Gaceta November 15, 2013

El cometa ISON sufre un estallido de actividad y ya es observable a simple vista
Noticias de Ciencia y Tecnología November 15, 2013

Un gigante visible
CNN Expansión November 15, 2013

Cometa ISON es cada vez más visible
La Tercerca November 15, 2013

El cometa ISON sufre un estallido y ya es visible a simple vista
La Vanguardia November 15, 2013

Cometa ISON es cada vez más visible
Informe21 November 15, 2013

Un cometa observable a simple vista
Ideal November 15, 2013

El cometa ISON ya se ve a simple vista
ABC November 15, 2013

ISON: 'El cometa del siglo' se puede observar a simple vista
RT Noticias November 15, 2013

El cometa ISON ya puede observarse a simple vista
teinteresa.es November 15, 2013

El cometa Ison registra un estallido y se hace visible
La República November 15, 2013

El cometa ISON se hace visible tras un reciente estallido de actividad
El Imparcial November 15, 2013

El cometa ISON ya se aprecia a simple vista por un estallido de actividad
Antena 3 November 15, 2013

Un paseo por la historia del Universo
El Mundo November 15, 2013

El cometa ISON sufre "un estallido" de actividad y se hace observable "a simple vista"
RTVE November 15, 2013

El cometa ISON sufre un estallido de actividad y ya se observa a simple vista
Panamá On November 15, 2013

El cometa ISON
La Voz de Tenerife November 15, 2013

Diez mil millones de años de evolución cósmica al alcance de la mano
La Razón

Presentan el mayor atlas del universo, un sondeo pionero de medio millón de objetos que explora su evolución
Europa Press 14 November, 2013

El cometa Ison registra un estallido de actividad y se hace visible
El País November 14, 2013

El cometa ISON sufre un estallido de actividad, observable ya a simple vista
EFE November 14, 2013

Proyecto Alhambra: diez mil millones de años al alcande de la mano
Granada Hoy November 14, 2013

Diez mil millones de años de evolución cósmica al alcance de la mano
El Economista November 13, 2013

Se presenta 'ALHAMBRA Survey'
Ideal Granada November 13, 2013

Diez mil millones de años de evolución cósmica al alcance de la mano
Agencia SINC November 13, 2013

La UGR y el IAA participan en el mayor telescopio del mundo
Granada Hoy November 6, 2013

El mayor radiotelescopio del mundo contará con tecnología española
El Economista November 5, 2013

El mayor radiotelescopio del mundo contará con tecnología española
Agencia SINC November 4, 2013

Así ha sido el eclipse de sol híbrido
Terra.es October 31, 2013

El eclipse del domingo apenas será "un bocadito" en el sol visto desde Madrid
teinteresa.es October 31, 2013

El eclipse del domingo apenas será "un bocadito" en el sol visto desde Madrid
La Información October 31, 2013

Andalucía impulsará acciones específicas que favorezcan el desarrollo del sector espacial
Actualidad Aeroespacial October 25, 2013

Un funeral por la ciencia
Granadaimedia October 17, 2013

Empleados de Calar Alto aceptan una reducción de sueldo del 15% y preparan la negociación del nuevo convenio
Europa Press October 17, 2013

La fragmentación de un cometa, al alcance de la mano
Radio Granada (SER) October 17, 2013

Observan el primer cometa del cinturón principal dividido en cuatro fragmentos
El Mercurio digital October 17, 2013

Telescopio Canarias ve un cometa del cinturón principal dividido en fragmentos
El Día October 17, 2013

Astrofísicos estudian desplegar 20 telescopios robóticos por el mundo
EFE October 10, 2013

Torremolinos reúne a más de 80 especialistas en un congreso de telescopios
La Opinión de Málaga October 7, 2013

Más de 80 especialistas de 22 países abordarán el desarrollo y el uso de telescopios robóticos autónomos
Europa Press October 5, 2013

Torremolinos acoge a 80 especialistas de 22 países, expertos en telescopios robóticos autónomos
ivecinos.es October 4, 2013

Las estrellas toman protagonismo en Almería
teinteresa.es September 19 , 2013

El Observatorio de Calar Alto negocia recortes salariales con los empleados para mermar su previsión de déficit
La Vanguardia September 19, 2013

La ciencia de la risa
El País September 18, 2013

La Noche de los investigadores reunirá en Granada a casi 2.000 ciudadanos con 143 investigadores
Andalucía Información September 12, 2013

La investigación científica se desvela
Granada Hoy September 12, 2013

La Noche de los Investigadores reunirá en Granada a casi 2.000 ciudadanos con 143 investigadores
granadaenlared.com September 12, 2013

Aficionados españoles obtienen las mejores imágenes del círculo polar ártico desde la estratosfera
elboletin.com August 22, 2013

Viaje entre enanas blancas y estrellas de neutrones
Noticias de la Ciencia y la Tecnología August 20, 2013

Nieve y estrellas para combatir el calor
Ideal Granada August 15, 2013

Destellos de luz desde la Sierra
Granada Hoy August 12, 2013

Unas 800 personas observan las Perseidas
Europa Press August 11, 2013

Diez sitios para observar la lluvia de estrellas
ABC August 9, 2013

Sierra Nevada abre el sábado para ver las Perseidas a 2.700 metros de altura
Ideal Granada August 7, 2013

Sierra Nevada abre este sábado el telecabina Borreguiles para observar las Perseidas a 2.700 metros
La Información August 7, 2013

Las llamadas 'Lágrimas de San Lorenzo' alcanzarán su máximo de actividad en la noche del 11 al 12 de agosto
Costa Digital August 7, 2013

Descubren un raro asteroide con cola de cometa
Tendencias 21 July 30, 2013

El asteroide que quería ser cometa
pysnnoticias.com July 27, 2013

El nuevo telescopio realiza una captura histórica en su primer día
Huelva Información July 27, 2013

El asteroide que quería ser cometa
La Voz de Tenerife July 27, 2013

Huelva alberga primer telescopio robótico de gran campo del hemisferio norte
Ideal July 25, 2013

Huelva alberga un nuevo telescopio robótico de gran campo
El Economista July 25, 2013

El Arenosillo se convierte en el 'gran hermano' del cosmos
Huelva Información July 22, 2013

Crear conocimiento y tecnología
El País July 21, 2013

Granada será la sede del XXI Congreso Estatal de Astronomía
granadaenlared.com July 18, 2013

El Parque de las Ciencias, sede de la astronomía 'amateur'
Granadaimedia July 18, 2013

El Parque de las Ciencias será la sede del XXI Congreso Estatal de Astronomía en 2014
Europa Press July 18, 2013

El Parque de las Ciencias será la sede del XXI Congreso Estatal de Astronomía en 2014
Europa Press July 18, 2013

Granada acoge una prestigiosa cita científica internacional sobre los plasmas de baja temperatura
granadaenlared.com July 16, 2013

Investigadores estudian en Granada propiedades de plasmas de baja temperatura
Ideal Granada July 16, 2013

Captada en imágenes la colorida muerte de una nebulosa planetaria
El Imparcial July 15, 2013

Granada acoge una cita científica sobre los plasmas de baja temperatura
Granada Digital July 15, 2013

¿Es doble la estrella central de la nebulosa del Esquimal?
Tendencias 21 July 13, 2013

¿Es doble la estrella central de la nebulosa del Esquimal?
13 July, 2013
Noticias de la Ciencia y la Tecnología July 13, 2013

¿Es la estrella central de la Nebulosa del Esquimal un sistema binario?
granadaenlared.com July 12, 2013

¿Es doble la estrella central de la nebulosa del Esquimal?
Agencia SINC July 12, 2013

Observada la tercera estrella del sistema HD 150136
7 July, 2013
Noticias de la Ciencia y la Tecnología July 7, 2013

La evolución del cosmos, a través de un catálogo
ABC Andalucía June 26, 2013

El catálogo Alhambra desvela los secretos de la evolución del cosmos
Tendencias 21 June 26, 2013

Se publica el "oro" de ALHAMBRA, el catálogo definitivo para el estudio de la evolución del universo
Noticias de la Ciencia y la Tecnología June 26, 2013

El Instituto de Astrofísica publica el catálogo definitivo para el estudio de la evolución del Universo
Radio Granada (SER) June 25, 2013

'Alhambra survey', un catálogo donde caben cien mil galaxias
Granada Hoy June 25, 2013

Un minucioso mapa cósmico español
La Opinión A Coruña June 24, 2013

Llega el 'oro' de ALHAMBRA, el mejor catálogo para estudiar la evolución del universo
Tendencias 21 June 24, 2013

La Universitat de València participa en el catálogo más detallado de galaxias del espacio profundo
La Información June 24, 2013

Se publica ALHAMBRA, el mejor catálogo para estudiar la evolución del universo
Agencia SINC June 24, 2013

Publican el catálogo definitivo para el estudio de la evolución del Universo
Ideal Granada June 24, 2013

Publican desde Granada el catálogo definitivo para el estudio de la evolución del Universo
Ideal Granada June 24, 2013

"El reto ahora es preparar Calar Alto para funcionar en un futuro sin los alemanes"
Diario de Almería June 15, 2013

Un telescopio solar viaja en globo por el Ártico
Tendencias 21 June 12, 2013

Viaje en globo a la estratosfera para explorar el Sol
El Mundo June 12, 2013

Un telescopio solar viaja en globo por el Ártico
Lukor June 12, 2013

El telescopio solar 'SUNRISE' viaja en globo por el Ártico
Econoticias June 12, 2013

El telescopio solar SUNRISE vuelve a surcar el ártico en globo
La Voz de Tenerife June 12, 2013

El telescopio SUNRISE surcará la estratosfera alrededor del Círculo Polar Ártico para investigar la superficie solar
La Información June 12, 2013

"El Observatorio de Calar Alto está ahora en su mejor momento"
Diario de Sevilla June 10, 2013

Estudian jets relativistas, uno de los fenómenos más energéticos del universo
Ideal Granada June 10, 2013

"El Observatorio de Calar Alto está ahora en su mejor momento"
Diario de Cádiz June 10, 2013

Un rendimiento científico al alza castigado con la partida más baja
Granada Hoy June 10, 2013

"El Observatorio de Calar Alto ahora se encuentra en su mejor momento"
Diario de Almería June 9, 2013

El Instituto de Astrofísica rechaza la limitación presupuestaria en el observatorio de Calar Alto
Radio Granada (SER) June 7, 2013

Cutbacks kick off kerfuffle over Spanish-German observatory
Nature (blogs) June 7, 2013

El nuevo director del Observatorio de Calar Alto saluda a la plantilla tras el cese de David Barrado
Europa Press June 7, 2013

Un rendimiento científico al alza castigado con la partida más baja
Diario de Almería June 7, 2013

Identifican los compuestos que forman la neblina de Titán
El Imparcial June 6, 2013

Los astrónomos denuncian el acuerdo del CSIC sobre el observatorio de Calar Alto
El País June 6, 2013

Astrónomos critican el 'optimismo' del CSIC con el Observatorio de Calar Alto
Terra.es June 6, 2013

Apagón en el cielo de Europa
elalmeria.es June 6, 2013

El Instituto de Astrofísica de Andalucía censura el "drástico recorte" para el Observatorio de Calar Alto
News España June 6, 2013

La Sociedad Española de Astronomía reprocha al CSIC su "optimismo" ante la "reducción" de recursos en Calar Alto
Ideal Almería June 6, 2013

Científicos de Granada identifican los compuestos que forman la neblina que cubre Titán
Radio Granada (SER) June 6, 2013

Los astrónomos denuncian que el acuerdo para salvar Calar Alto tenía 'trampa'
La Información June 6, 2013

El recorte presupuestario de Calar Alto obliga a despedir a parte de la plantilla
Almería 360 June 5, 2013

Resuelto el misterio de la espesa neblina de Titán
Agencia SINC June 5, 2013

El Instituto de Astrofísica de Andalucía censura el "drástico recorte" para el Observatorio de Calar Alto
Europa Press June 5, 2013

El Instituto de Astrofísica de Andalucía muestra su total desacuerdo con el drástico recorte para el CAHA
Ideal Granada June 5, 2013

El CSIC garantiza que Calar Alto continuará su actividad hasta 2018
Granada Hoy June 5, 2013

El Instituto de Astrofísica de Andalucía muestra su total desacuerdo con el drástico recorte para el CAHA
Ideal Almería June 5, 2013

El IAA afirma que el nuevo convenio sobre Calar Alto centra su novedad en el "drástico recorte presupuestario"
20 Minutos June 5, 2013

PSOE, PP e IU, tres puntos de vista diferentes sobre el futuro de Calar Alto
La Voz de Almería June 5, 2013

El recorte de Calar Alto pone en peligro de la investigación en Granada, según IU
4 June, 2013
Radio Granada (SER) June 4, 2013

IU dice que el recorte presupuestario en el Observatorio de Calar Alto afectará a la investigación de Granada
Ideal Granada June 4, 2013

Españoles participan en el lanzamiento de un telescopio solar en el Ártico
ABC June 4, 2013

Firmada continuidad del Observatorio de Calar Alto, que tendrá nuevo director
Terra.es June 4, 2013

El recorte de Calar Alto pone en peligro de la investigación en Granada, según IU
Radio Granada (SER) June 4, 2013

IU dice que el recorte presupuestario en el Observatorio de Calar Alto afectará a la investigación de Granada
Ideal Granada June 4, 2013

El telescopio solar SUNRISE vuelve a surcar el Ártico en globo
Granada Hoy May 30, 2013

Comienza hoy la décima edición de la Semana de Astronomía y Astrofísica
La Voz de Almería May 29, 2013

Cajamar acogerá la X Semana de Astronomía y Astrofísica
elalmeria.es May 28, 2013

Este verano se podrá visitar el observatorio de Sierra Nevada
Ideal Granada May 28, 2013

Almería, fiel a su cita con la astronomía
Novapolis May 27, 2013

Un referente para la NASA en la Luz de Campo Extragaláctia
La Semana de Dos Hermanas May 27, 2013

La plantilla de Calar Alto pide a la administración que se implique
Granada Hoy May 25, 2013

Clausura del proyecto PIIISA, que busca acercar a los estudiantes al mundo de la investigación profesional
Radio Granada (SER) May 21, 2013

Aras de Olmos reúne a expertos para analizar los sistemas planetarios y las estrellas
ABC Valencia May 20, 2013

La Junta de Andalucía muestra por escrito su disposición a implicarse en el sostenimiento de Calar Alto a partir de 2014
Noticias de Almería May 19, 2013

Miembro de IAA, finalista de concurso internacional de monólogos científicos
Ideal Granada May 12, 2013

Ocho científicos se verán las caras en el Teatro Alfil en la final de Famelab
Tendencias 21 May 12, 2013

Soy astrofísico y mi jefe ya me ha pedido que si gano lleve instrumentos
Ideal Granada May 10, 2013

Lo mío no es una fuga de cerebros, es una oportunidad
Información May 6, 2013

China dice adiós a los gases que dañan la capa de ozono
La Razón May 5, 2013

La Ruta de los Primeros Pobladores de Europa
Ideal Granada May 4, 2013

El Gobierno fijó 8,2 millones en 2011 para mantener Calar Alto hasta 2018
La Voz de Almería May 2, 2013

Denuncian el “engaño” del Gobierno del PP sobre el Observatorio de Calar Alto
El Plural April 27, 2013

El telescopio solar 'Sunrise' se prepara para un nuevo viaje a la estratosfera
Dicyt April 26, 2013

El observatorio astronómico más importante de Europa, víctima de los recortes en investigación
El Diario April 26, 2013

El PSOE critica el "falso acuerdo" del Gobierno con Alemania para el mantenimiento y funcionamiento de Calar Alto
Andalucía Información April 25, 2013

El CSIC y Max Planck mantendrán abierto Calar Alto, uno de los centros astronómicos más importantes de España
La Información April 24, 2013

El CSIC anuncia un acuerdo para salvar el observatorio de Calar Alto, en Almería
El País April 24, 2013

Las explosiones de rayos gamma más violentas del Universo
El Mundo April 22, 2013

Los recortes ponen en la cuerda floja el observatorio de Calar Alto
El País April 16, 2013

Guardan la memoria de su larga infancia
El Porvenir April 15, 2013

Las estrellas guardan "memoria" de su infancia en las etapas finales
Noticias de la Ciencia y la Tecnología April 14, 2013

Las estrellas conservan 'memoria' de sus orígenes
Ideal Granada April 11, 2013

Las estrellas conservan 'memoria' de sus orígenes
Ideal Granada April 11, 2013

Las estrellas tienen «recuerdos»
La Razón April 10, 2013

Las viejas estrellas relatan su infancia
Tendencias 21 April 10, 2013

¿Tienen memoria las estrellas?
Muy Interesante April 10, 2013

Las estrellas viejas guardan un 'recuerdo' de su infancia
Agencia SINC April , 2013

Las estrellas guardan "recuerdos" de su infancia en su ocaso
Europa Press April 9, 2013

Las estrellas tienen "recuerdos"
Terra.es April 9, 2013

Astronomía sin rumbo
El Periódico (Extremadura) April 8, 2013

La aceleración del universo, a través del telescopio de Gérgal
8 April, 2013
elalmeria.es April 8, 2013

“Soles” jóvenes brillan en rayos X en la Pequeña Nube de Magallanes
granadaenlared.com April 5, 2013

Inician la recogida de firmas en favor del Observatorio de Calar Alto
Ideal April 1, 2013

300.000 euros para ver las estrellas
elalmeria.es March 29, 2013

El PP de Almería critica el recorte de hasta el 75% en los presupuestos de Calar Alto
Ideal Almería March 25, 2013

El vórtice del polo sur de Venus se mueve de forma caótica y a gran velocidad
RTVE March 25, 2013

El observatorio de Calar Alto, en la cuerda floja por los recortes en investigación
Almería 360 March 25, 2013

Un grupo de la UPV publica en ‘Nature Geosciencie’ su estudio sobre Venus
El País March 24, 2013

El misterioso remolino polar de Venus
El Correo March 24, 2013

El vórtice polar de Venus se mueve de forma impredecible
El Mundo March 24, 2013

PSOE solicitará al Gobierno explicaciones por el "desmantelamiento" del observatorio astronómico de Calar Alto
El Economista March 22, 2013

Calar Alto afronta un posible cierre o reducción drástica de actividad
Europa Press March 22, 2013

Descubren gas “misterioso” en atmósfera de la mayor luna de Saturno
Milenio March 19, 2013

Un gas misterioso en Titán
El Mundo March 19, 2013

Se detecta un gas misterioso en la atmósfera de Titán, la luna de Saturno
Granada Hoy March 19, 2013

Hallan un gas "misterioso" en la atmósfera de Titán
terra.es March 19, 2013

Hallan un gas "misterioso" en la atmósfera de Titán, la mayor luna de Saturno
El Comercio (Perú) March 19, 2013

Hallan un gas "misterioso" en la atmósfera de Titán, la mayor luna de Saturno
La Información March 19, 2013

Titán, la mayor luna de Saturno, muestra un gas misterioso
El Sol online March 19, 2013

´Misterioso´ gas en luna de Saturno sorprende a científicos
Radio Capital March 19, 2013

Descubren un gas en la alta atmósfera de Titán, oculto hasta ahora
teinteresa.es March 19, 2013

Detectado un gas misterioso en la atmósfera de Titán
La Vanguardia March 18, 2013

Se localiza un gas misterioso en la atmósfera de Titán
pysnnoticias.com March 18, 2013

IU de Almería solicitará en el Parlamento instar al Gobierno a mantener el convenio de Calar Alto
Ideal Almería March 3, 2013

El instrumento astronómico CARMENES buscará planetas como el nuestro
Tendencias 21 February 26, 2013

Encontraron un exoplaneta más pequeño que Mercurio
El Porvenir February 25, 2013

Arranca en Granada la construcción de “CARMENES”, el instrumento que buscará planetas como el nuestro
Radio Granada (SER) February 22, 2013

El instrumento CARMENES buscará otras 'Tierras' desde Andalucía
Agencia SINC February 22, 2013

Investigadores descubren por primera vez un planeta extrasolar más pequeño que Mercurio
terra.es February 21, 2013

Mercurio ya tiene hermano pequeño
ABC Sevilla February 21, 2013

Descubren cuándo le nació la cola a un asteroide
20 February, 2013
El Economista February 20, 2013

El asteroide al que le nació una cola en 2011
RTVE February 20, 2013

En las entrañas de la estrella
Granada Hoy February 18, 2013

El Asteroide 2012 DA14 coincide con el meteorito de Rusia
Ideal Granada February 15, 2013

Asteroides y cometas, pedazos sobrantes de la concepción del sistema solar
Terra.es February 15, 2013

Asteroide 2012 DA14: Google evita su impacto con un doodle
Ideal Granada February 15, 2013

¿Qué es lo que ha caído sobre Rusia?
ABC February 15, 2013

Excluir 100% relación de meteoro ruso y asteroide es imposible, según experto
Terra.es February 15, 2013

El asteroide "descubierto" en Granada, a la vista de todos
Ideal Granada February 15, 2013

Investigadores del Proyecto GLORIA captan una imagen del asteroide 2012 DA14 desde Argentina
Europa Press February 15, 2013

La primera imagen del asteroide 2012 DA14
Finanzas.com February 15, 2013

´Con hielo de Groenlandia y la Antártida reconstruimos la historia magnética del Sol´
Faro de Vigo February 9, 2013

El Instituto de Astrofísica de Andalucía
RNE (A hombros de gigantes) February 4, 2013

La primera historia completa de una galaxia, descrita por astrónomos españoles
ABC February 4, 2013

El sondeo Califa desvela la evolución de galaxias en el tiempo y el espacio
Agencia SINC January 31, 2013

Una tormenta solar fuerte podría dejar sin luz a medio Canadá y parte de EE.UU
La Vanguardia January 29, 2013

Reinventando al astro rey
La Región January 24, 2013

La supernova de Belén
La Razón January 4, 2013

FUNDING

EUROPEAN COMISSION FP7

High-Resolution Solar Physics Network
Reference: 312495
PI: **Luis Bellot Rubio**
Agency: European Commission FP7
Duration: 2013-2017
Amount: 33.960 €

BioStirling-4SKA: Improved efficiency and cost reduction of solar dish systems, with a pilot application as renewable energy option for the SKA telescope
Reference: 309028
PI: Juan Carlos Romero (PI), **Lourdes Verdes-Montenegro Atalaya** (IAA-CSIC co-PI)
Agency: European Commission (FP7), topic ENERGY.2012.2.5-1
Duration: 01/2/2013-31/5/2016
Total funding: 3.941.924€
Amount: 144.212 €

FECYT

Cofinanciación del congreso "Galaxies meet GRBs at Cabo de Gata"
Reference: FCT-13-7356
PI: **Christina Carina Thöne**
Agency: FECyT
Duration: 2013-2014
Amount: 12.000 €

Deconstruyendo la luz
Reference: FCT-13-6281
PI: **Emilio José García Gómez-Caro**
Agency: FECyT
Duration: 2013-2014
Amount: 12.000 €

Proyecto de iniciación a la investigación e Innovación en Secundaria en Andalucía: PIIISA
Reference: FCT-13-6018
PI: **José Manuel Vilchez Medina**
Agency: FECyT
Duration: 2013-2014
Amount: 19.000 €

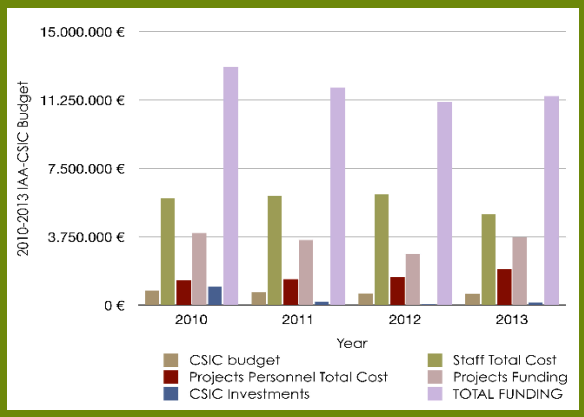
MICINN

Astrofísica galáctica y extragaláctica a la máxima resolución angular y sensibilidad
Reference: AYA2012-32237
PI: **Miguel Angel Pérez Torres**
Agency: MICINN
Duration: 2013-2015
Amount: 187.200 €

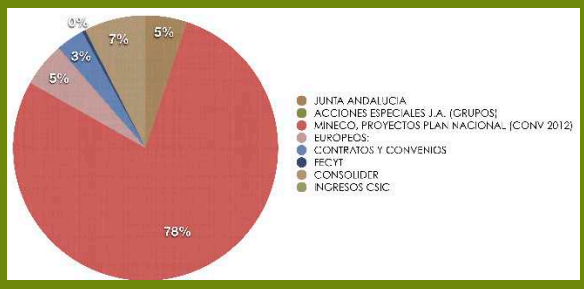
Califa: Calar alto legacy integral field area survey
Reference: AYA2012-31935
PI: **Sebastián Francisco Sánchez Sánchez**
Agency: MICINN
Duration: 2013-2015
Amount: 166.140 €

Diseño detallado, fabricación e integración de SO/PHI
Reference: AYA2012-39636-C06-05
PI: **José Carlos del Toro Iniesta**
Agency: MICINN
Duration: 2013-2014
Amount: 1 226.160 Euros

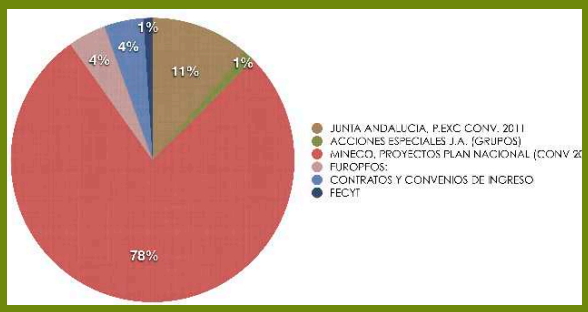
Estudio de las atmósferas planetarias y cometarias. Misión EXOMARS-NOMAD. Fase 2
Reference: AYA2012-39691-C02-01



Time evolution of the IAA budget.



Origin of the IAA 2013 budget by funding agency.



IAA 2013 new funding by agency.

PI: **José Juan López Moreno**
Agency: MICINN
Duration: 2013-2015
Amount: 436.410 €

Herramientas innovadoras para el estudio de fuentes transitorias de altas energías
Reference: AYA2012-39362-C02-C02
PI: **Antonio De Ugarte Postigo**
Agency: MICINN
Duration: 2013-2014
Amount: 187.200 €

In situ exploration of the solar system bodies and remote characterisation of the exoplanetary atmospheres
Reference: AYA2012-32237
PI: **Luisa María Lara López**
Agency: MICINN
Duration: 2013-2015
Amount: 739.440 €

Participación española en la misión CoRoT
Reference: AYA2012-39346-C02-01
PI: **Rafael Garrido Haba**
Agency: MICINN
Duration: 2013-2015
Amount: 187.200 €

Polarimetría robótica, extensión de la red BOOTES en GLORIA y participación en UFFO
Reference: AYA2012-39727-C03-01
PI: **Alberto Javier Castro Tirado**
Agency: MICINN
Duration: 2013-2015
Amount: 231.660 €

REGIONAL GOVERNMENT
JUNTA DE ANDALUCIA

Detección y estudio de planetas alrededor de estrellas poco masivas: contribución española a CARMENES, un espectrógrafo de dos canales para el telescopio de 3.5m de Calar Alto
Reference: P11-FQM-7363
PI: **Pedro José Amado González**
Agency: Junta de Andalucía
Duration: 2013-2015
Amount: 194.810 €

Historia de la formación estelar y evolución química de galaxias en entornos de diferente densidad
Reference: P11-FQM-7058
PI: **Jorge Iglesias Páramo**
Agency: Junta de Andalucía
Duration: 2013-2017
Amount: 234.073 €