

# WORKSHOP REPORT

## New instrumentation and legacy projects for Calar Alto

A workshop funded by  
Red de Infraestructuras en Astronomía (RIA)

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on behalf of the SOC



## Overview

The workshop “*New instrumentation and legacy projects for Calar Alto*” was held at the Instituto de Astrofísica de Andalucía (IAA-CSIC) headquarters (Granada) on October 13th-14th 2016.

A total of 70 people from 8 countries in 3 continents registered to attend the workshop. A total of 23 talks – 3 of them via teleconference from IHEP Beijing, MIT Boston, and Obs. Paris-Meudon – and 4 posters were presented.

The workshop was live-streamed; all the oral contributions of the different sessions of the workshop were made available on the IAA-CSIC Youtube channel at:

<https://www.youtube.com/user/iaaudc/videos>

In addition to the scientific and technological contributions, a special session on Friday morning was devoted to the contributions of the authorities or different public Spanish institutions (Junta de Andalucía, Consejo Superior de Investigaciones Científicas, Universidad de Granada and Universidad de Almería), who attended the workshop and stressed the relevance of Calar Alto observatory as a high-level scientific infrastructure; they expressed the main interests of their respective institutions to take part in the scientific activity of the observatory from different points of view.

From the scientific point of view, the contributions presented can be split into four different categories:

- A first group of contributions was devoted to explain the experience acquired during the different phases of the development of recent astronomical instruments already working at different observatories (e.g. SITELLE @ CFHT, MEGARA @ GTC, CARMENES @ 3.5mCAHA).
- A second group of contributions proposed new instrumental concepts for the Calar Alto telescopes covering different niches in terms of field-of-view, multiplexing and spectral resolution (including a multiobject spectrograph for the Schmidt camera, and several wide-field spectrographs and a multiband camera-spectrograph for the 3.5m telescope).
- The third group of contributions was focused on proposals for legacy projects, i.e. long-term scientific cases to be performed with the current facilities at Calar Alto (e.g. The NIR surveys CANIS and CA-JA, with PANIC; a survey of Virgo cluster dwarf galaxies with PMAS; and other surveys to exploit other facilities (already in operation) at the observatory, like TESS, CHRONOS plus an optical survey of AGNs).
- Finally, we had a fourth group of contributions from technological companies that illustrated their skills acquired during their participation in astronomical instrumentation, some of them in Calar Alto (among which we highlight FRACTAL, PROACTIVE R&D and SENER, as well as the role of INEUSTAR the Spanish association promoting science industry).

## Proposals and summary

From all the interesting proposals presented, we want to emphasize here the ones we think could result in a considerable added value for the quality of the science produced with the facilities at the Calar Alto observatory in the near future, and which are based on new technological development:

- The innoFSPEC Postdam Innovation Center showed the performance of a Multiplex Raman Spectrograph (MRS) and offered it, together with three more optical spectrographs, with the idea of being part of a consortium devoted to the construction of a new spectrograph for the 3.5m telescope at Calar Alto.
- Having an Imaging Fourier Transform Spectrometer would provide Calar Alto with a very powerful instrument to perform optical bidimensional spectroscopy mainly focused on objects with emission lines, after the results on SITELE presented in L. Drissen's talk.
- An improvement in the spectral resolution of CARMENES, aiming at reaching  $< 1 \text{ m s}^{-1}$  in radial velocities would result in new science drivers for the instrument (e.g. lower mass planets -  $< 1M_{\text{Earth}}$  – around the brightest CARMENES targets, and/or terrestrial planets around G and K stars. Of course, this would require an improved thermal, guiding and calibration stability of the instrument, as well as a more performant pipe-line.
- Another interesting proposal was to bring the Marseille Fabry-Perot to Calar Alto as a visitor instrument, to be adapted to the 2.2m and 3.5m telescopes, after negotiating a MoU with the Laboratoire d'Astrophysique de Marseille.
- Finally, we want to remark the need for the replacement of (3 of) the PANIC detectors since the current ones are defective and this is producing a deficit in the instrument performance.

This workshop revealed great interest of the astronomical community for new instrumentation and/or for new legacy projects, aimed at producing excellent science from the Calar Alto observatory in the years to come.

Calar Alto observatory is looking for competitive long-term science cases and associated instruments concepts. The proposals presented in this workshop could be used as a guide-line. Although some of the instrumental ideas could be co-funded by CAHA (from the budget allocated to the ICTS program, i.e. FEDER Funds 2014-2020), it is expected that the final investment should be predominantly externally funded.

It is now the time to open a process to select among the instrumental and legacy projects presented in this workshop, those that most contribute to the development at Calar Alto of cutting-edge science and technology. This process will be opened and organized by the CAHA direction, and will count on the requested scientific assistance from IAA-CSIC.

As soon as a decision is taken, the CAHA director will communicate it to the CAHA Executive Committee. In the case of instrumental concept(s), it(they) should have been previously reported by the RIA, so that it has the approval of the Spanish MINECO.

## **SOC members**

Jesús Aceituno (CAHA, Spain, co-chair)  
Jorge Iglesias (IAA-CSIC, Spain, co-chair)  
Gilles Bergond (CAHA, Spain)  
Nicolás Cardiel (UCM, Spain)  
Angeles Isabel Díaz (UAM, Spain)  
Laurent Drissen (U. Laval, Canada)  
Olga Muñoz (IAA-CSIC, Spain)  
Anna Pasquali (U. Heidelberg, Germany)  
Martin Roth (AIP, Germany)  
Catherine Turon (OPM, France)  
José Manuel Vílchez (IAA-CSIC, Spain)  
Almudena Zurita (U. Granada, Spain)

## **LOC members**

Ana Guijarro (CAHA, co-chair)  
Carolina Kehrig (IAA-CSIC, co-chair)  
Salvador Duarte (IAA-CSIC)  
Gilles Bergond (CAHA)  
Esther Calle (U. Cantabria)  
Jorge Iglesias (IAA-CSIC)  
Jesús Aceituno (CAHA)

## Scientific program

<b>Thursday 13th October</b>		
08:30 – 09:00	Registration at IAA	
09:00 – 09:10	Opening and welcome	
09:10 – 09:30	Jesús Aceituno (CAHA)	CAHA perspective for the near future
09:30 – 10:15	Martin Roth (AIP, Germany)	Astrophotonics – Innovation for astronomical instrumentation <b>(Invited)</b>
10:15 – 11:00	Laurent Drissen (U. Laval, Canadá)	Imaging Fourier Transform Spectroscopy: the case for SITELLE <b>(Invited)</b>
11:00 – 11:20	Jorge Iglesias (IAA-CSIC)	An IFTS for the 2.2m and 3.5m telescopes
11:20 – 11:50	Coffee break & poster viewing	
11:50 – 12:10	Johan Comparat (IFT-CSIC)	CASE LoRCA
12:10 – 12:55	Armando Gil de Paz (UCM)	MEGARA: the race for a niche <b>(Invited)</b>
12:55 – 13:15	Stefano Minardi (AIP, Germany)	How can photonics improve future astronomical instrumentation?
13:15 – 13:35	Dominik Bomans (U. Bochum, Germany)	High spectral resolution nebular 3D spectroscopy – technical options and legacy science
13:35 – 15:00	Lunch	
15:00 – 15:25	Ignasi Ribas (ICE-CSIC)	CARMENES: the first 9 months of operations
15:25 – 15:50	Andreas Quirrenbach (U. Heidelberg, Germany)	CARMENES – 2019 and beyond
15:50 – 16:10	George Ricker (MIT, USA)	The Transiting Exoplanet Survey Satellite (TESS) Mission
16:10 – 16:40	Coffee break & poster viewing	
16:40 – 17:25	Klaus Meisenheimer (MPIA, Germany)	CANIS – the Calar Alto Northern Infrared Survey <b>(Invited)</b>
17:25 – 17:45	Anna Pasquali (U. Heidelberg, Germany)	The Calar Alto study of environmental effects in the Virgo cluster
17:45 – 18:05	Alberto Molino (U. Sao Paulo, Brazil)	The CA-HA survey
18:05 – 18:25	Catherine Turon (Obs. Paris-Meudon, France)	The ESA GAIA mission and its possible synergies with CAHA
18:25 – 18:45	Benito Moralejo (AIP, Germany)	Commissioning the Potsdam MRS spectrograph: a multi-object instrument legacy of MUSE

## Friday 14th October

09:30 – 10:40	Contributions from regional Minister of Junta de Andalucía and representatives of CSIC, and universities of Granada and Almería	
10:40 – 11:10	Coffee break & poster viewing	
11:10 – 11:30	Fco. Javier Cáceres	The Asociación Española de Industria de la Ciencia (INEUSTAR)
11:30 – 11:50	Ismael Martínez	FRACTAL SLNE. A technological company for Astronomical instrumentation and software
11:50 – 12:10	Joan Manel Casalta	SENER experience in instrumentation development
12:10 – 12:30	Juan Herranz	Engineering challenges overcome in CARMENES-NIR by means of a collaboration PROACTIVE R&D and IAA-CSIC
12:30 – 12:50	David Barrado (CAB-INTA-CSIC)	CHRONOS: towards an auto-consistent and absolute age scale
12:50 – 13:10	Jian-Min Wang (IHEP Beijing, China)	Reverberation mapping of super-Eddington accreting AGNs
13:10 – 13:30	Antonio de Ugarte (IAA-CSIC)	Instrumentation for the characterisation and follow-up of transient sources
13:30 – 13:45	Closing remarks	