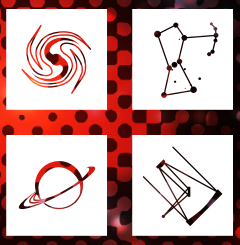
Institute of Astrophysics and Space Sciences
2016 Activity Report



ia
instituto de astrofísica
e ciências do espaço

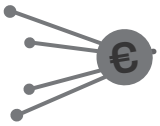
MISSÃO DO IA
IA MISSION

INVESTIGAÇÃO RESEARCH

ENSINO PRÉ E PÓS-GRADUADO EDUCATION AT THE GRADUATE AND UNDERGRADUATE LEVELS

APOIO A ESCOLAS PRIMÁRIAS E SECUNDÁRIAS SUPPORT TO PRIMARY AND SECONDARY SCHOOLS

COMUNICAÇÃO DE CIÊNCIA E DIVULGAÇÃO DA ASTRONOMIA SCIENCE OUTREACH AND POPULARISATION OF ASTRONOMY



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ADMINISTRATION AND SERVICES

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24 COLABORADORES
COLLABORATORS

62 INVESTIGADORES
RESEARCHERS

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ORIGIN AND EVOLUTION OF STARS AND PLANETS

GALÁXIAS, EVOLUÇÃO
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EVOLUTION OF T

RUMO A UM ESTUDO ABRANGENTE DE ESTRELAS
TOWARDS A COMPREHENSIVE STUDY OF STARS

A DETEÇÃO E CARACTERIZAÇÃO DE OUTRAS TERRAS
TOWARDS THE DETECTION AND CHARACTERIZATION OF OTHER EARTHS

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PROGRAMAS DOUTORAIS
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eLISA 2034

Canada France Hawaii Telescope

European Space Agency

VLT: ESPRESSO 2018
MOONS 2019
NIRPS 2019
HIRES 2026
MOSAIC 2026
PORTUGUESE ALMA CENTRE OF EXPERTISE

European Southern Observatory

COSMOLOGIA E DO UNIVERSO
SMOLOGY, AND THE THE UNIVERSE

SISTEMAS E TECNOLOGIA
SPACE AND GROUND SYSTEMS AND TECHNOLOGIES

A HISTÓRIA DA FORMAÇÃO DE GALÁXIAS RESOLVIDA NO ESPAÇO E NO TEMPO
THE ASSEMBLY HISTORY OF GALAXIES RESOLVED IN SPACE AND TIME

VELANDO A
NÂMICA DO
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VEILING THE
NAMICS OF
UNIVERSE

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Institute of Astrophysics and Space Sciences
2016 Activity Report

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COMPETE 2020

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Unit Overview

The mission of the **Instituto de Astrofísica e Ciências do Espaço** (**IA**) is to foster research with the highest impact in the field of astrophysics and space sciences, to support teaching and training of young researchers and students in close collaboration with the Universities of Lisbon and Porto, and to promote wide-ranging science communication activities that enhance public understanding of the Universe and our place in it, as well as awareness of the importance of research in this field.

Our vision is to achieve international leadership in key areas of astrophysics and space sciences, taking full advantage and realising the potential created by the national membership of the European Space Agency (ESA) and the European Southern Observatory (ESO). This is done through state-of-the-art research, enabled by our leading participation in strategic international ground- and space-based projects and missions.

During 2016 we have taken major steps for the realisation of our vision. Our scientific output has increased, while keeping the highest possible quality; the number of students working at the IA has also increased, at all levels: from BSc to MSc to PhD; the participation in major international projects and missions, including with leadership and supporting roles, has been consolidated; the communication of our activity has reached unparalleled levels, bringing state-of-the-art research to ever increasing audiences, through innovative ways.

The success of our activities has created a huge range of opportunities for the future. The strategic approach to these new opportunities implies difficult decisions: while it is tempting to align our activity with all exciting possibilities that appear, it is also necessary a balanced and thoughtful management of available human and technical resources, ensuring the conditions to have the highest scientific impact. We are confident that the choices we have made so far — and will keep making in the future — will result in the highest return for the country and for science.

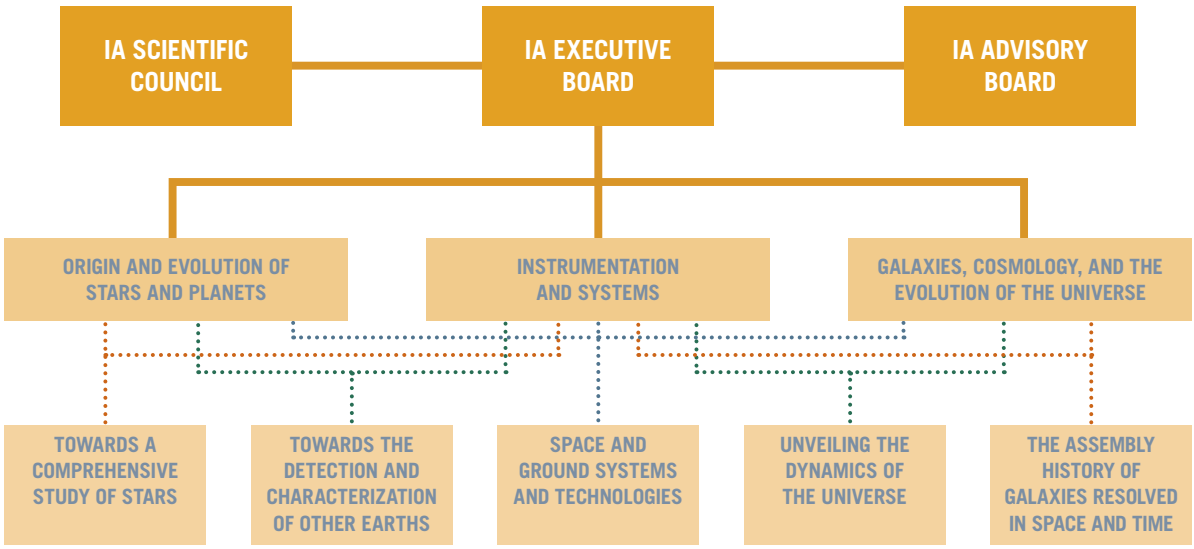
In the following pages we provide a brief overview of IA's dynamic activity during 2016, hopefully making very clear why we face 2017 with great excitement and even higher expectations.

José Afonso, Nuno Santos, João Lima, Alexandre Cabral
IA Executive Board

IA Management

IA is lead by the Executive Board (EB), composed of 2 members from the Porto node (João Lima and Nuno C. Santos) and 2 members from the Lisbon node (José Afonso and Alexandre Cabral). The head of the EB, José Afonso, is the coordinator of the research unit. The EB was elected by the Scientific Council (SC) on its meeting on the 3rd of February 2015. This structure did not suffer any changes in the course of 2016. This follows the normal functioning of the research unit, since according to the internal regulations the EB is elected for a period of 3 years.

SCIENTIFIC MANAGEMENT STRUCTURE



In 2016, the EB has met on a regular basis (every 2 weeks) to coordinate all the activities related to the implementation, scientific and management wise, of the strategic plan of IA. Once every month these meetings include an audience with all thematic line and group leaders, including the leaders of the Science Communication Group. Contacts with the two management institutions (CAUP and FFCUL) were also done whenever needed.

Following the internal regulations of IA, the EB should communicate with the Scientific Council through regular meetings. In 2016, the SC met on the 17th of May. The participants in Porto and Lisbon connected through videoconference system to avoid unnecessary travel costs. The meeting went smoothly. This meeting was also complemented by a large discussion at the IA-ON3 meeting (see below), that took place in Porto, in 13-14 October.

In 2016 IA has also defined the composition of its Advisory Board. Invitations to different internationally recognized scientists were sent, following suggestions from the different group and line leaders. In the end the composition of the Advisory Board was set to include Francesco Pepe (University of Geneva, Switerland, specialist in instrumentation and exoplanet research), Moira Jardine (University of St. Andrews, Scotland, specialist in stellar astrophysics), Yannick Mellier (IAP, France, specialist in

galaxies and cosmology), and Mark McCaughrean (ESA, specialist in star formation and public outreach activities). The first meeting of the advisory board is scheduled for 2017.

In 2016, the EB kept the 3 group leaders as defined in 2015: Origin and Evolution of Stars and Planets (Margarida Cunha), Instrumentation and Systems (Alexandre Cabral), and Galaxies, Cosmology, and the Evolution of the Universe (Polychronis Papaderos). All leaders of the 5 thematic lines were also kept, with exception of the Space and Ground Systems and Technologies thematic line where José Rebordão has asked to be replaced. At the EB's invitation, Manuel Abreu has accepted the coordinating position. The leaders of each thematic line are thus: Towards a Comprehensive study of stars (Mário Monteiro), Towards the detection and characterization of other Earths (Nuno C. Santos), Space and Ground Systems and Technologies (Manuel Abreu), Unveiling the dynamics of the Universe (Francisco Lobo), and The assembly history of galaxies resolved in space and time (José Afonso).

Visitor and young fellowship programs

In 2016 IA started two important programs: the visitor program and the young fellowship program.

The visitor program was established to attract senior scientists to work in IA for periods from 1 week to 1 month (http://www.iastro.pt/ia/visitorProgram.html), in order to contribute to the IA's excellence in research by promoting the interaction of IA's researchers and PhD students with internationally recognised scientists working in areas considered strategic for IA's development. Applications for this program are permanently open, with the evaluation process taking place once every 4 months. In 2016 one scientist was offered a fellowship to spend one week in IA (Petro Petro, from the Crimean Astrophysical Observatory, visited IA on the period 12-16 November 2016). Several other international level researchers have applied and will visit IA in 2017.

The young fellowship program was established to attract young undergraduate students to IA, offering them the possibility to work on small research projects (http://www.iastro.pt/training/bicProgram.html) for three months. In 2016 the initial call was open, having received 33 applications for 10 short-term fellowships starting in March 2017.

IA-ON 3

Since the early days of the IA, the IA-ON meetings were set up as an essential part of a good communication strategy for the IA team. In 2016, during two days (October 13 and 14), the 3rd internal workshop of IA (IA-ON3) took place in Porto. As stated in the rationale for the meeting, the IA-ON3 "marks another internal annual meeting of the IA team, where the progress of the research, outreach, and management activities will be discussed. With the participation of all IA members, IA-ON3 will be a golden opportunity to discuss the IA's strategy and make further improvements, as well as to foster synergies between IA groups across all activity areas.".

The IA-ON 3 had an attendance of 92 participants, which equates to a major part of the IA team. Besides highlighting some of the teams' scientific results, which in 2016 were presented by some of the younger researchers, a significant part of the IA-ON3 was dedicated to produce two SWOT analysis. During part of the afternoon of the first day the team discussed the Institute’s internal matters (e.g., management and internal communication). The afternoon of the second day was dedicated to IA Scientific Strategy. Both SWOT analysis were produced and the IA Board charged with implementing the resulting actions, which should be demonstrated in the following year.

The model followed for the IA-ON3 was generally regarded as extremely useful and important to maintain an excellent research environment, and will certainly be continued in 2017.

The IA team (2016)[1]

Origin and Evolution of Stars and Planets Group

Researchers (PhDs)
Alberto Negrão
Alexandre Santerne (left in september 2016)
Antonio García Hernández (left in october 2016)
Bárbara Rojas-Ayala (left in june 2016)
Chen Jiang (left in december 2016)
Daniel F. M. Folha *
David Luz (left in june 2016)
Elisa Delgado-Mena
Fátima López Martínez (joined in may 2016)
Gabriella Gilli (joined in october 2016)
Isa M. Brandão
João J. G. Lima
João Lin Yun
Jorge Filipe S. Gameiro
Jorge M. C. Grave
Marco Montalto (left in september 2016)
Margarida S. Cunha
Maria Teresa V. T. Lago
Mário J. P. F. G. Monteiro
Mathieu Vrard (joined in may 2016)
M. S. Nanda Kumar (joined in december 2016)
Nuno C. Santos
Pedro M. Palmeirim (joined in september 2016)
Pedro Machado
Pedro Figueira *
Pedro T. P. Viana
Rizia Rodrigues (left in may 2016)
Sérgio A. G. Sousa *
Susana C. C. Barros
Vardan Zh. Adibekyan
Vítor M. M. Costa

Others
Akinsanmi Babatunde (Msc student)
Ana C. S. Rei (PhD student)
Andressa C. S. Ferreira (PhD student)
Ângela R. G. Santos (PhD student)
Benard Nsamba (PhD student)
Daniel Thaagaard Andreasen (PhD student)
Guilherme D. C. Teixeira (PhD student)
Ishan Mishra (internship during oct.-dec. 2016)
Jason J. Neal (PhD student) *
João D. R. Camacho (Msc student)
João P. S. Faria (PhD student)
Joana Oliveira (Msc student)
Jorge H. C. Martins (PhD student)
Luís Filipe Pereira (PhD student)
Luisa M. Serrano (PhD student)
Lupércio B. Bezerra (PhD student)
Miguel Silva (PhD student)
Paola A. Quitral Manosalva (PhD student)
Paulina M. Zaworska (PhD student)
Pedro I. T. K. Sarmento (PhD student)
Raquel M. G. Albuquerque (PhD student)
Ruben Gonçalves (PhD student)
Saeed Hojjatpanah (PhD student)
Salil Dhaka (internship during june-july 2016)
Solène C. Ulmer-Moll (PhD student)

[1] Researchers that work in more than one group are marked with '*'

Galaxies, Cosmology, and the Evolution of the Universe Group

Researchers (PhDs)
Alberto Rozas-Fernández
Andrew J. Humphrey
António C. da Silva
Carla Sofia Carvalho (left in september 2016)
Carlos J. A. P. Martins
Catarina Lobo
Cirino Pappalardo
David Sobral (left in january 2016)
David Wittman (left in september 2016)
Diego Sáez Gómez (left in november 2016)
Diego Rubiera-Garcia
Elvira Leonardo (left in july 2016)
Fernando Buitrago
Francisco S. N. Lobo
Hugo Messias (left in august 2016)
Ippocratis Saltas
Ismael Tereno *
Israel Matute
Jarle Brinchmann
Jean Michel Gomes
José Afonso
José Pedro Mimoso
Lara G. Sousa
Marina Cortês (joined in may 2016)
Nathan Roche (left in may 2016)
Nelson J. Nunes
Noemi Frusciante (joined in november 2016)
Paulo Maurício de Carvalho
Patricio Lagos
Pedro Pina Avelino
Polychronis Papaderos
Rui Agostinho
Sonia Antón
Silvio Lorenzoni
Tiago Barreiro
Tom C. Scott

Others
Ana C. O. Leite (PhD student)
Ana S. Paulino Afonso (PhD student)
Angela Ng (PhD student, left in april 2016)
Arlindo Trindade (PhD student, finished his PhD in june 2016)
Bruno J. C. B. Barros (PhD student)
Fernando Moucherek (PhD student)
Francisco T. O. Cabral (PhD student)
Iris P. Breda (PhD student)
Ismael Ayuso (PhD student)
Ivan Rybak (PhD student)
João Calhau (PhD student)
Lara Sofia Gorgulho Alegre (MSc student)
Leandro S. M. Cardoso (PhD student)
Leyla Seyed Ebrahimpour (PhD student)
Marckelson S. Silva (PhD student)
Rahul Raj (internship from june to july 2016)
Sandra N. Reis (PhD student)
Sandy Gonçalves Morais (PhD student)
Sara Pérez Sánchez (PhD student)
Sérgio Miguel da Graça Santos (MSc student)
Stergios Amarantidis (PhD student)
Vasco M. C. Ferreira (PhD student)

Instrumentation and Systems Group

Researchers (PhDs)
Alexandre Cabral
David C. Alves (from december 2016)
Elena Duarte
Ismael Tereno *
João Dinis
João Coelho
José M. Rebordão
Manuel Abreu
Pedro Figueira *
Sérgio A. G. Sousa *

Others
António Joaquim Marques de Oliveira
Bachar Wehbe (PhD student)
Catarina de Jesus Eira Silva Mendes
David C. Alves (PhD student until december 2016)
Filipe Duarte Sousa Velosa
Jason J. Neal (PhD student) *
João David
João Manuel Sousa Águas
Mahmoud Hayati
Manuel Monteiro *
Pedro Manuel Fonseca Nunes dos Santos
Tiago Magalhães (PhD student)

Interface to Science

Science Communication Group
Ana Alves
Daniel F. M. Folha *
Filipe A. L. Pires
Ilídio André P. M. Costa (joined in september 2016)
João Retrê
Paulo J. T. Pereira
Pedro D. M. Mondim (left in december 2016)
Pedro O. J. Pedrosa
Ricardo S. S. C. Reis
Sérgio Pereira Ribeiro

Administration and Services
Argentina Pereira
Carlos M. A. Santos
Elsa M. P. P. Silva
Manuel Monteiro *
Nelma A. Silva
Paulo Peixoto (left in july 2016)
Sandra M. F. Homem
Sara Berguete Coelho (from july-september 2016)
Teresa Vareta

Research Projects/Programmes

During 2016, there were 15 funded projects in IA, which provided most of the funds available for research related expenses, as well as for outreach and basic expenses.

Projects focused on scientific activities

The research projects that in 2016 were supported by national and European funds are:

(i) **Projects funded by the European Commission (EC):**

SELGIFS – Study of emission line galaxies with integral field spectroscopy – IRSES (PIRSES-GA-2013-612701)
[Start date: 1st October 2013 – End date: 30th September 2017]

EUROVENUS – European Unified Research on Observations of Venus using coordinated space- and Earth-base project – SPACE (FP7-SPACE-2013-606798)
[Start date: 1st October 2013 – End date: 30th September 2016]

SPACEINN – Exploitation of Space Data for Innovative Helio- and Asteroseismology – SPACE (FP7-SPACE-2012-312844)
[Start date: 1st January 2013 – End date: 31st December 2016]

PASTIS – Planet Analysis and Small Transit Investigation Software – IEF (PIEF-GA-2013-627202)
[Start date: 1st October 2014 – End date: 30th September 2016]

ORIGINS – Origins and evolution of life on Earth and in the Universe (Trans-Domain COST Action TD1308)
[Start date: 15th May 2014 – End date: 14th January 2018]

CANTATA – Cosmology and Astrophysics Network for Theoretical Advances and Training Actions (COST Association COST Action CA-15117)
[Start date: 8th April 2016 – End date: 7th April 2020]

(ii) **Research projects funded by Fundação para a Ciência e a Tecnologia (FCT):**

The Gaia-ESO census of the Milky Way: unlocking the secrets of stellar populations (GES) (PTDC/FIS-AST/7073/2014 & POCI-01-0145-FEDER-016880)
[Start date: 1st July 2016 – End date: 30th June 2019]

Overcoming today's challenges in the quest for other Earths (QUEST) (PTDC/FIS-AST/1526/2014 & POCI-01-0145-FEDER-016886)
[Start date: 1st July 2016 – End date: 30th June 2018]

Towards very high-redshift radio galaxies in the reionisation epoch using ALMA (PTDC/FIS-AST/2194/2012)
[Start date: 1st July 2013 – End date: 30th June 2016]

Unveiling the resolved properties of galaxies from near to far (IF/01654/2014/CP1215/CT0003)
[Start date: 30th June 2015 – End date: 29th June 2020]

Gravitational Lensing in the Universe with Euclid (IF/ 01518/2014/GLUE)
[Start date: 30th June 2015 – End date: 29th June 2020]

Towards the precise characterization of Earth-like exoplanets (IF/00028/2014/CP1215/CT0002)
[Start date: 1st May 2015 – End date: 30th April 2020]

The future of Extrasolar Planets: new instrumentation for new science (IF/01037/2013CP1191/CT0001)
[Start date: 1st January 2014 – End date: 31st December 2018]

(iii) ***Infrastructure*** **funded projects (FCT):**

R&D Units: Instituto de Astrofísica e Ciências do Espaço (UID/FIS/04434/2013 & POCI-01-0145-FEDER-007672)
[Start date: 1st January 2015 – End date: 31st of December 2017]

(iv) **Doctoral programme (FCT):**

Doctoral Network in Space Sciences (PhD::SPACE) (PD/00040/2012)
[Start date: 1st October 2013 – End date: 31st of December 2020]

(v) ***Gulbenkian foundation*** **funded research projects:**

Optimization of ESPRESSO Fundamental Physics Tests
[Start: 15th December 2014 – End: 31st May 2016]

(vi) **Cooperation projects funded by Gabinete de Relações Internacionais da Ciência e do Ensino Superior (FCT):**

Understanding the nature of pulsations and the physics of the Ap stars (FCT/CNRS: PICS 2014)
[Start: 1st January 2015 – End: 31st December 2017]

Characterizing Earth-like planets around small stars (Programa Pessoa)
[Start: 1st January 2015 – End: 31st March 2017]

The study of stellar activity for the search and characterization of extrasolar planets (Programa Pessoa)
[Start: 1st January 2014 – End: 31st March 2016]

Projects focused on communication and outreach

During 2016 there were 4 funded outreach projects in IA, which provided funds available for outreach related expenses. These were:

Ciência Viva no Verão em Rede 2016 (CV: 2016-26/446)
[Start date: 1st July 2016 – End date: 31st October 2016]

Ao leme com Ciência Viva (CV: 2016-26)
[Start date: 1st July 2016 – End date: 31st October 2016]

Astrocamp2016 (CV: 2016-24/769)
[Start date: 1st January 2016 – End date: 15th September 2016]

Ciência Viva no Laboratório – Ocupação Cientifica de Jovens nas Férias 2016 (CV: 25-2016)
[Start date: 1st June 2016 – End date: 31st July 2016]

Scientific Output and Activities

The overall scientific output of IA in **2016** was (see Appendix for details):

167
Papers in refereed Journals

11
Papers in Proceedings

139
Communications in international meetings

56
Communications in national meetings

45
Seminars in other institutions

65
Seminars organized at IA

92
Public Outreach talks

12/2
MSc/PhD thesis completed

35
Observing runs

Further to these items, it is relevant to mention that IA researchers published/contributed to 2 books and published 10 official reports, mostly related to the instrumentation projects where IA has a leading participation. Finally, IA organized (as LOC or SOC) 16 national and international conferences and workshops.

The outcome of this productivity is illustrated in the three plots below. We can see that despite the slight decrease in terms of FTE (several researchers left following the end of their contracts), the number of published refereed papers increased significantly (upper panel). We expect this situation to continue in 2017, given that i) there haven't been many new opportunities to hire new young pos-docs (e.g. at FCT level there were relevant changes in the fellowship policy with still difficult to predict consequences), and that ii) the strong participation of IA members in state-of-the-art international collaborations will tend to increase the overall productivity of the team. We should be aware, however, that point "i)" above may have relevant consequences in a mid-term horizon. The plots also show that the accumulated number of citations per paper kept an increasing trend (middle panel), likely reflecting the coherent IA scientific strategy that has been explored throughout recent years (in IA or in its parent research units, CAUP and CAAUL). Finally, the number of citations to papers published by IA researchers (lower panel) did not significantly change with respect to the 2015 value.

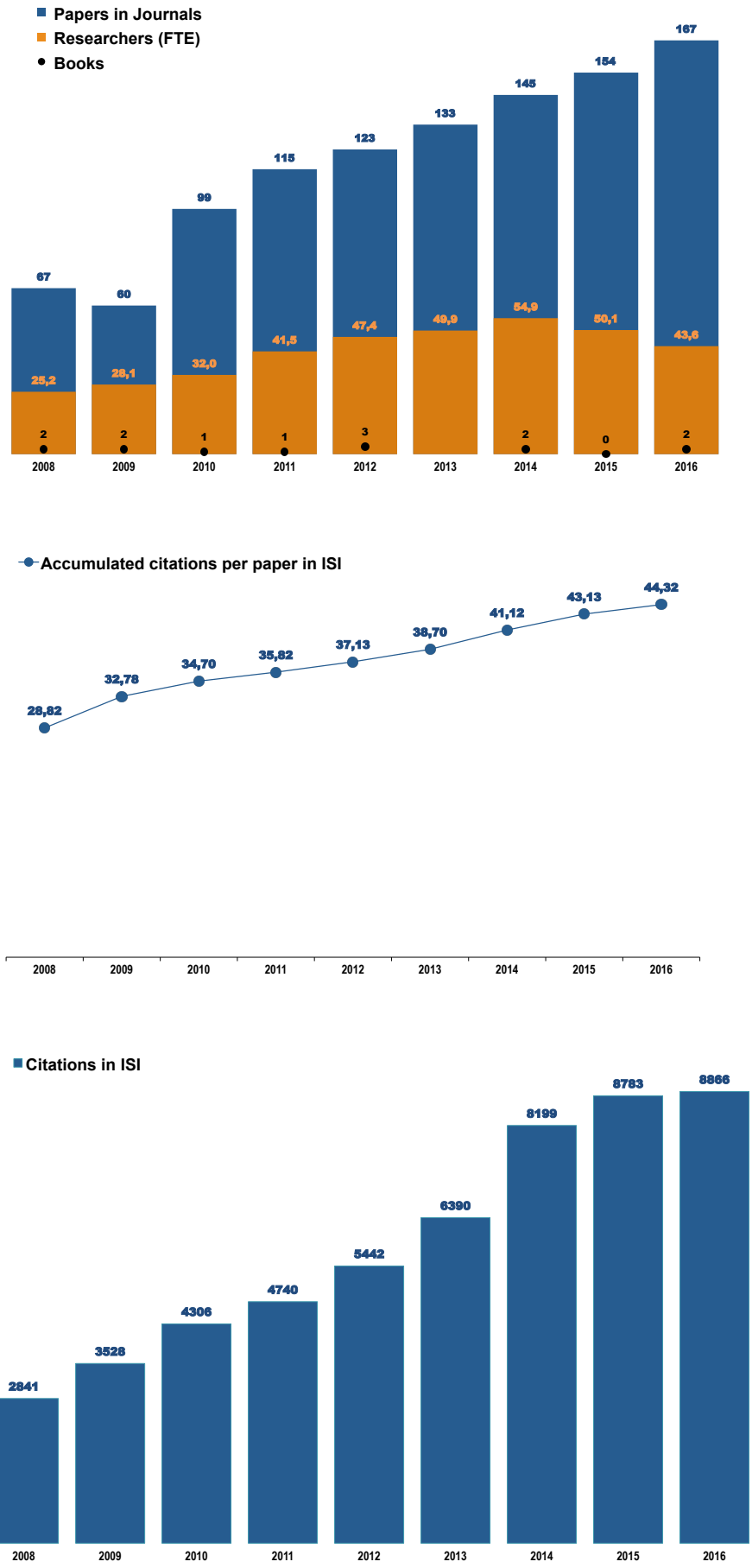


Figure: Time evolution of some scientific productivity indicators.

Report from the Group

Origin and Evolution of Stars and Planets

During 2016, the group on the Origin and Evolution of Stars and Planets continued to dedicate a significant part of its scientific efforts towards the fulfilling of commitments that the team had previously assumed in the context of the development of major ground-based projects and space-based missions, including the ESPRESSO (ESO), HIRES@E-ELT (ESO), SPIrou (CFHT), and NIRPS (ESO) projects, and the CHEOPS mission (ESA). Moreover, the team worked towards the conclusion of the preliminary target lists for the Nasa mission TESS and contributed to finalising the red book for the ESA mission PLATO 2.0, whose adoption is now foreseen for June 2017.

The team has organised seven different meetings, including a large conference and a PhD school, both taking place in Azores, during the summer 2016. In particular, the PhD school, entitled “Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds”, brought together experts on stellar and exoplanet research, the two topics that compose the group. The group has also continued to work towards the consolidation of the interaction between the thematic lines “Towards the detection and characterisation of other Earths” and “Towards a comprehensive study of stars”. The monthly meetings have continued, gathering together all members from the two thematic lines, with a change of format during the second half of the year. In addition, members of both thematic lines often participated in the weekly Journal clubs and meetings which are organised by each thematic line.

The distribution of group members among the two thematic lines has been kept even and a number of group researchers continue to contribute effectively to both research lines. During 2016, 7 researchers have left the group and 5 new researchers have joined. Moreover, in 2016, 3 new students have started their PhD under the supervision of members of the group.

Finally, during 2016, two new FCT projects have started with PIs from the group.

Margarida Cunha
Group Leader

Report from the Thematic Line

Towards the detection and characterisation of other Earths

In 2016, Planetary System research at IA kept is main focus in its two major branches: Exoplanet research and Solar System atmospheres.

On the exoplanet side, the team focused on the detection and characterisation (using radial velocity and transit methods) of planets orbiting solar-type stars. Stronger emphasis was given to the search for very low mass (Earth- or Neptune-like) planets, and to the follow-up of Kepler and K2 targets. In this context, we stress our leadership position in several planet search programs with ESO/HARPS (including two ESO Large Program lead by the IA team, one of them approved in 2016), HARPS-N and OHP/SOPHIE telescopes/instruments.

The study of the effects of stellar activity on the detection and characterisation of very low mass planets with radial-velocities is also one of the major goals, having in mind the exploitation of data coming from future instruments such as ESPRESSO (ESO-VLT, 2018), CHEOPS (ESA, 2018), SPIROU (CFHT, 2018), NIRPS (ESO-3.6-m, 2019), Plato (ESA, 2025), and HIRES (ESO/E-ELT, 2025). In all these instruments and missions the team has major participations (e.g. Co-PI'ship and Board membership), and in all cases, our team is responsible for scientific tasks as well as part of the data reduction/analysis pipelines (among other HW and SW participations responsibility of the Instrumentation team in IA).

In the 2018-2020 horizon, this strong participation will allow us to be in a privileged position inside the various consortia to exploit the valuable data coming from these projects: 273 guaranteed nights of observations (GTO) with ESPRESSO at the VLT, and 80% of the time of the CHEOPS ESA mission (both starting in 2018/2019). The new NIRPS project for the ESO/3.6-m telescope was also recently granted by ESO 725 nights of GTO (starting in 2019/2020), and SPIROU will be granted between 500 and 700 GTO nights. Further ahead, our secured participation in the ESA-PLATO and ESO-HIRES (E-ELT) projects guarantee our international leadership role beyond 2025. In this context, it is relevant to say that the team has in 2016 put significant efforts to actively participate and contribute to the definition and preparation of the observations and science definition goals of all these instruments.

The study of the physical properties and chemical abundances of planet hosting stars is also a major field of research within the team. This allows us to place important constraints into the models of planet formation and evolution, as well as on the structure and composition of transiting planets. This work is done in close collaboration with the "stellar" line in IA.

Finally, a continuous investment was done in the development of novel methods for the detection of exoplanet atmospheres, with a focus on the study of reflected light in high resolution spectra. This subject also allows us to interface with the research done in the context of Solar System atmospheres.

Regarding the Solar System's research side, we focused our efforts in the dynamical studies of Venus' mesosphere with the Doppler velocimetry techniques we have developed and fine-tuned, and with an improved cloud tracking method based in phase correlation between images. In the framework of our new collaboration with the Japanese space mission Akatsuki, we prepared a ground based support

campaign (ALMA, VLT/UVES, CFHT/ESPaDOnS). The team has also started to adapt the developed methods (Doppler velocimetry and cloud tracking) in order to study the Giant planets' atmospheres (Jupiter and Saturn).

We should note that in 2016 IA took the important decision to invest in the reinforcement of the existing manpower in Solar System atmospheres, by opening two new pos-doc positions in this domain. The team has now all the conditions to pursue its research until the end of 2017, in view of consolidating the role of the institution in this domain. A new pos-doc position in the field of exoplanet atmospheres was also open as part of a newly started FCT project (July 2016-June 2018), led by our team. The new pos-doc arrived in January 2017.

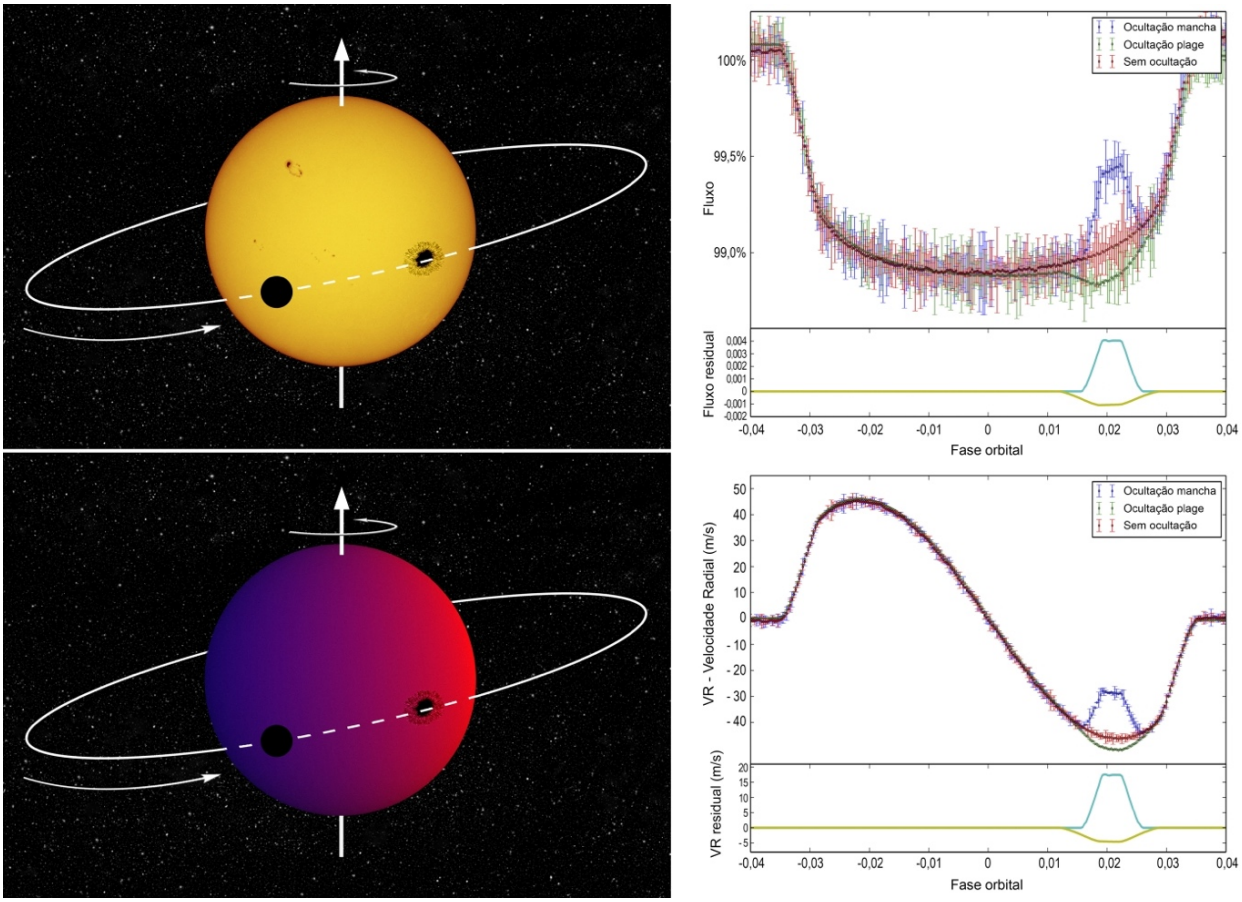


Figure: (Left) Artist's impression of a photometric (top) and spectroscopic (bottom) observation of a transiting exoplanet, with a trajectory that takes it on a path to occult a stellar spot. (Right) Simulated light curve (top) and of radial velocity variation (bottom) of a planetary transit (red), and anomaly curves due to the occultation of, respectively, a stellar spot (blue) and a plage (green). Credit: Artist's impression: Ricardo Cardoso Reis (IA/UPorto). Plots: Oshaugh et al. 2016.

In the next few lines we describe some results led by our team that illustrate the high level of the research done:

1. A study led by the team has shown that the measurement of the angle between the orbital plan and the stellar equator of a transiting planet (one important variable to understand the process of planet formation and evolution) can be measured wrong by the presence of stellar active regions in the stellar photosphere (Oshagh et al. 2016 – see figure). These study shows that a proper

model of the signals produced by stellar active regions is very important for the analysis of high precision data coming for a whole new generation of instruments, including the high-resolution spectrograph ESPRESSO. More information at http://www.iastro.pt/news/news.html?ID=47.

2. Several results from the HARPS Large Program survey led by the team to search for planets orbiting metal-poor stars, were published in 2016. These include the detection of a new very low mass, Neptune like planet, orbiting a metal-poor stars (Mortier et al. 2016). A thorough statistical analysis of the stars with the largest number of measurements also revealed the existence of several good candidates. The results also seem to suggest that the frequency of low-mass planets orbiting metal-poor stars may be similar to the one found by other surveys covering the solar-metallicity domain (Faria et al. 2016). The implications for planet formation and evolution models are still unknown. The survey is now gathering more data to verify this result and to search for more low-mass planets. In parallel, the team also led several follow up works to characterise and confirm planet candidates discovered by the Kepler extended mission K2 (e.g. Santerne et al. 2016). A new Large Program with this goal, also led by the team, has been approved by ESO and started in October 2016.

3. Another study led by our team (Faria et al. 2016) has shown that in the case of the benchmark planet CoRoT-7, a rocky planet orbiting one active solar-type star, the use of a mathematical tool called “Gaussian Processes” is very effective to model the effects of stellar activity in the data. Using this approach, the team could retrieve the correct planetary properties, as well as the correct number of planets in the system. This result opens important perspectives for our understanding of the methods to mitigate the noise coming from stellar sources in high precision exoplanet search projects (e.g. ESPRESSO).

4. Our team is leading the development of a pipeline to reduce the light curves of the Kepler – K2 mission and search for planetary candidates. The pipeline has been published this year (Barros et al 2016). The application of the pipeline to the K2 data revealed 172 planetary candidates and 327 eclipsing binary candidates from campaigns 1, 2, 3, 4, 5, and 6. These candidates and the light curves obtained are available for the community, and are being followed for the confirmation and characterisation of exoplanets and binaries.

5. A first-time estimation of the meridional component of the wind in another planet was a breakthrough result from an investigation led by our team, using ground and space based cloud-top wind velocities measured using coordinated measurements with CFHT/ESPaDOnS (Doppler velocimetry) and VEx/VIRTIS (cloud tracking). These results show evidence for a symmetrical, poleward meridional Hadley flow in both hemispheres of Venus (Machado et al., 2016: http://dx.doi.org/10.1016/ j.icarus.2016.12.017).

Thematic line meetings and journal clubs

In 2016 the Thematic line “Towards the detection and characterization of other Earths” organized regular team meetings (once every month) where all team members discuss their present and future work plans, where information about the ongoing projects is discussed, as well as other relevant points. All team meetings are done using a videoconference system, to allow the participation of the researchers in Porto and Lisbon.

A regular journal club (every 2 weeks) is also running (http://www.astro.up.pt/wiki/PlanetJournalClub). In 2016, a total of 32 papers were discussed, covering all topics of interest to the research line. As for the team meetings, all journal clubs are done using a videoconference system.

Finally, in 2016 the team had a meeting outside the institute (historically called 2DEMOC), where all team members joined (in 2016 the venue was in Ribeira de Pena – http://www.iastro.pt/research/conferences/2democ2016) to do team building activities and make a SWOT analysis. This SWOT is used to improve the team organization as well as to build the scientific and management strategy of the team.

Nuno Santos
Thematic Line Leader

Report from the Thematic Line

Towards a comprehensive study of stars

The main goal of this thematic line is to understand the details of the structure and evolution of stars of low and intermediate masses, from the early stages of star formation to late stages of evolution. Increasing importance is being given to the study of rotation and activity both in Young Stellar Objects (YSOs) and in main-sequence stars, as well as to the modelling of star-disk interactions in the former.

Part of the work of the team continues to be centred on the exploitation of seismic data acquired with the NASA satellite Kepler (launched in 2009, and now operating as K2, a new phase of this NASA satellite), as well as on the determination of the global properties of stars in the context of the team's participation in the Gaia-ESO survey.

Simultaneously, the team is getting prepared for the exploitation of future asteroseismic data from the NASA satellite TESS, in relation to which the team leads one of the working groups establish by the Tess Asteroseismic Science Consortium (TASC). In preparation for the adoption by ESA (in June 2017) of the mission PLATO2.0, the team continues also to increase its involvement in the stellar part of the work, in the context of which is leading a work package on seismic diagnostics.

Scientific Highligths for 2016:

The team participated in the EU SPACE project SPACEINN, whose implementation ended in December 2016. Under this consortium the team in Porto contributed to the tools, data and activities of the project. Including the organisation of the final large conference of the project in the Azores (July 2016) as well as an advanced school, jointly with the Exoplanets Thematic Line, also in the Azores (July 2016). The main contribution of the team was through the leadership of a work-package for Dissemination of the results of the project, including several tasks and deliverables that have been completed by the end of the project in 2016.

The ever-growing number of large spectroscopic survey programs has increased the importance of fast and reliable methods with which to determine precise stellar parameters. The team led the work to obtain a new spectroscopic calibration for a fast estimate of Teff and [Fe/H] for a wide range of stellar spectral types. Spectra from a joint sample of 708 stars, compiled from 451 FGK dwarfs and 257 GK-giant stars were used to calibrate FGK dwarfs and GK-giant stars. A new computer code, GeTCal, has been provided for automatically producing new calibration files based on any new sample of stars.

The team also lead a study of the activity-related variations in the solar oscillation properties. The relative importance of the different contributions to the observed variations is not yet fully understood, so the team aim was to estimate the relative contribution from sunspots to the observed activity-related variations in the frequencies of the acoustic modes. The result of this comparison is consistent with a sunspot contribution to the observed frequency shifts of roughly 30 per cent, with the remaining 70 per cent resulting mostly from a global, non-stochastic variation, possibly related to the changes in the overall magnetic field.

During the past decade, several studies reported a correlation between chemical abundances of stars and condensation temperature (also known as Tc trend), but the real astrophysical nature of this correlation is still debated. The team published the work done to explore the possible dependence of the Tc trend on stellar Galactocentric distances. High-quality spectra of about 40 stars observed with the HARPS and UVES spectrographs were used to derive precise stellar parameters, chemical abundances, and stellar ages. The results confirmed previous results that [X/Fe] abundance ratios depend on stellar age and that for a given age, some elements also show a dependence on the distance.

Figure: Group photo of the Conference that took place in terceira – Azores, in July 2016. The conference had 169 participants from 20 countries. The program, organised in 14 sessions, included 80 talks (one of this was a public talk) and 83 posters.

Complementary to the many publications, the team also participated in several international conferences where the results of the project have been presented and discussed. We maintained an active participation in the large projects of ESA and ESO related to the Thematic Line.

Thematic line meetings and journal clubs

The team organizes regular journal clubs on topics related to stars, has specific team meetings on asteroseimology and also on star formation and early evolution. Participation in outreach activities covering topics on stars is also frequent, including several talks in the Ignite IAstro initiative that cover topics related to this thematic line.

Mário João Monteiro
Thematic Line Leader

Report from the Group

Galaxies, Cosmology, and the Evolution of the Universe

During 2016, the Group has taken further steps toward implementation of its strategic plan and vision for 2017 and beyond, intensifying synergies within and among its two Thematic Lines, deepening its broad multidisciplinary expertise and consolidating its substantial involvement with co-leadership roles in collaborations and consortia with relevance to its main axes of research. While working toward front-line contributions in the field of cosmology, fundamental physics and the nature of dark energy in the framework of its key involvement in ESPRESSO and Euclid, the Group has also solidified the foundation for sustainable excellence at the 2020 horizon and in the next decade through its co-leadership in ESO MOONS and participation in ESO MOSAIC and ESA Athena consortia. Moreover, recognising the opportunities arising in the era of gravitational wave cosmology, the Group has taken an active role in the development of science cases and predictive algorithms in the context of the eLISA mission. The achievement of the science objectives of the Group has been further supported by its participation in WODAN+EMU, AzTEC, CALIFA, as well as the COST action CANTATA and the Marie Curie IRSES project SELGIFS.

The size of both Thematic Lines, “The assembly history of galaxies resolved in space and time” and “Unveiling the dynamics of the Universe”, has remained similar, with 14 and 15 researchers, respectively, by the end of 2016, and 19 PhD students supervised by Group members throughout the year.

During 2016, the IA has co-organized the annual meeting of the Euclid Consortium in Lisbon. Group members have also organized an international conference on Lyman photon escape from galaxies and co-organized the 2nd SELGIFS Advanced School on Integral-Field Spectroscopic Data Analysis, and served in various time allocation committees (ESO, ALMA, HST, XMM-Newton, Calar Alto). Finally, the increasing international visibility and momentum of the Group is reflected in a regular inflow of visiting scientists and numerous peer-reviewed publications and oral conference contributions by its members.

Polychronis Papaderos
Group Leader

Report from the Thematic Line

The assembly history of galaxies resolved in space and time

During 2016 the activity of the Thematic Line, following the implementation of its strategic scientific plan, continued to focus on the study and detailed characterization of galaxies throughout cosmic time, ensuring a leading participation in international consortia, developing innovative tools for the understanding of observations, and consolidating the path to the group's growth over the coming years.

The following highlights provide an overview of our activity during the past year.

1. We have continued our activity in the development of the upcoming generation of whole-sky radio surveys. Of particular note is the arrival, in 2016, of a new PhD student to work on the identification of very high redshift radio galaxies, a topic which supports our leadership of the Evolutionary Map of the Universe Survey Key Science Project "Radio AGN in the EoR", to be performed with the Australia SKA Pathfinder. As an initial focus of the PhD project, a comparison between the predictions from different state-of-the-art models of galaxy formation for the number (and detectability) of early supermassive black holes was started, a work which has been presented in several international conferences during 2016;

2. The team has been involved in the definition, proposal and now development, of the future Athena X-ray mission, ESA's second (L2) large class mission within ESA Cosmic Vision Program. In 2016, the team has contributed to several Athena Science Study Team Working Groups activities. In order to enhance our capabilities, we successfully secured an Integrated Activities in the High Energy Astrophysics Domain (AHEAD) grant for a collaborative mission to INAF – Bologna Astronomical Observatory, which allowed us to obtain working experience with the SIXTE software, used to simulate the Athena/WFI observations. As a result of team's activity for Athena, a researcher of the IA has been invited to represent Portugal at the WFI Consortium Board and the WFI Science Team;

3. The team continued to prepare the scientific exploitation of MOONS (the Multi Object Optical and Near-infrared Spectrograph for the VLT), which will have its Final Design Review in 2017 and is expected to start observations in 2019. During 2016 the IA was selected to host the 2017 MOONS Science Meeting, which will be a prime opportunity to further promote our role in the project;

4. We have consolidated our involvement in the development of MOSAIC, the multi-object spectrograph for the E-ELT (2024+) which started Phase-A studies phase in 2016. The team is committed to a very high level of support to the project and an IA researcher is currently a member of the MOSAIC steering committee.

5. Several Team members have contributed to the proposal of FLARE (First Light And Reionization Explorer), a mission proposed as a medium-class mission (M5) to ESA in 2016.

6. The development of innovative state-of-the-art tools for the detailed study of galaxies has been extremely successful in 2016. Porto3D, the IA-developed Integral Field Spectroscopy (IFS) fitting and post-processing pipeline, was used to investigate gas excitation mechanisms and kinematics

in early-type galaxies (ETGs) in the CALIFA survey. In particular, Team members have explored empirically and theoretically the impact of aperture effects on the spectroscopic classification of inside-out assembling galaxies, developed a new classification scheme for ETGs and discovered extremely faint spiral-arm like star-forming features in the periphery of several of these seemingly "old and dead" galaxies;

7. Also in 2016, the tool RemoveYoung was publicly released. This is a code developed at IA that allows for the spectroscopic subtraction of the contribution from young stellar populations in IFS data. The purpose of this tool is to go beyond the study of young stellar populations that often dominate galaxy spectra, hiding faint structural/morphological features in the older underlying stellar background (e.g., relics from recent minor mergers) that hold fundamental insights into the galaxy build-up process. An extensive study of the assembly history of ETGs, based on the entire set of ETGs and of the bulge and disk component in spiral galaxies based on nearly 250 galaxies from CALIFA is ongoing as a show-case of the capabilities of RemoveYoung;

8. Pursuing our increasing expertise in detailed modelling of galaxy spectra, IA researchers have investigated the ability of state-of-the-art spectral synthesis codes to recover the power-law component of an AGN immersed within an evolved ETG with a high Lyman continuum photon escape fraction. This study has revealed that an AGN contributing less than ~26% of the monochromatic luminosity of the continuum at 4020 Angstrom evades detection with standard spectral synthesis techniques. This conclusion, subsequently corroborated through spectral modelling of an extensive grid of synthetic spectra corresponding to various star formation histories, has potentially far-reaching implications for AGN demographics and our understanding of the co-evolution of super-massive black holes with their galaxy hosts.

9. Finally, FADO, a conceptually novel population spectral synthesis (PSS) code developed by IA researchers with the unique capability of allowing the determination of the star formation history that self-consistently reproduces the nebular (line and continuum) characteristics of star-forming galaxies has been extensively tested during 2016. These tests have demonstrated that FADO can recover the mass, age and metallicity of stellar populations in star-forming galaxies showing strong nebular emission with a very high accuracy. A public release of FADO is planned shortly after publication of the presentation article of the code, which at the end of 2016 was under review.

Also during 2016, the IA organised the international conference "Escape of Lyman radiation from galactic labyrinths" (Crete, 26-29 April 2016) and the 2nd SELGIFS Advanced School on Integral-Field Spectroscopic Data Analysis (Madrid, 21-25 November 2016). The conference was attended by 60 participants from 17 countries, with 9 invited review speakers and 36 contributed talks, and was generally considered outstanding. The Advanced School welcomed 17 lecturers and 22 students from seven and six countries, respectively, and has covered a wide range of astrophysical subjects and advanced IFS analysis tools, including RemoveYoung. Team members have served in several Time Allocation Committees: ALMA, XMM-Newton, ESO, HST, Calar Alto.

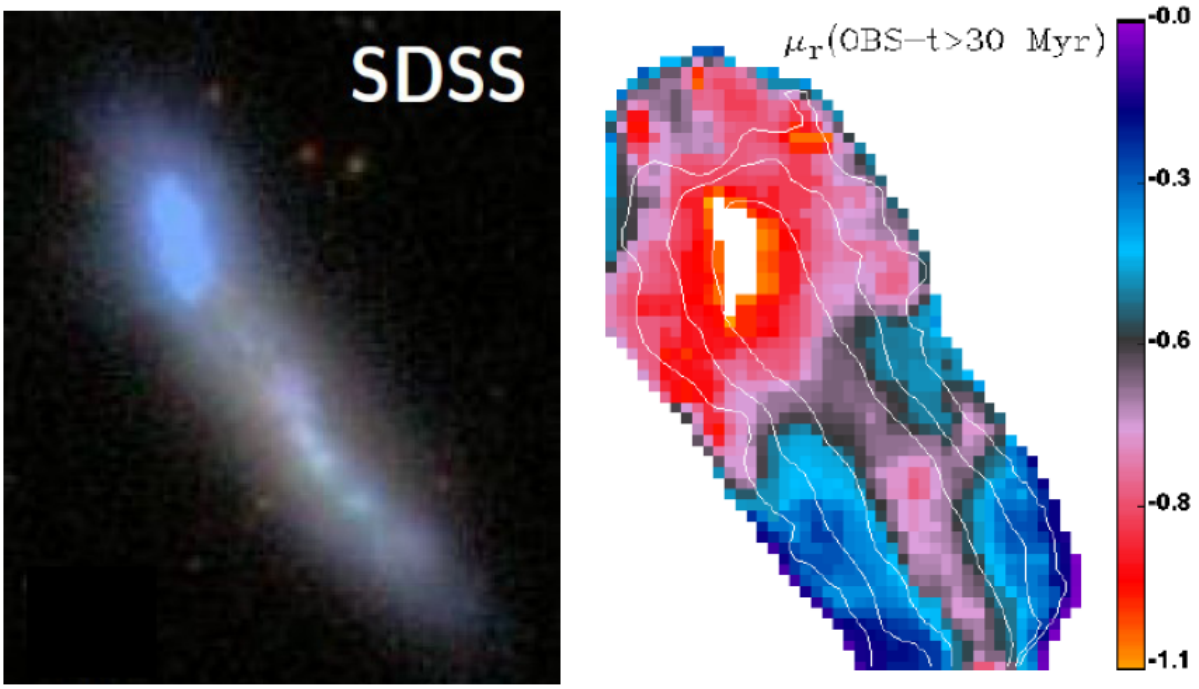


Figure: The appearance of galaxies is generally dictated by luminous young stars, which can often outshine features that are fundamental to understand their nature. To overcome this limitation, IA researchers have developed RemoveYoung (RY; Gomes & Papaderos 2016), a code that permits subtraction from integral field spectroscopy data of the effect of young stellar populations, allowing a deeper understanding of galaxy assembly history. This figure shows the application of RY on a star-forming galaxy with the right-hand side panel identifying the luminosity contribution by young stellar populations and associated ionized gas emission.

Thematic line meetings and journal clubs

During 2016 the thematic line consolidated an initiative started in the previous year, the so called “Galaxies TL Briefing”. Every Friday the team joins a zoom session for a short (1 hour) discussion about recent work and results, working difficulties, strategy and funding opportunities. While the short duration forces a very focused meeting, the high frequency of the briefings allows for a continuous flow of information within the TL. The latter was also supported by the setting up of a slack team with dedicated channels to “announcements” and “team publications”.

Finally, the team met in person for a two-day meeting in Leiria (16-17 June 2016, Leiria).
The programme and the list of participants can be consulted at
http://www.iastro.pt/research/conferences/xastronomers2016

Throughout the year a weekly journal club has also been in place to discuss recent publications, suggested by team members as being relevant for the TL activity.

José Afonso
Thematic Line Leader

Report from the Thematic Line

Unveiling the dynamics of the Universe

This report focuses on the Thematic Line (TL) scientific highlights activity throughout 2016, with ongoing projects, new projects, highlight contributions to the IA and the TL strategic plan and vision for 2017+. We focus essentially on the Euclid, eLISA and ESPRESSO missions.

Relative to Euclid, after the successful PDR milestone reported in 2015, the mission entered in its construction phase. The previous work presented in the technical report MOCD-B was summarised in paper format to be submitted soon to an astrophysical journal. In this new phase, the IA members of the Euclid survey group increased the interaction with ESA in order to start to jointly define the Mission Operation Documents (to supersede Operation Concept Documents) and produce the Euclid Reference Survey Definition File ICD. These documents are due in 2017. The team have also continued the development of their scheduling tool ECTile and applied it to compute new optimised scenarios, namely new surveys with larger synergy with ground-based observations, with the goal of maximising the scientific return of the mission, as had been foreseen in last year's report.

Besides the survey group, the team is present in various Euclid Science Working Groups. Currently, the main activity of most groups is the preparation of the Science Performance Verification, a full-scale simulation of the Euclid mission. Team members are involved in this exercise, preparing software modules for the pipeline of this end-to-end simulation. Results of this exercise are due in 2017. In the meantime, the Theory Working Group has published the new issue of the review “Cosmology and Fundamental Physics with the Euclid Satellite”, with the participation of team members.

In 2016, the annual meeting of the Euclid Consortium (EC) took place in Portugal, organised by the coordination of the national participation in the EC with the support of IA and FCT. It took place at Centro Cultural de Belem, from 30th May to 3rd June, welcoming almost 402 participants among members of the consortium, invited guests, and ESA, NASA and industry partners. The meeting included plenary sessions in the main auditorium and 50 parallel sessions spread over 9 rooms and was unanimously considered a big success. This event also strengthened the international visibility of the team's presence in Euclid, producing an increase on the number of researchers applying to IA in the following FCT post-doc call. The organisation of this event in Portugal appeared in the media. The project also got a new boost from the new collaboration CANTATA (COST action) with overlapping goals.

Concerning the eLISA mission, it is currently on the science preparation stage and, thus, for the moment, the main objective of the cosmology working group is to develop research in the area of gravitational wave cosmology in order to prepare the science case for the mission. Therefore, the main activity related to eLISA pursued this year was the development of an algorithm to accurately compute and characterise the stochastic gravitational wave background generated by cosmic superstrings. This resulted in the article Probing Cosmic Superstrings with Gravitational Waves, by L. Sousa and P. P. Avelino, published in Phys.Rev. D94 (2016) no.6, 063529. The detection of gravitational waves during 2016 is likely to cause an acceleration of the timeline of the mission, and, as a consequence, this early development of research (and, in particular, of numerical tools) may prove to be very important to increase our involvement in this mission. This work also opened further avenues of research related to

the gravitational wave emission generated by cosmic strings and cosmic superstrings that are currently being pursued. Moreover, we have participated in the cosmology working group activities –- namely, teleconferences and the 3rd eLISA Cosmology Working Group Workshop –- that, not only allowed us to keep informed about the mission status, but also provided opportunities to network and increase our visibility within the working group.

Looking now into the ESPRESSO activities, the instrument's fundamental physics GTO was extensively prepared in 2015, with the planned list of targets made public in 2016, and presented at several international conferences as well as in a peer-reviewed publication (Leite et al. PhysRevD.94.123512). This target list was also used, together with appropriate ESPRESSO specs, to make detailed forecasts of the impact of these measurements on cosmology and fundamental physics, and in particular on dark energy.

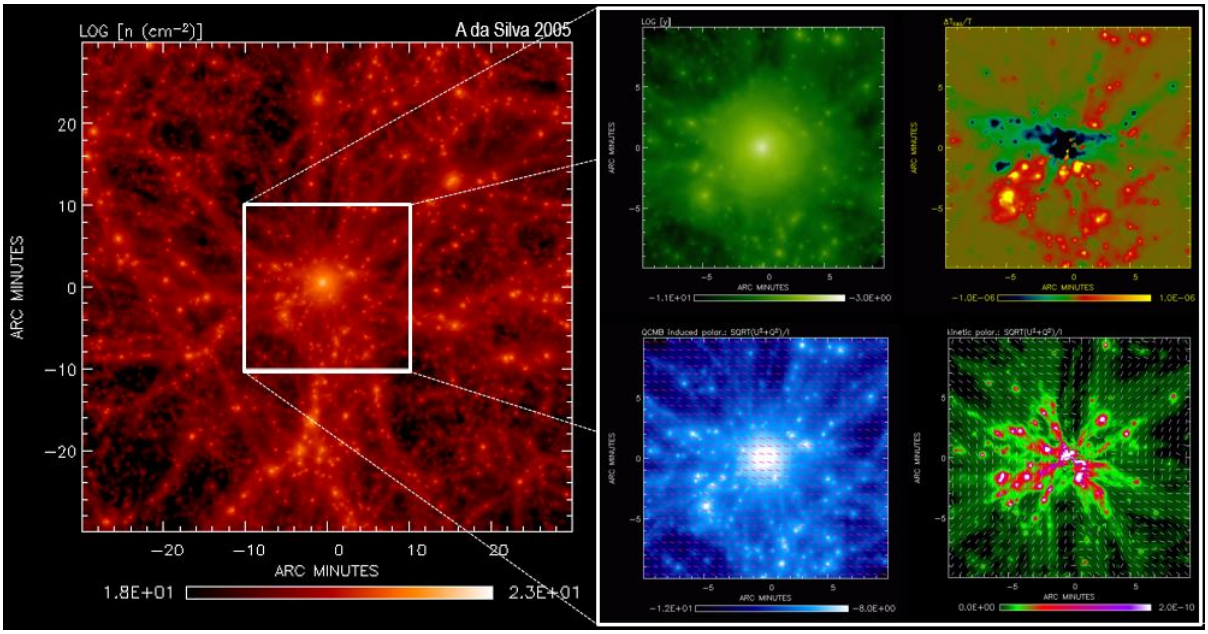


Figure: Images of a Galaxy cluster in a hydrodynamic N-Body simulation. The main panel shows a column density map, in logarithmic scale, of a region centred in the cluster. The smaller maps inside the zoomed box show the intensity and polarization of the CMB radiation that emerges from the cluster. The mapped quantities are the cluster thermal SZ effect (top left); kinetic SZ effect (top right); CMB quadrupole induced polarization (bottom left); and tangential velocity polarization (bottom right), [267], due to the interaction of the CMB with the hot gas in the cluster. Taken from the review paper "Unveiling the Dynamics of the Universe" [arXiv:1607.02979 [astro-ph.CO]], written by several team members.

There was also significant effort towards our participation in other missions and projects, as follows:

1. CORE: Following an ESA CDF study in early 2016, a proposal was submitted to the ESA M5 call in October. In parallel the collaboration has been working on a series of proposal supporting papers describing key scientific and technical aspects of the proposed mission. All these papers (about 10, with a total size already above 500 pages) have been or will soon be submitted for publication, and 3 of them can already be found on the arXiv (cosmological parameters, inflation, extragalactic sources).

2. THEIA: Several team members (Ismael Tereno, Antonio da Silva, Ippocratis Saltas, Sofia Carvalho) were involved in a proposal for an astrometric mission, named Theia. It was submitted on October 2016, for ESA's call for M-class missions within the Cosmic Vision programme (M5). Theia is a space observatory designed to determine the small-scale properties of dark matter in the local Universe, indirectly testing cosmological scenarios.

CANTATA: The COST project “CANTATA” is a research program including complementary aspects of theoretical physics, cosmology and astrophysics. Within the proposed program, existing collaborations are to be enhanced, with the goal of developing a synergy between the team member’s expertise and competences. CANTATA considers, in a coordinated and multidisciplinary way, the possibility to go beyond General Relativity (GR) on scales where Einstein’s theory fails at ultraviolet (quantum gravity) and infrared (cosmology). The main goal is to construct an effective theory of gravity capable of encompassing both the phenomenology related to the lack of a quantum field theory of gravity, and the phenomenology related to the various astrophysical scales (e.g., self-gravitating systems, galaxies, large scale structure) that cannot be explained within the framework of GR without including dark matter and dark energy. The majority of the IA Cosmology researchers are team members of the CANTATA Cost Action project. The first CANTATA meeting, organised by several IA-Cosmology team members, took place in Lisbon on the 14th and 15th of November, 2016, and was attended by over 90 participants.

Thematic line meetings and journal clubs

The Thematic Line (TL) “Unveiling the Dynamics of the Universe” carried out journal clubs and seminars on a weekly basis, and TL meetings once every month. All the relevant information can be found in the following link: http://ia-cosmoclub.wikidot.com/

The themes discussed during the approximately 28 journal clubs (http://ia-cosmoclub.wikidot.com/previous-meetings-2016) ranged from theoretical aspects to observational topics. Approximately sixty two papers were discussed throughout 2016.

Francisco Lobo
Thematic Line Leader

Report from the Group

Instrumentation and Systems

During 2016, the following instruments had engineering and implementation activities at IA: ESPRESSO, MOONS, NIRPS, HIRES, EUCLID, e-LISA, PLATO, CHEOPS, SPIROU and ATHENA.

Currently the Group participates in a considerable number of projects, involving all its human resources. By the end of 2016, the group is composed of 21 people: 10 researchers (with PhD), 8 engineers and 3 PhD students. Several researchers are also part of the other two scientific groups and PhD students are mainly focused on their thesis work, leading to a manpower availability to the running project of less than 12 FTE.

Following is listed the activity detail of the running projects.

1. **ESPRESSO**: For ESPRESSO, 2016 was the year where the first Coudé Trains were installed in the Paranal Observatory. After the conclusion of all the MAIV activities (Manufacturing Assembly, integration and Test), the Coudé Trains for UT4 (September) and UT1 (December) unit telescopes were installed and already tested in the sky with very sucessfull results. During 2017 the remaining 2 Coudé Trains will be installed, concluding the participation of the IA team on ESPRESSO. Minor contributions were also given to the data analysis system components where the team has a participation.

2. **MOONS**: The activity during 2016 was focused on the instrument final design, to be concluded in the first month of 2017. Without any outcome in 2016 (reports or milestones), there was a heavy workload on the design of the Rotating Front End and the Instrument Field Corrector. 2017 will mark the start of the construction phase.

3. **NIRPS**: The fast-track instrument NIRPS went through several important milestone since 2016, as expected from an instrument with such a tight timeline. However it is important to note that this is not a standard ESO instrument with “ESO-as-costumer” imposing all the milestones and receiving the corresponding documentation to check the progress at each of these milestones. As such the terms referring to the review stages correspond only loosely (and informally) to those used in other ESO projects. In 13-15 January 2016 we had the kick-off meeting in Geneva, in which we discussed and defined the Top Level Requirements (TLR) of NIRPS. These requirements guided the design of the whole spectrograph and were finally consolidated for the PDR, held in Montreal in the dates of 03/07/10. Our work was twofold: the design of the Atmospheric Dispersion Compensator (as part of the Instrument Front End Optical Design) and on the definition of the TLR, with a part of the work developed leading to a publication. We also participated in the weekly management meetings, participating in all the management decisions, such as the writing of the Consortium Agreement with ESO.

4. **HIRES**: 2016 marks the beginning of the Phase A for the design of this High-Resolution Spectrograph for the ESO Extremely Large Telescope. IA team is responsible for the instrument Front End and 2016 was dedicated to define the main concept for this subsystem. The group also

participates in the management of the consortium, having several key persons. The national representative in the HIRES board is also from IA.

5. **Euclid**: 2016 marks the beginning of the construction phase in Euclid. In this phase, we continued the development of ECTile, the mission observation planning software, now with more focus on optimisation and on flexibility for operation contingency plans. New scenarios were produced, aiming to increase the synergy with ground-based observations and maximise scientific return. In 2016 there where no major mission milestones or reports due.

6. **e-LISA**: The activities in e-LISA during the past year are associated to the Phase B of this project, conducing to the CDR (Critical Design Review) that will occur in the first months of 2017. In this scope, final developments on the Power Monitor unit were produced, now that all the components and trade-offs were defined. Preparation of Bill of Materials and launching of the procurement process for the various parts was also achieved. Regarding the Optical Modeling of the Laser Head, further developments were achieved, integrating noise figures for various components, derived from new experimental data. Added complexity and parametrisation was also achieved at the level of the Optical Fiber Amplifier, being the results (of this new model) similar to the ones obtained experimentally.

7. **PLATO**: The activities on Plato are associated to the development of an OGSE for camera tests in ambient temperature. Although the final design and production of the said equipment is only due in 2020, close to the initiation of the camera integration activities, several studies were performed and presented to the consortia, mainly regarding the performance of the OGSE using the Hartman technique to evaluate the CCD position and tip/tilt angles with regard to the Telescope Optical Unit focal plane. Further developments were also registered with an intensification of effort in the PSF modelling, where several algorithms were developed to include in the PSF model extrinsic perturbation factors, such as jitter, aberrations, etc. This line of work is being lead directly by LAM (Marseille). Finally, IA is also responsible for several work packages for SW development within the PLATO PDC. The national representative in the PLATO board is also from IA; in 2016 several meetings took place at this level, and contacts with industry were also done (at present 2 national companies are involved).

8. **CHEOPS**: During 2016, the IA team had a contribution for the mission science operation center, more specifically for the CHEOPS data reduction pipeline where we are responsible for the calibration. This year we have continued the implementation of the code and respective documentation for the pipeline software. The milestone “System Critical Design Review” was achieved and passed successfully in end of March. Another relevant milestone which was achieved at the end of 2016 was the Mission Operation Center(MOC)/Science Operation Center (SOC) Interface Test-0. IA also has one member in the CHEOPS consortium board.

9. **SPIROU**: In the year of 2016 the different instrument parts were received and the instrument started to be assembled at IRAP/OMP (Toulouse). It was the year that saw the solution to many complicated issues such as the delay on the delivery of the scientific detector. On the management side we participated mostly in the exploration on how the instrument will be transported to CFHT, and by which means, so that it is mounted in Q3 of 2017 and operational for

Q4 of 2017, as planned. On the science preparation side, we participated in the Second Spirou Science meeting, in Nice (05/06 of May), in which we discussed how to best explore the Scientific opportunity of SPIRou and maximize its yield.

10. **Athena**: In 2016, the participation in Athena has been formalised through the inclusion of an IA researcher, in representation of Portugal, at the WFI Consortium Board and the WFI Science Team. As a result, contacts with the industry have continued in order to explore possibilities to increase our industrial participation in the mission, in particular in the areas of thermal insulation. Ground support equipment and contributions to the WFI Instrument Science Centre are also under consideration.

11. **MOSAIC**: The participation in MOSAIC, which has started Phase-A studies in 2016, has increased with the inclusion of an IA researcher in its Steering Committee. The possibilities for the participation of the instrumentation group were identified and are being explored — something that would be a natural continuation of the work done for MOONS, and allowing for the evolution of our expertise in the context of a major E-ELT instrument.

Alexandre Cabral
Group Leader

Report from the Thematic Line

Space and Ground Systems and Technologies

The activities of the thematic line in Space and Ground Systems and Technologies focused on three main objectives:

1. **Development of capabilities spawning from running projects**
   Exploitation of modelocked lasers for distance metrology systems, that resulted in a PhD dissertation presented last November 2016. Also in the scope of a protocol with INTA (Sp), several samples of Long Period Fiber Gratings (LPG) based sensors produced in Lisbon were tested at INTA labs. Gamma radiation hardness tests of the LPGs were also performed in a batch of 3 sensors. These devices showed a remarkable resilience to cosmic-like radiation levels, which can be considered as a good indicator for further developments with the goal of achieving a sensor fully compatible with space environment.

2. **Exploitation of in-house expertise in new missions and instruments**
   As a natural sequence on the background expertise resulting from the activities in the eLISA project, we have been expanding our activities in the stabilization of Optical Sources for high accuracy long distance metrology systems, as a new area of development. In this scope, a new proposal was submitted to ESA for the development of a Laser Head based on alternative seed laser (as opposed to the “traditional” NPRO solution). This proposal considered the constitution of a Consortia also lead by the Portuguese company Lusospace. Further initiatives in this area are also being pursued, in the scope of the National Delegation for L3 missions @ ESA, where the baseline of the future LISA instrument is being defined. The Portuguese Scientific community and IASTRO in particular, are assuming a series of commitments, in order to further our participation (and expectedly, an active role in the board) in the instrument and in the future Gravitational Wave Observatory.

3. **New themes of research**
   In the area of Multi Aperture Telescopes and as noted in the initial thematic line objectives, a particular area of research is being pursued as a PhD thesis, associated to the design of an instrument that will allow us to evaluate the presence of correlation-induced spectral changes (Wolf effect) in the astronomical far-field spectra. Since last year, the PhD candidate developed a simulator (with GUI) that will allow the propagation of partially coherent light from the source plane to the image plane using heterogeneous computing (PyOpenCl). By heterogeneous computing we mean systems which use different kinds of processors, for example, a system with CPU (Central Processing Unit) and GPUs (Graphics Processing Unit). This allows one, for example, to use serial tasks on CPU and extensive calculations over data sets on GPUs. In other words, we are dividing the calculations needed for the propagation in parallel tasks in order to reduce the time-consuming factor associated with partially coherent light propagation. To the best of our knowledge, this is the first attempt to perform these kind of simulations of the cross-spectral density function and it will be a useful tool for both astronomical and laboratory sources. This simulator will also be important to confirm the models we have been working on, namely to distinguish between the Wolf effect and the Doppler effect in the far-field spectra.

As a seed for eventual future activities, we have been directing our MSc students to pursue their thesis in areas that may have potential for Space or Astronomical related instruments. In this context, two MSc thesis were completed during 2016 under the themes of Polarimetry/Ellipsometry, and also on Fiber Optical Gyroscopes.

Thematic line meetings and communication

The instrumentation Thematic line carried out a few informal meetings between their members, specially of the Lisbon section, for presentations and discussions on themes that were the core of one PhD and 2 MSc thesis completed during the present year. These were related to the development of techniques high accuracy distance metrology for space, based on modelocked lasers, ellipsometric polarimetry techniques and instruments, and optical gyroscopes.

Open discussions have also taken place, not only internal to the team members, but also to the general public, related to the presentation of new progresses on the PhD theme of one of our students, based on the Wolf effect and its implications in astronomical observations.

Manuel Abreu
Thematic Line Leader

Report from the Group

Science Communication

During 2016, the Science Communication Group at IA (SCG) organised and participated in several public outreach initiatives which reached in total more than 84,800 people (more than twice of the number reached in 2015). The public activities organised by IA included planetarium presentations, monthly periodic outreach sessions, exhibitions, showcases, hands-on laboratories and special public events and talks. The SCG has also participated in several initiatives promoted by other institutions, like Ciência Viva or ESERO-PT, contributing with talks, observations of the night sky, planetarium sessions, exhibitions, showcases, workshops and short courses.

The team produced and made available to the media 25 press releases (13 national, 2 international and 10 regional) related to the science produced by the Institute or to its outreach activities. This number of press releases resulted in 376 references in national news media with a total Automatic Advertisement Value (AAV) of about €1,900,000. Some of the IA's news have been referred in international news media, for example, Astronomy Magazine, Space Daily, Astronomy Now and the International Business Times.

The SCG co-created and co-produced five short full-dome movies and has developed SkyExplorer scripts for use during live presentations in the fixed planetarium sessions. Together with several showcase products (flyers, roll-ups, exhibition boards), the SCG team has produced 4 exhibitions/exhibitions modules and a large format (6 x 6 m) astronomy board game. These educational products have been displayed in several national institutions.

The science communication and education work at IA has been presented in conferences with contributions accepted – one contributed poster, and 2 contributed talks. The conferences include the 4th Science Communication Congress – SciCom PT 2016 and the 2º Encontro em Ensino e Divulgação das Ciências – FCUP. The team has one refereed article accepted and published in the IAU Communicating Astronomy with the Public Magazine and is responsible for several articles for monthly columns.

Throughout 2016, the SCG has conducted several training sessions for professors, science communication officers, students and general public.

The SCG is responsible for the creation and development of several national projects, including the Tour Ignite IAstro. During 2016, 34 IA researchers toured Portugal bringing IA's science to towns and cities with less access to science communication in astronomy. The Ignite IAstro Tour reached more than 1840 people in 11 events, held in 9 districts, mainly out of the main population centers. In each event there were 8-9 researchers present, performing in total 93 presentations of 5 minutes each.



IA has an ongoing partnership with the Leiden Observatory/ University of Leiden for the development of an Astronomy Literacy Project. This international joint-project aims to define global astronomy education goals to be applied in worldwide school curricula. Another goal of this project is the production of localized astronomy educational contents in several languages, together with educational guidelines for educators.

IA continues with a strong involvement with the "Portuguese Language Expertise Centre for the Office of Astronomy for Development (of the International Astronomical Union)" – PLOAD. It is hosted by Núcleo Interativo de Astronomia (NUCLIO), in collaboration with IA. The PLOAD's main objectives are to establish a strong collaborative network between Portuguese speaking countries and communities and empower these countries and communities with the necessary tools to build their own local support structures and strategy development in Astronomy and Space Sciences.

The strategy of the SCG for the 2017-2018 period envisions the production of Astronomy related educational and science communication contents for several specific target audiences, with a special focus on students and professors. This production will be strengthened by the involvement on the "Astronomy Literacy" international project. These contents, can exist by themselves or be connected to other activities like planetarium sessions, hands-on activities or exhibitions. The production of these materials will place IA as the main institution in Portugal in terms of the production of Astronomy related contents. IA's strong involvement in the PLOAD will allow the dissemination of its contents throughout the Portuguese language countries which engulfs 240 million people, giving to the IA's Science Communication a real international dimension.

João Retrê and Daniel Folha
Group Leaders

Other reports

The Portuguese ALMA Centre of Expertise

Since May 2014, IA is officially part of the European Atacama Large Millimetre Array (ALMA) Regional Centre Network as a Centre of Expertise (CoE), a status granted by ESO after recognition of IA team's capability to support the community with the use of ALMA.

The Portuguese ALMA CoE (PACE) is currently supported by the activity of 10 IA researchers, technical, administrative, and outreach personnel. The tasks of PACE include proposal preparation support and ALMA data quality assurance. In the following, we report the main activities of PACE in 2016:

1. **Face to face support:** As a CoE, one of the main goals of PACE is to provide support to the Portuguese ALMA users. The support can be in the proposal preparation, data reduction, and archive mining. Since 2014, when PACE started its activity, the improvement in terms of submitted proposals has been enormous. The table below compares the number of ALMA proposals submitted for each cycle (col. 3) with the number of proposals with Portuguese participation (col. 4) and the number of accepted proposals with Portuguese participation (col. 5). The last two columns indicate that while the number of total proposals submitted has undergone a partial settlement in the last two cycles, 1578 proposals in 2015 and 1573 in 2016, the number of Portuguese proposals is still increasing, going from 40 in 2015, to 57 in 2016. The number of accepted proposal with Portuguese Principal Investigators or Co-Investigators, has almost doubled between Cycle 3 and Cycle 4, fully rewarding the huge effort that PACE staff placed in building a strong Portuguese ALMA community;

2. **Quality Assurance:** As a CoE, PACE contributes to the ALMA project, participating in data quality assessment (QA2), software development, and data archiving. In 2016 PACE has been heavily involved in the Weak Calibrator campaign, a set of tests proposed by the UK ARC node, whose goal is to found reliable calibrators all over the sky. This work, when completed, will allow for a reduction of time for calibration procedures, a crucial point when ALMA works jointly with other interferometers, as for example in VLBI mode;

3. **Software Testing:** The ALMA user community makes use of different software tools, which need to be tested following continuous upgrades. In 2016 PACE has been involved in a large campaign of tests for the Common Astronomy Software Applications (CASA). The campaign leads to an improvement in terms of running speed for different software routines. Beyond this, PACE participated to the ALMA user Science Portal tests, in collaboration with ESO and NRAO. These tests were designed to facilitate the fruition of the ALMA website by the scientific community;

4. **Events and Activities:** To support Portuguese ALMA users, PACE organises ALMA events as a preparation for upcoming observing cycles. In 2016 PACE organised in March the Portuguese ALMA Community day, a two-day event with 29 participants, focused on the preparation of ALMA proposals for Cycle 4. Moreover, a PACE member participated with a ALMA-focused talk to the IberiCos2016, a Cosmology conference gathering the Portuguese and Spanish community. Finally, between the 5th and the 7th October PACE hosted, in collaboration with ESO, the annual

meeting of the EU-ARC Network. More than 50 scientists from the different ARC nodes in Europe attended this meeting to discuss the strategic lines for the future of ALMA, and the technical improvements of the official data reduction pipeline of the instrument.

5. **Outreach:** PACE contributes regularly to IA outreach events, promoting the ALMA project and educating the community in this scientific area. In 2016 PACE has been involved in the Tour Ignite IAstro, where eight IA researchers explain their research field to a lay audience in 5 minute presentations. These events were organised during 2016, and they were held in cultural venues in towns and cities away from the main Portuguese urban areas, where there is less access to scientific dissemination.

Year	**Cycle**	**# of proposals submitted**	**Proposals with PT participation/PI**	**Accepted roposals with PT participation**
(1)	(2)	(3)	(4)	(5)
2012	0	919	4/2	1
2013	1	1131	9/4	2
2014	2	1381	11/6	4
2015	3	1578	40/8	12
2016	4	1571	57/11	22

Ciro Pappalardo
PACE Lead Scientist

Scientific Output

Books
(http://www.iastro.pt/research/books.html)

1. C. J. A. P. Martins, 2016; *Defect Evolution in Cosmology and Condensed Matter*; Springer International Publishing

2. the CoRot Team - Coordination Annie Baglin, 2016; *The CoRoT Legacy Book*; EDP Sciences

Articles in Internacional Journals
(http://www.iastro.pt/research/papers.html)

1. **V. Zh. Adibekyan**, **P. Figueira**, **N. C. Santos**, 2016; *Which Type of Planets do We Expect to Observe in the Habitable Zone?*; Origins of Life and Evolution of Biospheres, 46, 4, 351

2. **V. Zh. Adibekyan**, **E. Delgado Mena**, **P. Figueira**, **S. G. Sousa**, **N. C. Santos**, J. I. González Hernández, I. Minchev, **J. P. S. Faria**, G. Israelian, G. Harutyunyan, L. Suárez-Andrés, A. A. Hakobyan, 2016; *Abundance trend with condensation temperature for stars with different Galactic birth places*; Astronomy and Astrophysics, 592, A87, 12

3. **V. Zh. Adibekyan**, **E. Delgado Mena**, **P. Figueira**, **S. G. Sousa**, **N. C. Santos**, **J. P. S. Faria**, J. I. González Hernández, G. Israelian, G. Harutyunyan, L. Suárez-Andrés, A. A. Hakobyan, 2016; *ζ^2 Reticuli, its debris disk, and its lonely stellar companion ζ^1 Ret. Different T_c trends for different spectra*; Astronomy and Astrophysics, 591, A34, 11

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9. **P. P. Avelino**, **L. Sousa**, 2016; *Thermodynamics of cosmic defect network evolution*; Physical Review D, 93, 2

10. **P. P. Avelino**, 2016; *Inner structure of black holes in Eddington-inspired Born-Infeld gravity: The role of mass inflation*; Physical Review D, 93, 4

11. **P. P. Avelino**, 2016; *Avoiding unrealistic priors: The case of dark energy constraints from the time variation of the fine-structure constant*; Physical Review D, 93, 8

12. **P. P. Avelino**, 2016; *Mass inflation in Eddington-inspired Born-Infeld black holes: Analytical scaling solutions*; Physical Review D, 93, 10

13. A. Avgoustidis, G. Luzzi, **C. J. A. P. Martins**, R. T. Génova-Santos, 2016; *Subpercent constraints on cosmological temperature evolution*; Physical Review D, 93, 0435

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36. **E. Delgado Mena**, M. Tsantaki, **S. G. Sousa**, M. Kunitomo, **V. Zh. Adibekyan**, **P. Zaworska**, **N. C. Santos**, G. Israelian, C. Lovis; 2016; *Li-rich giants with substellar companions, a hint of planet engulfment?*; XII Reunion Cientifica de la Sociedad Española de Astronomia, Bilbao, Spain

37. **E. Delgado Mena**, **M. Tsantaki**, **S. G. Sousa**, M. Kunitomo, **V. Zh. Adibekyan**, **P. Zaworska**, **N. C. Santos**, G. Israelian, C. Lovis; 2016; *Li-rich giants with substellar companions, a hint of planet engulfment?*; Cool Stars 19, Uppsala, Sweden

38. **L. Ebrahimpour**, **P. T. P. Viana**; 2016; *Bayesian parametric and non-parametric characterization of relations between galaxy cluster properties*; Statistical Challenges in 21st Century Cosmology (COSMO21), Chania, Greece

39. **L. Ebrahimpour**, **P. T. P. Viana**; 2016; *X-ray Luminosity-Temperature relation for the XMM Cluster Survey by parametric and non-parametric Bayesian*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

40. **J. P. S. Faria**; 2016; *The search for low-mass planets around metal-poor stars*; 4th Annual GMT Community Science Meeting, Asilomar Conference Grounds in Pacific Grove, CA, USA

41. **J. P. S. Faria**, R. D. Haywood, B. J. Brewer, **P. Figueira**, M. Oshagh, **A. Santerne**, **N. C. Santos**; 2016; *CoRoT-7 as seen with HARPS radial velocities*; K2 meeting, Porto, Portugal

42. **A. C. S. Ferreira**, **S. G. Sousa**, **V. Zh. Adibekyan**; 2016; *The GAIA-ESO Survey benchmark stars: abundances derived in high- and medium-resolution*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds IVth Azores International Advanced School, Faial, Azores, Portugal

43. **V. M. C. Ferreira**; 2016; *Nonlinear Chaplygin Gas Cosmologies*; Summer School on Cosmology, Triestre, Italy

44. **V. M. C. Ferreira**; 2016; *Nonlinear Chaplygin Gas Cosmologies*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

45. **P. Figueira**; 2016; *Deriving precise Radial velocities*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds, IVth Azores International Advanced School, Faial, Azores, Portugal

46. **A. García Hernández**, **M. J. P. F. G. Monteiro**, Z. Guo, D. R. Reese, J.-C. Suárez, S. Martín-Ruiz, J. Pascual Granado, A. Moya Bedón, R. Garrido; 2016; *Accurate ρ and log g of δ Sct stars using Asteroseismology*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

47. **J. M. Gomes**; 2016; *Spectral synthesis studies of Lyman photon leaking galaxies*; Escape of Lyman radiation from galactic labyrinths, Kolymbari, Crete, Greece

48. **J. M. Gomes**; 2016; *Extended nebular emission and gas excitation mechanisms in early-type galaxies*; The Interplay between Local and Global Processes in Galaxies, Cozumel, Mexico

49. **A. Humphrey**; 2016; *VLT optical imaging and spectroscopy of luminous type 2 AGN at 0.3*; The Interplay Between Local and Global Processes in Galaxies, Cozumel, Mexico

50. **C. Jiang**, J. Christensen-Dalsgaard, **M. S. Cunha**; 2016; *Using phase shift to numerically characterize the mixed modes in post-main sequence stars*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

51. **M. S. N. Kumar**; 2016; *Infrared observations of OB star forming systems*; Star formation in different environments, Quy Nhon, Vietnam

52. N. Lagarde, D. Bossini, A. Miglio, **M. Vrard**, B. Mosser; 2016; *Star quakes: a new tool to test the properties of red giant stars*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

53. **P. Lagos**; 2016; *On the properties of the interstellar medium in extremely metal poor galaxies: An IFU view*; The Interplay Between Local and Global Processes in Galaxies, Cozumel, Mexico

54. **A. C. O. Leite**, **C. J. A. P. Martins**, P. Molaro; 2016; *Dark energy constraints from ESPRESSO tests of the stability of fundamental couplings*; Varying Constants and Fundamental Cosmology Conference, Szczecin, Poland

55. **A. C. O. Leite**, **C. J. A. P. Martins**, P. Molaro; 2016; *Dark Energy constraints from the ESPRESSO Fundamental Physics GTO*; Theoretical Cosmology in the Era of Large Surveys, Florence, Italy

56. **A. C. O. Leite**, **C. J. A. P. Martins**, P. Molaro; 2016; *Dark Energy constraints from the ESPRESSO Fundamental Physics GTO*; 51st Rencontres de Moriond Cosmology session, La Thuile, Italy

57. **A. C. O. Leite**, **C. J. A. P. Martins**, P. Molaro; 2016; *Dark Energy constraints from the ESPRESSO Fundamental Physics GTO*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

58. **F. S. N. Lobo**; 2016; *Hybrid metric-Palatini gravity*; Beyond Concordance Model II, Cape Town, South Africa

59. **F. S. N. Lobo**; 2016; *Gravitational, lensing, and stability properties of Bose-Einstein condensate dark matter halos*; Dark Matter 2016: From the smallest to the largest scales, Santander, Spain

60. **F. S. N. Lobo**; 2016; *Modified theories of gravity – mathematical aspects and phenomenology*; The First CANTATA MEETING IN LISBON, Lisbon, Portugal

61. **S. Lorenzoni**; 2016; *Lyman break galaxies in the epoch of reionization: interacting systems and cosmic variance.*; Signals from the Deep Past: Unveiling Early Cosmic Structures, Fort of St Elmo, Valletta, Malta

62. **S. Lorenzoni**; 2016; *Lyman break galaxies in the epoch of reionization: interacting systems and cosmic variance*; Escape of Lyman radiation from galactic labyrinths, Kolymbari, Crete

63. **S. Lorenzoni**; 2016; *Interacting systems in the epoch of reionization*; JWST ESAC Workshop - Mastering the Science Instruments and Observing Modes, Madrid, Spain

64. **P. Machado**, J. Peralta, D. Luz, **R. Gonçalves**, T. Widemann; 2016; *Venus' night side dynamics using near infrared observations from VEx/VIRTIS and TNG/NICS*; DPS 48 / EPSC 11, Pasadena, USA

65. **P. Machado**, T. Widemann, J. Peralta, **R. Gonçalves**, J.-F. Donati, D. Luz; 2016; *Ground and space based cloud-top wind velocities using CFHT/ESPaDOnS (Doppler velocimetry) and VEx/VIRTIS (cloud tracking) coordinated measurements*; European Geosciences Union General Assembly 2016, Vienna, Austria

66. **P. Machado**, J. Peralta, D. Luz, **R. Gonçalves**, J. M. Oliveira; 2016; *Cloud tracked winds at the lower cloud level using Venus' night side observations at 2.28 μm with TNG/NICS*; International Venus Conference 2016, Oxford, UK

67. **P. Machado**, T. Widemann, J. Peralta, **R. Gonçalves**, J.-F. Donati, D. Luz; 2016; *Ground and space based cloud-top wind velocities using CFHT/ESPaDOnS (Doppler velocimetry) and VEx/VIRTIS (cloud tracking) coordinated measurements*; International Venus Conference 2016, Oxford, UK

68. **P. Machado**, J. Peralta, D. Luz, **R. Gonçalves**; 2016; *VEx/VIRTIS and TNG/NICS cloud tracked winds at Venus' lower cloud level using night side observations*; European Geosciences Union General Assembly 2016, Vienna, Austria

69. **P. Machado**, M. F. Silva, J. Peralta, D. Luz, A. Sánchez-Lavega, R. Hueso; 2016; *Wind measurements in Saturn's atmosphere with UVES/VLT ground-based Doppler velocimetry*; European Geosciences Union General Assembly 2016, Vienna, Austria

70. **P. Machado**, M. F. Silva, J. Peralta, D. Luz, A. Sánchez-Lavega, R. Hueso; 2016; *Wind measurements in Saturn's atmosphere with UVES/VLT ground-based Doppler velocimetry*; DPS 48 / EPSC 11, Pasadena, USA

71. **T. Magalhães**, **J. M. Rebordão**; 2016; *Impact of Optical Coherence on Stellar Spectra*; International School of Space Science - Ground and space-based instruments for future research in Solar-Terrestrial physics, L'Aquila, Italy

72. M. Maris, R. Scaramella, C. Burigana, E. Romelli, J. Amiaux, **C. S. Carvalho**, J.-C. Cuillandre, **A. C. da Silva**, A. de Rosa, **J. Dinis**, P. Hudelot, E. Maiorano, **I. Tereno**, T. Trombetti; 2016; *Modelling of Zodiacal Light Emission for Space Missions*; ADASS 2016, Trieste, Italy

73. **C. J. A. P. Martins**; 2016; *Walls*; From Algorithms to Architectures, Cambridge, UK

74. **C. J. A. P. Martins**; 2016; *Fundamental Cosmology in the E-ELT Era*; Theoretical Cosmology in the Era of Large Surveys, Arcetri, Italy

75. **C. J. A. P. Martins**; 2016; *Fundamental Cosmology in the E-ELT Era*; Varying Constants and Fundamental Cosmology Conference, Szczecin, Poland

76. **C. J. A. P. Martins**; 2016; *Fine-structure constant constraints on dark energy and the Weak Equivalence Principle*; 51st Rencontres de Moriond Gravitation Session, La Thuile, Italy

77. **J. H. C. Martins**; 2016; *Exoplanet Reflections in the era of Giant Telescopes*; Fourth Annual GMT Community Science Meeting, Asilomar Conference Grounds in Pacific Grove, CA, USA

78. **J. H. C. Martins**, **N. C. Santos**, **P. Figueira**, C. Melo; 2016; *A method to detect visible Reflected Light from Giant Planets in Habitable Zones*; K2 meeting, Porto, Portugal

79. **H. Messias**; 2016; *HATLAS 142935.3-002836 as a case study for a wet-dry major-merger*; APEX2016, Ringberg, Germany

80. **H. Messias**; 2016; *Setting new cosmology constraints with ALMA*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

81. **J. P. Mimoso**; 2016; *The cosmological divide: local collapse versus global expansion*; Beyond The Concordance Model II, Cape Town, South Africa

82. **J. P. Mimoso**; 2016; *Stabilization of the sign of the gravitational constant*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

83. **J. P. Mimoso**; 2016; *Stabilization of the Sign of the Gravitational Constant*; Spanish-Portuguese Relativity Meeting, Lisboa, Portugal

84. **J. J. Neal**; 2016; *Towards exoplanetary atmospheres: new data reduction techniques for the nIR*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds IVth Azores International Advanced School, Faial, Azores, Portugal

85. **B. Nsamba**, **M. J. P. F. G. Monteiro**, T. L. Campante, D. R. Reese, T. R. White, **A. García Hernández**, **C. Jiang**; 2016; *Asteroseismic modelling of the binary HD176465*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

86. **N. J. Nunes**; 2016; *Three-forms in Cosmology*; Beyond The Concordance Model II, Cape Town, South Africa

87. **N. J. Nunes**; 2016; *Cosmology of the de Sitter Horndeski models*; Varying constants and fundamental cosmology, Szczecin, Poland

88. **N. J. Nunes**; 2016; *The variation of the fine-structure constant from disformal couplings?*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

89. **S. Pérez Sánchez**; 2016; *The largest Lyman-α survey at z~5: the most luminous Lyman-α emitters after re-ionisation*; Escape of Lyman radiation from galactic labyrinths, Kolymbari, Crete

90. **P. M. Palmeirim**; 2016; *Star formation and ionized regions in the Inner Galactic Plane*; VIALACTEA 2016 - The Milky Way as a Star Formation Engine, Rome, Italy

91. **P. Papaderos**; 2016; *LINERS and Lyman continuum photon escape*; Escape of Lyman radiation from galactic labyrinths, Kolymbari, Crete

92. **P. Papaderos**, **J. M. Gomes**; 2016; *FADO: a novel spectral population synthesis tool for the exploration of galaxy evolution by means of genetic optimization under self- consistency boundary conditions*; How Galaxies form Stars?, Stockholm, Sweden

93. **C. Pappalardo**; 2016; *Physical properties of low luminosity FIR sources at z < 0.5*; EWASS2016, Athens, Greece

94. **C. Pappalardo**; 2016; *Physical properties of low luminosity FIR sources at z < 0.5*; H-ATLAS meeting, Lisbon, Portugal

95. **C. Pappalardo**; 2016; *PACE activities report*; Annual meeting of the Alma Regional Centers (ARC) and Center of Expertises (CoE) in Europe, Lisbon, Portugal

96. **A. Paulino-Afonso**; 2016; *Morphological properties of the Lyα emitting galaxies at z≥2.23*; Escape of Lyman radiation from galactic labyrinths, Kolymbari, Crete

97. **L. F. Pereira**, **M. J. P. F. G. Monteiro**, **J. P. S. Faria**; 2016; *SIGS – Seismic Inferences for Glitches in Stars*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

98. **A. M. M. Pinho**; 2016; *Updated constrains on spatial variations of the fine-structure constant*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

99. **P. A. Quitral Manosalva**, **M. S. Cunha**; 2016; *A theoretical tool for the study of radial velocities in the atmospheres of roAp stars*; Understanding the roles of rotation, pulsation and chemical peculiarities in the upper main sequence, Lake District, UK

100. **P. A. Quitral Manosalva**, **M. S. Cunha**; 2016; *A theoretical tool for the study of radial velocities in the atmospheres of roAp stars*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

101. **N. Roche**, **A. Humphrey**, **P. Lagos**, **P. Papaderos**; 2016; *MUSE Spectroscopy of a very High Redshift Radio Loud QSO and Giant Lyman-Alpha Nebula*; The Interplay Between Local and Global Processes in Galaxies, Cozumel, Mexico

102. **B. Rojas-Ayala**, S. Lépine, M. Tsantaki, C. ODonell; 2016; *Reliable Colour-Based Metallicities for 20k SUPERBLINK M Dwarfs*; Cool Stars 19, Uppsala, Sweden

103. **A. Rozas-Fernández**, I. Leanizbarrutia, **I. Tereno**; 2016; *Observational constraints on a Unified Dark Matter scalar field model with fast transition*; Spanish-Portuguese Relativity Meeting, Lisboa, Portugal

104. **D. Rubiera-Garcia**; 2016; *Are curvature singularities so bad? some counterexamples*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

105. **D. Rubiera-Garcia**; 2016; *Black holes in Born-Infeld inspired of gravity and resolution of space-time singularities*; IX Black Holes Workshop, Guimaraes, Portugal

106. **D. Rubiera-Garcia**; 2016; *Latest results on metric-affine theories*; Spanish-Portuguese Relativity Meeting, Lisboa, Portugal

107. **I. Yu. Rybak**, **C. J. A. P. Martins**, A. Avgoustidis, E. P. S. Shellard; 2016; *Extending the velocity-dependent one-scale model for domain walls*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

108. **D. Sáez Gómez**; 2016; *Future cosmological singularities:theoretical aspects and observations*; Beyond Concordance Model in Cosmology, Cape Town, South Africa

109. **D. Sáez Gómez**; 2016; *Approaching future cosmological singularities*; Siberian Cosmology days 2016, Tomsk, Russia

110. **D. Sáez Gómez**; 2016; *Analysing viable modified gravities as an alternative to dark energy*; Quantum Field theory and Gravity 2016, Tomsk, Russia

111. **D. Sáez Gómez**; 2016; *Future singularities in cosmology*; 11th Iberian Cosmology Meeting 2016, Porto, Portugal

112. **D. Sáez Gómez**; 2016; *Extending unimodular gravity*; Spanish-Portuguese Relativity Meeting, Lisboa, Portugal

113. **I. Saltas**; 2016; *(Non-) Running Higgs inflation and quantum gravity*; The Exact Renormalisation Group, Trieste, Italy

114. **I. Saltas**; 2016; *Bridging cosmology and astrophysics with gravitational waves*; 11th Iberian Cosmology Meeting 2016, Porto, Portugal

115. **A. Santerne**; 2016; *Characterisation of small exoplanets*; K2 workshop, Porto, Portugal

116. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, W. J. Chaplin, T. L. Campante; 2016; *On the relation between activity-related frequency shifts and the sunspot distribution over the solar cycle 23*; Asteroseismology of stellar activity cycles, Nice, France

117. **A. R. G. Santos**, T. L. Campante, W. J. Chaplin, **M. S. Cunha**, R. Keifer; 2016; *Search for magnetic cycles in the seismic data of solar-type stars observed by Kepler*; Asteroseismology of stellar activity cycles, Nice, France

118. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, T. L. Campante; 2016; *Spot cycle reconstruction: an empirical tool – Application to the sunspot cycle*; K2 Meeting, Porto, Portugal

119. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, R. A. García, S. Mathur; 2016; *Starspot signature on the light curve: learning about the spot distribution*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds IVth Azores International Advanced School, Faial, Azores, Portugal

120. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, T. L. Campante, W. J. Chaplin; 2016; *Short- and mid-term activity-related variations in the solar acoustic frequencies*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds IVth Azores International Advanced School, Faial, Azores, Portugal

121. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, R. A. García, S. Mathur; 2016; *Starspot signature on the light curve: learning about the spot distribution*; Seismology of the Sun and the Distant Stars 2016: Using Today's Successes to Prepare the Future, Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

122. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, T. L. Campante, W. J. Chaplin; 2016; *Short- and mid-term activity-related variations in the solar acoustic frequencies*; Seismology of the Sun and the Distant Stars 2016: Using Today's Successes to Prepare the Future, Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

123. **N. C. Santos**; 2016; *Stellar activity and radial velocities in the ESPRESSO era*; ISSI International Team meeting on Researching the Diversity of Planetary Systems, Bern, Switzerland

124. **N. C. Santos**; 2016; *Stellar chemistry: hints for planet formation and structure*; From star and planet formation to early life, Vilnius, Lithuania

125. **N. C. Santos**; 2016; *Exoplanets: a review*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds IVth Azores International Advanced School, Faial, Azores, Portugal

126. **S. Santos**; 2016; *A wide z~5.7 narrow band survey to probe the bright end of the Lyman-α luminosity function at the end of re-ionisation*; Escape of Lyman radiation from galactic labyrinths, Kolymbari, Crete

127. **L. M. Serrano**, M. Oshagh, **S. C. C. Barros**, **N. C. Santos**; 2016; *An MCMC tool for fitting stellar light curves in presence of spots and plages*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds IVth Azores International Advanced School, Faial, Azores, Portugal

128. **M. S. Silva**, **A. Humphrey**, **P. Lagos**; 2016; *Investigating feedback in the z=2.92 radio galaxy MRC 0943-242 with XSHOOTER IFU and SLIT Spectroscopy*; The Interplay Between Local and Global Processes in Galaxies, Cozumel, Mexico

129. **L. Sousa**, **P. P. Avelino**; 2016; *Cosmic Microwave Background anisotropies generated by domain wall networks*; 11th Iberian Cosmology Meeting 2016, Vila do Conde, Portugal

130. **L. Sousa**; 2016; *Domain walls and dark energy*; 1st CANTATA Cost action workshop, Lisbon, Portugal

131. **L. Sousa**, **P. P. Avelino**; 2016; *Probing cosmic superstrings with gravitational waves*; Spanish-Portuguese Relativity Meeting, Lisboa, Portugal

132. **G. D. C. Teixeira**, **S. G. Sousa**, M. Tsantaki, **M. J. P. F. G. Monteiro**, **N. C. Santos**, G. Israelian; 2016; *A new spectroscopic calibration to determine T_{eff} and [Fe/H] of FGK dwarfs and giants*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

133. **G. D. C. Teixeira**, **S. G. Sousa**, M. Tsantaki, **M. J. P. F. G. Monteiro**, **N. C. Santos**, G. Israelian; 2016; *A new spectroscopic calibration to determine T_{eff} and [Fe/H] of FGK dwarfs and giants*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds IVth Azores International Advanced School, Faial, Azores, Portugal

134. **S. C. Ulmer-Moll**, Z. Wahhaj; 2016; *NICI view of the AU Mic debris disk*; K2 meeting, Porto, Portugal

135. **M. Vrard**, C. Barban, B. Mosser, F. Baudin; 2016; *Amplitudes and lifetime of radial modes in red giant star spectra observed by Kepler*; Seismology of the Sun and the Distant Stars 2016 Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference, Angra do Heroísmo, Terceira-Açores, Portugal

136. **D. Wittman**; 2016; *Dark Matter in Galaxy Clusters: Past, Present, and Future*; American Association of Physics Teachers annual meeting, Sacramento, CA, USA

137. **D. Wittman**; 2016; *Dark Matter in Galaxy Clusters: Past, Present, and Future*; National Astronomy Teaching Summit, San Francisco, CA, USA

138. **D. Wittman**; 2016; *Overconfidence: diagnosis and steps toward treatment*; National Astronomy Teaching Summit, San Francisco, CA, USA

139. **D. Wittman**, N. Golovich, J. Jee, W. A. Dawson, B. A. Benson, K. Ng; 2016; *Merging Cluster Collaboration: Recent Results*; Gravlens 2016: From theory to applications, celebrating a century of gravitational lensing, Leiden, Netherlands

Communications – National Meetings
(http://www.iastro.pt/research/communications.html)

1. **J. Afonso**; 2016; *A evolução da comunidade astronómica portuguesa nas últimas 3 décadas*; Explorar o Espaço, Lisbon, Portugal

2. **R. M. G. Albuquerque**, V. Cayatte, **J. F. Gameiro**, **J. J. G. Lima**, C. Sauty; 2016; *Simulating accretion and outflow features with PLUTO*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

3. **D. T. Andreasen**, **S. G. Sousa**, **N. C. Santos**, **E. Delgado Mena**; 2016; *Determine stellar atmospheric parameters using high quality NIR spectra*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

4. **I. Ayuso**, **J. P. Mimoso**, A. de la Cruz-Dombriz; 2016; *On the stability and scalar perturbations growth in non-local extended gravity theories*; Spanish-Portuguese Relativity Meeting, Lisboa, Portugal

5. **I. Ayuso**; 2016; *Is General Relativity the final theory of gravity?: Modified gravity and new problems*; 2nd IDPASC Students Workshop, Porto, Portugal

6. **I. Ayuso**; 2016; *Is General Relativity the final theory of gravity?: Modified gravity and new problems*; 1st PhD Journeys in the Physics Department, Lisbon, Portugal

7. **I. P. Breda**, **P. Papaderos**, **J. M. Gomes**; 2016; *Formation history and accretion-powered activity in pseudo-bulges*; Thematic Line meeting, Leiria, Portugal

8. **I. P. Breda**, **P. Papaderos**, **J. M. Gomes**; 2016; *A spatially resolved exploration of the assembly history and gas excitation mechanisms in pseudo-bulges from the CALIFA galaxy survey*; Encontro Ciência 2016, Lisbon, Portugal

9. **F. Buitrago**; 2016; *The outskirts of massive early-type galaxies at z=0.65 in the Hubble Ultra Deep Field*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

10. **M. S. Cunha**, L. Balona, D. L. Holdsworth, G. Houdek, K. Perraut, B. Smalley; 2016; *Revisiting the Instability Strip for rapidly oscillating Ap stars*; XXVI Encontro Nacional de Astronomia e Astrofisica, Aveiro, Portugal

11. **E. Delgado Mena**, **M. Tsantaki**, **S. G. Sousa**, M. Kunitomo, **V. Zh. Adibekyan**, P. Zaworska, **N. C. Santos**, G. Israelian, C. Lovis; 2016; *Li-rich giants with substellar companions, a hint of planet engulfment?*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

12. **L. Ebrahimpour**, **P. T. P. Viana**; 2016; *Bayesian parametric and non-parametric characterization of relations between galaxy cluster properties*; 2nd IDPASC Students Workshop, Porto, Portugal

13. **L. Ebrahimpour**, **P. T. P. Viana**; 2016; *Estimating galaxy cluster properties using Hierarchical Bayesian and Gaussian Processes approaches*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

14. **A. C. S. Ferreira**, **S. G. Sousa**, **V. Zh. Adibekyan**; 2016; *Abundances of GAIA-ESO benchmark stars derived in High- and Medium-Resolution*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

15. **N. Frusciante**; 2016; *Stability requirements when exploring Large Scale Structure observables*; 1st CANTATA Cost action workshop, Lisbon, Portugal

16. **J. M. Gomes**; 2016; *FADO: Fitting Analysis using Differential Evolution Optimization*; "The assembly history of galaxies resolved in space and time" Thematic Line Internal Meeting, Leiria, Portugal

17. **J. M. Gomes**; 2016; *Exploring the assembly history of ETGs*; IA-ON3 - Instituto de Astrofísica e Ciências do Espaço - 3rd internal workshop, Porto, Portugal

18. **R. Gonçalves**, **P. Machado**, J. Peralta, D. Luz, J. C. R. E. Oliveira; 2016; *VEx/VIRTIS and TNG/NICS cloud tracked winds at Venus' lower cloud level using nightside observations*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

19. **A. Humphrey**; 2016; *The physical conditions in the NLR of Type 2 quasars at z ~ 2*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

20. **F. López Martínez**; 2016; *Magnetospheric properties of T Tauri stars through ultraviolet emission lines*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

21. **A. C. O. Leite**, **C. J. A. P. Martins**, P. Molaro; 2016; *Dark energy constraints from ESPRESSO tests of the stability of fundamental couplings*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

22. **P. Machado**, T. Widemann, J. Peralta, **R. Gonçalves**, D. Luz; 2016; *Ground and space based cloud-top wind velocities using CFHT/- ESPaDOnS (Doppler velocimetry) and VEx/VIRTIS (cloud tracking) coordinated measurements*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

23. **T. Magalhães**, **J. M. Rebordão**; 2016; *Impact of Coherence on Stellar Spectra*; 20th Conferência Nacional de Física, Braga, Portugal

24. **C. J. A. P. Martins**; 2016; *Scientific and Technological Challenges of Modern Astrophysics: ESPRESSO, and the road to the E-ELT*; InnovationNow, Aveiro, Portugal

25. **C. J. A. P. Martins**; 2016; *Fundamental Physics with ELT-HIRES*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

26. **I. Matute**; 2016; *The Extra-galactic Universe and its Cosmology*; Portuguese ALMA Community Days 2016, Porto, Portugal

27. **I. Matute**; 2016; *The first robust candidates for high-z radio galaxies*; IA-ON3, Porto, Portugal

28. **H. Messias**; 2016; *The observatory ALMA*; Portuguese ALMA Community Days 2016, Porto, Portugal

29. **H. Messias**; 2016; *Observation simulations*; Portuguese ALMA Community Days 2016, Porto, Portugal

30. **J. P. Mimoso**; 2016; *Particle Production from modified gravity with a non-minimal curvature coupling*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

31. **M. J. P. F. G. Monteiro**; 2016; *Portugal and the ESA Science Programme*; Apresentação convidada no Ciência 2016, Lisbon, Portugal

32. **S. G. Morais**; 2016; *GTC spectroscopy of two radio galaxies at z~2.5: ionization and feedback in Lyα halos*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

33. **J. J. Neal**; 2016; *Towards exoplanetary atmospheres: new data reduction techniques for the nIR*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

34. **J. J. Neal**; 2016; *Towards exoplanetary atmospheres: new data reduction techniques for the nIR*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

35. **C. Pappalardo**; 2016; *Low luminosity FIR sources*; Team Meeting, Leiria, Portugal

36. **C. Pappalardo**, M. Baes, S. Viane; 2016; *Dusty galaxies at z<0.5: an insight in the quenching phase of the Universe*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

37. **A. Paulino-Afonso**; 2016; *Blue vs. Red morphological evolution of star-forming galaxies*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

38. **A. Paulino-Afonso**, D. Sobral, **J. Afonso**; 2016; *Size evolution of star-forming galaxies in the last ~11Gyrs*; Encontro Ciência '16, Lisbon, Portugal

39. **A. M. M. Pinho**; 2016; *Constraining spatial variations of the fine structure constant in symmetron models*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

40. **A. C. S. Rei**, **J. F. Gameiro**, **G. D. C. Teixeira**, S. Alencar; 2016; *The analysis of VLT/GIRAFFE spectra of wTTS from NGC 2264*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

41. **A. C. S. Rei**, **J. F. Gameiro**, **G. D. C. Teixeira**, S. Alencar; 2016; *Fundamental stellar parameters for weak-line T Tauri Stars from NGC 2264*; Encontro Ciência 2016, Lisbon, Portugal

42. **S. N. Reis**, **F. Buitrago**; 2016; *Compact high-z galaxies must hide in the cores of the present-day most massive galaxies*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

43. **J. Retrê**, **J. Afonso**, **R. Agostinho**; 2016; *Viver Astronomia Programme – Future scientists communicating science*; SciCom PT 2016, Lisbon, Portugal

44. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, T. L. Campante; 2016; *Spot cycle reconstruction*; Ciência 2016, Lisboa, Portugal

45. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, R. A. García, S. Mathur; 2016; *Starspot signature on the light curve: learning about the spot distribution*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

46. **A. R. G. Santos**, **M. S. Cunha**, **P. P. Avelino**, W. J. Chaplin, T. L. Campante; 2016; *Short- and mid-term activity-related variations in the solar acoustic frequencies*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

47. **N. C. Santos**; 2016; *The ESPRESSO project: finding other worlds*; SPIE Student Chapter, Department of Physics and Astronomy, Univ. Porto, Portugal

48. **L. M. Serrano**, **S. C. C. Barros**, M. Oshagh; 2016; *Measuring exoplanetary phase curves with CHEOPS: the issue with stellar activity*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

49. **M. Silva**, **P. Machado**, D. Luz, A. Sánchez-Lavega, R. Hueso, J. Peralta; 2016; *Wind measurements in Saturn's atmosphere with UVES/VLT ground-based Doppler velocimetry*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

50. **L. Sousa**, **P. P. Avelino**; 2016; *Probing cosmic superstrings with gravitational waves*; IA-on 3 Workshop, Porto, Portugal

51. **S. G. Sousa**; 2016; *Latest results from IA on the Gaia-ESO Survey*; IA-ON3, Porto, Portugal

52. **G. D. C. Teixeira**; 2016; *Variability study of the high-resolution spectra of an O-star - Preliminary findings*; 2nd IDPASC Students Workshop, Porto, Portugal

53. **G. D. C. Teixeira**; 2016; *Variability study of the high-resolution spectra of an O-star - Preliminary findings*; Map-Fis Conference 2016, Aveiro, Portugal

54. **I. Tereno**; 2016; *Observational discriminants: the case of weak lensing*; 1st CANTATA Cost action workshop, Lisbon, Portugal

55. **I. Tereno**, **J. Dinis**, C. S. Carvalho, **A. C. da Silva**, R. Scaramella, J. Amiaux, Y. Mellier; 2016; *Euclid at PDR: building the sky survey*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

56. **S. C. Ulmer-Moll**; 2016; *Atmospheric correction in the near-infrared*; XXVI Encontro Nacional de Astronomia e Astrofísica, Aveiro, Portugal

Organisation of Seminars
(http://www.iastro.pt/research/seminars.html)

1. Antón, S.; 2016; What's in a radio loud Narrow-Seyfert 1 galaxy?

2. Barceló Forteza, S.; 2016; Asteroseismology of CoRoT & Kepler delta Scuti stars

3. Barros, S. C. C.; 2016; Observation of exoplanet transits

4. Bennert, V. N.; 2016; Towards an Understanding of the Black Hole Mass Scaling Relations

5. Bettoni, D.; 2016; Constraining Lorentz-violating dark matter with galaxy satellites

6. Borsa, F.; 2016; Chromatic line-profile tomography to reveal exoplanetary atmospheres

7. Brinchmann, J.; 2016; Slicing the Universe with MUSE and a few other things

8. Buitrago, F.; 2016; What's beyond my lab? Current challenges in extragalactic Astronomy

9. Caballero, J.; 2016; CARMENES at Calar Alto: from the Barnard's star, through exoearths, to PLATO

10. Campante, T. L.; 2016; Asteroseismology of Exoplanet-Host Stars in the TESS Era

11. Carvalho, C. S.; 2016; Angular distribution of cosmological parameters as a measurement of spacetime inhomogeneities

12. Casas, S.; 2016; Constraining general models of modified gravity in the nonlinear regime using semi-analytics and simulations

13. Cembranos, J. A. R.; 2016; Disformal Dark Matter: Branon phenomenology

14. Conselice, C. J.; 2016; How many galaxies are in the universe?

15. Correia, A. C. M.; 2016; Improving our knowledge on planetary systems using dynamics

16. de la Cruz-Dombriz, A.; 2016; What neutron stars are telling us about extended theories gravities

17. de Laverny, P.; 2016; The AMBRE Project: chemical tagging of the Galactic disc

18. Dutta, J.; 2016; Disk Fragmentation During Primordial Star Formation

19. Frusciante, N.; 2016; Testing dark energy and modified gravity models with EFTCAMB: The Hořava gravity case
20. Garcia, P. J. V.; 2016; Observing with the ESO/GRAVITY instrument
21. Gil de Paz, A.; 2016; MEGARA, the new IFU & MOS for the 10.4m GTC telescope
22. Gilli, G.; 2016; The atmosphere of Venus simulated by a general circulation model
23. Gomes, C. F. V.; 2016; Non-minimally coupling matter to curvature
24. Haywood, R. D.; 2016; Towards precise and accurate exoplanet mass determinations: HARPS-N observes the Sun
25. Kholtygin, A.; 2016; Fast Line Profile Variations in spectra of OBA and a Nature of GW Precursors
26. Koivisto, T. S.; 2016; Gauge gravity and gauge unification
27. Kramer, M.; 2016; Tests of theories of gravity using radio astronomy: from now to the Square Kilometre Array
28. Kunitomo, M.; 2016; The effects of planet formation and planet engulfment on stellar surface composition
29. Kurtz, D. W.; 2016; Asteroseismology: A New Keplerian Revolution
30. López Martínez, F.; 2016; Constraints to the magnetospheric properties of T Tauri stars
31. Lazanu, A.; 2016; A three-shape description the matter bispectrum of large-scale structure with and without primordial non-Gaussianity
32. Le Delliou, M.; 2016; Progresses on expansion/collapse separation: Matter Trapping Surfaces, dual null formalism and Trapping Horizons
33. Leanizbarrutia, I.; 2016; MCMC applied to a UDM model with fast transition
34. Machado, P.; 2016; Characterization of planetary atmospheres
35. Martins, C. J. A. P.; 2016; Fundamental cosmology in the E-ELT era
36. Martins, C. J. A. P.; 2016; Supercomputing, science and art
37. Mikolaitis, S.; 2016; Astrophysical research at Institute of Theoretical Physics and Astronomy, Vilnius University
38. Molino, A.; 2016; Accurate photo-z in massive galaxy clusters
39. Muirhead, P. S.; 2016; Fundamental Properties of M Dwarf Stars and Their Many Exoplanets
40. Nerozzi, A.; 2016; A new approach to the Newman-Penrose formalism
41. Nersisyan, H.; 2016; IR non-local cosmology
42. Odintsov, S. D.; 2016; Accelerating cosmology from modified gravity: new theories
43. Pérez-González, P.; 2016; SHARDS: diving into the details of the SFHs of massive dead galaxies at z>1
44. Pace, F.; 2016; Approximation of the potential in scalar field dark energy models
45. Papaderos, P.; 2016; RemoveYoung: A tool for the removal of the young stellar component in galaxies within an adjustable age cutoff
46. Paulino-Afonso, A.; 2016; Star-forming galaxies morphology in the COSMOS field: evolution and environmental effects
47. Pavón, D.; 2016; Thermodynamics of Nonsingular Bouncing Universes
48. Pepe, F.; 2016; HARPS-N: Project, results, challenges and future plans
49. Perraut, K.; 2016; Determination of fundamental parameters of stars through optical interferometry
50. Petrov, P. P.; 2016; Wind-dust interaction in the accreting T Tauri stars
51. Peyravi, S.; 2016; Solitons in cosmology
52. Rodriguez del Pino, B.; 2016; The influence of environment on the star formation properties of galaxies
53. Rubiera-Garcia, D.; 2016; Non-Riemannian geometries for gravitational physics
54. Sáez Gómez, D.; 2016; Is the universe heading towards a violent end?
55. Sánchez-Lavega, A.; 2016; The Dynamics of Planetary Atmospheres
56. Saltas, I.; 2016; Gravitational waves: The story of an exciting discovery
57. Scott, T. C.; 2016; Evolution of late–type galaxies in galaxy clusters: cold gas
58. Silva, H. O.; 2016; Neutron stars in scalar-tensor theories of gravity
59. Vauclair, S.; 2016; Fingering convection: an unforeseen physical process at work inside stars
60. Viero, M.; 2016; The Far-Infrared Properties of Optically-Selected Galaxies
61. Villar-Martín, M.; 2016; Negative feedback in the most powerful active galaxies
62. Vrard, M.; 2016; Automated measurement of the gravity mode period-spacing in red giant star spectra
63. Wade, G. A.; 2016; Stellar magnetic fields and stellar evolution
64. Weilbacher, P.; 2016; Stars and Gas in the Antennae as seen with the MUSE Integral Field Spectrograph
65. Zambujal Ferreira, R.; 2016; Gauge fields in inflation

Organisation of Conferences
(http://www.iastro.pt/research/conferences.html)

1. Understanding the nature of pulsations and the physics of the Ap stars; 2nd PICS workshop; 11 to 12 February 2016; Porto, Portugal
2. Portuguese ALMA Community Days; 14 to 15 March 2016; Porto, Portugal
3. IberiCos 2016; 29 to 31 March 2016; Vila do Conde, Portugal
4. CHEOPS SOC meeting # 07; 12 to 14 April 2016; Porto, Portugal
5. Escape of Lyman radiation from galactic labyrinths; 26 to 29 April 2016; OAC, Kolymbari, Crete
6. The Cosmic FIR Landscape; Building on the legacy of Herschel; 4 to 6 May 2016; Lisbon, Portugal
7. K2 meeting; 10 to 11 May 2016; Porto, Portugal
8. Euclid Consortium Meeting 2016; Mapping the geometry of the dark universe; 30 May to 3 June 2016; Centro Cultural de Belém, Lisboa, Portugal
9. Sun-like stars unlike the Sun; A Cool Stars 19 Splinter Session; 9 June 2016; Uppsala, Sweden
10. X-Astronomers 2016; "The assembly history of galaxies resolved in space and time" Thematic Line Internal Meeting; 16 to 17 June 2016; Leiria, Portugal
11. Seismology of the Sun and the Distant Stars 2016; Using Today's Successes to Prepare the Future Joint TASC2 & KASC9 Workshop – SPACEINN & HELAS8 Conference; 11 to 15 July 2016; Angra do Heroísmo, Terceira-Açores, Portugal
12. 2-DEMOC 2016; "Towards the detection and characterization of other Earths" Thematic Line Internal Meeting; 12 to 13 July 2016; Ribeira de Pena, Portugal
13. Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds; IVth Azores International Advanced School in Space Sciences; 17 to 27 July 2016; Horta, Faial, Azores Islands, Portugal
14. 2016 EU ARC ALL-HANDS; Annual meeting of the Alma Regional Centers (ARC) and Center of Expertises (CoE) in Europe; 5 to 7 October 2016; Lisboa, Portugal
15. IA-ON3; Institute of Astrophysics and Space Sciences 3rd internal workshop; 13 to 14 October 2016; Porto, Portugal
16. 1st CANTATA Cost action workshop; Cosmology and Astrophysics Network for Theoretical Advances and Training Actions; 11 to 12 November 2016; Lisbon, Portugal

LOC/SOC of Other Conferences

1. M. S. Cunha; SOC; Understanding the roles of rotation, pulsation and chemical peculiarities in the upper main sequence; Lake District, UK; 11-16 September 2016; (http://www.star.uclan.ac.uk/stars2016
2. C. J. A. P. Martins; International Steering Committee, COSMO-16; Ann Arbor, USA; 8-12 August 2016; http://cosmo16.physics.lsa.umich.edu/
3. C. J. A. P. Martins; International Advisory Board, VarCosmoFun'16; Szczecin (Poland); 12-17 September 2016; http://cosmo.fiz.univ.szczecin.pl/?q=node/197
4. P. Papaderos; Co-organizer; 2nd SELGIFS Advanced School on Integral-Field Spectroscopic Data Analysis; Madrid; 21-25 November 2016
5. J. Coelho; Member of the Program Committee of the 4th International Conference on Photonics, Optics and Laser Technology; Rome, Italy; 27-29 February 2016

PhD Thesis completed
(under the supervision of IA researchers)

1. Arlindo Cunha; Non-Gaussian models for the formation of large-scale structure in the Universe; Supervisor: P. T. P. Viana; June 2016
2. David Alves; Stabilization of Modelock lasers for metrology applications in space; Supervisor: M. Abreu; November 2016

MSc Thesis completed
(under the supervision of IA researchers)

1. Abdeldjalil Zaid; Chaplygin gas – unifying dark matter and dark energy; University of Porto; Adviser: Paulo Maurício de Carvalho; 30 June 2016
2. Luis Filipe Regala Pereira; Development of automatic tools for measuring acoustic glitches in seismic data of solar-type stars, Master Degree in Astronomy, University of Porto; Adviser: Mário J.P.F.G. Monteiro; November 2016,
3. Ana Marta Pinho; EPIC: Equivalence Principle Tests in Cosmology; Adviser: Carlos Martins; 7 November 2016
4. Sandy Gonçalves Morais; Probing the Formation of Galaxies using Lyman-Alpha Emission and Absorption; Adviser: Andrew Humphrey; February 2016
5. Elsa Moreira; Validation of the Kepler system KOI-1880; Adviser: Alexandre Santerne; 31 October 2016
6. Filipe Velosa; Development of a low cost ellipsometer; Adviser: Manuel Abreu; September 2016
7. João Ricarte; Optical fiber gyroscopes; Adviser: Manuel Abreu; September 2016
8. Ruben Gonçalves; Dynamics of Venus' atmosphere: wind characterization with Doppler velocimetry; Adviser: Pedro Machado; July 2016
9. Miguel Silva; Wind measurements in Saturn's atmosphere using Doppler velocimetry techniques from ground-based observations; Adviser: Pedro Machado; July 2016
10. Joana Oliveira; The Differential Evolution of Hot and Cold-Dust in Galaxies in the Last 7.5Gyr; Adviser: Hugo Messias; 2 May 2016

11. João Retrê; Characterisation in radio-frequencies of the star-formation rate in bulgeless galaxies at intermediate redshifts; Adviser: José Afonso; November 2016

12. Sérgio Santos; The largest Ly-alpha narrow band survey at z=5.7: implications for reionization; Adviser: David Sobral; September 2016

BSc Traineeships/Projects completed
(under the supervision of IA researchers)

1. Luís Branco; Searching for Lyman-alpha emitters at z~2.2; Adviser: David Sobral; July 2016

2. Salvador Bruschy; Cosmological Interpretation of the interior of a Reissner-Nordstrom black hole; Advisers: Francisco Lobo and Nelson Nunes; July 2016

3. Hugo Martins; The Role of Environment in the Star Formation of Galaxies at z~0.8; Adviser: David Sobral; July 2016

4. Effects of primordial non-gaussianity in the density, temperature and enthropy profiles of present-day (z=0) galaxy clusters; Advisers: António da Silva and Arlindo Trindade

Observing Runs

1. K. Perraut, M. S. Cunha, L. Bigot, and D. Mourard; Fundamental parameters of the magnetic stars HD 120198, HD188041, HD 153882,HD 204411, HD 220825, HD42659; 8 nights between June and November 2016

2. M. Fernández, P. P. Petrov, J. F. Gameiro, R. M. G. Albuquerque; ID F16-2.2-009, CAFE, 2.2m Calar Alto; January 2016

3. S. G. Sousa, D. Andreasen, A. Mortier, N. C. Santos, E. Delgado Mena, V. Zh. Adibekyan, M. Tsantaki, I. Brandao, B. Rojas-Ayala, G. Israelian, S. C. C. Barros, A. Santerne, M. Oshagh, M. Montalto, P. Figueira; Planet formation hints using detailed and homogeneous spectroscopic characterization of planet hosts stars; 097.C-0280; UVES UT2; P97

4. S. G. Sousa, D. Andreasen, A. Mortier, N. C. Santos, E. Delgado Mena, V. Zh. Adibekyan, M. Tsantaki, A. Ferreira, I. Brandao, B. Rojas-Ayala, G. Israelian, S. C. C. Barros, A. Santerne, M. Montalto, P. Figueira; Know the star to know the planet: building the largest catalog of exoplanet host star parameters and chemical abundances; 098.C-0151; UVES UT2; P98

5. N. C. Santos; HARPS, La Silla-Paranal Observatory, ESO, Chile, as part of different programs to search for planets orbiting solar-type stars; 22-29 January 2016

6. N. C. Santos; Coordination of one HARPS Large Program: “The deepest search for hot Neptunes around a sample of metal-poor stars: a fundamental test for planet formation models”; 51 nights from October 2015 to September 2017

7. P. Figueira; HARPS-N GTO in Obs. Roque de los Muchachos; December 2016

8. P. Figueira; HARPS Observing Run in La Silla; February 2016

9. G. D. C. Teixeira, M. S. Nanda Kumar; “Observational study of Sigma Ori”; PRL Advanced Radial-velocity All-sky Search(PARAS) at the PRL 1.2m Infrared Telescope at Mount Abu, India; March 2016

10. V. Zh. Adibekyan; Combination of several Large programs to detect exoplanets: HARPS run P97; 20-26 August 2016

11. E. Delgado Mena, N. C. Santos et al.; The deepest search for hot Neptunes around a sample of metal-poor stars: a fundamental test for planet formation models; 196.C-0042(A); HARPS/ESO-3.6m telescope; observing during 21-29 November 2016 (period 98)

12. E. Delgado Mena et al.; Searching for the fingerprints of planet engulfment in red giants; 097.D-0418; UVES/VLT; P97 service mode

13. E. Delgado Mena, S. G. Sousa et al.; Planet formation hints using detailed and homogeneous spectroscopic characterization of planet hosts stars; 097.C-0280; UVES/VLT; P97 service mode

14. E. Delgado Mena, N. C. Santos et al.; Probing hot Neptune formation: Rossiter-McLauglin measurements of the hot Neptune HD219828; OPTICON-16B/028; HARPS-N/TNG, service mode

15. E. Delgado Mena, A. Santerne et al.; Rocky or gaseous? Exploring the composition of small worlds using K2 and HARPS; 198.C-0169; HARPS/ESO-3.6m telescope (other observers)

16. E. Delgado Mena et al.; Towards a new method for derivation of precise parameters for M dwarfs; IRTF.068; i-SHELL/IRTF; 14 October and 4 November 2016 (remote observing)

17. M. Kunitomo, E. Delgado Mena, V. Zh. Adibekyan; Searching for the fingerprints of planet engulfment in red giants; S16B0178S, HDS/Subaru; November 2016, service mode

18. J. H. C. Martins; ESO reference PID: 191.C-0873, 192.C-0852, 097.C-0021, 196.C-0042, 097.C-1025, 097.C-0561, 097.C-0434; HARPS; 5-10 May 2016

19. Ming Sun, Francoise Combes, Jeffrey Kenney, Luca Cortese, T. Scott, Suresh Sivanandam, Elias Brinks, Elke Roediger, Michele Fumagalli; 2015.1.01520.S; Star formation and gas mixing in a multi-phase tail of the nearest jellyfish galaxy?; ALMA; March to July 2016

20. Mirian Fernandez Lorenzo, Stéphane Leon, Sergio Martin, Pablo Ramirez Moreta, Francoise Combes, Armando Gil de Paz, Min Yun, Jesus Martin-Pintado, T. Scott, Javier Blasco-Herrera, Kambiz Fathi, M Carmen Toribio; 2015.1.00587.S; Why do isolated galaxies host red pseudobulges?; ALMA

21. Guillaume Hebrard (PI), S. C. C. Barros; Characterisation of transiting exoplanets OHP; 22-29 August 2016

22. A. C. O. Leite, C. J. A. P. Martins, H. Messias, P. Molaro; Enabling millimeter tests of the stability of fundamental couplings at high redshift; 098.A-0887(A); SHFI-APEX; 45.6 h, Service mode, Period 98; 2016

23. M. Oshagh; HARPS observation, ESO La Silla; September 2016

24. M. Montalto (PI), N. Iro, N. C. Santos, J. Martins, P. Figueira, R. Alonso; OPT16A_14: Characterization of the optical transmission spectrum of a highly inflated exoplanet; Telescope: TNG, Instrument: DOLORES. Time awarded: 1.5 nights; Observations executed the 8 June 2016 and 21 June 2016

25. N. C. Santos (PI), J. P. S. Faria, A. Mortier, V. Zh. Adibekyan, I. Boisse, E. Delgado Mena, P. Figueira, X. Dumusque, G. Lo Curto, C. Lovis, M. Mayor, C. Melo, M. Montalto, M. Oshagh, D. Queloz, F. Pepe, B. Rojas-Ayala, A. Santerne, A. Sozzetti, S. G. Sousa, S. Udry; 196.C-0042: The deepest search for hot Neptunes around a sample of metal-poor stars: a fundamental test for planet formation models.; Telescope: 3.6m La Silla, Instrument: HARPS, large programme; Observations executed between 3-8 August 2016

26. C. Pappalardo, L. Bizzocchi, J. Afonso, I. Matute; Gas-scaling relations during the quenching phase - 30_021 - GMRT; July 2016

27. J. Gallimore (PI), S. Antón; Finding one to count a hundred: searching for high-z blazars; ARC 3.5m APO; November 2015

28. S. Antón; What is in a radio-loud NLS1 galaxy?; APEX, 98A

29. A. Paulino-Afonso, A. Stroe; A large H-alpha survey of star formation and AGN activity across relaxed and merging clusters; N2; WFC/INT; 2-5 June 2016

30. T. Widemann, P. Machado; Mauna Kea, Canada-France-Hawaii-Telescope (CFHT); Hawaii USA; January 2016

31. P. Machado; Pluto stellar occultation; Centro Ciência de Constância; July 2016

32. P. Machado; Asteroid Ambrosia stellar occultation; Monte Ratolas; August 2016

33. H. Messias; HATLAS team; Tracing with APEX the CO ladder toward the lensed galaxy in HATLAS J142935.3-002836: case study for wet-dry mergers; ESO 097.A-0995; SEPIA-Band5 and APEX2 at APEX; 97

34. I. Matute; Title: "Gas-scaling relations during the quenching phase"; GMRT Observations during June & July 2016

35. D. Sobral, S. Pérez Sánchez; Spectroscopy of bright lyman-alpha candidates; N4; ISIS William Herschel Telescope; 4, 5 and 6 of May 2016

Online Catalogs and Tools

1. C. Pappalardo, M. Grossi et al.; 2016 VizieR On-line Data Catalog: J/A+A/590/A27; Originally published in: 2016A&A...590A..27G

2. B. Ribeiro, C. Lobo, S. Anton, J. M. Gomes, P. Papaderos; VizieR Online Data Catalog: Red galaxies with pseudo-bulges in the SDSS (Ribeiro+2016); VizieR Online; Data Catalog, 745; http://adsabs.harvard.edu/abs/2016yCat..74563899R

3. J. M. Gomes, P. Papaderos; RemoveYoung: A tool for the removal of the young stellar component in galaxies within an adjustable age cutoff; 2016; http://www.iastro.pt/research/tools/RemoveYoung.html

Seminars by IA Researchers

1. Fundamental Cosmology in the E-ELT Era; Carlos Martins (OATS Seminar, Trieste Observatory, Italy), 20 April 2016

2. The Taxonomy of Varying Alpha Models; Carlos Martins (Galileo Galilei Institute, Arcetri, Italy), 26 April 2016

3. Supercomputing, science and art; Carlos Martins (FCUL), 24 November 2016

4. Detection and characterisation of exoplanets using high resolution spectroscopy; Nuno Santos (Instituto Superior Técnico (IST), Departamento de Física), 18 May 2016

5. Exoplanets: from stellar activity to the next generation of planet-hunting spectrographs; Pedro Figueira (Institute of Astrophysics of Canaries, Spain), 29 November 2016

6. Exoplanets: from stellar activity to the next generation of planet-hunting spectrographs; Pedro Figueira (Institute for Astrophysics of Gottingen, Germany), 11 August 2016

7. A pragmatic Bayesian perspective on correlation analysis: The exoplanetary gravity - stellar activity case; Pedro Figueira (ESO-Santiago Chile), 26 February 2016

8. Searching for low-mass planets around metal-poor stars; João Faria (Torino, Italy), 20 October 2016

9. Exoplanet Reflections in the era of Giant Telescopes; Jorge Martins (ESO Thirty Minute Talk, ESO Vitacura, Chile), 30 November 2016

10. EPIC Heidelberg project; Ana Pinho (Heidelberg, Germany), 21 June 2016

11. Observation of exoplanet transits; Susana Barros (Aveiro Portugal), 27 April 2016

12. Euclid Legacy Science; Jarle Brinchmann (Kapteyn Institute, Groningen, the Netherlands), 10 February 2016

13. The Characterization of Exoplanetary Atmospheres: current challenges and future prospects; Marco Montalto (Research seminar at the Fundación Galileo Galilei – INAF – Rambla José Ana Férnandez Pérez, 7, 38712 San Antonio de Breña Baja, La Palma, Canary Islands, Spain), 8 June 2016

14. The Characterization of Exoplanetary Atmospheres: current challenges and future prospects; Marco Montalto (Research seminar at INAF – Osservatorio Astronomico di Padova, vicolo Osservatorio 5, 35122, Padova, Italy), 8 September 2016

15. The physical properties of giant exoplanets within 400 days; Alexandre Santerne (Aarhus, Denmark), 14 April 2016

16. The physical properties of giant exoplanets within 400 days; Alexandre Santerne (Santiago, Chile), 21 January 2016

17. Discovering the First Monsters in the Universe; José Afonso (Faculty of Sciences of the University of Lisbon - Department of Physics Seminar, Portugal), 13 April 2016

18. Inflaton decays into Curvatons: Perimeter Institute; Marina Cortês (Canada), 26 May 2016

19. From the Einstein-Rosen bridge and geons to the modern renaissance of space-time tunnels; Francisco Lobo (ICE-IEEC, Univ. Aut. Barcelona, Spain), 20 June 2016

20. From the Einstein-Rosen bridge and geons to the modern renaissance of space-time tunnels; Francisco Lobo (Babes-Bolyai University Cluj-Napoca, Romania), 12 July 2016

21. The modern renaissance of traversable wormholes; Francisco Lobo (Virtual Institute of Astroparticle Physics, Paris), 21 October 2016

22. Doppler Velocimetry - A fine-tuned tool to study planetary Atmospheres; Pedro Machado (Bilbao, Spain), July 2016

23. Setting new cosmology constraints with ALMA; Hugo Messias (FCUL, Portugal), 27 April 2016

24. Invited seminar on gravitational waves and large-scale structure: "Bridging cosmology and astrophysics with gravitational waves"; Ippocratis Saltas (Oxford U., Oxford, UK), May 2016

25. Seminar on gravitational waves and large-scale structure: "Bridging cosmology and astrophysics with gravitational waves"; Ippocratis Saltas (Nottingham U., Nottingham, UK), May 2016

26. Talk on gravitational waves and LIGO, "Gravitational waves: The story of an exciting discovery"; Ippocratis Saltas (Departmental seminar, FCUL, U. Lisbon), March 2016

27. Seminar on gravitational waves and large-scale structure: "Bridging cosmology and astrophysics with gravitational waves"; Ippocratis Saltas (U. Aveiro, Aveiro, Portugal), May 2016

28. Seminar on gravitational waves and large-scale structure, "Bridging cosmology and astrophysics with gravitational waves"; Ippocratis Saltas (CENTRA Tecnico, U. Lisbon), April 2016

29. Talk on gravitational waves and LIGO, "Gravitational waves: The story of an exciting discovery"; Ippocratis Saltas (Departmental seminar, FCUL, U. Lisbon), March 2016

30. Galactic Extremophiles: The most massive galaxies of the Universe; Fernando Buitrago (Centro de Astrobiología, Madrid, Spain), 18 November 2016

31. What's beyond my lab? Current challenges in extragalactic Astronomy; Fernando Buitrago (Faculdade de Ciências, Lisboa, Portugal), 9 November 2016

32. Review about the state-of-the-art of massive galaxies; Fernando Buitrago (CENTRA, Lisbon, Portugal), 10 March 2016

33. The Palatini approach in gravitation; Diego Rubiera-Garcia (Covilha, Portugal), 2016

34. Regular black holes and cosmic bounces in Palatini theories of gravity; Diego Rubiera-Garcia (Centro de Física do Porto, Portugal), 2016

35. Non-Riemannian geometries for gravitational physics; Diego Rubiera-Garcia (Lisbon University, Portugal), 2016

36. Resolving black hole singularities; Diego Rubiera-Garcia (University of Aveiro, Portugal), 2016

37. Black holes with internal structure and avoidance of singularities; Diego Rubiera-Garcia (Vienna Technological University, Austria), 2016

38. Learning to live with space-time singularities with the help of non-Riemannian geometry; Diego Rubiera-Garcia (CSIC, Madrid, Spain), 2016

39. Exploring new avenues for the resolution of space-time singularities; Diego Rubiera-Garcia (University of Cape Town, South Africa), 2016

40. Stepping into a black hole and living to tell it; Diego Rubiera-Garcia (University of Lisbon, Portugal), 2016

41. Maybe black holes aren't so monstrous as we thought; Diego Rubiera-Garcia (CENTRA, Instituto Superior Técnico, Lisbon, Portugal), 2016

42. Extending General Relativity with metric-affine geometries; Diego Rubiera-Garcia (Fundación Universitaria Konrad Lorenz, Bogotá, Colombia), 2016

43. Merging Galaxy Clusters as Dark Matter Colliders; David Wittman (University of Coimbra, Coimbra, Portugal), 3 March 2016

44. Merging Galaxy Clusters as Dark Matter Colliders; David Wittman (University of Hamburg, Hamburg, Germany), 13 April 2016

45. Merging Galaxy Clusters as Dark Matter Colliders; David Wittman (Leiden Observatory/University of Leiden, Leiden, NL), 18 April 2016

Outreach Talks

1. J. P. M. de Carvalho; Matemática e Astronomia: no futuro como no passado, Mat-Oeste 2016 – Matemática e o Futuro; Escola Superior de Tecnologia e Gestão, Instituto Politécnico de Leiria, Leiria, Portugal; 8 July 2016

2. J. P. M. de Carvalho; Da Idade da Magia a Galileu – do Homem ao Universo; Escola Regional Dr. José Dinis da Fonseca, Outeiro de S. Miguel, Guarda, Portugal, 6 October 2016

3. J. P. M. de Carvalho; Um Universo de Informação - a Luz; Escola Básica de Vale do Este, Arnoso - Santa Maria, Vila Nova de Famalicão, Portugal; 17 October 2016

4. J. P. M. de Carvalho; Da Idade da Magia a Galileu – do Homem ao Universo; Escola Básica EB1 Rui Martins, Figueira da Foz, Portugal; 19 October 2016

5. J. P. M. de Carvalho; Da Idade da Magia a Galileu – do Homem ao Universo; Escola Básica e Secundária de Airães, Airães, Portugal; 20 October 2016

6. M. S. Cunha; Debate - Conhecer o Espaço para melhor viver na Terra; in Festival Europeu de Documentário Científico de Lisboa, organized by Ciência Viva, EuroScience, EuroPAWS e Apordoc.; 2 December 2016

7. D. F. M. Folha; Astrobiologia: o contexto cósmico da vida; Noites do Observatório; Lisboa; 17 December 2016

8. J. F. Gameiro; A impressão digital dos astros, no âmbito da ação O Espaço vai à Escola, Ciência e Viva;

Escola Secundária Daniel Faria, Baltar, Paredes; 6 October 2016

9. J. J. G. Lima; O nosso sistema solar; Fajozes, Vila do Conde; 27 December 2016

10. C. Lobo; A Via Láctea e as outras galáxias; Externato das Escravas do Sagrado Coração de Jesus, Porto; 10 October 2016

11. C. Lobo; A Via Láctea e as outras galáxias; Centro de Astrofísica da Universidade do Porto; 14 July 2016

12. C. Lobo; A Via Láctea e as outras galáxias; Centro de Astrofísica da Universidade do Porto; 21 July 2016

13. C. Lobo; Galáxias de grupos e enxames: evolução acelerada; Faculdade de Ciências da Universidade do Porto; 16 April 2016

14. M. J. P. F. G. Monteiro; Portugal e o Espaço: A aventura científica na ESA; Colégio de Ermesinde, Valongo; 18 October 2016

15. M. J. P. F. G. Monteiro; Portugal e o Espaço: A aventura científica na ESA; in Seismology of the Sun and the Distant Stars 2016: Using Today's Successes to Prepare the Future; Universidade dos Açores, Angra do Heroísmo-Terceira, Portugal; 12 July 2016

16. S. G. Sousa; À Descoberta de Planetas Extra-Solares; Escola Básica de Loureiro; 10 October 2016

17. S. G. Sousa; À Descoberta de Planetas Extra-Solares; Externato das Escravas do Sagrado Coração de Jesus; 7 October 2016

18. S. G. Sousa; À Descoberta de Planetas Extra-Solares; Centro de Ciência Viva Universidade Coimbra Rómulo; 5 May 2016

19. C. J. A. P. Martins; A Física do Big Bang; Universidade Júnior; CAUP; 13 July 2016

20. C. J. A. P. Martins; A Física do Big Bang; Universidade Júnior; CAUP; 20 July 2016

21. C. J. A. P. Martins; A Física dos Jogos Olímpicos; CEIA-PPCB; Paredes de Coura; 8 August 2016

22. C. J. A. P. Martins; A Origem do Modelo do Sistema Solar; CEIA-PPCB; Paredes de Coura; 13 August 2016

23. C. J. A. P. Martins; História da Astronomia: O Universo Grego; CEIA-PPCB; Paredes de Coura; 15 August 2016

24. C. J. A. P. Martins; História da Astronomia: O Nascimento da Ciência Moderna; CEIA-PPCB; Paredes de Coura; 16 August 2016

25. C. J. A. P. Martins; História da Astronomia: Neptuno e Vulcano; CEIA-PPCB; Paredes de Coura; 19 August 2016

26. C. J. A. P. Martins; A Física da Gravidade e dos Satélites; ES Dr Antonio Granjo, Chaves; 3 October 2016

27. C. J. A. P. Martins; A Física da Vida e dos Extraterrestres; Colégio Júlio Dinis, Porto; 4 October 2016

28. C. J. A. P. Martins; A Física da Gravidade e dos Satélites; ES Gago Coutinho, Alverca do Ribatejo; 6 October 2016

29. C. J. A. P. Martins; A Física do Big Bang; ES José Cardoso Pires, Stº Antº dos Cavaleiros; 6 October 2016

30. C. J. A. P. Martins; A Física da Gravidade e dos Satélites; ES António Damásio, Lisboa; 7 October 2016

31. C. J. A. P. Martins; A Física do Big Bang; ES Francisco Fernandes Lopes, Olhão; 10 October 2016

32. C. J. A. P. Martins; A Física do Big Bang; ES de Camarate; 15 November 2016

33. N. C. Santos; À procura de outras Terras; Escola Secundária da Sé (alunos do 7º ano), Lamego; 19 February 2016

34. N. C. Santos; Palestra: "À procura de outras Terras"; Escola Secundária Gaia Nascente (7º e 9º anos), Vila Nova de Gaia; 15 January 2016

35. P. Figueira; Outras Terras no Universo; Biblioteca Pública e Arquivo Regional João José da Graça, Horta, Faial; 22 July 2016

36. P. Figueira; À busca de uma nova Terra; at Planetário Calouste Gulbenkian; 25 June 2016

37. P. Figueira; Exoplanetas - Em busca de uma nova Terra; at Olimpíadas de Física; 16 April 2016

38. P. Figueira; Exoplanetas; at Escola Básica Adriano Correia de Oliveira; 8 January 2016

39. V. Zh. Adibekyan; Science(astronomy) in Armenia before, during and after Anania Shirakatsi; Aveiro University; 7 December 2016

40. L. Sousa; Ondas Gravitacionais – uma grande descoberta; Noites no Observatório Astronómico de Lisboa; Planetário Calouste Gulbenkian, Lisboa; 27 February 2016

41. N. Roche; From the Planet Mars to the Edge of the Universe; Quinta do Sol, Framilo, Coimbra; 14 September 2016

42. A. García Hernández; Viaje al interior de las estrellas. Escuchando la "música de los astros"; Agrupación Astronómica Palentina, Palencia (Spain); 8 October 2016

43. A. C. da Silva; No princípio era a Luz...; Observatório Lago Alqueva, Monsaraz; 23 July 2016

44. R. S. S. C. Reis; "Todo o Universo num hemisfério", 4º Congresso de Comunicação de Ciência - Scicom PT 2016; 26 May 2016

45. R. S. S. C. Reis; Estrelas aos Molhos; Parque Avioso; 1 July 2016

46. R. S. S. C. Reis; Visões do Cosmos; Fundação de Serralves; 2 July 2016

47. R. S. S. C. Reis; Poluição Luminosa; Planetário do Porto; 30 September 2016

48. J. Afonso; O Sistema Solar e mais além...; Encontro com o Cientista (Escola Ciência Viva) – Lisboa; 8 January 2016

49. J. Afonso; E Fez-se Luz: em busca das primeiras estrelas do Universo, Encontros com a Ciência - Banco de Portugal; 26 January 2016

50. J. Afonso; O Sistema Solar e mais além...; EB1 Pedro de Santarém – Benfica; 4 February 2016

51. J. Afonso; Um Universo Deslumbrante; ITQB Oeiras; 18 March 2016

52. J. Afonso; O Astrónomo, Fórum de Profissionais - Escola Secundária de Casquilhos; 21 April 2016

53. J. Afonso; Comunicações com Extraterrestres; NOAL – Lisboa; 26 March 2016

54. J. Afonso; Comunicações com Extraterrestres; Starlight Party Alqueva; 27 August 2016

55. J. Afonso; Em busca das primeiras galáxias do universo; Sessão de boas vindas aos novos alunos da FCUL; 21 September 2016

56. J. Afonso; A Astronomia da próxima geração; Noite Europeia dos Investigadores - Pavilhão do Conhecimento; 30 September 2016

57. J. Afonso; IAstro Júnior; Lisboa; 19 November 2016

58. A. Cabral; Palestra: “Grandes telescópios, espectrógrafos e a luz na busca de planetas extra solares”; Escola Secundária de Cacilhas – Tejo, Almada; 8 January 2016

59. A. Cabral; Palestra: “Grandes telescópios, espectrógrafos e a luz na busca de planetas extra solares”; Externato António Sérgio em Beringel, Beja; 14 April 2016

60. A. Cabral; Palestra: “Grandes telescópios, espectrógrafos e a luz na busca de planetas extra solares”; Escola Josefa de Óbidos, Lisboa; 20 October 2016

61. F. S. N. Lobo; A Física do “Interstellar”, (O Espaço vai à Escola); CED D. Maria Pia; 7 October 2016

62. F. S. N. Lobo; Cosmologia e outras questões do Universo, (O Espaço vai à Escola); Escola Básica 2,3 Ferreira de Castro; 7 October 2016

63. F. S. N. Lobo; “A Física do Interstellar”; Observatório Lago Alqueva (integrada na Bienal Cultural Monsaraz Museu Aberto 2016); 17 July 2016

64. F. S. N. Lobo; "Wormholes - atalhos no espaço-tempo”; Noites no Observatório; Planetário Calouste Gulbenkian; 29 October 2016

65. N. J. Nunes; "Surfing a gravitational wave"; Escola António Sérgio, Cacém; 14 March 2016

66. N. J. Nunes; "How do we weight the Universe?"; Observatório do Lago Alqueva; 19 November 2016

67. N. J. Nunes; "How do we weight the Universe?"; Escola Pedro Nunes, Lisbon; 3 October 2016

68. N. J. Nunes; "How do we weight the Universe?"; Astrofesta 2016, Arcos de Valdevez; 6 August 2016

69. C. Pappalardo; Noites no Observatório Astronómico de Lisboa - A Historia do Universo em 30s; Planetário Gulbenkian; 26 November 2016

70. S. Antón; “Estudar Galáxias com Buracos Negros serve para quê?"; Escola Básica Alto do Moinho; October 2016

71. S. Antón; "Estudar Galáxias com Buracos Negros serve para quê?"; Escola Básica e Secundária de Gama Barros; October 2016

72. S. Antón; "Estudar Galáxias com Buracos Negros serve para quê?"; EB 2, 3 Nuno Álvares; October 2016

73. A. Paulino-Afonso; O céu e os seus mitos; Valongo; 4 October 2016

74. A. Paulino-Afonso; O céu e os seus mitos; Porto; 7 October 2016

75. P. Machado; "Adventure in the Solar system"; Invited talk by the Ponta Delgada City Hall, Azores; 18 February 2016

76. P. Machado; "Planetary Exploration"; Lagoa High School, São Miguel, Azores; February 2016

77. P. Machado; "Space Exploration - From the Solar system to Exoplanets"; OASA, Azorean Observatory, Santana, Azores; February 2016

78. P. Machado; Public presentation of the film "Venus Twilight Experiment", Lightcurve Films; Lisbon Planetarium; 9 May 2016

79. P. Machado; "Space Exploration - From the Solar system to Exoplanets"; ESA - CANSAT, May 2016; Santa Maria Island, Azores, February 2016

80. P. Machado; "Planetary Adventure"; Planetário Calouste Gulbenkian; 30 July 2016

81. I. Matute; Title: ”Black-Holes & AGNs: How they helped to shape our Universe”; Formation lecture given to the students/volunteers at the Noites del Observatorio; 28 May 2016

82. T. Barreiro; "O lado escuro da força"; Noites no Observatório; Lisboa; 31 May 2016

83. J. L. Sobrinho; "Viagem pelo Sistema Solar"; Biblioteca Municipal de Machico; 15 April 2016

84. J. L. Sobrinho; "Dois milhões e meio de anos-luz!"; Escola da APEL (Funchal); 8 April 2016

85. J. L. Sobrinho; "Matéria Escura e Energia Escura"; Palestra integrada na Astronomia no Verão 2016, Universidade da Madeira; 10 September 2016

86. F. Buitrago; María Auxiliadora High School, Salamanca (Spain); 28 January 2016

87. F. Buitrago; Trinitarios School, Salamanca (Spain); 29 January 2016

88. F. Buitrago; Universidad de la Experiencia, Universidad Pontificia de Salamanca (Spain); 25 April 2016

89. F. Buitrago; Noites no observatório; Lisbon (Portugal); 30 April 2016

90. F. Buitrago; Espaço vai à Escola 2016; CED Nossa Senhora da Conceição, Lisbon (Portugal); 4 October 2016

91. D. Rubiera-Garcia; Public talk: “Black holes, wormholes and gravitational waves" (in Spanish); Instituto de Cultura Antiguo Instituto, Gij'on, Spain; 27 December 2016

92. D. Rubiera-Garcia; Method and status of scientific research: Einstein and the Big Bang (In Spanish); Instituto de Educaci'on Secundaria Universidad Laboral, Gijón, Spain; 14 March 2016

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