instituto de astrofísica
e ciências do espaço

Institute of Astrophysics and Space Sciences

2018 Activity Report

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e ciências do espaço

U.PORTO

U LISBOA | UNIVERSIDADE DE LISBOA

COFINANCIAMENTO

FCT Fundação para a Ciência e a Tecnologia

COMPETE 2020

PORTUGAL 2020

UNIÃO EUROPEIA
Fundo Europeu de Desenvolvimento Regional

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Unit Overview

The **Instituto de Astrofísica e Ciências do Espaço (IA)** is the reference institution for research in Astronomy, Astrophysics and Space Sciences in Portugal, implementing a bold strategy for the development of this area in the country. Being the largest national research unit in this area, and with a strong participation in major international projects, IA is responsible for the majority of the national productivity in international ISI journals in the area of Space Sciences, one of the scientific areas with the highest relative impact for Portugal.

Our mission is to foster research with the highest impact in the field of astrophysics and space sciences and to support teaching and training of young researchers and students in close collaboration with the Universities of Lisbon and Porto. It also aims 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.

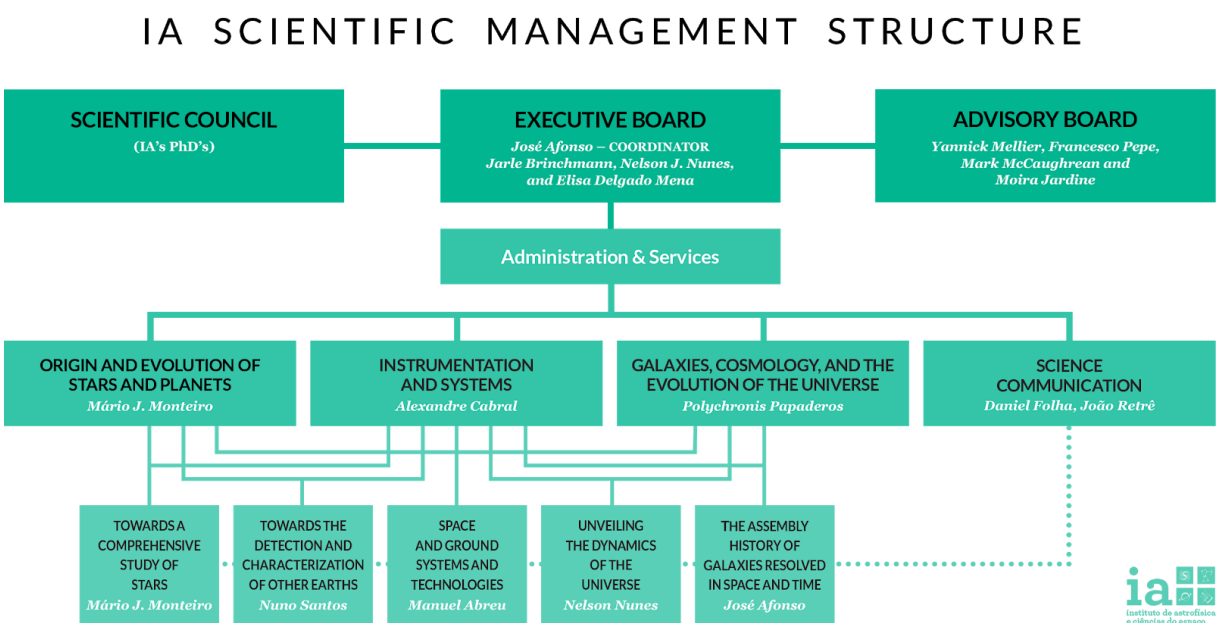
Our vision is to achieve international leadership in key areas of astrophysics and space sciences, taking full advantage and realising the potential created by the national membership of the European Space Agency (ESA) and the European Southern Observatory (ESO). This is done through state-of-the-art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

Over the past few years, IA has demonstrated its full capability to drive major astronomical projects, at all development levels: scientific and technical definition, instrument concept and design, construction and commissioning, and scientific exploitation. This has never been clearer than during 2018, with IA's strategic projects advancing successfully and either producing new and exciting science or promising to open up new windows into literally uncharted scientific territory. ESPRESSO is a case-in-point: after more than 10 years in the making, with a major scientific and technical role from IA, it has finally started scientific operations and is keeping us all on edge in anticipation of the discoveries that will follow. But take also the work done with Akatsuki, or Kepler, or Cheops, or MOONS, or ALMA, or Euclid, or a number of other state-of-the-art projects as described in the following pages, and one easily understands how far IA's activity is growing and how promises have already become certainties at IA for the evolution of personal, institutional, and national research.

José Afonso, Jarle Brinchmann, Elisa Delgado Mena, Nelson Nunes
IA Executive Board

IA Management

In 2018, following the normal functioning of the research unit, a new Executive Board (EB) was elected. The EB is composed of 2 members from the Porto node (Jarle Brinchmann and Elisa Delgado Mena) and 2 members from the Lisbon node (José Afonso and Nelson Nunes). José Afonso continues as the coordinator of the research unit. The EB was elected by the Scientific Council (SC) in its meeting on the 23rd of April 2018, in accordance with the internal regulations.



During 2018, the EB has set up regular weekly meetings to coordinate the scientific and management activities of the IA strategic plan. Every other week these meetings also include thematic line and group leaders, including the Science Communication Group. Contacts with the two management institutions (CAUP and FCiências.ID) were also done whenever needed.

Following the internal regulations of IA, the EB communicates with the Scientific Council via regular meetings. In 2018, the SC met on the 19th of March and on the 23rd of April, the latter specifically for the election of the EB. The participants in Porto and Lisbon connected via videoconference system to avoid unnecessary travel costs. Details of the IA-ON5 meeting (see below) were discussed in the March meeting, as this constitutes an important opportunity to address the Institute's status and strategy with members of the Scientific Council. The IA-ON5 took place in Anadia, on the 15th and 16th of October 2018.

In 2018, the EB has implemented some changes to the group and thematic lines leaderships. In the *Origin and Evolution of Stars and Planets* Group, Mário Monteiro replaced Margarida Cunha, while for the *Unveiling the Dynamics of the Universe* Thematic Line Nelson Nunes replaced Francisco Lobo also from around mid 2018. The organogram as of end-2018 can be seen in the figure above.

The Visitor Program at the Institute for Astrophysics and Space Sciences

The Visitor Program at the Institute for Astrophysics and Space Sciences was established at IA in 2016. Its main goal is to attract senior scientists to work at the Institute for periods from 1 week to 1 month (http://www.iastro.pt/ia/visitorProgram.html) 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 2018 the program supported the visits of:

- Anjan Ananda Sen (Center For Theoretical Physics, Jamia Milli Islamia Central University), between July 8 and 15;
- Mário Santos (University of the Western Cape), between July 2 and August 3;
- Diego Pavón Coloma (Departamento de Física, Universidad Autónoma de Barcelona), between October 28 and November 10.

Incentive Program for the Training of Excellence of Young Researchers in Astrophysics and Space Sciences

The Incentive Program for the Training of Excellence of Young Researchers in Astrophysics and Space Sciences was established to attract young undergraduate students to IA by offering them the possibility to work on small research projects (http://www.iastro.pt/training/bicProgram.html) for the period of three months. In 2018, after selection from 22 applications, the following fellowships and selected projects were implemented:

- João André Baeta Dias, "Estudo das atmosferas planetárias com base em espectros de alta resolução" (supervisor: Pedro Machado);
- Catarina Isabel Sousa Alves Rocha, "Development of a new method for the determination of the ages of stars (part 1: diagnostics of the stellar cores)" (supervisors: Margarida Cunha, Mario João Monteiro).
- Luís Atayde, "Cosmological tests of theories beyond General Relativity" (supervisors: Nelson Nunes and Noemi Frusciante);
- Hugo Manuel Duarte Martins, "Galaxy satellites in the Hubble Ultra Deep Field" (supervisors: Fernando Buitrago, Israel Matute);
- José Matos, "Impacto cosmológico da observação da expansão do universo em tempo real" (supervisor: Carlos Martins);
- Gonçalo Martins Domingues, "Simulação numérica de ruído em sensores CCD" (supervisor: Manuel Abreu);

– Marcel Bernet Martí, “Estudo de enxames estelares jovens no infravermelho próximo e milímetro” (supervisor João Lin Yun)

IA-ON 5

The IA-ON meetings have established themselves as a fundamental annual event that promotes scientific discussion between IA researchers and the coordination on outreach, management issues and strategic lines of the Institute. In 2018, the 5th Internal workshop (IA-ON 5) took place in Anadia on the 15th and 16th of October, at the Hotel Termas da Curia. As stated in the internal announcement, “The **IA-ON5 meeting** marks the fifth 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-ON5 will be a major opportunity to discuss and keep improving IA’s strategy, as well as to foster synergies between IA groups across all activity areas.”.

The IA-ON 5 had an attendance of 81, meaning that most of IA participated in the meeting. The highlights of the year were shared with the whole team, with the majority presented by younger researchers. In 2018 two sets of SOAR analyses were produced. As in previous IA-ON meetings, the various thematic lines had the opportunity to have their splinter meeting where an update on their research was made and plans for the future were set.

The IA-ON model is regarded as extremely useful and fundamental to maintaining an excellent research environment and foster synergies between groups, and will certainly be continued in future years.

The IA team (2018)

Origin and Evolution of Stars and Planets Group

Researchers (PhDs)

- Alberto Negrão
- Ana C. S. Rei (finished PhD in 24 July 2018)
- Daniel F. M. Folha*
- Elisa Delgado-Mena
- Fátima López Martínez (left in November 2018)
- Gabriella Gilli
- Isa M. Brandão
- João P. S. Faria (finished PhD in 26 January 2018)
- João J. G. Lima
- João Lin Yun
- João Gomes da Silva (left in January 2018)
- Jorge Filipe S. Gameiro
- Jorge H. C. Martins* (finished PhD in 2 July 2018)
- Margarida S. Cunha
- Maria Teresa V. T. Lago
- Maria Tsantaki (joined in 15 April 2018)
- Mário J. P. F. G. Monteiro
- Mathieu Vrard
- M. S. Nanda Kumar
- Nuno C. Santos
- Olivier Demangeon
- Pedro M. Palmeirim
- Pedro Machado
- Pedro Figueira* (left in January 2018)
- Pedro T. P. Viana
- Rui Agostinho*
- Sérgio A. G. Sousa*
- Susana C. C. Barros
- Tiago Campante
- Vardan Zh. Adibekyan
- Vítor M. M. Costa

Others

- Akinsanmi Babatunde (PhD student)
- Alexandros Antoniadis Karnavas (PhD student)
- Ana C. S. Rei (PhD student, finished in 24 July 2018)
- André Miguel Silva (MSc student, joined in 14 September 2018)
- Andressa C. S. Ferreira (PhD student)
- Benard Nsamba (PhD student)
- Daniel Thaagaard Andreasen (PhD student, finished in 20 April 2018)
- Daniela Cortes Espadinha (MSc student)
- Eduardo Cristo (MSc student)
- Guilherme D. C. Teixeira (PhD student)
- Gyanender Singh (MSC student)
- Hermano Valido (MSc student)
- Hugo Manuel Silva (MSc student, joined in 20 September 2018)
- Jason J. Neal (PhD student)*
- João D. R. Camacho (PhD student)
- João Guilherme (MSc student, finished in 30 July .2018)
- João P. S. Faria (PhD student, finished in 26 January 2018)
- João Francisco Garcia Ferreira (PhD student)
- Jorge H. C. Martins* (PhD student, finished in 2 July 2018)
- Jorge Miguel Gonçalves (MSc student, joined in 27 September 2018)
- José Silva (PhD student)
- José Luís Fernandes Ribeiro (MSc student)
- Luís Filipe Pereira (PhD student)
- Luisa M. Serrano (PhD student)
- Lupércio B. Bezerra (PhD student)
- Miguel Clara (MSc student, joined in 27 September 2018)
- Miguel Silva (PhD student)
- Nuno Moedas (MSc student, joined 27 September 2018)
- Paola A. Quitral Manosalva (PhD student)
- Paulina M. Zaworska (PhD student)
- Pedro I. T. K. Sarmento (PhD student)
- Pedro Miguel (MSc student, joined 19 September 2018)
- Raquel M. G. Albuquerque (PhD student)
- Ruben Gonçalves (PhD student)
- Saeed Hojjatpanah (PhD student)
- Solène C. Ulmer-Moll (PhD student)*
- Tomás Silva (MSc student, joined in 19 September 2018)
- Vasco Silva (MSc student)

Galaxies, Cosmology, and the Evolution of the Universe Group

Researchers (PhDs)
Alberto Rozas-Fernández
Andrew J. Humphrey
Andrew R. Liddle
António C. da Silva*
Carlos J. A. P. Martins
Catarina Lobo
Cirino Pappalardo
Diego Rubiera-Garcia
Fernando Buitrago
Francisco S. N. Lobo
Ismael Tereno*
Israel Matute
Ivan Rybak (finished PhD in 18 December 2018)
Jarle Brinchmann
Jean Michel Gomes
José Afonso
José Pedro Mimoso
Lara G. Sousa
Leandro Cardoso
Leyla Seyed Ebrahimpour (finished PhD in 12 December 2018)
Maria de los Angeles Moliné (left in 31 Dec. 2018)
Marina Cortês
Martina Vicinanza
Mercedes Martin-Benito (left in 31 January 2018)
Nelson J. Nunes
Noemi Frusciante
Paulo Crawford
Paulo Maurício de Carvalho
Pedro Pina Avelino
Polychronis Papaderos
Rui Agostinho*
Silvio Lorenzoni
Tiago Barreiro
Tom C. Scott

Others
Ana C. O. Leite (PhD student)
Ana S. Paulino Afonso (PhD student, left in 31 October 2018)
Bruno J. C. B. Barros (PhD student)
Diogo Castelão (PhD student)
Elsa Maria Campos Teixeira (MSc student)
Fábio A. R. Ferreira (PhD student, joined in 1 October 2018)
Francisco T. O. Cabral (PhD student)
Hugo Martins (MSc student)
Iris P. Breda (PhD student)
Ismael Ayuso (PhD student)
Ivan Rybak (PhD student, finished in 18 December 2018)
José Ricardo Correia (PhD student)
Leyla Seyed Ebrahimpour (PhD student, finished in 12 December 2018)
Marckelson S. Silva (PhD student)
Rita Neves (MSc student)
Rui P. L. Azevedo (joined in 8 March 2018)
Sandra N. Reis (PhD student)
Sandy Gonçalves Morais (PhD student)
Stergios Amarantidis (PhD student)
Vasco M. C. Ferreira (PhD student)

Instrumentation and Systems Group

Researchers (PhDs)
Alexandre Cabral
David C. Alves
Elena Duarte
Ismael Tereno*
João Dinis
João Coelho
José M. Rebordão
Manuel Abreu
Pedro Figueira* (left in January 2018)
Sérgio A. G. Sousa*

Others
António Joaquim Marques de Oliveira
Bachar Wehbe (PhD student)
Catarina de Jesus Eira Silva Mendes (left in 31 December 2018)
Filipe Duarte Sousa Velosa (left in 31 January 2018)
Jason J. Neal (PhD student)*
João David (MSc student)
Mahmoud Hayati (left in January 2018)
Manuel Monteiro
Pedro Manuel Fonseca Nunes dos Santos
Solène C. Ulmer-Moll (PhD student)*
Tiago Magalhães (PhD student)

Interface to Science

Science Communication Group
Ana Alves (left in 31 August 2018)
Carolina Lobão (MSc student)
Catarina Leote (joined in 15 October 2018)
Elsa M. P. S. Moreira (joined in 1 January 2018)
Daniel F. M. Folha*
Filipe A. L. Pires
Hilberto M. R. Silva (joined in 1 october 2018)
Ilídio André P. M. Costa (PhD student)
Jessica de Lima Trásfi (MSc student)
João Retrê
Paulo J. T. Pereira
Pedro O. J. Pedrosa (left in August 2018)
Ricardo S. S. C. Reis
Sérgio Pereira Ribeiro

Administration and Services
Argentina Pereira
Carlos M. A. Santos
Elsa M. P. P. Silva
Eva Lopes (left in 31 August 2018)
Jorge H. C. Martins*
Sandra M. F. Homem
Teresa Vareta

Researchers that work in more than one group are marked with (*).

Research Projects/Programmes

During 2018, a number of funded projects were on-going at IA, providing most of the funds available for research, including outreach activities.

Projects focused on scientific activities

The research projects that in 2018 were supported by national and European funds are:

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

Detecting and characterization exoplanets around evolved stars with NASA's TESS mission (PULSATION) (MSCA-IF-EF-ST-792848)
PI: Tiago Campante
[start date: 1st November 2018 – end date: 31th October 2020]

Hot Terrestrial Exo-planet Atmospheres: preparing new generation instrument observations with a global climate model (Hot-TEA) (MSCA-IF-EF-ST-796923)
PI: Gabriella Gilli
[start date: 1st September 2018 – end date: 31th August 2020]

ORIGINS – Origins and evolution of life on Earth and in the Universe (Trans-Domain COST Action TD1308)
PIs at IA: Nuno Santos & Filipe Gameiro
[start date: 15th May 2014 – end date: 14th May 2018]

CANTATA – Cosmology and Astrophysics Network for Theoretical Advances and Training Actions (COST Association Cost Action CA-15117)
PI: Ruth Lazkoz. Management Committee: José Pedro Mimoso
[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)
PI: Vardan Adibekyan
[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)
PI: Nuno Santos
[start date: 1st July 2016 – end date: 31th July 2018]

Characterizing the smallest planet hosts (IF/00849/2015/CP1276/CT0003)
PI: Elisa Delgado Mena

[start date: 1st January 2017 – end date: 31th December 2021]

Zoom-In ON hIgh-mass Star forMation (ZIONISM) (IF/00956/2015/CP1273/CT0002)
PI: Nanda Kumar
[start date: 15th December 2016 – end date: 14h December 2021]

Resolving galaxy evolution (IF/01654/2014/CP1215/CT003)
PI: Jarle Brinchmann
[start date: 30th June 2015 – end date: 29th June 2020]

Gravitational Lensing in the Universe with Euclid (IF/01518/2014)
PI: Ismael Tereno
[start date: 30th June 2015 – end date: 29th June 2020]

Towards characterization of Earth-like exoplanets (IF/00028/2014/CP1215/CT0002)
PI: Sérgio Sousa
[start date: 1st May 2015 – end date: 30th April 2020]

The future of Extrasolar Planets: new instrumentation for new science
(IF/01037/2013/CP1191/CT0001)
PI: Pedro Figueira
[start date: 1st January 2014 – end date: 31th January 2018]

Probing the Physics of the Dark Universe with Euclid (IF/01135/2015)
PI: António da Silva
[start date: 3rd October 2016 – end date: 2nd October 2021]

Dark Couplings (IF/00852/2015)
PI: Nelson Nunes
[start date: 1st October 2016 – end date: 30th September 2021]

Probing cosmic strings and other topological defects with gravitational waves (Gwstrings)
(POCI-01-0145-FEDER-031938 & PTDC/FIS-PAR/31938/2017)
PI: Lara Sousa
[start date: 15th October 2018 - end date: 14th October 2021]

Planets - Towards Understanding their General circulation Atmospheres (P-TUGA)
(PTDC/FIS-AST/29942/2017)
PI: Pedro Machado
[start date: 3rd September 2018 - end date: 2nd September 2021]

Identify the Earliest Supermassive Black Holes with ALMA (IdEaS with ALMA)
(PTDC/FIS-AST/29245)
PI: José Afonso
[start date: 3rd September 2018 - end date: 2nd September 2021]

Spacetime ripples in the dark gravitational Universe (DarkRipple)
(PTDC/FIS-OUT/29048/2017)
PI: Francisco Lobo
[start date: 1st September 2018 - end date: 31th August 2021]

a Generation of Earth-ANalogs Exploration Spectrographs (G.EANES)
(POCI-01-0145-FEDER-032113 & PTDC/FIS-AST/32113/2017
PI: Nuno Santos
[start date: 1st August 2018 - end date: 31th July 2021]

Cosmology and Fundamental Physics with ESPRESSO (CosmoESPRESSO)
(POCI-01-0145-FEDER-028987 & PTDC/FIS-AST/28987/2017
PI: Carlos Martins
[start date: 1st June 2018 - end date: 31th May 2021]

Exploring exoPlanets wIth CHEOPS (EPIC)
(POCI-01-0145-FEDER-028953 & PTDC/FIS-AST/28953/2017)
PI: Sérgio Sousa
[start date: 1st June 2018 - end date: 31th May 2021]

Breaking through outstanding problems in stellar evolution with ultra-precise space-based photometry (BreakStarS) (POCI-01-0145-FEDER-030389 & PTDC/FIS-AST/30389/2017)
PI: Margarida Cunha
[start date: 1st May 2018 - end date: 30th April 2021]

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

R&D Units: Instituto de Astrofísica e Ciências do Espaço (UID/FIS/04434/2013 & POCI-01-0145-FEDER-007672)
PI: José Afonso
[start date: 1st January 2015 – end date: 31th December 2018]

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

Doctoral Network in Space Sciences (PhD::SPACE) (PD/00040/2012)
PI: Mário João Monteiro
[start date: 1st October 2013 – end date: 31th December 2020]

(v) **Cooperation projects funded by Gabinete de Relações Internacionais da Ciência e do Ensino Superior (FCT) and by Conselho de Reitores das Universidades Portuguesas**

Understanding the nature of pulsations and the physics of the Ap stars (FCT/CNRS: PICS 2014)
PI at IA: Margarida Cunha
[start date: 1st January 2015 – end date: 30th September 2018]

Strategic partnership in astrophysics Portugal-Brazil: the connection between black holes and galaxies using powerful new instrumentation and theoretical insights (Cooperação Cientifica e Tecnológica FCT/CAPES - 2018/2019)
PI at IA: Andrew Humphrey
[start date: 1st May 2018 – end date: 30th April 2019]

Projects focused on communication and outreach

During 2018, there were 4 funded outreach projects in IA, which provide funds available for outreach related expenses. These were:

Ciência Viva no Verão em Rede 2018 (CV: 05-2018)
PI: Daniel Folha
[start date: 1st July 2018 – end date: 15th October 2018]

Astrocamp2018 (CV: 01-2018/823)
PI: Carlos Martins
[start date: 1st May 2018 – end date: 17th September 2018]

Ciência Viva no Laboratório – Ocupação Científica de Jovens nas Férias 2018 (CV: 4-2018)
PI: Carlos Martins
[start date: 1st July 2018 – end date: 30th September 2018]

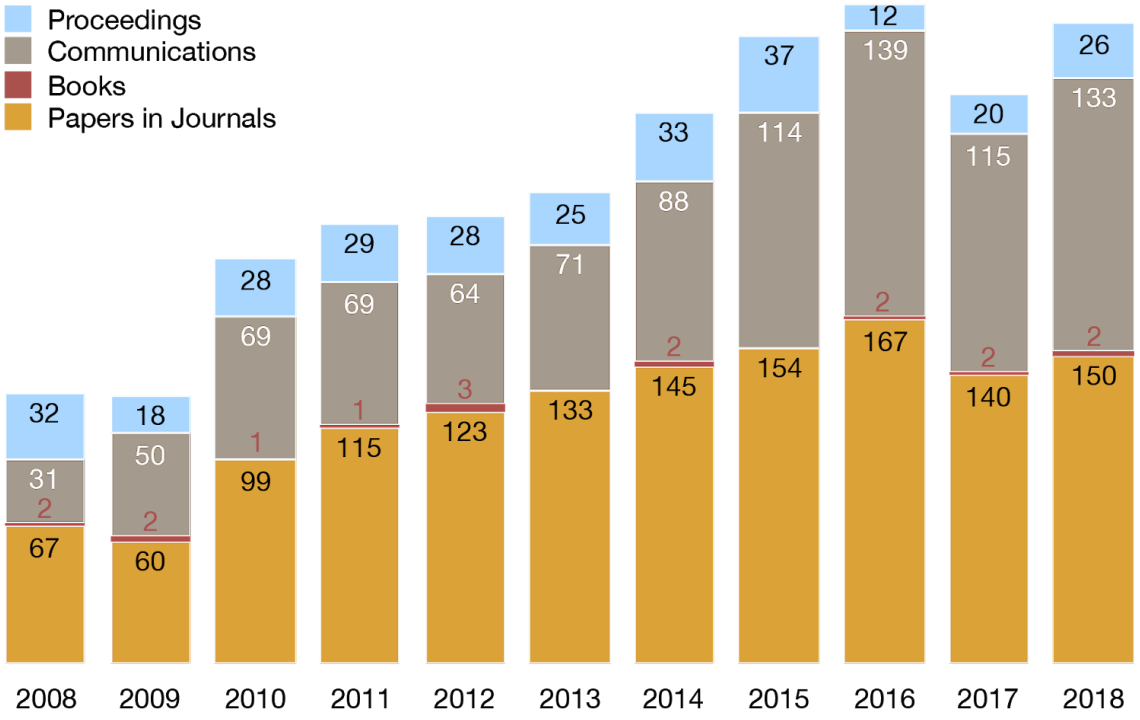
Ciência Viva no Laboratório – Ocupação Científica de Jovens nas Férias 2018 (CV: 4-2018)
PI: João Retrê
[start date: 1st July 2018 – end date: 1st January 2019]

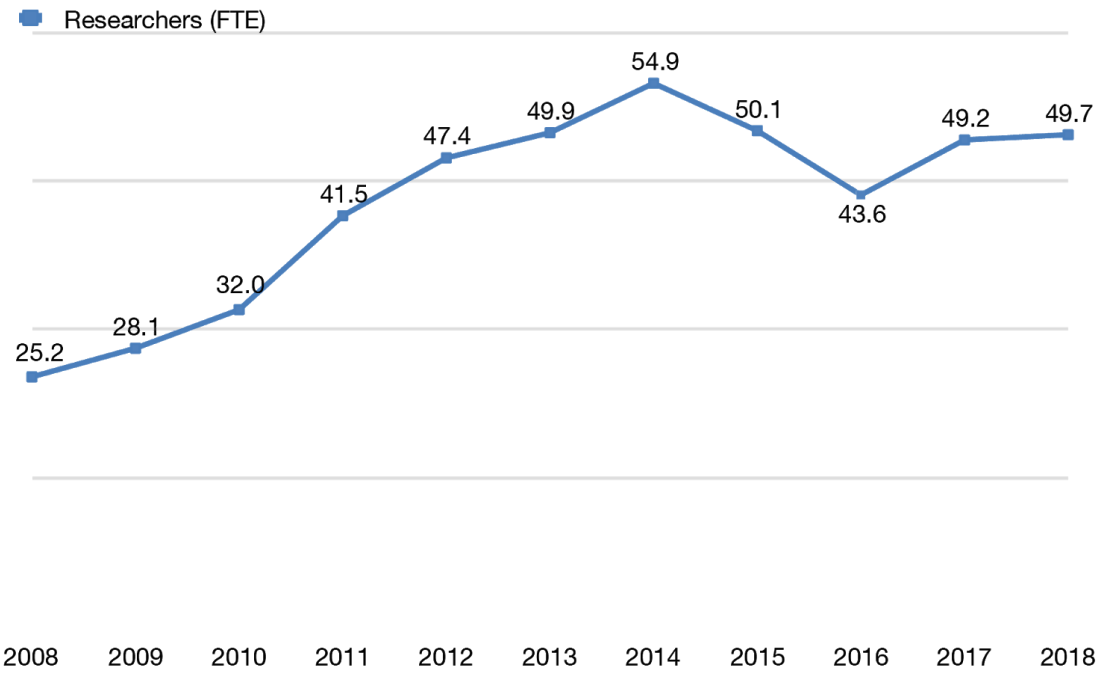
Scientific Output and Activities

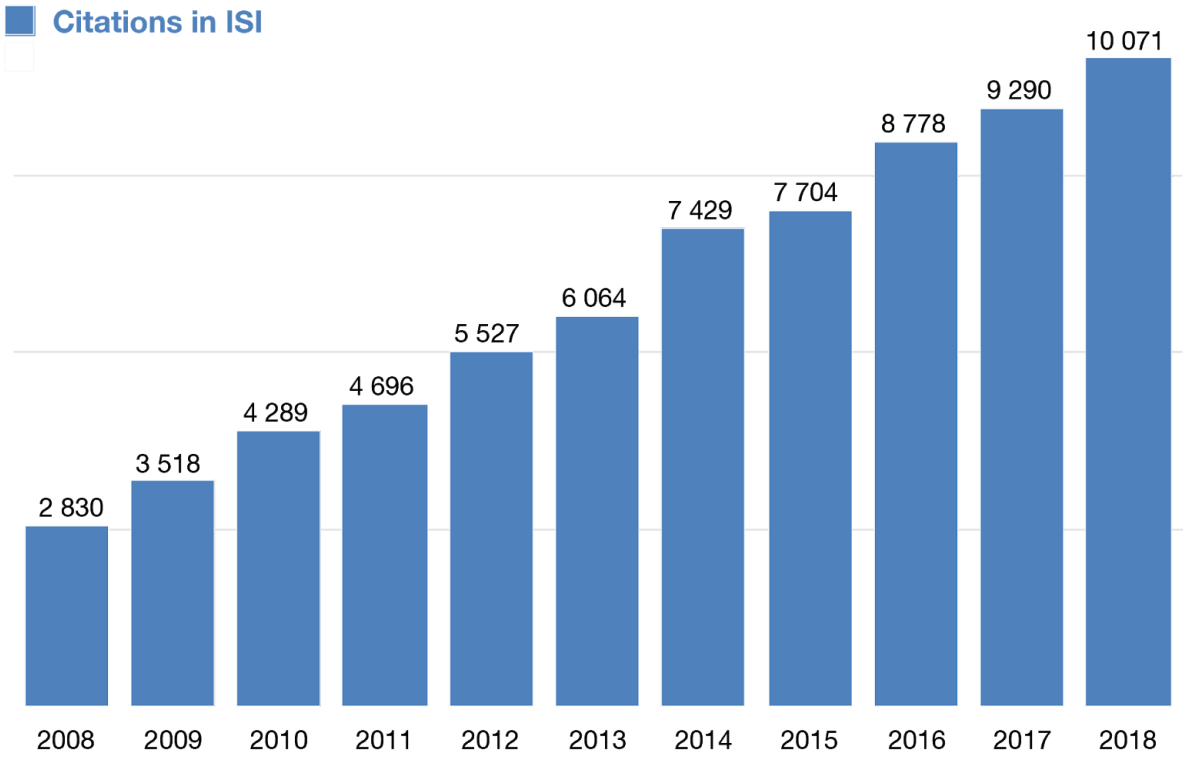
The overall scientific output of IA in **2018** was (see Appendix for details):

150	26	133
Papers in refereed journals	**Papers in books and proceedings**	**Communications in international meetings**
32	30	43
Communications in national meetings	**Seminars in other institutions**	**Seminars organized at IA**
135	10/6	51
Public outreach talks	**MSc/PhD thesis completed**	**Observing runs**
10	2	7
Organization of conferences	**Books**	**Reports**

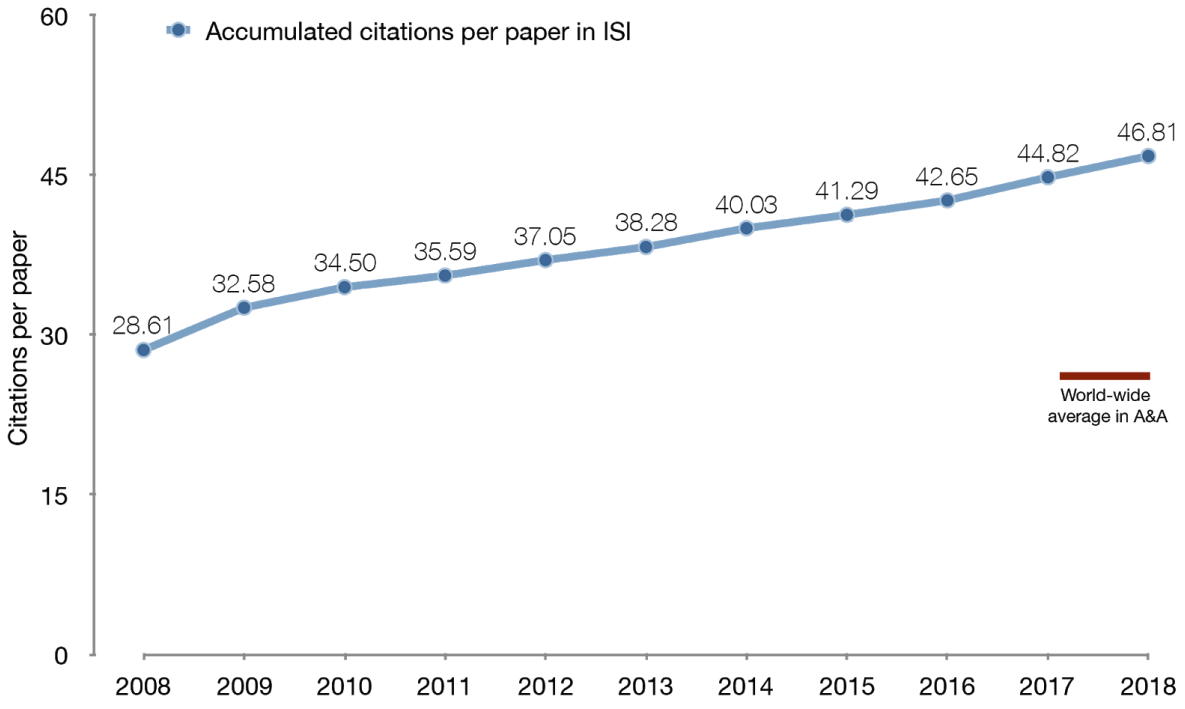
The figures below illustrate the institute's productivity during the past year. There is a clear relation between the number of researchers and the number of papers in journals subject, understandably, to a small shift in time. The former has only slightly increased in 2018 due to a severe delay in the evaluation and disclosure of the results of FCT's call for projects and for the Individual Scientific Stimulus call which prevented new arrivals. The figures show that the number of citations maintain an increasing trend which is not simply justified by an increase in the numbers or articles. Indeed, the lower figure shows that the accumulated impact is also growing.




Researchers (FTE)
25.2
28.1
32.0
41.5
47.4
49.9
54.9
50.1
43.6
49.2
49.7
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Citations in ISI
2 830
3 518
4 289
4 696
5 527
6 064
7 429
7 704
8 778
9 290
10 071
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

The number of citations obtained in a given year for all the IA articles published since 1990 up to that year. This is contrasted with the world-wide number of citations per paper in all refereed papers in astronomy and astrophysics since 1990.



The accumulated impact in a given year is measured as the ratio between the sum of the number of citations up to that year since 1990 and the number of articles in the same period.

Report from the Group

Origin and Evolution of Stars and Planets

During 2018 the group on the Origin and Evolution of Stars and Planets continued to dedicate a significant part of its scientific efforts towards fulfilling ongoing commitments that the team 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 Plato (ESA), CHEOPS (ESA), and TESS (NASA) missions. The team also participates in relevant surveys, namely the GAIA-ESO Survey, having been able to provide an important contribution towards several working groups. Along with these, the team continued to dedicate a significant share of its time to the exploitation of data from state-of-the-art instruments, particularly in relation to planet search programs and to stellar characterisation and modelling.

Several small meetings have been organized, including a meeting of the ARIEL Portuguese Consortium which took place in November 2018, with the goal of preparing the participation of both Thematic Lines in this ESA mission. 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". General group meetings have been organised, gathering together all members from the two thematic lines. In addition, members of both thematic lines often participated in the weekly Journal clubs and meetings that are organised by each thematic line. It is also worth noticing the continued updates and additional contributions the team has done for open-source tools and data-sets that IA has made available in its website. This is an important activity that has given visibility and impact to the work done by the team.

The distribution of group members amongst the two thematic lines has been kept even and a number of group researchers continue to contribute effectively to both research lines. During 2018, 4 researchers have left the group and 4 new researchers have joined.

In 2018 the team secured new 4 FCT funded projects while continuing 2 projects from previous years. The team has also obtained 2 new Marie Curie contracts, whose contracts also started in 2018. This balance is a very positive one, corresponding to an important achievement of the team as the available resources have been renewed in most of the critical research topics of the team.

Mário João Monteiro
Group Leader

Report from the Thematic Line

Towards the detection and characterisation of other Earths

In 2018, Planetary System research at IA continued the activities around the two major branches, namely Exoplanet research and Solar System atmospheres.

Exoplanet research in IA focused on several complementary aspects: 1) the search and characterization of exoplanets using state-of-the-art radial velocity data, including the mass measurement of planets previously detected by the transit method; 2) the detection or identification of planets using high precision transit photometry from space missions (e.g. K2 and TESS); 3) the study of astrophysical sources of noise for the detection and characterization of planets as well as methods to correct them; 4) the study of planet-host stars as a way to characterize the planets, their properties, and their formation processes; 5) the statistical study of planet properties as well as the relation with the properties of the host stars; 6) the study of exoplanet atmospheres using broad band photometry and high resolution spectroscopy.

We stress in this context our leadership position in several planet search and study programs with instruments such as ESO/HARPS, HARPS-N@TNG, and OHP/SOPHIE. With the start of the ESPRESSO (VLT/ESO) Guaranteed Time Observations (GTO), the team focused considerable resources on its science program.

The strategy of the team has in mind the exploitation of data from state-of-the-art instruments (such as ESPRESSO), as well as the preparation for data that will come from future ground based instruments and space missions. These latter include the CHEOPS mission (ESA, launch expected in late 2019), SPIROU (CFHT, starting operations in early 2019), NIRPS (ESO-3.6-m, 2020), Plato (ESA, 2026), ARIEL (ESA, 2028), and HIRES (ESO/E-ELT, 2027). In all these instruments and missions the team has major participations (e.g. Co-PIship and Board membership), and in all cases, we are 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 2018-2022 horizon, all these efforts 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, 80% of the time of the CHEOPS ESA mission, as well as 725 nights of GTO for the NIRPS consortium. To these, the SPIROU consortium will add ~500 GTO nights with this high resolution near-infrared spectrograph. Our participation in these projects will reinforce the existing strategy, and allow the team to be in the forefront of exoplanet detection and characterization. Further ahead, our secured participation in the ESA-PLATO, ESA-ARIEL, and ESO-HIRES (EELT) projects guarantee our international leadership role beyond 2026.

On the Solar System side, research mainly focused on solar-system planet atmospheres, with clear synergies with the exoplanet side. The recent selection by ESA (already in 2018) of the space mission ARIEL, with a relevant IA participation, shows that the adopted strategy was correct.

Furthermore, the team continued his studies of the atmospheres of Venus, Mars, Saturn, and Jupiter. We can highlight here the use of space-based observations (from the missions Akatsuki and Venus Express for Venus, and from Cassini for Jupiter and Saturn) to perform dynamical studies based on cloud tracking techniques (UV and IR) and for the detection and characterization of atmospheric waves. To these we add the use of ground-based observations (VLT/UVES for Saturn, HARPSN/TNG and CFHT/ESPaDOnS for Venus) and their related high-resolution spectra in order to retrieve wind velocities using our Doppler velocimetry method (long-slit and fiber-fed techniques).

Scientific Highlights for 2018

1. After more than ten years of planning and construction, the ESPRESSO spectrograph - a high resolution instrument that will enable the discovery of exoplanets similar to our Earth - started its scientific operations in 2018. Since September 2018, and for a period of 4-5 years, the IA team will have the opportunity to explore data coming from this state-of-the-art instrument (a total of 273 nights of Guaranteed Time Observations were granted). During the past few years, significant efforts were put in place by the IA team to prepare the scientific exploitation of ESPRESSO. With the approach and then start of the observing program, the team has intensified its role in the project, leading several aspects of the three exoplanet related working groups. For instance, we have led the **preparation of the input catalogue of stars to be observed in the search of planets**, we have several team members strongly contributing to the transit follow-up program (to derive precise masses for rocky planets discovered by transit photometry missions like K2 and TESS), and **we are leading the science case that is using ESPRESSO to detect reflected light spectra from exoplanets**. The first results of the ESPRESSO science program will be published in 2019.

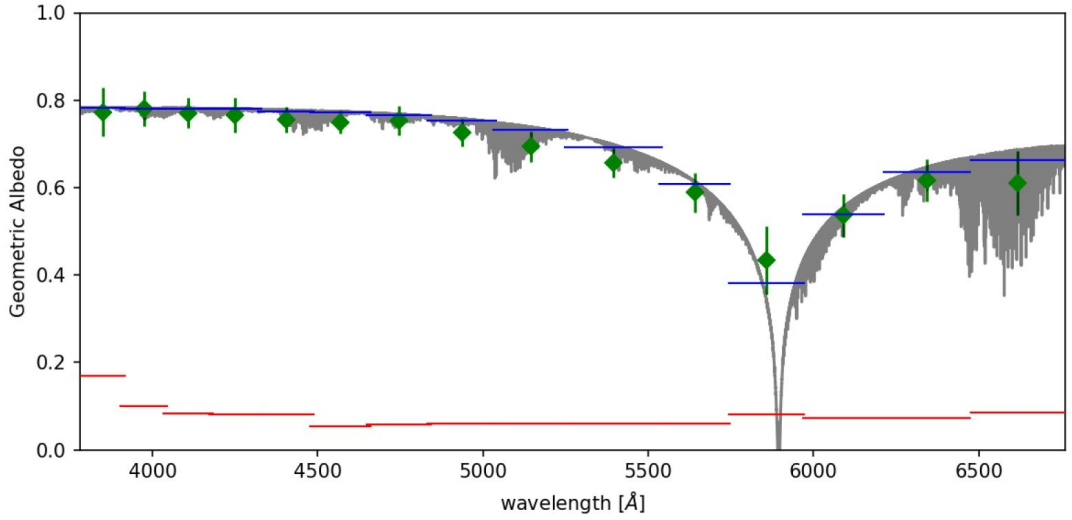


Figure: Simulation of the detection of the reflected light spectrum of one giant exoplanet using the ESPRESSO spectrograph. The results show that the ESPRESSO data will allow the detection, for the first time, the colour dependent albedo of an exoplanet, providing valuable information about the properties of its atmosphere.

2. Rings are ubiquitous around all giant planets in the Solar System. It is theoretically possible, and even expectable, that rings have also formed around extrasolar planets. However, no such features have been detected so far. In a study lead by IA (Akinsanmi et al. 2018), we tested the

possibility of detecting rings around exoplanets by investigating the photometric and spectroscopic signatures in high-precision transit signals. For this goal, the **team developed a new code, SOAP3.0, a numerical tool to simulate the signals produced by a ringed planet transiting in front of a star**. The results found that it is perfectly possible to detect the photometric and spectroscopic signatures of near edge-on rings. We have also shown that instruments like CHEOPS and ESPRESSO will allow ring signatures to be detected well above their noise-level, presenting good prospects for detecting rings.

3. The detection and study of exoplanet atmospheres is presently one of the hottest topics in exoplanet research. Different approaches are being used in this context, including the use of high precision photometry to detect the light modulations produced by the phase variations of the planet as we observe it along its orbit. This reflected light component, usually referred to as phase curve, depends on the planetary albedo and the physical conditions of the system. Having in mind the exploitation of high precision spectroscopy and photometry from the near-future ESPRESSO (ESO), HIRES (ELT/ESO), and CHEOPS (ESA) mission, the team led two different studies to understand the prospects for the detection of reflected light from exoplanets. The first study, by Serrano et al., explored the limitations imposed by stellar activity noise on the detection of the planetary albedo using the high precision photometry phase curve measurements. The results have shown that measurements obtained **at least one full stellar rotation is necessary to obtain a reliable detection of the planetary albedo**, and pointed to a mathematical approach to correct for the spurious signals produced by stellar activity. On the second study, led by Martins et al., the team has shown that high resolution spectra obtained with ESPRESSO, as well as with future facilities like the **HIRES spectrograph at ESO's ELT, will allow for the detection of the colour dependent albedo** of transiting and non-transiting planets. Both results thus show that data from ground and space based projects and missions where our team is strongly involved will allow us to open a new window into the study of exoplanet atmospheres.

4. In the context of the study of Solar System atmospheres, in 2018 team members (Gilli et al.) have strongly contributed to the **improvement of the description of the thermal structure of the Martian mesosphere** (50-100 km). This research result used 3D modelling (LMD-General Circulation Model) by implementing an innovative scheme to simulate the propagation of the non-orographic waves through the atmosphere, assuming convection as source. The inclusion of this process into the model provides a plausible physical explanation for some of the remaining discrepancy found between observations and simulations, in particular regarding the amplitude and intensity of diurnal tides. We used the observations by the Mars Climate Sounder (MCS) on board Mars Reconnaissance Orbiter, the only available systematic temperature in the mesosphere of Mars. Our study shows that, not only does the propagation of GW drive significant changes in the zonal and meridional component of the wind, as expected, but it also controls the diurnal tides in most seasons. In parallel, the team continued to study in detail the atmosphere of Venus, namely addressing the fact that the atmosphere of Venus circles the planet sixty times faster than its rotation period, a mystery not yet fully solved. The quest for the mechanisms that sustain this "super-rotation" motivated one of the most complete and detailed studies about the nocturnal winds on Venus close to its surface (Peralta et al.). This study, that used Akatsuki (JAXA) space data, had avery significant contribution from the IA team. One of the

main results was the discovery of the acceleration of the winds, at altitudes around 48-70 km, in the transition between the day side and the night side of the planet.

5. The discovery of planets around massive stars is important for understanding how planet formation and evolution is conditioned by different stellar environments. However, current planetary search surveys have failed to detect planets around massive evolved stars. This lack of planets might be a consequence of the specificities of planet formation around such objects. Alternatively, the detection of planets around evolved massive stars might be hindered by the increasing stellar jitter as the stars evolve. In the study Delgado Mena et al. we targeted planets around evolved stars in open clusters, most of them with masses above 2 solar masses. We studied the cases of three objects where periodic long term (i.e. a few years) and high amplitude RV signals point to the presence of planets. However, by combining the RV signals with several indicators of stellar activity and stellar surface inhomogeneities we found that those signals are probably of stellar origin. **If produced by stellar spots, this would be the first case of such long period prevalence of activity in this kind of red giants.** On the other hand, the RV variations might be produced by a new class of stellar pulsations not well understood yet.

Thematic line meetings, Journal Clubs and other activities:

In 2018, as for the previous years, the IA-planet line maintained a regular journal club and team meeting schedule. Team meetings are organised on a monthly basis. Journal clubs are more frequent, and usually done every two weeks. A journal club more specific about solar system research is also now organised. All team meetings and Journal Clubs are done using a videoconference link (ZOOM), so that all members can attend. We also organised our annual meeting outside the institute (called "2-DEMOC"), that in 2018 took place in Anadia/Buçaco, where the team strategy (both scientific and organisational) was discussed using a SOAR analysis.

Worth mentioning also is the fact that team members actively participated in different public outreach activities, including "IAstro Junior" (co-organized with the magazine Visão), several Ignite IAstro events throughout the country, as well as with public talks and debates in schools and other outreach events.

During 2018 two theses were finished within the topics of this thematic line: “**Exoplanet detection in metal-poor star: a fundamental test for planet formation models”** by João Faria and “**Characterizing the atmosphere of exoplanets through transmission and reflected light spectroscopy”** by Jorge Martins.

Nuno Santos
Thematic Line Leader

Report from the Thematic Line

Towards a comprehensive study of stars

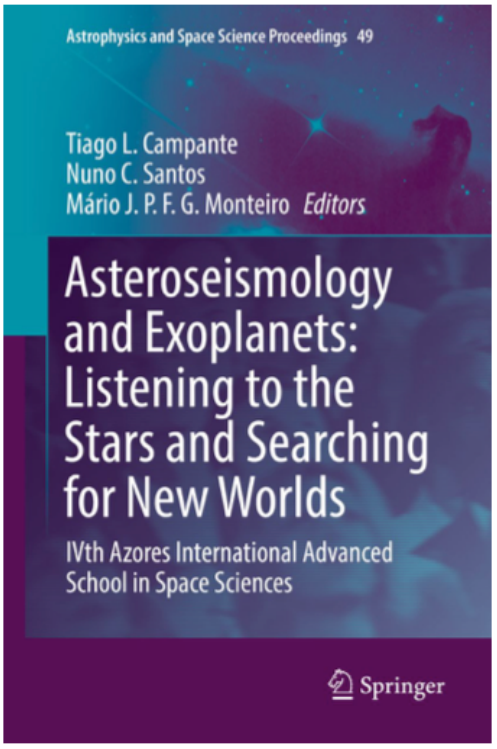
The main goal of this thematic line is to understand the details of the structure and evolution of stars of low and intermediate masses, from the early stages of star formation to late stages of evolution. It also covers the study of rotation and activity both in Young Stellar Objects (YSOs) and in main-sequence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

Part of the work of the team continued to be centered on the exploitation of seismic data acquired with the NASA satellite Kepler (launched in 2009, and now operating as K2), 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 has started the exploitation of asteroseismic data from the NASA satellite TESS (to be launched in 2018), in relation to which the team leads one of the working groups established by the Tess Asteroseismic Science Consortium (TASC). Following the adoption by ESA (in 2017) of the mission PLATO, the team is actively participating in the implementation of the work in the stellar part of the mission, in the context of which is leading work packages on seismic diagnostics and calculation of stellar models for the pipeline, as well as participates in several others. The team is also involved on the preparation of the ARIEL/ESA (2028) mission through stellar characterization with asteroseismology and determination of atmospheric parameters.

Scientific Highlights for 2018:

1. The **team edited a volume published by Springer in 2018**. This is a collection of review articles by the lectures of the IVth Azores International Advanced School in Space Sciences entitled "*Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds*". The book compiles the contributions from 18 invited lecturers, including a number of hands-on tutorials, addressing topics at the forefront of scientific research being conducted in the fields of asteroseismology and exoplanetary science, two fields of modern astrophysics that share many synergies and resources. The book has been listed by Springer in the top 10 books for downloads in 2018 and can be accessed at www.springer.com/us/book/9783319593142



2. The team Adibekyan et al., lead a major work focus on **finding solar siblings** (stars formed in the same cluster as the Sun) in order to establish the conditions at the Sun's birthplace.

Through the use of high-resolution spectra to derive precise stellar parameters and chemical abundances of the selected sample of 55 stars, four candidates have been identified (see figure), with strong evidence supporting that one of these stars (HD186302) is indeed a solar sibling.

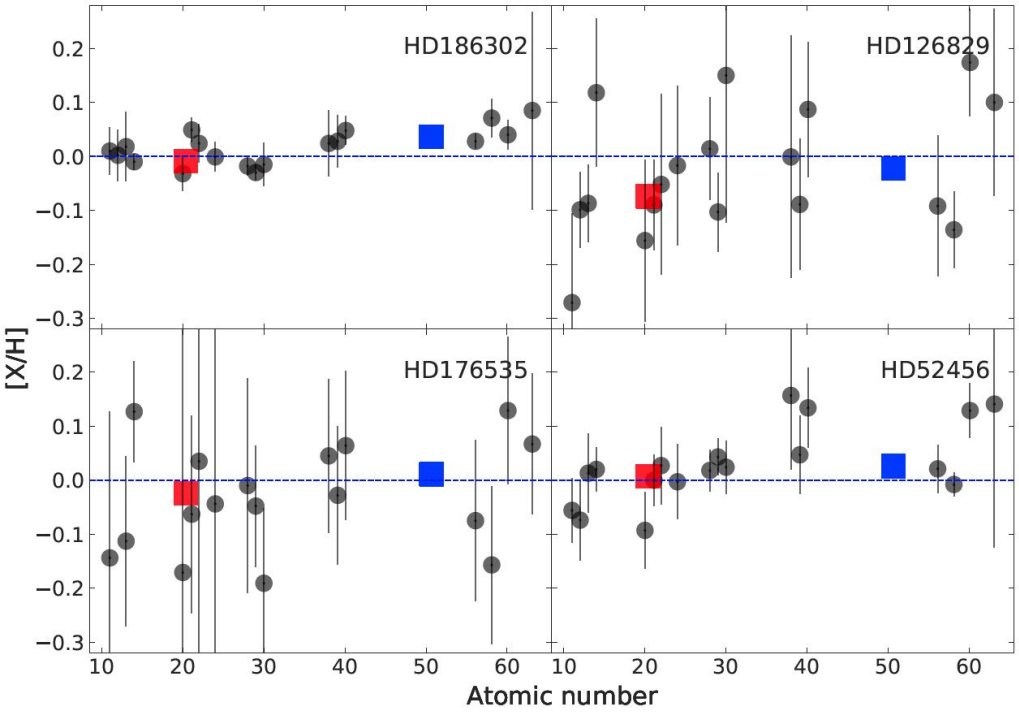


Figure. Abundances vs. atomic number for the four best-fit solar sibling candidates. The average abundances of light (Z 30) and heavy (Z > 30) elements are shown by red and blue squares, respectively. Figure from Adibekyan et al., Astronomy and Astrophysics, 619, A130.

3. Based on the data from the **Vista Variables in the Via Lactea** (VVV) and Spitzer, for a total of 718 targets for massive young stellar objects (MYSO), the team of Teixeira et al. lead an extensive and detailed study on the variability of these stellar objects. Of these stars, 190 sources were found to be variable. As the outcome of this very extensive study, the team has been able to provide a detailed characterization of the variability in MYSO in terms of their mass and type of variability (see figure).

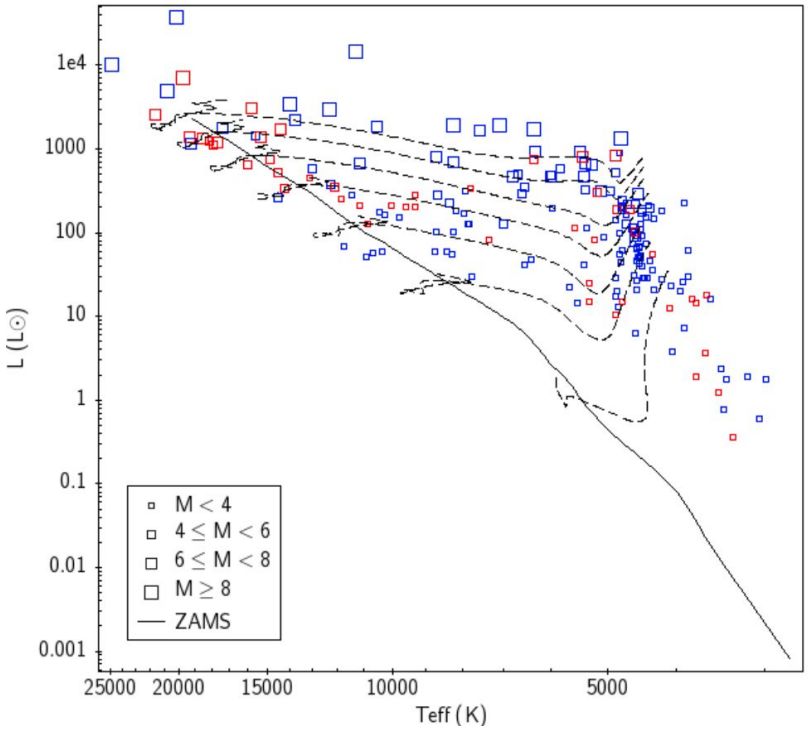


Figure. HR diagram for our sources. Symbol size corresponds toM<4, 4≤M<6, 6≤M<8,M≥8 M, from smaller to larger, respectively. The dashed lines (from bottom to top) are the PMS tracks for 1, 2 , 3, 4, 5, 6, and 7 solar masses, the filled line is the ZAMS. Blue and red symbols are, respectively, EGOs and non-EGOs. Figure from Teixeira et al., Astronomy and Astrophysics, 619, A46.

4. Using data from CoRoT (CNES & ESA) e Kepler (NASA) on red giants, the team lead the **seismic analysis** of a very large sample of more than 5000 of these stars. The goal of these analysis was to (i) validated the methods used, (ii) to obtain information on the excitation and damping of pressure modes through the measurement of the stars' pressure mode widths and (iii) amplitudes and to analyze how they are modified with stellar evolution. With a stellar sample two orders of magnitude larger than previous results, the IA team Vrard et al., confirmed that the mode width depends on stellar evolution and varies with stellar effective temperature.

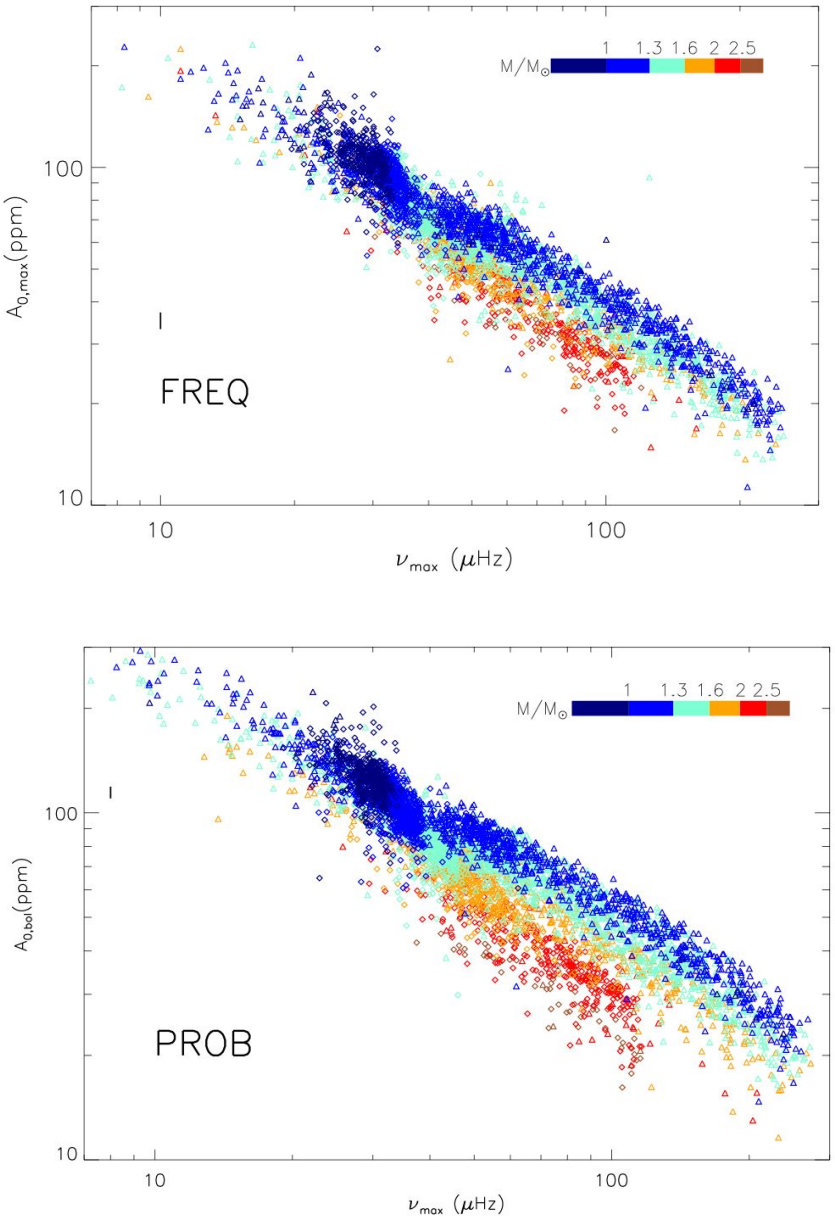


Figure. Bolometric amplitudes as a function of maximum frequency for the FREQ method (top) and for the PROB method (bottom). The colour code indicates stellar mass. The diamond and triangle symbols indicate clump and RGB stars, respectively. The black line corresponds to the mean uncertainties. Figure from Vrard et al., Astronomy and Astrophysics, 616, A94.

5. The quality of the Kepler data and its extent has been critical in characterizing the magnetic variability in solar-like stars and constrain stellar magnetic cycles. This is critical for understanding the mechanisms behind our own Sun and its magnetic cycle. The team Santos et al., lead a study of 87 solar-type stars (see figure) using seismic data to study its variability together with other indicators. More than 60% of the stars were found to show evidence for (quasi-)periodic variations in the frequency shifts. In the majority of the cases, these variations are accompanied by variations in other activity proxies. About 20% of the stars show mode frequencies and heights varying approximately in phase, in opposition to what is observed for the Sun. This work confirms the **possibility of using asteroseismology to study stellar magnetism,** a step towards a better understanding of stellar magnetic cycles.

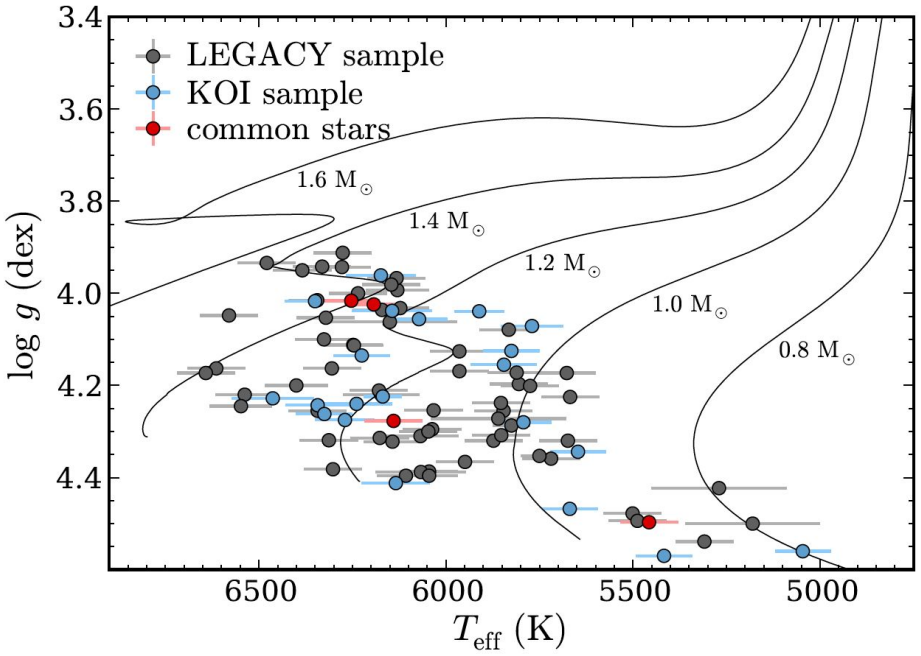


Figure: Kiel-diagram for the stars in the target sample, which is composed of the LEGACY sample (grey dots) and a sample of 25 KOIs (blue dots). The red dots mark the stars that are common to both sub-samples. The black solid lines show the solar-calibrated evolutionary tracks obtained with the evolution code Modules for Experiments in Stellar Astrophysics (MESA; Paxton et al. 2011, 2013). Figure from Santos et al., The Astrophysical Journal Supplement Series, 237, 1.

Thematic line meetings, Journal Clubs and other activities:

Complementary to the many publications produced, 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 selected as the backbone of IA under its strategic plan.

The team includes several PhD students working on topics related to the main goals of the thematic line, with two theses completed in 2018, namely "**Determination of Stellar Parameters for M-dwarf Stars: The NIR Approach"** by Daniel T. Andreasen and "**The Activity and Evolution of Low-Mass Young Stellar Objects"** by Ana C. S. Rei.

The team organizes regular journal clubs on topics related to stars, having specific journal clubs and team meetings both on asteroseismology and also on star formation and early evolution. Participation in outreach activities covering topics on stars is also frequent, including several talks 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

The Group aims to provide fundamental contributions in: 1) advancing our understanding of the assembly and evolution of galaxies across cosmic time; 2) modelling cosmological scenarios and devising sensitive observational discriminators between them.

In the field of extragalactic research, the Group is developing and intensively applying innovative tools (e.g., FADO) for the exploration of the star formation- and chemical enrichment history of galaxies both with single-aperture data and spatially resolved integral field spectroscopy (IFS).

Taking advantage of modern IFS units (e.g., MUSE@VLT) and advanced data analysis and modelling techniques, it investigates several fundamental astrophysical subjects, such as the nature of extended Lyα halos at a redshift > 3, the co-evolution of super-massive black holes (SMBHs) with their galaxy hosts, the role of starburst-driven feedback on the galaxy assembly history, the influence of the environment on galaxy evolution, the build-up of galaxy structural components (e.g., bulge, disk) and the size evolution of massive elliptical galaxies. The Group places special emphasis on the exploration of the earliest stages of galaxy evolution, co-leading the development of several SKA-precursor surveys (e.g., EMU) that are expected to reveal powerful AGN activity within the Epoch of Reionization of the Universe and by making quantitative predictions on the multi-wavelength characteristics of these first AGN. Well aligned with these goals is the central role of the Group in the Portuguese ALMA Centre of Expertise (PACE) and its co-leadership of the MOONS AGN Science Working Group (SWG).

In the field of cosmology, the Group investigates early and late-time cosmological scenarios, the evolution of dynamical scalar fields and, topological defects, as well as modern statistical tools for parameter estimation and model selection. Observational predictions emerging from this work will soon be tested with major facilities like ESPRESSO and Euclid. After having accomplished the fundamental task of defining the Euclid Mission Reference Survey, the Group is currently leading several work packages in the Euclid Weak Lensing and Theory SWGs. In addition to this the group has a strong presence in the 1400-people strong Euclid consortium with da Silva as board member. In addition the group also has one of the top level science coordinators of the Euclid mission, Brinchmann, who also co-leads the Galaxy & AGN Evolution Science Working Group and is involved in the calibration, archive, publication, and communication groups. He is also the editor of the Euclid newsletter and is co-lead of the science side of the Euclid Publication Group.

It also contributed extensively, both observationally and theoretically, to astrophysical tests of fundamental physics (FF). These include tests of the stability of fundamental couplings, such as the fine-structure constant and high-redshift measurements of the CMB temperature. Within ESPRESSO, the Group is responsible for the definition of targets for the FF GTO. Moreover, Group members have explored the consequences of currently available data for cosmology and FF, and participated in the planning and optimization of future facilities, such as the ELT (Project Science Team) with its HIRES spectrograph, and CORE. Science cases and predictive algorithms developed in the context of the

LISA mission constitute further elements of the Group's coherent strategic roadmap towards front-line research in the next decade and beyond.

The Group currently comprises 30 researchers, 15 PhD students and 11 collaborators, and its activities are supported by 6 research projects with national funding. The strategy of the Group toward sustainable scientific excellence and international visibility also involves leadership roles in key international collaborations and consortia: In the period of this report, the Group has taken further steps towards this goal through its co-leadership of MOONS@VLT, increasing involvement in ALMA, and major participations in MOSAIC@ELT (ESO, 2026), Athena (ESA, 2028) and LISA (ESA, 2032). Furthermore, the Group has organized two international conferences and two internal workshops, and co-organized and hosted meetings of the consortia of the Athena and Euclid missions.

Polychronis Papaderos
Group Leader

Report from the Thematic Line

The assembly history of galaxies resolved in space and time

During 2018 the Thematic Line has continued the implementation of its strategic plan, strengthening its efforts to study the evolution of galaxies throughout cosmic time.

One fundamental aspect of the extragalactic team's activities is the development of innovative codes that can enable a better understanding of galaxies. After the publication and public release of the population spectral synthesis (PSS) code FADO, the first and only existing algorithm that considers, besides stellar emission, nebular lines and continuum, the team has devoted considerable efforts in 2018 to complete a detailed spectral modelling study of the entire SDSS DR7 (approximately one million galaxy spectra). At the same time, several activities were initiated dedicated both to tests of FADO on synthetic spectra and its application to the investigation of several fundamental astrophysical issues, such as, e.g., the mass-metallicity relation, the 'star formation main sequence' and galaxy downsizing, and the stellar mass assembly history of low-metallicity starburst galaxies

FADO, together with other tools being developed at IA, are being used to prepare the scientific exploitation of MOONS (the Multi Object Optical and Near-infrared Spectrograph for the VLT), an instrument the IA co-leads and which is expected to start observations on 2021. During 2018, in preparation for the definition of the its guaranteed time, the MOONS consortium has formalised the activity of various Science and Technical Working Groups (WGs), with IA researchers assuming major roles in several: coordination of WG-5, on the study of Active Galactic Nuclei (AGN), and technical WG-1, on the definition of the MOONS Input Catalogues, and active roles on several others (in particular in the scientific WGs on Physics of the ISM, Passive galaxies and stellar continuum, Galaxy environment, Large Scale Structures, High-z Universe and the EoR, Clusters/Protoclusters, and in the technical WGs on Mock Catalogues from Simulations, Determination of Redshift and Physical Parameters from Spectra, and on the Determination of Environmental Parameters).

Another strategic goal of the team is to understand the highest redshifts, and in particular the role of the very first powerful AGN in the Universe, and how they shaped the earliest galaxy evolution. The team concluded its exploitation of a wide range of state-of-the-art models of galaxy formation, extracting quantitative predictions to the number (and detectability) of early supermassive black holes at X-rays and radio wavelengths. This work is not only supporting our current observational search for these early AGN, which has led to a IA-led ALMA observation of a very high redshift ($z>5$) radio galaxy candidate, but also helping to: (a) steer our efforts in the development of the future ASKAP's Evolutionary Map of the Universe survey, through the IA-lead Key Science Project "Radio AGN in the EoR" and (b) enhancing our role in ESA's future X-ray mission, Athena, where IA is represented at the board and Science team level. In fact, IA's participation in these two projects is as strong as ever, with IA hosting in November 2018 the Athena-WFI Consortium meeting and initiating the organisation of the IXth SKA Pathfinder Radio Continuum Survey Group (SPARCS) meeting, to take place in Lisbon in May 2019.

The team's expertise in current state-of-the-art telescopes and instruments is well worth stressing. Not only the team is nuclear to the activities of the Portuguese ALMA Centre of Expertise (PACE), providing manpower and expertise to support the national use of the facility and helping ESO validating its data, but during 2018 the team has shown a remarkable level of proficiency in the use of

one of the most revolutionary and complex optical spectrographs currently in operation — the Multi Unit Spectroscopic Explorer (MUSE) — as detailed below.

Scientific Highlights for 2018

1. Although Spectral population synthesis is a fundamental tool to decipher the assembly history of galaxies from their spectral energy distribution (SED), considerable uncertainties exist due to major degeneracies that are linked to the limitations of the models - and in particular, the neglect of nebular emission. The IA-developed FADO (Fitting Analysis using Differential evolution Optimisation) code allows to overcome this long-standing limitation, potentially allowing for a much more accurate understanding of galaxy evolution. By applying FADO and a commonly used purely stellar population synthesis code to a range of synthetic Spectral Energy Distributions **we have shown that the (still usual) neglect of nebular continuum emission will severely impact the estimates of both stellar masses and star formation histories in galaxies**, two of the main parameters to understand galaxy evolution. Quite importantly, the documented biases in (purely stellar) SED fitting codes may affect our understanding on the regulatory role of SMBHs on the galaxy assembly history.

2. During 2018 several results focused on galaxy morphology, a fundamental key to understand galaxy formation and evolution. Using a IA-developed tool, RemoveYoung, a code that allows to model and remove the contribution of young stellar populations in a galaxy image, **IA researchers have found strong indications that two different types of bulges in the center of spiral galaxies are not, contrary to previously expected, the result of distinct formation processes**, being instead opposite ends of a continuous formation timescale. In another study, the morphology evolution of Lyman-alpha emitters (LAEs) was investigated using a large sample of 4000 such galaxies spread out over the first 3 Gyr of the Universe ($2 < z < 6$). **It was found that rest-frame UV morphology of LAEs does not evolve significantly over the first 3 Gyr of the early Universe**, and the sizes of these galaxies depart significantly from those of normal star-forming galaxies at $z<4$, an important factor to understand the relation between these two galaxy populations. Finally, IA researchers selected and studied ultra compact massive galaxies, rare objects that should not exist except in clusters, according to galaxy formation models. Surprisingly, **several ultra compact massive galaxies were found in relatively under-dense environments, showing signs of being primordial galaxies that remained largely untouched since their formation**, more than ten billion years ago.

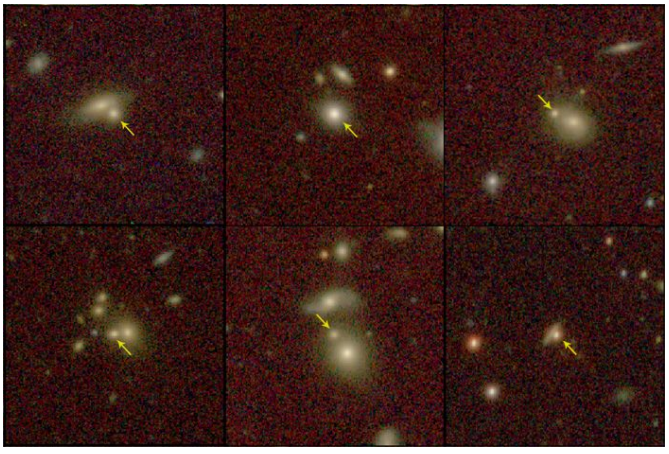


Figure: Massive ultracompact galaxies (indicated with a yellow arrow, at the centre of the images) with stellar masses $M > 8\times1010M_{\odot}$ and $z<0.3$. These images were obtained with the KiDS survey, conducted with ESO's VST telescope. Credits: Buitrago et al, 2018

3. A study of the Arp 202 interacting pair confirmed the existence of a tidal dwarf galaxy (TDG) in the system. The absence of detectable emission from the TDG in Spitzer 3.6 μm and 4.5 μm images, and the lack of absorption lines and weak continuum in the spectrum indicates the absence of an old (>0.5 Gyr) stellar population. The study of this TDG by members of the team suggested a scenario in which **the TDG is formed from neutral hydrogen stripped from the parent galaxies that coalesced within their extended dark matter halo** - a scenario that provides insights into the impacts of initial gravitational potential and chemical abundance on the subsequent star formation histories and the chemical evolution of dwarf galaxies, including TDGs.

4. The exploration of higher redshift galaxies has also been performed, and with impressive results. On the one hand, the use of MUSE, the Multi Unit Spectroscopic Explorer at the VLT, **revealed an abundant presence of extended Lyman-alpha halos around galaxies at 3<z<6, resulting in a nearly 100% coverage of the sky at those redshifts by Lya surrounding galaxies**. This suggests that most circumgalactic atomic hydrogen at these redshifts has now been detected in emission. Another IA study using MUSE focused on the kinematic, chemical and excitation properties of the giant Lyman-alpha emitting nebula associated with the z = 2.92 radio galaxy MRC 0943–242. Together with other observations, it **revealed clear evidence for jet gas interactions affecting the kinematic properties of the nebula, suggesting both outflows and inflows being induced by radio-mode feedback**.

5. The team has also been intensively exploring the selection of very high redshift AGN. During 2018 a detailed exploitation of the predictions from state-of-the-art models of galaxy formation for the number (and detectability) of early supermassive black holes (SMBH) at X-rays and radio wavelengths was concluded, **showing that even the best theoretical framework is still not capable to predict the most luminous and massive high-redshift SMBHs already observed**. Although improvements in the modelling of the physical conditions in these early systems are certainly needed, **the main limitation appears to be computational**, as even the largest current simulation volumes appear to be restricting their predictive power. In parallel, the team has also been exploring different selection criteria for the detection of very high redshift AGN. During 2018, we continued to explore far-Infrared and radio criteria, **having confirmed that FIR colours can be used to select some of the most massive, dusty z > 4 galaxies**.

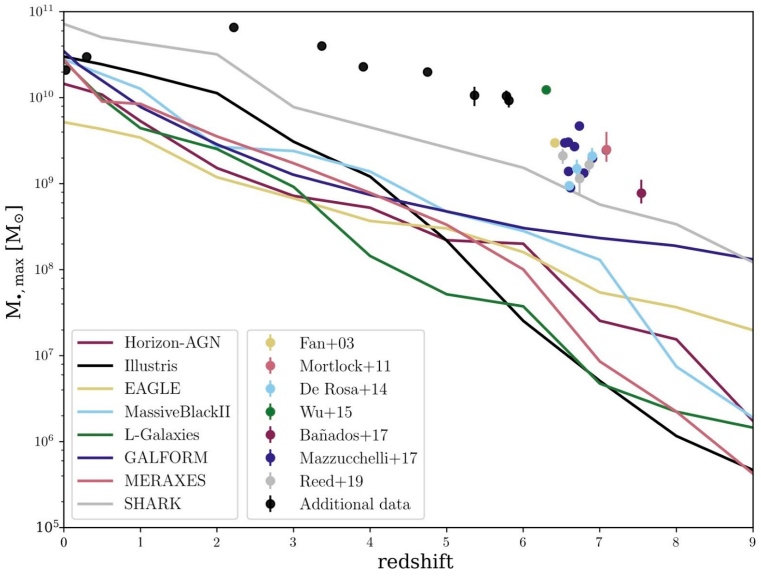


Figure: Comparison between the mass of the most massive SMBHs predicted by various state-of-the-art models of galaxy formation and evolution (solid lines) and estimated masses of some of the most massive QSOs already discovered. Credits: Amarantidis et al, 2018.

Thematic line meetings, Journal Clubs and other activities:

Throughout 2018, the team maintained a busy schedule of weekly Briefings, when the team's scientific work is discussed. Regular weekly journal clubs were also continued, for the discussion of recent, mostly non-IA, scientific results. All meetings use a videoconference tool, zoom, which allows easy and practical access to all team members.

Team members are core participants in the Portuguese ALMA Centre of Expertise, providing support to ALMA users in Portugal, and also providing, in the context of the European ALMA Regional Centre, scientific and technical assistance to ESO on the validation of ALMA data before being delivered to the respective PIs. It is also worth noticing that team members actively participate in IA public outreach activities, not only providing frequent public talks on galaxies and the Universe, but also in major institutional initiatives such as IAstro Junior or Ignite IAstro.

Finally, during 2018, the team hosted and organised the Athena-WFI Consortium Meeting (Lisbon, 20-22 November 2018), which brought together 70 experts from the consortium member institutes to discuss the development status and the science goals of the WFI instrument, and the preparation for the Instrument Science Centre. The team also organised the international conference "Escape of Lyman radiation from galactic labyrinths" (Crete, 11-14 September 2018), with more than 60 participants.

José Afonso
Thematic Line Leader

Report from the Thematic Line

Unveiling the dynamics of the Universe

The main focus of the thematic line is the research on the construction of cosmological model and devising tools to test their viability having in mind the plethora of data coming from forthcoming mission with IA large participation: ESPRESSO, Euclid and LISA.

In October 2018, the Euclid consortium delivered the technical reports required for the critical design review of the mission. During the year there was strong activity in the consortium in preparation of this review. The coordinators of the national participation in the mission (which are team members) participated in the preparation of the Mission Operation Concept Document-part B (MOCD-B), a 150-page technical document, and contributed to the Science Performance Verifications (also co-authoring the associated technical document). The results reported in the MOCD-B were produced with ECTile, the software developed by IA in the Instrumentation and Systems group. The scientific preparation of the mission also continued as planned, with the participation of various team members on various working groups. In the Weak Lensing WG, where we lead one work package, team members worked on the measurement of higher-order statistics (see highlights). In the Theory Working Group, where we are more numerous and also lead one work package, we are involved in a Euclid key project on cosmological parameters' forecasts for non-standard models. In preparation of that participation we continued last years' activities in the development of Einstein-Boltzmann solvers that include modifications to General Relativity and dark energy models. We also hosted this year a workshop of work package 1 of the Euclid theory group. We are also present in the Cosmological simulations work group.

Members of the TL dedicate their research to the LISA's cosmology working group, in particular to the project 3: Cosmic Strings. This project aims to evaluate the LISA's ability to test different scenarios of cosmic strings and the respective working group is producing an article to be published soon.

Two team members were among the authors of an extensive Living Reviews in Relativity article on Cosmology and Fundamental Physics with the Euclid Satellite. This review was the outcome of work within Euclid's Theory Working Group, and provides a guide to the scientific themes that will underlie the activity of the group during the preparation of the Euclid mission. This already has more than 175 citations. One team member co-authored a review article published in Physics Reports, on the Born–Infeld inspired modifications of gravity. This article has already 65 citations. Two team members were involved in a two-year study of a post-Planck European CMB satellite mission, CORE, which was concluded in 2018. The study involved more than 100 researchers and encompassed the science, instrument and survey requirements as well as the mission design. The main results were published in a series of 10 JCAP publications.

We were involved in the Phase A study of the ELT-HIRES instrument, which was successfully completed in 2018. One team member (C. Martins) was the deputy lead of the cosmology and fundamental physics WG. We contributed to the revision and update of the key science and design drivers of the instrument, and to the early preparations of Phase B.

We were involved in the SOC of the IAU General Assembly Symposium 347 Early Science with ELTs (through C. Martins, a member of the ELT Project Science Team since its creation in 2012). The symposium reviewed the current status of Extremely Large Telescopes (ELT, GMT, TMT), their instrumentation and the planned early science, and their impact on several long-standing Astrophysical problems, Team members presented one invited talk and one contributed talk.

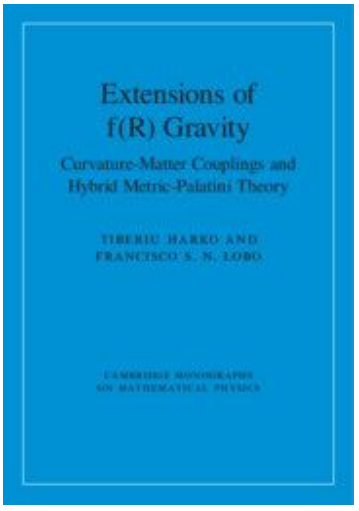
The TL had from its beginning, a significant role in the European COST Network "CANTATA", CA 15117. During 2018, the TL welcomed one researcher funded by the action's Short Term Scientific Missions (STSM). This working visit maintained on going collaborations with members of the TL and contributed to the training of young researchers, one of the main goals of the CANTATA cost action and IA itself. The TL also welcomed IberiCos: the 13th Iberican Cosmology Meeting in March.

The TL secured three grants in the last highly competitive FCT call for projects. Gwstrings, Dark Ripple and CosmoESPRESSO not only fund part of the TL research but also allow the hiring of new team members.

In the extremely competitive call for 2017 Scientific Stimulus funded by FCT, the TL was awarded four positions granted to Francisco Lobo, Andrew Liddle, Giuseppe Fanizza and Claudio Linares due to start in 2019. In this way, the TL is in a stronger position to be internationally competitive.

Scientific Highligths for 2018:

1. One team member co-authored a recently **published book "Extensions of f(R) Gravity: Curvature-Matter Couplings and Hybrid Metric-Palatini Theory** (Cambridge Monographs on Mathematical Physics). It presents a detailed theoretical and phenomenological analysis of several leading modified theories of gravity. This timely book first discusses key motivations behind the development of these modified gravitational theories, before presenting a detailed overview of their subsequent development, mathematical structure, and cosmological and astrophysical implications.



2. Team members have investigated the **potential of high-order weak lensing statistics (HOS) in breaking cosmological degeneracies**. In a recently published work, they applied topological estimators to realistic simulated maps, finding that Minkowski functionals are indeed helpful to break the well-known degeneracy between matter density and clustering amplitude when combined with more standard gravitational lensing statistics. This work also led to the idea of making a systematic comparison of all known HOS estimators. The project HOWLS, co-led by a team member was created within the Euclid consortium with this goal and is currently underway.

3. A few of the team members, including a PhD student, computed the **power spectrum of the stochastic gravitational wave background generated by i-string networks** (a string network created during inflation) using the velocity-dependent one-scale model to describe the network dynamics, and demonstrated that this regime introduces a high-frequency signature on an otherwise standard spectrum of the stochastic gravitational wave background generated by cosmic strings. If observed by current or forthcoming experiments, this signature can provide strong evidence for i-strings and, therefore, for (primordial) inflation.

4. The existence of **new scaling solutions in the context of the Horndeski Lagrangian**, the most general scalar-tensor theory with second order equations of motion, was proposed by team members, including a master student. The cubic coupling G3 provides an important contribution to the field density that scales in the same way as the background fluid density. Quantities associated with the growth of matter perturbations and weak lensing potentials under the quasi-static approximation in the sub-horizon limit were computed and it was shown that the cubic coupling leads to the modified evolution of perturbations which can be distinguished from quintessence.

5. One team member co-authored a work where the cosmology of Covariant Galileon gravity in view of the most recent cosmological data sets, is revisited. A recent and extended combination of data, also including massive neutrinos was used. More specifically, the study considered the Planck measurements of Cosmic Microwave Background temperature and polarization; Baryonic Acoustic Oscillations measurements by BOSS DR12; local measurements of H0; the joint light-curve analysis supernovae sample; and, for the first time, weak gravitational lensing from the KiDS collaboration. It was found that the comparison of the Bayesian Evidence to the ΛCDM shows that in all the cases considered, **Covariant Galileon models are statistically ruled out by cosmological data**.

Thematic line meetings, Journal Clubs and other activities:

Two team members working on topics related to the main objectives of the thematic line, completed their theses in 2018, namely **“Characterizing dark energy with Euclid data on galaxy clusters”** by Leyla Ebrahimpour and **“Cosmic Paleontology: Searching for superstrings”** by Ivan Rybak.

In 2018 the thematic line continued organizing journal club meetings and seminars in a regular basis, typically, once a week. Approximately 38 articles were discussed during the 31 journal club sessions (http://ia-cosmoclub.wikidot.com/previous-meetings-2018). These are done via videoconference so that both nodes can participate. A monthly TL meeting was also scheduled. The TL organized its first internal workshop that took place in Curia on the 17th October.

The TL members had active presence on outreach activities such as Ignite Astro, IAstro Junior and visits to schools.

Nelson Nunes
Thematic Line Leader

Report from the Group

Instrumentation and Systems

During 2018, the following instruments had engineering and implementation activities at IA: ESPRESSO (ESO), MOONS (ESO), NIRPS (ESO), HIRES (ESO), Euclid (ESA), e-LISA (ESA), PLATO (ESA), CHEOPS (ESA), HELIOS (ESO) and ARIEL (ESA).

Currently the Group participates in a considerable number of projects, involving all its human resources. This includes not only the technical design of the instruments themselves but also the respective science exploration of the collected data through big collaboration projects such as consortiums and surveys. Its importance stems from the need to secure privileged access to existing and future facilities of the European Organization for Astronomical Research in the Southern Hemisphere (ESO) and of the European Space Agency (ESA) and to contribute to the long term development of Astronomy in Portugal. Several CAUP members continued to be involved in the scientific definition of astronomical instrumentation and several projects have been running in collaboration with other Portuguese teams.

The group is composed of 18 people. 10 researchers (with PhD), 5 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 man power availability to the running project of about 10 FTE. It should be mentioned that 3 engineers left the team in the beginning of 2018.

Contracting specialized engineers is not feasible for IA due to the type of contracts we can provide and the competition with industry. Moreover, there is specific knowledge to instrumentation in astrophysics that limits even more the range of possible candidates. For this reason, IA's strategy is more focused on finding new students who want to pursue a career in this area, attending outreach events and organizing workshops for future candidates. Following this strategy, a Summer school was organized by the Instrumentation Group at the end of 2018, with about 40 participants (note that one of the participants already defined for 2019 their MSc thesis in the group).

In the end of 2018, the Group and the labs and integration facilities started a move to Campus of the Faculty of Sciences of the University of Lisbon. This will also help to reinforce the connection with the students, increasing their presence in our labs and the visibility of our activities within the University.

In the following we list the details of the respective running projects.

1. **ESPRESSO (ESO)**: The Echelle SPectrograph for Rocky Exoplanet-and Stable Spectroscopic Observations (ESPRESSO) is a new-generation spectrograph for ESO’s VLT. In 2018 ESPRESSO has seen the first light for the 4 UT (Unit Telescopes) at the VLT. This 4 UT mode, that transforms the VLT into the largest collecting area in the world with an equivalent 16 m diameter, is provided by the 4 Coudé Trains (CT) that were designed, assembled, integrated and tested by the IA team. In 2018 there was the last Coudé Train mission, and the CT was delivered to the observatory. In what regards ESPRESSO software,

in 2018 we have improved the Data Analysis Software and performed tests to the pipeline during and after commissioning runs.

2. **MOONS (ESO)**: The Multi-Object Optical and Near-infrared Spectrograph (MOONS) is a future third-generation instrument for the Very Large Telescope (VLT) to have first light by 2020. It matches an enormous multiplexing capability, reaching up to 1000 positions being spectroscopically observed at the same time over a single telescope pointing, to the grasp of the 8.2m VLT, making it a unique instrument for deep galaxy surveys. The subsystems under IA responsibility are the MOONS Rotating Front End (RFE) and the Field Corrector (1 m diameter set of two lenses). In 2018 the activities focused on the procurement of these subsystems. Due to the large amount of interfaces (with other institutes in the consortium) in the RFE, the first activities comprised several meetings (two face-to-face) with all partners in the RFE to frozen all the sub-system dependencies. In the end of 2018 the contract with the field corrector manufacturer was signed and the selection process for the construction of the first mechanical parts was terminated (contract to be signed in 2019).

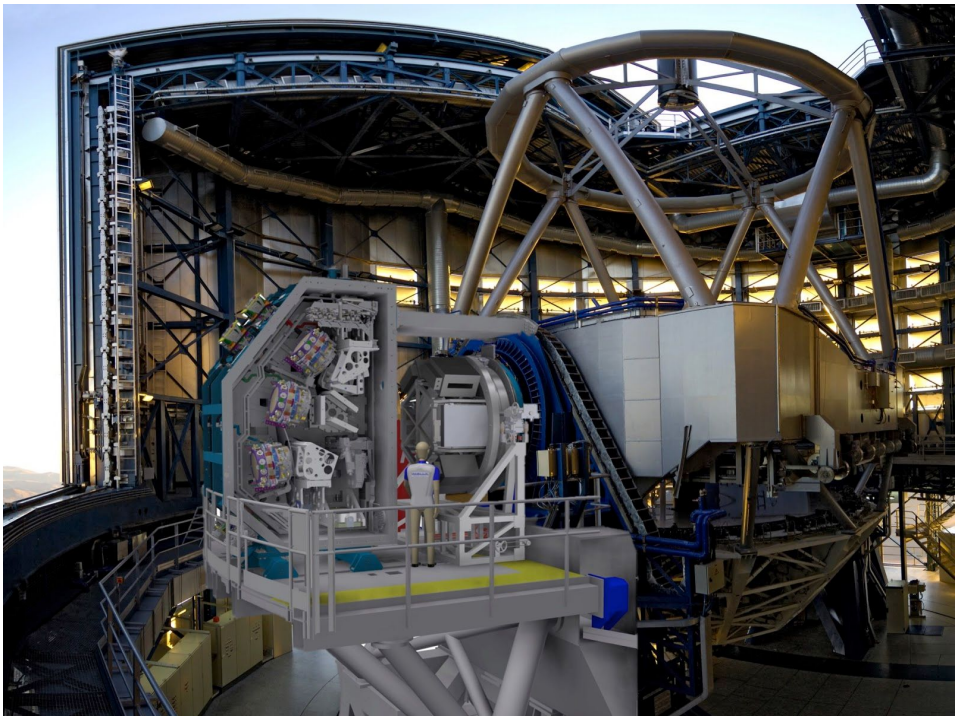


Figure: MOONS at the VLT.

3. **NIRPS(ESO)**: NIRPS is a new (fast-track instrument) high resolution spectrograph working at near-infrared wavelengths, that is being designed for the ESO 3.6-m telescope (La Silla-Paranal Observatory). NIRPS will work together with the existing HARPS spectrograph, allowing us to obtain simultaneous optical and near-IR spectra of stars. The major goal of NIRPS is to detect and characterize planets orbiting late type stars. The NIRPS consortium includes a strong participation from IA, including in the development of hardware and software (the Atmospheric Dispersion Correctors - ADC), and in the definition of the scientific activities. In 2018 the ADC optics was delivered (after some corrections done at the manufacturing level) and assembled in the optomechanical components. Two test campaigns were done in Geneva were the remaining of the front end was also integrated. In the end of

2018 the ADC was fully tested, characterized and became ready for the first light expected in the end of 2019.

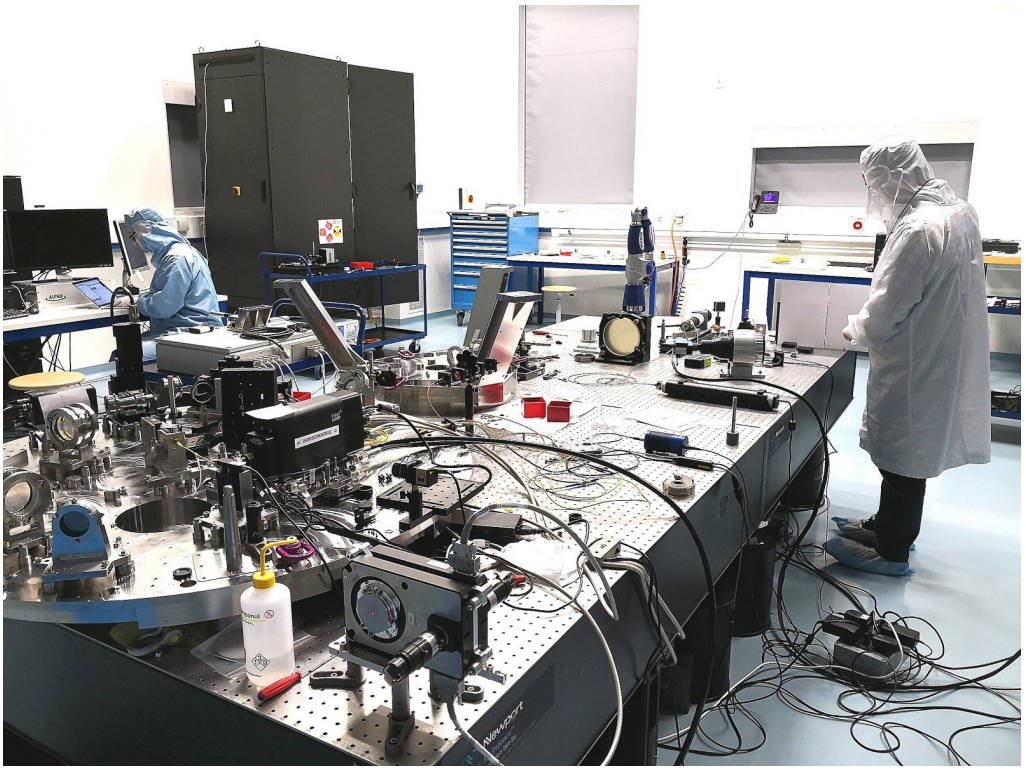


Figure: NIRPS integration in Geneva.

4. **Hires (ESO)**: HIRES is the project for a high resolution spectrograph to be installed at the ESO E-ELT telescope. The concept of HIRES is being developed by a consortium that comprises several institutes in different European countries, as well as Brazil and Chile. The Portuguese participation in this consortium is done through IA that is leading the “front end” work package component of the instrument, the data reduction and analysis software, the software system architecture, and the science drivers for the project. The group also participates in the management of the consortium, having several key persons. After completing Phase A studies in 2017, during 2018 the work was focused on the phase B consortium definition (phase planned to start in 2019).

5. **Euclid (ESA)**: In 2018, as in previous years, the participation of IA's Instrumentation and Systems group in the preparation of the Euclid mission was focused on the development of the ECTile software. This software produces solutions of the Euclid Deep and Wide surveys, including implementation of all calibrations, compliant with all constraints and requirements. This year, a major change in the interpretation of the slew angles definition prompted a major code overhaul to cope with the stronger requirement in the field-to-field slew. This also led to the development of a new tool for scheduling observations at high-latitude, which had become unfeasible with the previous strategy. This new tool, for observing the "polar caps", is now integrated in the ECTile software. Another important activity was the consolidation of the Euclid Deep Field South location. This activity required the study of visibility and observation angles for various candidates, plus interaction with Euclid science groups.

Besides development, the team contributed to the survey group delivery for the Critical Design Review (CDR) milestone that took place in October 2018.

6. **LISA (ESA)**: LISA is an ESA project regarding the development of solutions and prototypes up to a TRL of 7 - 8, where technological solutions shall be tested in view of the LISA mission, adopted by ESA as an L3 mission in 2027. This particular project had as the main objective the development of the high power laser head and has been carried out since 2014 by an international industrial consortium lead by the Portuguese company Lusospace. IA is a partner in this industrial consortium and worked on the full optical chain modelling and frequency stabilization loop, as well as in the development of an extremely low noise sensor to be used as a tool for the characterization of the laser performance. The activities in LISA during 2018 were mainly related to the support to Lusospace in the test setups and performance reporting of the laser head, namely in what concerns tests towards the verification of compliance of the stability and timing requirements. The work performed this year lead to the elaboration of the final report and end of phase 2 of the project. All the activities and results produced by the consortium were accepted by ESA that considered this work phase successful. Negotiations are now on course related to the content of the work-packages to be attributed to the partners for the Phase 3 of the project, which is expected to start in 2019.

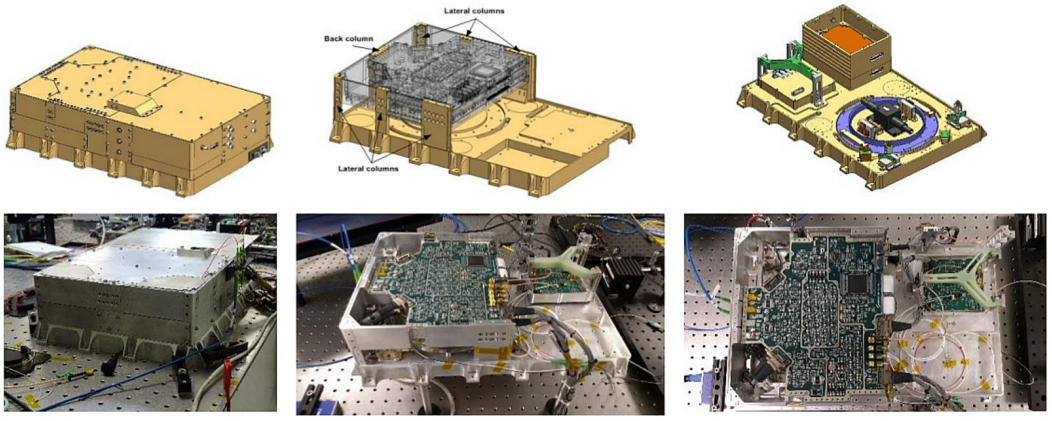


Figure: LISA high power laser developed by Lusospace and IA.

7. **PLATO (ESA)**: The PLATO mission, whose main scientific focus is the detection and characterization of extra-solar planets orbiting nearby, bright stars, using the transit method, as well as the detailed characterization of their host stars through asteroseismology, has been adopted by ESA in June 2017. The IA team is deeply involved in this project. On top of the scientific activities, the team has leadership of several work packages for the development of software for the Plato Data Center (PDC) as well as in the development of the Optical Ground Segment (OGSE) component to test the PLATO cameras on the ground. In 2018 all the activities related to this project continued at good pace, now with funding of a Prodex Arrangement, which supports all the capital expenses related to the manufacture of the OGSE, as well as travelling of all the team members to the several meetings occurring throughout the year. In terms of the OGSE production, all the procurement activities were completed during 2018, although we had to report some delays regarding LLI such as the Parabolic mirrors. The preparation of the metrological tools and setups for the collimator

performance and requirements verification was also completed during 2018. The integration of the mechanical parts started in November 2018. The collimators are expected to be delivered to CSL (Belgium) during the second quarter of 2019. The PDC activities are also considered on schedule, although the deliverables being only due at the end of 2019.

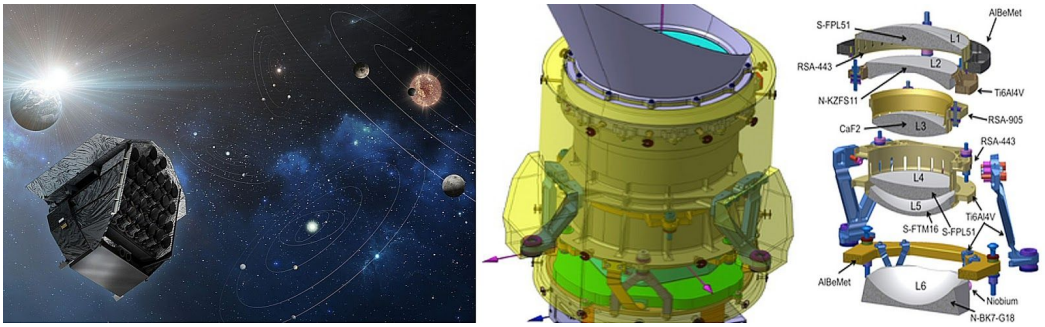


Figure: PLATO camera telescope.

8. **CHEOPS (ESA)**: The Characterising Exoplanet Satellite (CHEOPS) will be the first mission dedicated to search for transits of exoplanets by means of ultrahigh precision photometry on bright stars already known to host planets. It will provide the unique capability of determining accurate radii for a subset of those planets for which the mass has already been estimated from ground-based spectroscopic surveys. CHEOPS will also provide prime targets for future instruments suited to the spectroscopic characterization of exoplanetary atmospheres. IA is strongly contributing for this mission participating both in the board and the core science team of the mission. This work is also closely related with the science data archive which is being developed by our industry partners (DEIMOS), contributing to the development of stronger relation with the Portuguese industry in the area of scientific related software. Moreover there is a contribution for the mission science operation centre, more specifically for the CHEOPS data reduction pipeline where we are responsible for the calibration of the pipeline. In 2018, we have continued the implementation of the code and respective documentation for the pipeline software. The code has passed the second set of science validation tests. We have also received a formal confirmation from Arianespace on the CHEOPS launch slot, which is 15th October to 14th November 2019.

9. **HELIOS (ESO)**: HELIOS is a small solar telescope to feed the HARPS/ESO spectrograph with solar integrated light. IA has a major participation in this project, participating in its scientific preparation and in the acquisition of several of its components. In March 2018 we had the commissioning and first light of HELIOS. The telescope was installed in La Silla by a crew of 6 technicians and astronomers, with a participation of IA (by Pedro Figueira, co-PI). After one week of commissioning, the telescope was observing successfully from the catwalk of the 3.6 m telescope, and feeding its light into HARPS. At the end of the commission, the work continued for a couple of weeks on the remote connection, and the telescope started observing daily.

10. **ARIEL (ESA)**: ARIEL (Atmospheric Remote-sensing Exoplanet Large-survey) was one of the three candidate missions selected by the European Space Agency (ESA) for its next medium-class science mission due for launch in 2028. The goal of the ARIEL mission is to

investigate the atmospheres of several hundred planets orbiting distant stars in order to address the fundamental questions on how planetary systems form and evolve. During 2018, the collaboration of the science team to the consortium was also formalized, with the participation and leadership in several working groups. Regarding the participation of the Instrumentation group in ARIEL, and after a few discussions with the Consortium leaders, it was decided that the group will be participating in the OGSE work packages, namely with the production of a calibrated and stabilized visible/NIR light source. The work of IA in the OGSE work packages will be included in the activities of the AIV team, led by the Rutherford Appleton Laboratory (RAL) and by the University of Oxford. The Instrumentation Group, along with the Science Team participating in this mission, is now working in a funding proposal to Prodex, which is expected to be signed up during the first semester of 2019. This funding will cover all the capital costs associated to the OGSE activities.

Alexandre Cabral
Group Leader

Report from the Thematic Line

Space and Ground Systems and Technologies

The Instrumentation thematic line shares essentially the same manpower of the Instrumentation group. Its activity is dedicated to the exploration of new avenues in the expertise of the group or to the development of capabilities and competences in the scope of running projects or new funding proposals.

The activities of this thematic line are focused on two main objectives

1. Exploitation of in-house expertise in new missions and instrument.

   As referred in the report from the Instrumentation group, several initiatives are on course for the participation in international consortiums, also seeking diverse sources of activity financing. In this scope, in 2018, the group integrated several consortiums that submitted 3 funding proposals. One funding proposal was produced in the scope of a H2020 initiative, with a consortium led by INTA (Sp). This project was related to the development of optical tools designed for probing samples in quest for extant life in Mars/Europa missions. Although highly rated, this proposal was not accepted for funding.

   Two other proposals in the area of expertise of the group were also submitted in response to ESA ITT calls, in consortiums lead by a Portuguese company. The result of the call is already known for one of the proposals, which was unfortunately negative. The results for the second proposal are to be declared during 2019.

   We also participated in a Athena Progress mission held in Lisbon, in order to explore new areas of application of our expertise, namely with optical metrology techniques in spacecrafts. Contacts with ESA technical officers were initiated in order to evaluate eventual participation in this exciting mission.

2. New themes of research

   In terms of new themes of research, somehow supported by background expertise in Astronomy Instruments / Space missions, are consolidated by the work of two PhD students supervised by Instrumentation Group researchers:

   a) Research on the Wolf Effect and its implications on astronomical observations. Development of a dedicated simulator and baseline design of an instrument for the verification of this effect in solar telescopes.

   b) Development of tools/ models for Atmospheric Dispersion Compensators, resulting from the work done / projected work on different instruments such as Espresso, NIRPS and HIRES.

Other areas of research are also being pursued, namely in the area of extreme stabilization of light sources that are utilized in calibration of photometric instruments, such as in Ariel and in a certain aspect, Plato. During 2018 we initiated several studies that included the work of a Physics

Engineering MsC student, leading to its MsC thesis, and a proposal for a PhD scholarship funded by a Spanish institution “La Caixa” under the same theme.

We are also supporting the work of a Pos-Doc collaborator and its proposal to a fellowship/funding contract “Individual Scientific Stimulus” under the theme of Optical transmission of time and frequency standards in space.

Manuel Abreu
Thematic Line Leader

Report from the Group

Science Communication

During 2018, the Science Communication Group at IA (SCG) organized and participated in several public outreach initiatives which reached in total more than **86,760 people**. In addition, we note a conspicuous IA presence at the 2018 Festival LUMINA, an event attended by more than **200,000 people**.

The public activities directly organized by IA reached about **56,745 people** including, among others, planetarium presentations, monthly periodic outreach sessions, exhibitions, showcases, hands-on laboratories and special public events and talks. The SCG team has also participated in several initiatives promoted by other institutions, like Ciência Viva, ESERO Portugal or the Museums of the University of Lisbon, contributing also with talks, observations of the night sky, planetarium sessions, exhibitions, showcases, workshops and short courses, having reached to about **30,013 people**. IA organised 3 activities framed in the SpaceTalks initiative by the European Space Agency.

The team produced and made available to the media **27 press releases** (18 national, 7 international and 2 regional) related to the science produced by the Institute or to its outreach activities. This number of press releases resulted in about **635 references in national news media** with a total Automatic Advertisement Value (AAV) of about **€ 2.627.618,50**. We also made available through our webpage and partners, **6 news releases**.

IA has been mentioned by international news media, for example, Space.com, Astronomy.com, Cosmos Magazine and BBC News Brazil. IA was also mentioned by the ESO Blog and the INAF – Istituto Nazionale di Astrofísica in Italy.

The SCG co-created and co-produced 19 short fulldome movies and has developed SkyExplorer scripts for use during live presentations in the fixed planetarium sessions. Together with several showcase and exhibition products (flyers, roll-ups, exhibition boards), the SC team has created

several videos, contents for its official webpage and distributed 11 SC newsletters to more than 2,000 people.

The science communication and education work at IA has been presented in national and international conferences with invited and contributed talks and posters – 5 invited talks, 10 contributed talks and 1 contributed posters. The conferences include, among others, the IAU's Communicating Astronomy with the Public, the XIII Reunión Científica de la Sociedad Española de Astronomía, the International Planetarium Society (IPS) Conference 2018, Ciência 2018 and the V Encontro Internacional da Casa das Ciências. The team has one paper and five proceeding articles published and is responsible for several articles for monthly columns.

The SCG has co-supervised the dissertation project of a student from Mestrado em Práticas Artísticas Contemporâneas, of the Faculdade de Belas Artes da Universidade do Porto (FBAUP), 17 students' short projects and internships from the Licenciatura in Animação Digital of the the Universidade Lusófona, the Communication Design and New Media Masters degree of the Faculdade de Belas Artes da U. Lisboa, the Science Communication MSc degree from the Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa and from the Licenciatura in Design de Comunicação da FBAUP, as well as several groups of students from the ESAD Matosinhos Motion Design post graduation and from the Licenciatura in Design de Comunicação da FBAUP.

Throughout 2018, the SCG has conducted several training sessions for teachers, science communication officers, students and the general public.

The SCG is responsible for the creation and development of several national projects, including the Tour Ignite IAstro or the IAstro Júnior. During 2018, **25 IA researchers** toured Portugal bringing IA's science to towns and cities with less access to science communication in Astronomy and Astrophysics. The Ignite IAstro Tour reached more than **450 people** in 4 events, held in **3 districts**, mainly in the interior of the country. In each event there were 8-9 researchers present, performing in total **34 presentations** of 5 minutes each. Two of these events were special events of Ignite IAstro, at the Portuguese Parliament and at the Ciência Viva Academy Conference.

IA developed another national project (Ler+Espaço), together with the Plano Nacional de Leitura 2017-2027 (PNL2027), and the Faculdade de Ciências da Universidade de Lisboa (FCUL), aiming at encouraging schools to develop reading strategies of scientific nature. IA also participates in the Cientificamente Provável programme, a partnership by the Portuguese Government, implemented through the network of school libraries, partnering with 7 schools.

The IAstro Junior initiative consists of a series of sessions conceived by IA in partnership with Visão Júnior magazine, targeted to 7 to 12 years old children, held at the Planetário Calouste Gulbenkian - Centro Ciência Viva and Planetário do Porto - Centro Ciência Viva. Four sessions took place in 2018, and gathered more than **600 people**. Each sessions consisted of 3 mini-talks (10 min. each) about an Astronomy and Astrophysics theme, followed by a Q&A session.

IA provides the scientific management of the Porto Planetarium activities, all of which are developed, organized and implemented by members of the IA SCG, having reached in 2018 to about **33000 people** through fixed domed and portable planetarium sessions and hands-on laboratories.

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 2019-2020 period envisions the continuation of the implementation of proximity activities with the public, students of the various school cycles in particular, and the production of Astronomy related educational and science communication contents for several specific target audiences, with a special focus on students and teachers. This production will be strengthened by the involvement on the “Astronomy Literacy” international project. These contents can exist by themselves or be produced with specific uses such 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 2014 the Portuguese ALMA Center of Expertise (PACE) supports the Atacama Large Millimetre Array (ALMA) facility as a Center of Expertise (CoE), recognizing the Institute of Astrophysics (IA) with the capability to support the Portuguese community growing a group of expert radio astronomers. The CoE is a temporary status, eventually becoming a full ALMA Regional Centre (ARC) node with more specific duties towards the ALMA project, such as the allocation of Project Scientists for ALMA proposals, and the face-to-face data reduction support.

PACE is now composed by a team of nine researchers, technical, administrative, and outreach personnel. The main tasks of PACE are the support to the proposal preparation, the training of a radio community in Portugal, and at the European level, on behalf of the European Southern Observatory, the technical support for the quality assessment, a procedure that validates ALMA data before the delivery to the Principal Investigator. PACE activities in 2018 can be summarised as follows:

- strengthening of computational resources: in 2018 PACE coordinated the establishment at IA of a computational infrastructure adequate to its data processing requirements. The data management of ALMA products, which is one of the tasks to be performed by PACE as a member of the European ALMA network, implied computational power beyond what was available before. A workstation adapted for the demands of such computational need was installed. At present, this infrastructure is available to the community for specific tasks, enhancing the computational support for the national community.

- leading role in an ARC working group: A technical working group (TWG) within the European ALMA Regional Center network has been created to deal with hardware issues. The upgrades of the computer clusters used within the ALMA network have experienced in some cases an efficiency drop in the input/output speed, as a consequence of the different setups defined by each different node. The goal of this TWG, led by PACE analyst Israel Matute, is to track these problems and define a common work platform to identify the issues and speed up their solution.

- growing expertise within IA: in April 2018, a few weeks before the Cycle 6 deadline for ALMA proposals, PACE visited the Faculty of Sciences of the University of Porto to present an seminar about the new capabilities of ALMA for Cycle 6. Moreover, PACE analysts supported different proposals submitted by researchers in Porto for the same cycle. One of these proposals was later approved for observations, a result that rewards the effort done by PACE members to grow their expertise in radio interferometry and complements another set of observations already performed in January for the approved proposal 2017.1.01713.S (P.I. J. Afonso, “Confirmation of the first radio-selected galaxy at the doorstep of the EoR”), supported and completely managed by PACE analysts.

- IA participation in the NewSPACE ATLANTIC SUMMIT 2018 (http://newspaceatlantic.spacefrontier.org/2018/about/). At this summit, PACE Representative Jose Afonso referred explicitly to PACE activities during his talk. This event

had the participation of FCT, and the Minister of Science, Technology and Higher Education, giving us the possibility to show our achievements to a large audience.

- PACE team members have been involved in the discussions and presentations leading to the drafting of the Portuguese SKA white paper.

- Meeting of the Spanish Astronomical Society (SEA). PACE participated in SEA, the annual meeting of the Spanish Astronomical Community, where PACE representatives had the possibility to speak about possible synergies between Spanish and Portuguese communities in the plenary session, and present a poster on PACE activities in the Galaxies and Cosmology session.

In addition, throughout 2018, PACE has promoted ALMA nationally through several research seminars and PACE researchers have provided an introductory lecture in radio-interferometry as part of the course 'Observations and Data reduction in Astronomy', for the students of the MSc in Physics of the Faculty of Sciences of the University of Lisbon. We have also explored a collaboration with the regional government of Azores in order to explore the geodetic radio telescope in Santa Maria Island (Azores) for astrophysical purposes.

PACE has also participated in several outreach and science communication activities, in particular:

- participated in the Open Day at the Faculty of Sciences of the University of Lisbon, in May, giving different seminars along the day;

- participated in the IA outreach activity on the Scientists Day (May 16th), at the National Parliament. The education and science commission of the Parliament were present, and PACE was highlighted within the event;

- participated with a stand in the national science exhibition event "Ciência 2018", in July;

- participated at the "Ser Cientista" Week at the Faculty of Sciences of the University of Lisbon (July). High-school students participated in several projects, one of which was coordinated by PACE researchers ("The Astrophysics of Galaxies") aimed at introducing the basic concepts of galaxy formation and evolution. For this purpose, 16 students, analyzed observations from the most advanced telescopes in the world - including HST, VLT and ALMA - exploring concepts like the expansion of the universe, redshift, galaxy morphology/colors or the presence and impact of nuclear activity. The multiwavelength approach highlighted its importance to better understand the relevant physical processes at work during the current, past and future history of galaxies. This project also introduced tools commonly used by astrophysicists in their daily research namely, Aladin, Topcat, ds9 as well as many libraries developed in Python.

- PACE manager Ciro Pappalardo visited for two weeks the University of Dar Es Salaam en Dodoma in Tanzania as a visiting researcher, a visit triggered by the establishment of a radio astronomy group. A small course of interferometry for undergraduate students was presented.

The involvement of PACE in the ARC network activities during 2018 has been particularly fruitful, strengthening the collaboration with the other ARC nodes:

- Ciro Pappalardo attended the ARC nodes face-to-face meeting, hosted by the Italian node of Bologna, presenting the PACE development plan for 2019.
- PACE is involved in a new task that will soon be implemented by the ALMA Regional Center: the weblog review. For this purpose, in February a preliminary teleconference meeting was organized by ESO, to give an introductory training. This preliminary step will be continued in April 2019, when the ESO data reduction manager Dirk Petry visits PACE to complete the training.
- All PACE members attended the annual ARC Retreat in Prague.
- PACE is actively involved in the ALMA DAta Mining (ADAM) project. One of the aims is to develop a 'user-friendly' manual for the use of the ALMA archive. Once finished this document, called 'ALMA Archive Primer', will be part of the official documentation of the ESO Archive.
- in April ALMA Cycle 6 call for proposals took place. Like in every year since 2014, PACE has been actively involved in the process, helping the community to submit proposals, and giving their advice on specific projects. The statistics are quite positive, since the number of researchers involved in ALMA proposals in Portugal, and the number of researchers with accepted proposals, is continuing to increase (see Table 1).

	SUBMITTED		**ACCEPTED**	
Cycle (1)	**Unique PI** (2)	**Unique PI/co-Is** (3)	**Unique PI** (4)	**Unique PI/co-Is** (5)
2011	2	6	0	1
2012	4	9	0	3
2013	6	13	0	5
2015	7	15	1	7
2016	8	19	0	7
2017	4	14	1	6
2018	7	21	1	8

Table 1: Portuguese participation in ALMA proposals per Cycle. Col. 1: cycle year; col. 2: unique PI, i.e. number of people submitting proposals as a PI; col. 3: unique PIs/Co-Is, i.e. total number of researchers participating into an ALMA proposal; col. 4: unique PI.

Ciro Pappalardo
PACE Lead Scientist

Scientific Output

Books [2]

1. **T. L. Campante, M. J. P. F. G. Monteiro, S. G. Sousa, N. C. Santos**, 2018; *Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds*; Springer International Publishing
2. T. Harko, **F. S. N. Lobo**, 2018; *Extensions of f(R) Gravity*; Cambridge University Press

Published articles [150]

1. **V. Zh. Adibekyan**, P. de Laverny, A. Recio-Blanco, **S. G. Sousa**, **E. Delgado Mena**, G. Kordopatis, **A. C. S. Ferreira**, **N. C. Santos**, A. A. Hakobyan, **M. Tsantaki**, 2018; *The AMBRE project: searching for the closest solar siblings*; Astronomy and Astrophysics, 619, A130, 19
2. V. I. Afonso, G. J. Olmo, **D. Rubiera-Garcia**, 2018; *Mapping Ricci-based theories of gravity into general relativity*; Physical Review D, 97, 2
3. V. I. Afonso, G. J. Olmo, E. Orazi, **D. Rubiera-Garcia**, 2018; *Mapping nonlinear gravity into General Relativity with nonlinear electrodynamics*; The European Physical Journal C, 78, 866
4. **B. Akinsanmi**, **M. Oshagh**, **N. C. Santos**, **S. C. C. Barros**, 2018; *Detecting transit signatures of exoplanetary rings using SOAP3.0*; Astronomy and Astrophysics, 609, A21
5. A. Alecu, I. Albarran, M. Bouhmadi-López, **F. T. O. Cabral**, P. Martín-Moruno, 2018; *The Avoidance of the Little Sibling of the Big Rip Abrupt Event by a Quantum Approach*; Galaxies, 6, 1, 13
6. N. Sánchez, E. J. Alfaro, **F. López Martínez**, 2018; *A method for determining the radius of an open cluster from stellar proper motions*; Monthly Notices of the Royal Astronomical Society, 475, 3, 4122
7. J.-M. Almenara, R. F. Díaz, G. Hébrard, R. A. Mardling, C. Damiani, A. Santerne, F. Bouchy, **S. C. C. Barros**, I. Boisse, X. Bonfils et al. (*including:* **O. Demangeon**), 2018; *SOPHIE velocimetry of Kepler transit candidates XVIII. Radial velocity confirmation, absolute masses and radii, and origin of the Kepler-419 multiplanetary system*; Astronomy and Astrophysics, 615, A90, 16
8. **C. S. Alves**, **A. C. O. Leite**, **C. J. A. P. Martins**, **T. A. Silva**, S. A. Berge, B. S. A. Silva, 2018; *Current and future constraints on extended Bekenstein-type models for a varying fine-structure constant*; Physical Review D, 97, 2
9. L. Amendola, S. Appleby, A. Avgoustidis, D. Bacon, T. Baker, M. Baldi, N. Bartolo, A. Blanchard, C. Bonvin, S. Borgani et al. (*including:* **C. J. A. P. Martins**, **N. J. Nunes**), 2018; *Cosmology and fundamental physics with the Euclid satellite*; Living Reviews in Relativity, 2018, 21, 2
10. E. Artigau, L. Malo, R. Doyon, **P. Figueira**, X. Delfosse, N. Astudillo-Defru, 2018; *Optical and Near-infrared Radial Velocity Content of M Dwarfs: Testing Models with Barnard's Star*; The Astrophysical Journal, 155, 5
11. **P. P. Avelino**, D. Bazeia, L. Losano, J. Menezes, B. F. Oliveira, 2018; *Spatial patterns and biodiversity in off-lattice simulations of a cyclic three-species Lotka-Volterra model*; Europhysics Letters, 121, 4800, 5
12. G. S. F. Guedes, **P. P. Avelino**, **L. Sousa**, 2018; *Signature of inflation in the stochastic gravitational wave background generated by cosmic string networks*; Physical Review D, 98, 12, 123505
13. **P. P. Avelino**, D. Bazeia, L. Losano, **J. Menezes**, B. F. de Oliveira, M. A. Santos, 2018; *How directional mobility affects coexistence in rock-paper-scissors models*; Physical Review E, 97, 3
14. **P. P. Avelino**, **L. Sousa**, 2018; *Matter Lagrangian of particles and fluids*; Physical Review D, 97, 6, 5
15. **P. P. Avelino**, **R. P. L. Azevedo**, 2018; *Perfect fluid Lagrangian and its cosmological implications in theories of gravity with nonminimally coupled matter fields*; Physical Review D, 97, 6
16. A. R. Gomes, F. C. Simas, K. Z. Nobrega, **P. P. Avelino**, 2018; *False vacuum decay in kink scattering*; Journal of High Energy Physics, 2018, 10
17. **R. P. L. Azevedo**, **P. P. Avelino**, 2018; *Big-bang nucleosynthesis and cosmic microwave background constraints on nonminimally coupled theories of gravity*; Physical Review D, 617, 6, 6
18. E. Barrientos, **F. S. N. Lobo**, S. Mendoza, G. J. Olmo, **D. Rubiera-Garcia**, 2018; *Metric-affine f(R,T) theories of gravity and their applications*; Physical Review D, 97, 10
19. **B. J. Barros**, **F. S. N. Lobo**, 2018; *Wormhole geometries supported by three-form fields*; Physical Review D, 98, 4
20. J. Beltrán Jiménez, L. Heisenberg, G. J. Olmo, **D. Rubiera-Garcia**, 2018; *Born-Infeld inspired modifications of gravity*; Physics Reports, 727, 1
21. M. T. Beltrán, R. Cesaroni, V. M. Rivilla, Á. Sánchez-Monge, L. Moscadelli, A. Ahmadi, V. Allen, H. Beuther, S. Etoka, D. Galli et al. (*including:* **M. S. N. Kumar**), 2018; *Accelerating infall and rotational spin-up in the hot molecular core G31.41+0.31*; Astronomy and Astrophysics, 615, A141, 22

22. M. Benedettini, S. Pezzuto, E. Schisano, P. André, V. Konyves, A. Men'shchikov, B. Ladjelate, J. Di Francesco, D. Elia, D. Arzoumanian et al. (*including:* **P. M. Palmeirim**), 2018; *A catalogue of dense cores and young stellar objects in the Lupus complex based on Herschel Gould Belt Survey observations*; Astronomy and Astrophysics, 619, A52, 24
23. O. Bertolami, C. F. V. Gomes, **F. S. N. Lobo**, 2018; *Gravitational waves in theories with a non-minimal curvature-matter coupling*; European Physical Journal C - Particles and Fields, 78, 5
24. M. Bischetti, E. Piconcelli, C. Fergulio, F. Duras, A. Bongiorno, S. Carniani, A. Marconi, **C. Pappalardo**, R. Schneider, A. Travascio, 2018; *The WISSH quasars project*
V. ALMA reveals the assembly of a giant galaxy around a z = 4.4 hyper-luminous QSO; Astronomy and Astrophysics, 617, A82, 12
25. X. Bonfils, N. Astudillo-Defru, R. F. Díaz, J.-M. Almenara, T. Forveille, F. Bouchy, X. Delfosse, C. Lovis, M. Mayor, F. Murgas et al. (*including:* **N. C. Santos**), 2018; *A temperate exo-Earth around a quiet M dwarf at 3.4 parsec*; Astronomy and Astrophysics, 613, A25, 9
26. X. Bonfils, J.-M. Almenara, R. Cloutier, A. Wünsche, N. Astudillo-Defru, Z. Berta-Thompson, F. Bouchy, D. Charbonneau, X. Delfosse, R. F. Díaz et al. (*including:* **N. C. Santos**), 2018; *Radial velocity follow-up of GJ1132 with HARPS*
A precise mass for planet b and the discovery of a second planet; Astronomy and Astrophysics, 618, A142, 12
27. L. A. Boogaard, **J. Brinchmann**, N. Bouché, M. Paalvast, R. Bacon, R. J. Bouwens, T. Contini, M. Gunawardhana, H. Inami, R. A. Marino, 2018; *The MUSE Hubble Ultra Deep Field Survey*
XI. Constraining the low-mass end of the stellar mass - star formation rate relation at z < 1; Astronomy and Astrophysics, 619, A27, 20
28. F. Bossema, **J. Retrê**, **S. Pereira**, P. Russo, 2018; *Your Night out under the Stars: Reaching beyond Native Audiences*; Communicating Astronomy with the Public, 24, 9
29. L. Bravi, E. Zari, G. G. Sacco, S. Randich, R. D. Jeffries, R. J. Jackson, E. Franciosini, E. Moraux, J. López-Santiago, E. Pancino et al. (*including:* **S. G. Sousa**), 2018; *The Gaia-ESO Survey: a kinematical and dynamical study of four young open clusters*; Astronomy and Astrophysics, 615, A37, 14
30. **I. P. Breda**, **P. Papaderos**, 2018; *The continuous rise of bulges out of galactic disks*; Astronomy and Astrophysics, 614, A48, 24
31. **F. Buitrago**, I. Ferreras, L. S. Kelvin, I. K. Baldry, L. Davies, J. Angthopo, S. Khochfar, A. M. Hopkins, S. P. Driver, S. Brough, 2018; *Galaxy and Mass Assembly (GAMA): Accurate number densities and environments of massive ultra-compact galaxies at 0.02 < z < 0.3*; Astronomy and Astrophysics, 619, A137, 21
32. A. Burdanov, P. Benni, E. Sokov, V. Krushinsky, A. Popov, L. Delrez, M. Gillon, G. Hébrard, M. Deleuil, P. A. Wilson et al. (*including:* **O. Demangeon**), 2018; *KPS-1b: The First Transiting Exoplanet Discovered Using an Amateur Astronomer's Wide-field CCD Data*; Publications of the Astronomical Society of the Pacific, 130, 989, 12
33. C. Burigana, **C. S. Carvalho**, T. Trombetti, Notari, M. Quartin, G. de Gasperis, A. Buzzelli, N. Vittorio, G. de Zotti, P. de Bernardis et al. (*including:* **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: Effects of observer peculiar motion*; Journal of Cosmology and Astroparticle Physics, 4, 021
34. D. Carton, **J. Brinchmann**, T. Contini, B. Epinat, H. Finley, J. Richard, V. Patrício, J. Schaye, T. Nanayakkara, P. Weilbacher, L. Wisotzki, 2018; *First gas-phase metallicity gradients of 0.1 ≲ z ≲ 0.8 galaxies with MUSE*; Monthly Notices of the Royal Astronomical Society, 478, 4, 4293
35. J. Caruana, L. Wisotzki, E. C. Herenz, J. Kerutt, T. Urrutia, K. B. Schmidt, R. J. Bouwens, **J. Brinchmann**, S. Cantalupo, C. M. Carollo, 2018; *The MUSE-Wide survey: a measurement of the Ly alpha emitting fraction among z > 3 galaxies*; Monthly Notices of the Royal Astronomical Society, 473, 1, 30
36. A. Challinor, R. Allison, J. Carron, J. Errard, S. Feeney, T. Kitching, J. Lesgourgues, A. Lewis, I. Zubeldia, A. Achúcarro et al. (*including:* **C. S. Carvalho**, **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: Gravitational lensing of the CMB*; Journal of Cosmology and Astroparticle Physics, 4, 018, 45
37. D. L. Clements, C. Pearson, D. Farrah, J. Greenslade, J. Bernard-Salas, E. González-Alfonso, **J. Afonso**, A. Efstathiou, D. Rigopoulou, V. Lebouteiller, P. Hurley, H. W. W. Spoon, 2018; *HERUS: the far-IR/submm spectral energy distributions of local ULIRGs and photometric atlas*; Monthly Notices of the Royal Astronomical Society, 475, 2, 2097
38. **J. R. C. C. C. Correia**, **I. S. C. R. Leite**, **C. J. A. P. Martins**, 2018; *Effects of biases in domain wall network evolution. II. Quantitative analysis*; Physical Review D, 97, 8
39. J. Cortez, I. I. Rodrigues, **M. Martín-Benito**, J. M. Velhinho, 2018; *On the Uniqueness of the Fock Quantization of the Dirac Field in the Closed FRW Cosmology*; Advances in Mathematical Physics, 2018, 2450, 7
40. M. Damasso, A. S. Bonomo, N. Astudillo, X. Bonfils, L. Malavolta, A. Sozzetti, E. Lopez, L. Zeng, R. D. Haywood, J. M. Irwin et al. (*including:* **P. Figueira**, **N. C. Santos**), 2018; *Eyes on K2-3: A system of three likely sub-Neptunes characterized with HARPS-N and HARPS*; Astronomy and Astrophysics, 615, A69
41. P. de Bernardis, P. A. R. Ade, Baselmans, E. Battistelli, A. Benoît, M. Bersanelli, A. Bideaud, M. Calvo, F. Casas, G. Castellano et al. (*including:* **C. S. Carvalho**, **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: The instrument*; Journal of Cosmology and Astroparticle Physics, 04, 015, 47
42. G. de Zotti, J. González-Nuevo, M. López-Caniego, M. Negrello, J. Greenslade, C. Hernández-Monteagudo, J. Delabrouille, Z.-Y. Cai, M. Bonato, A. Achúcarro et al. (*including:* **C. S. Carvalho**, **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: Extragalactic sources in cosmic microwave background maps*; Journal of Cosmology and Astroparticle Physics, 2018, 020, 38
43. D. Defrère, A. Léger, O. Absil, C. Beichman, B. Biller, W. C. Danchi, K. Ergenzinger, C. Eiroa, S. Ertel, M. Fridlund et al. (*including:* **N. C. Santos**), 2018; *Space-based infrared interferometry to study exoplanetary atmospheres*; Experimental Astronomy, 46, 3, 543

44. A. Del Popolo, F. Pace, M. Le Delliou, **X. Lee**, 2018; *Energy transfer from baryons to dark matter as a unified solution to small-scale structure issues of the Λ CDM model*; Physical Review D, 98, 6, 10
45. A. Del Popolo, **M. Le Delliou**, X. Lee, 2018; *On the Dwarf Galaxy Rotation Curve Diversity Problem*; Galaxies, 6, 3, 12
46. J. Delabrouille, P. de Bernardis, F. R. Bouchet, A. Achúcarro, P. A. R. Ade, R. Allison, F. Arroja, E. Arta, M. Ashdown, C. Baccigalupi et al. (*including:* **C. S. Carvalho**, **A. C. da Silva**, **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: Survey requirements and mission design*; Journal of Cosmology and Astroparticle Physics, 2018, 04
47. **E. Delgado Mena**, **V. Zh. Adibekyan**, **P. Figueira**, J. I. González Hernández, **N. C. Santos**, M. Tsantaki, **S. G. Sousa**, **J. P. S. Faria**, L. Suárez-Andrés, G. Israelian, 2018; *Chemical Abundances of Neutron-capture Elements in Exoplanet-hosting Stars*; Publications of the Astronomical Society of the Pacific, 130, 991
48. **E. Delgado Mena**, C. Lovis, **N. C. Santos**, **J. Gomes da Silva**, A. Mortier, M. Tsantaki, **S. G. Sousa**, **P. Figueira**, **M. S. Cunha**, **T. L. Campante** et al. (*including:* **V. Zh. Adibekyan**, **J. P. S. Faria**), 2018; *Planets around evolved intermediate-mass stars*
II. Are there really planets around IC 4651 No. 9122, NGC2423 No. 3, and NGC 4349 No. 127?; Astronomy and Astrophysics, 619, A2, 13
49. J.-B Delisle, D. Segransan, X. Dumusque, R. F. Diaz, F. Bouchy, C. Lovis, F. Pepe, S. Udry, R. Alonso, W. Benz et al. (*including:* **P. Figueira**, **N. C. Santos**), 2018; *The HARPS search for southern extra-solar planets*
XLIII. A compact system of four super-Earth planets orbiting HD 215152; Astronomy and Astrophysics, 614, A133, 9
50. **O. Demangeon**, F. Faedi, E. Hébrard, D. Brown, **S. C. C. Barros**, A. P. Doyle, P. F. L. Maxted, A. C. Cameron, K. L. Hay, J. Alikakos, 2018; *The discovery of WASP-151b, WASP-153b, WASP-156b: Insights on giant planet migration and the upper boundary of the Neptunian desert*; Astronomy and Astrophysics, 610, A63, 19
51. E. Di Valentino, T. Brinckmann, M. Gerbino, V. Poulin, F. R. Bouchet, J. Lesgourgues, A. Melchiorri, J. Chluba, S. Clesse, J. Delabrouille et al. (*including:* **C. J. A. P. Martins**, **C. S. Carvalho**), 2018; *Exploring cosmic origins with CORE: Cosmological parameters*; Journal of Cosmology and Astroparticle Physics, 04, 017, 88
52. P. Dimauro, M. Huertas-Company, E. Daddi, P. Pérez-González, M. Bernardi, G. Barro, **F. Buitrago**, F. Caro, A. Catalano, H. Dominguez-Sánchez, 2018; *A catalog of polychromatic bulge-disc decompositions of ~17.600 galaxies in CANDELS*; Monthly Notices of the Royal Astronomical Society, 478, 4, 18
53. D. Donevski, V. Buat, F. Boone, **C. Pappalardo**, M. Bethermin, C. Schreiber, F. Mazyed, J. Alvarez-Marquez, S. Duivenvoorden, 2018; *Towards a census of high-redshift dusty galaxies with Herschel*
A selection of "500 μm-risers"; Astronomy and Astrophysics, 614, A33, 26
54. B. Epinat, T. Contini, H. Finley, L. A. Boogaard, A. Guerou, **J. Brinchmann**, D. Carton, L. Michel-Dansac, R. Bacon, S. Cantalupo, 2018; *Ionised gas structure of 100 kpc in an over-dense region of the galaxy group COSMOS-Gr30 at z similar to 0.7*; Astronomy and Astrophysics, 609, A40, 21
55. X. Er, H. Hoekstra, T. Schrabback, V. F. Cardone, R. Scaramella, R. Maoli, **M. Vicinanza**, B. Gillis, J. D. Rhodes, 2018; *Calibration of colour gradient bias in shear measurement using HST/CANDELS data*; Monthly Notices of the Royal Astronomical Society, 476, 4, 5645
56. M. Zeballos, I. Aretxaga, D. H. Hughes, **A. Humphrey**, G. W. Wilson, J. Austermann, J. S. Dunlop, H. Ezawa, D. Ferrusca, B Hatsukade, 2018; *AzTEC 1.1 mm observations of high-z protocluster environments: SMG overdensities and misalignment between AGN jets and SMG distribution*; Monthly Notices of the Royal Astronomical Society, 479, 4, 4577
57. **J. P. S. Faria**, **N. C. Santos**, **P. Figueira**, B. J. Brewer, 2018; *kima: Exoplanet detection in radial velocities*; The Journal of Open Source Software, 3, 26, 487
58. A. Feltre, R. Bacon, L. Tresse, H. Finley, D. Carton, J. Blaizot, N. Bouché, T. Garel, H. Inami, L. A. Boogaard et al. (*including:* **J. Brinchmann**), 2018; *The MUSE Hubble Ultra Deep Field Survey*
XII. Mg II emission and absorption in star-forming galaxies; Astronomy and Astrophysics, 617, A62, 17
59. **V. M. C. Ferreira**, **P. P. Avelino**, 2018; *Extended family of generalized Chaplygin gas models*; Physical Review D, 98, 0435, 5
60. F. Finelli, M. Bucher, A. Achúcarro, M. Ballardini, N. Bartolo, D. Baumann, S. Clesse, J. Errard, W. Handley, M. Hindmarsh et al. (*including:* **C. S. Carvalho**, **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: Inflation*; Journal of Cosmology and Astroparticle Physics, 201, 016, 106
61. **I. S. Albuquerque**, **N. Frusciante**, **N. J. Nunes**, S. Tsujikawa, 2018; *New scaling solutions in cubic Horndeski theories*; Physical Review D, 98, 6
62. **N. Frusciante**, R. Kase, **N. J. Nunes**, S. Tsujikawa, 2018; *Most general cubic-order Horndeski Lagrangian allowing for scaling solutions and the application to dark energy*; Physical Review D, 98, 12
63. X. Fu, D. Romano, A. Bragaglia, A. Mucciarelli, K. Lind, **E. Delgado Mena**, **S. G. Sousa**, S. Randich, A. Bressan, L. Sbordone, 2018; *The Gaia-ESO Survey: Lithium enrichment histories of the Galactic thick and thin disc*; Astronomy and Astrophysics, 610, A38, 15
64. B. Giesers, S. Dreizler, T.-O. Husser, S. Kamann, G. Anglada-Escude, **J. Brinchmann**, C. M. Carollo, M. M. Roth, P. Weilbacher, L. Wisotzki, 2018; *A detached stellar-mass black hole candidate in the globular cluster NGC 3201*; Monthly Notices of the Royal Astronomical Society: Letters, 475, 1, L15
65. **J. Gomes da Silva**, **P. Figueira**, **N. C. Santos**, **J. P. S. Faria**, 2018; *ACTIN: A tool to calculate stellar activity indices*; The Journal of Open Source Software, 3, 31, 667
66. A. Gowardhan, H. W. W. Spoon, D. A. Riechers, E. González-Alfonso, D. Farrah, J. Fischer, J. Darling, C. Fergulio, **J. Afonso**, L. Bizzocchi, 2018; *The Dual Role of Starbursts and Active Galactic Nuclei in Driving Extreme Molecular Outflows*; The Astronomical Journal

67. M. Grossi, **C. A. C Fernandes**, D. Sobral, **J. Afonso**, E. Telles, L. Bizzocchi, **A. Paulino-Afonso**, **I. Matute**, 2018; *Bulgeless galaxies in the COSMOS field: environment and star formation evolution at z < 1*; Monthly Notices of the Royal Astronomical Society, 475, 1, 735
68. T. Harko, T. S. Koivisto, **F. S. N. Lobo**, G. J. Olmo, **D. Rubiera-Garcia**, 2018; *Coupling matter in modified Q gravity*; Physical Review D, 98, 8
69. M. Hobson, R. F. Díaz, X. Delfosse, N. Astudillo-Defru, I. Boisse, F. Bouchy, X. Bonfils, T. Forveille, N. Hara, L. Arnold et al. (*including:* **O. Demangeon**, **N. C. Santos**), 2018; *The SOPHIE search for northern extrasolar planets XIII. Two planets around M-dwarfs Gl617A and Gl96*; Astronomy and Astrophysics, 618, A103, 15
70. D. L. Holdsworth, **M. S. Cunha**, H. Shibahashi, D. W. Kurtz, D. M. Bowman, 2018; *K2 observations of the rapidly oscillating Ap star 33 Lib (HD 137949): new frequencies and unique non-linear interactions*; Monthly Notices of the Royal Astronomical Society, 480, 3, 2976
71. C. Inserra, R. C. Nichol, D. Scovacricchi, J. Amiaux, M. Brescia, C. Burigana, E. Cappellaro, **C. S. Carvalho**, S. Cavuoti, V. Conforti et al. (*including:* **A. C. da Silva**, **J. Dinis**, **I. Tereno**), 2018; *Euclid: Superluminous supernovae in the Deep Survey*; Astronomy and Astrophysics, 609, A83, 12
72. C. Jiang, J. Christensen-Dalsgaard, **M. S. Cunha**, 2018; *Using the phase shift to asymptotically characterize the dipolar mixed modes in post-main-sequence stars*; Monthly Notices of the Royal Astronomical Society, 474, 4, 5413
73. A. G. Karapetyan, A. A. Hakobyan, L. V. Barkhudaryan, G. A. Mamon, D. Kunth, **V. Zh. Adibekyan**, M. Turatto, 2018; *The impact of spiral density waves on the distribution of supernovae*; Monthly Notices of the Royal Astronomical Society, 481, 1, 566
74. C. Karoff, T. S. Metcalfe, **A. R. G. Santos**, B. T. Montet, H. Isaacson, V Witzke, A. I Shapiro, S. Mathur, G. R. Davies, M. N. Lund et al. (*including:* **P. P. Avelino**, **M. S. Cunha**, **T. L. Campante**), 2018; *The Influence of Metallicity on Stellar Differential Rotation and Magnetic Activity*; The Astrophysical Journal, 852, 1
75. D. Bresnahan, D. Ward-Thompson, J. M. Kirk, Z. Çelik, K. Pattle, S. Eyres, G. J. White, V. Konyves, A. Men'shchikov, P. André et al. (*including:* **P. M. Palmeirim**), 2018; *The dense cores and filamentary structure of the molecular cloud in Corona Australis: Herschel SPIRE and PACS observations from the HerschelGould Belt Survey*; Astronomy and Astrophysics, 615, A125, 31
76. M. Lacy, H. U. Nørgaard-Nielsen, K. Nyland, M. Y. Mao, P. Jagannathan, J. Pforr, S. E. Ridgway, **J. Afonso**, D. Farrah, P. Guarnieri, 2018; *A Subarcsecond Near-infrared View of Massive Galaxies at z > 1 with Gemini Multi-conjugate Adaptive Optics*; The Astrophysical Journal, 864, 1, 20
77. **P. Lagos**, **T. C. Scott**, A. Nigoche-Netro, R. Demarco, **A. Humphrey**, **P. Papaderos**, 2018; *Detecting metal-poor gas accretion in the star-forming dwarf galaxies UM 461 and Mrk 600*; Monthly Notices of the Royal Astronomical Society, 477, 1, 392
78. K. W. F. Lam, A. Santerne, **S. G. Sousa**, A. Vigan, D. J. Armstrong, **S. C. C. Barros**, B. Brugger, **V. Zh. Adibekyan**, J.-M. Almenara, **E. Delgado Mena** et al. (*including:* **O. Demangeon**, **N. C. Santos**), 2018; *K2-265 b: a transiting rocky super-Earth*; Astronomy and Astrophysics, 620, A77, 13
79. A. F. Lanza, L. Malavolta, S. Benatti, S. Desidera, A. Bignamini, A. S. Bonomo, M. Esposito, **P. Figueira**, R. Gratton, G. Scandariato, 2018; *The GAPS Programme with HARPS-N at TNG XVII. Line profile indicators and kernel regression as diagnostics of radial-velocity variations due to stellar activity in solar-like stars*; Astronomy and Astrophysics, 616, A155, 16
80. J. L. Rosa, J. P. S. Lemos, **F. S. N. Lobo**, 2018; *Wormholes in generalized hybrid metric-Palatini gravity obeying the matter null energy condition everywhere*; Physical Review D, 98, 6
81. R. Ligi, **O. Demangeon**, **S. C. C. Barros**, D. Mesa, M. Bonavita, A. Vigan, M. Bonnefoy, R. Gratton, M. Deleuil, 2018; *K2 Targets Observed with SPHERE/VLT: An M4-7 Dwarf Companion Resolved around EPIC 206011496*; The Astronomical Journal, 156, 4
82. J. Lillo Box, D. Barrado, **P. Figueira**, A. Leleu, **N. C. Santos**, A. C. M. Correia, P. Robutel, **J. P. S. Faria**, 2018; *The TROY project: Searching for co-orbital bodies to known planets I. Project goals and first results from archival radial velocity*; Astronomy and Astrophysics, 609, A96
83. J. Lillo Box, A. Leleu, H. Parviainen, **P. Figueira**, M. Mallonn, A. C. M. Correia, **N. C. Santos**, P. Robutel, M. Lendl, Henri M. J. Boffin et al. (*including:* **J. P. S. Faria**, **J. J. Neal**), 2018; *The TROY project II. Multi-technique constraints on exotrojans in nine planetary systems*; Astronomy and Astrophysics, 618, A42, 20
84. A. Maciel, M. Le Delliou, **J. P. Mimoso**, 2018; *Revisiting the Birkhoff theorem from a dual null point of view*; Physical Review D, 98, 2, 11
85. **T. Magalhães**, **J. M. Rebordão**, 2018; *Numerical simulations of spectral shifts in the far-field spectrum of light due to source correlations*; Journal of the Optical Society of America A, 35, 3, 423
86. L. Magrini, L. Spina, S. Randich, E. Friel, G. Kordopatis, C. Worley, E. Pancino, A. Bragaglia, P. Donati, G. Tautvaišienė et al. (*including:* **E. Delgado Mena**, **V. Zh. Adibekyan**, **S. G. Sousa**), 2018; *The Gaia-ESO Survey: the origin and evolution of s-process elements*; Astronomy and Astrophysics, 617, A106, 15
87. L. Malavolta, A. W. Mayo, T. Louden, V. Rajpaul, A. S. Bonomo, L. A. Buchhave, L. Kreidberg, M. H. Kristiansen, M. López-Morales, A. Mortier et al. (*including:* **P. Figueira**), 2018; *An Ultra-short Period Rocky Super-Earth with a Secondary Eclipse and a Neptune-like Companion around K2-141*; The Astronomical Journal, 155, 3, 13
88. R. A. Marino, S. Cantalupo, S. Lilly, S. G. Gallego, L. A. Straka, E. Borisova, G. Pezzulli, R. Bacon, **J. Brinchmann**, C. M. Carollo, 2018; *Dark Galaxy Candidates at Redshift ~3.5 Detected with MUSE*; The Astrophysical Journal, 859, 1
89. **C. J. A. P. Martins**, Maria Prat Colomer, 2018; *Constraining late-time transitions in the dark energy equation of state*; Astronomy and Astrophysics, 616, A32, 9

90. **J. H. C. Martins**, **P. Figueira**, **N. C. Santos**, C. Melo, **A. Garcia Muñoz**, **J. P. S. Faria**, F. Pepe, C. Lovis, 2018; *Recovering the colour-dependent albedo of exoplanets with high-resolution spectroscopy: from ESPRESSO to the ELT*; Monthly Notices of the Royal Astronomical Society, 478, 4, 23
91. M. Maseda, R. Bacon, M. Franx, **J. Brinchmann**, J. Schaye, L. A. Boogaard, N. Bouché, R. J. Bouwens, S. Cantalupo, T. Contini, 2018; *MUSE Spectroscopic Identifications of Ultra-faint Emission Line Galaxies with M_{UV} ~ -15*; The Astrophysical Journal Letters, 865, 1
92. J. Matthee, D. Sobral, M. Gronke, **A. Paulino-Afonso**, M. Stefanon, H. J. A. Röttgering, 2018; *Confirmation of double peaked Lyα emission at z = 6.593*
Witnessing a galaxy directly contributing to the reionisation of the Universe; Astronomy and Astrophysics, 619, A136, 15
93. L. T. Maud, R. Cesaroni, **M. S. N. Kumar**, F. F. S. van der Tak, V. Allen, M. G Hoare, P. D. Klaassen, Á. Sánchez-Monge, P. Schilke, A. Ahmadi, 2018; *Chasing discs around O-type (proto)stars. ALMA evidence for an SiO disc and disc wind from G17.64+0.16*; Astronomy and Astrophysics, 620, A31, 20
94. R. J. McLure, L. Pentericci, A. Cimatti, J. S. Dunlop, D. Elbaz, K. Nandra, R. Amorin, M. Bolzonella, A. Bongiorno, A. C Carnall et al. (*including:* **F. Buitrago**), 2018; *The VANDELS ESO public spectroscopic survey*; Monthly Notices of the Royal Astronomical Society, 479, 1, 18
95. N. Medina, J. Borissova, A. Bayo, R. Kurtev, C. Navarro Molina, M. Kuhn, **M. S. N. Kumar**, P. W. Lucas, M. Catelan, D. Minniti, L. C. Smith, 2018; *An Automated Tool to Detect Variable Sources in the Vista Variables in the Vía Láctea Survey: The VVV Variables (V4) Catalog of Tiles d001 and d002*; The Astrophysical Journal, 864, 1, 19
96. J.-B. Melin, A. Bonaldi, M. Remazeilles, S. Hagstotz, J. M. Diego, C. Hernández-Monteagudo, R. T. Génova-Santos, G. Luzzi, **C. J. A. P. Martins**, S. Grandis et al. (*including:* **C. S. Carvalho**), 2018; *Exploring cosmic origins with CORE: Cluster science*; Journal of Cosmology and Astroparticle Physics, 4, 019, 42
97. **J. P. Mimoso**, D. Pavón, 2018; *Fluctuations of the flux of energy on the apparent horizon*; Physical Review D
98. I. Minchev, F. Anders, A. Recio-Blanco, C. Chiappini, P. de Laverny, A. Queiroz, M. Steinmetz, **V. Zh. Adibekyan**, I. Carriillo, G. Cescutti, 2018; *Estimating stellar birth radii and the time evolution of Milky Way's ISM metallicity gradient*; Monthly Notices of the Royal Astronomical Society, 481, 2, 14
99. A. Mortier, A. S. Bonomo, V. Rajpaul, L. A. Buchhave, A. Vanderburg, L. Zeng, M. López-Morales, L. Malavolta, A. Collier Cameron, C. D. Dressing et al. (*including:* **P. Figueira**), 2018; *K2-263 b: a 50 d period sub-Neptune with a mass measurement using HARPS-N*; Monthly Notices of the Royal Astronomical Society, 481, 2
100. L. Moscadelli, V. M. Rivilla, R. Cesaroni, M. T. Beltrán, Á. Sánchez-Monge, P. Schilke, J. C. Mottram, A. Ahmadi, V. Allen, H. Beuther et al. (*including:* **M. S. N. Kumar**), 2018; *The feedback of an HC HII region on its parental molecular core The case of core A1 in the star-forming region G24.78+0.08*; Astronomy and Astrophysics, 616, A66, 22
101. C. B. Motta, A. Pasquali, J. Richer, G. Michaud, M. Salaris, A. Bragaglia, L. Magrini, S. Randich, E. K. Grebel, **V. Zh. Adibekyan** et al. (*including:* **S. G. Sousa**), 2018; *The Gaia-ESO Survey: evidence of atomic diffusion in M67?*; Monthly Notices of the Royal Astronomical Society, 478, 1, 13
102. P. Natoli, M. Ashdown, R. Banerji, J. Borrill, A. Buzzelli, G. de Gasperis, J. Delabrouille, E. Hivon, D. Molinari, G. Patanchon et al. (*including:* **C. S. Carvalho**, **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: Mitigation of systematic effects*; Journal of Cosmology and Astroparticle Physics, 04, 022, 52
103. **B. Nsamba**, **T. L. Campante**, **M. J. P. F. G. Monteiro**, **M. S. Cunha**, B. M. Rendle, D. R. Reese, K. Verma, 2018; *Asteroseismic modelling of solar-type stars: internal systematics from input physics and surface correction methods*; Monthly Notices of the Royal Astronomical Society, 477, 4
104. **B. Nsamba**, **M. J. P. F. G. Monteiro**, **T. L. Campante**, **M. S. Cunha**, **S. G. Sousa**, 2018; *α Centauri A as a potential stellar model calibrator: establishing the nature of its core*; Monthly Notices of the Royal Astronomical Society, 479, 1
105. G. J. Olmo, **D. Rubiera-Garcia**, A. Sanchez-Puente, 2018; *Accelerated observers and the notion of singular spacetime*; Classical and Quantum Gravity, 35, 5
106. F. Oppizzi, M. Liguori, A. Renzi, **F. Arroja**, N. Bartolo, 2018; *CMB constraints on running non-Gaussianity*; Journal of Cosmology and Astroparticle Physics, 05, 045, 20
107. **M. Oshagh**, A. H. M. J. Triaud, A. Burdanov, **P. Figueira**, A. Reiners, **N. C. Santos**, **J. P. S. Faria**, G. Boué, R. F. Diaz, S. Dreizler et al. (*including:* **L. M. Serrano**), 2018; *Activity induced variation in spin-orbit angles as derived from Rossiter-McLaughlin measurements*; Astronomy and Astrophysics, 619, A150, 17
108. V. Patrício, J. Richard, D. Carton, T. Contini, B. Epinat, **J. Brinchmann**, K. B. Schmidt, D. Krajnović, N. Bouché, P. Weilbacher, 2018; *Kinematics, turbulence, and star formation of z ~ 1 strongly lensed galaxies seen with MUSE*; Monthly Notices of the Royal Astronomical Society, 477, 1, 18
109. **A. Paulino-Afonso**, D. Sobral, B. R. L. Ribeiro, J. Matthee, S. Santos, J. Calhau, A. Forshaw, A. Johnson, J. Merrick, **S. Pérez Sánchez**, O. Sheldon, 2018; *On the UV compactness and morphologies of typical Lyman alpha emitters from z~2 to z~6*; Monthly Notices of the Royal Astronomical Society, 476, 4, 5479
110. **A. Paulino-Afonso**, D. Sobral, B. Darvish, B. R. L. Ribeiro, A. Stroe, P. Best, **J. Afonso**, Y. Matsuda, 2018; *VIS3COS. I. Survey overview and the role of environment and stellar mass on star formation*; Astronomy and Astrophysics, 620, A186, 16
111. S. Peirone, **N. Frusciante**, B. Hu, M. Raveri, N. Silvestri, 2018; *Do current cosmological observations rule out all covariant Galileons?*; Physical Review D, 97, 6
112. L. Pentericci, R. J. McLure, B. Garilli, O. Cucciati, P. Franzetti, A. Iovino, R. Amorin, M. Bolzonella, A. Bongiorno, A. C Carnall et al. (*including:* **F. Buitrago**), 2018; *The VANDELS ESO public spectroscopic survey: Observations and first data release*; Astronomy and Astrophysics, 616, A174, 15

113. J. Peralta, K. Muto, R. Hueso, T. Horinouchi, A. Sánchez-Lavega, S. Murakami, **P. Machado**, E. F. Young, Y. J. Lee, T. Kouyama et al. (*including:* **D. Luz**), 2018; *Nightside Winds at the Lower Clouds of Venus with Akatsuki/IR2: Longitudinal, Local Time, and Decadal Variations from Comparison with Previous Measurements*; The Astrophysical Journal, 239, 2
114. **P. A. Quitral Manosalva**, **M. S. Cunha**, O. Kochukhov, 2018; *A theoretical tool for the study of radial velocities in the atmospheres of roAp stars*; Monthly Notices of the Royal Astronomical Society, 480, 2, 11
115. A. S. Rajpurohit, F. Allard, S. Rajpurohit, S. Sharma, **G. D. C. Teixeira**, O. Mousis, R. Kamlesh, 2018; *Exploring the stellar properties of M dwarfs with high-resolution spectroscopy from the optical to the near-infrared*; Astronomy and Astrophysics, 620, A180, 8
116. A. S. Rajpurohit, F. Allard, **G. D. C. Teixeira**, D. Homeier, S. Rajpurohit, O. Mousis, 2018; *Photospheric properties and fundamental parameters of M dwarfs*; Astronomy and Astrophysics, 610, A19, 13
117. S. Randich, E. Tognelli, R. J. Jackson, R. D. Jeffries, S. Degl'Innocenti, E. Pancino, P. R. Fiorentin, Spagna, G. G. Sacco, A. Bragaglia et al. (*including:* **S. G. Sousa**), 2018; *The Gaia-ESO Survey: open clusters in Gaia-DR1*
A way forward to stellar age calibration; Astronomy and Astrophysics, 612, A99, 30
118. E. Bellini, A. Barreira, **N. Frusciante**, B. Hu, S. Peirone, M. Raveri, M. Zumalacárregui, A. Avilez-Lopez, M. Ballardini, R. Battye, 2018; *Comparison of Einstein-Boltzmann solvers for testing general relativity*; Physical Review D, 97, 2
119. E. Redaelli, L. Bizzocchi, P. Caselli, J. Harju, A. Chacón, **E. Leonardo**, L. Dore, 2018; *$^{14}N/^{15}N$ ratio measurements in prestellar cores with N_2H^+: new evidence of ^{15}N-antifractionation*; Astronomy and Astrophysics, 617, A7, 16
120. **A. C. S. Rei**, P. P. Petrov, **J. F. Gameiro**, 2018; *Line-dependent veiling in very active classical T Tauri stars*; Astronomy and Astrophysics, 610, A40, 10
121. M. Remazeilles, A. J. Banday, C. Baccigalupi, S. Basak, A. Bonaldi, G. de Zotti, J. Delabrouille, C. Dickinson, H. K. Eriksen, J. Errard et al. (*including:* **C. S. Carvalho**, **C. J. A. P. Martins**), 2018; *Exploring cosmic origins with CORE: B-mode component separation*; Journal of Cosmology and Astroparticle Physics, 2018, 04, 83
122. J. Rey, F. Bouchy, M. Stalport, M. Deleuil, G. Hébrard, J.-M. Almenara, R. Alonso, **S. C. C. Barros**, A. S. Bonomo, G. Cazalet, 2018; *Brown dwarf companion with a period of 4.6 yr interacting with the hot Jupiter CoRoT-20 b*; Astronomy and Astrophysics, 619, A115, 7
123. **I. Yu. Rybak**, A. Avgoustidis, **C. J. A. P. Martins**, 2018; *Collisions of cosmic strings with chiral currents*; Physical Review D, 98, 6, 9
124. A. Santerne, B. Brugger, D. J. Armstrong, **V. Zh. Adibekyan**, J. Lillo Box, H. Gosselin, A. Aguichine, J.-M. Almenara, D. Barrado, **S. C. C. Barros** et al. (*including:* **E. Delgado Mena**, **O. Demangeon**, **J. P. S. Faria**, **P. Figueira**, **S. Hojjatpanah**, **J. J. Neal**, **N. C. Santos**, **S. G. Sousa**), 2018; *An Earth-sized exoplanet with a Mercury-like composition*; Nature Astronomy, 2, 393
125. **A. R. G. Santos**, **T. L. Campante**, W. J. Chaplin, **M. S. Cunha**, M. N. Lund, R. Keifer, D. Salabert, R. A. García, G. R. Davies, Y. Elsworth, 2018; *Signatures of Magnetic Activity in the Seismic Data of Solar-type Stars Observed by Kepler*; The Astrophysical Journal Supplement Series, 237, 1
126. **T. C. Scott**, E. Brinks, L. Cortese, A. Boselli, H. Bravo-Alfaro, 2018; *Abell 1367: a high fraction of late-type galaxies displaying HI morphological and kinematic perturbations*; Monthly Notices of the Royal Astronomical Society, 475, 4, 4648
127. **T. C. Scott**, **P. Lagos**, S. Ramya, C. Sengupta, S. Paudel, D. K. Sahu, K. Misra, J.-H. Woo, B. W. Sohn, 2018; *Arp 202: a TDG formed in a parent's extended dark matter halo?*; Monthly Notices of the Royal Astronomical Society, 475, 1, 1148
128. **L. M. Serrano**, **S. C. C. Barros**, M. Oshagh, **N. C. Santos**, **J. P. S. Faria**, **O. Demangeon**, **S. G. Sousa**, M. Lendl, 2018; *Distinguishing the albedo of exoplanets from stellar activity*; Astronomy and Astrophysics, 611, A8, 14
129. **M. S. Silva**, **A. Humphrey**, **P. Lagos**, M. Villar-Martín, **S. G. Morais**, S. S. Alighieri, A. Cimatti, R. A. E. Fosbury, R. Overzier, J. Vernet, L. Binette, 2018; *The MUSE 3D view of feedback in a high-metallicity radio galaxy at z=2.9*; Monthly Notices of the Royal Astronomical Society, 474, 3, 3649
130. **M. S. Silva**, **A. Humphrey**, **P. Lagos**, R. N. Guimarães, **T. C. Scott**, **P. Papaderos**, **S. G. Morais**, 2018; *Detection of large-scale Ly α absorbers at large angles to the radio axis of high-redshift radio galaxies using SOAR*; Monthly Notices of the Royal Astronomical Society, 481, 1, 1401
131. R. Smiljanic, E. Franciosini, A. Bragaglia, G. Tautvaišienė, X. Fu, E. Pancino, **V. Zh. Adibekyan**, **S. G. Sousa**, S. Randich, J. Montalbán, 2018; *The Gaia-ESO Survey: properties of newly discovered Li-rich giants*; Astronomy and Astrophysics, 617, A4, 19
132. D. Sobral, S. Santos, J. Matthee, **A. Paulino-Afonso**, B. R. L. Ribeiro, J. Calhau, A. A. Khostovan, 2018; *Slicing COSMOS with SC4K: the evolution of typical Lyα emitters and the Lyα escape fraction from z˜2 to 6*; Monthly Notices of the Royal Astronomical Society, 476, 4, 4725
133. **S. G. Sousa**, **V. Zh. Adibekyan**, **E. Delgado Mena**, **N. C. Santos**, **D. T. Andreasen**, **A. C. S. Ferreira**, **M. Tsantaki**, **S. C. C. Barros**, **O. Demangeon**, G. Israelian et al. (*including:* **J. P. S. Faria**, **P. Figueira**, **I. M. Brandão**, **A. Santerne**), 2018; *SWEET-Cat updated*
New homogenous spectroscopic parameters; Astronomy and Astrophysics, 620, A58, 13
134. A. Suárez Mascareño, J. I. González Hernández, R. Rebolo López, S. Velasco, I. Toledo, B. Toledo-Padrón, S. Udry, F. Motalebi, D. Ségransan, A. Wyttenbach et al. (*including:* **N. C. Santos**, **P. Figueira**), 2018; *The RoPES project with HARPS and HARPS-N*
I. A system of super-Earths orbiting the moderately active K-dwarf HD 176986; Astronomy and Astrophysics, 612, A41, 16
135. L. Suárez-Andrés, G. Israelian, J. I. González Hernández, **V. Zh. Adibekyan**, **E. Delgado Mena**, **N. C. Santos**, **S. G. Sousa**, 2018; *C/O vs. Mg/Si ratios in solar type stars: The HARPS sample*; Astronomy and Astrophysics, 614, A84, 8

136. **G. D. C. Teixeira**, **M. S. N. Kumar**, L. C. Smith, P. W. Lucas, C. Morris, J. Borissova, **M. J. P. F. G. Monteiro**, A. Caratti o Garatti, C. Contreras Peña, D. Froebrich, **J. F. Gameiro**, 2018; *Photometric variability of massive young stellar objects*; Astronomy and Astrophysics, 619, A46, 46
137. B. B. Thompson, C. G. Few, M. Bergemann, B. K. Gibson, B. A. MacFarlane, A. M. Serenelli, G. Gilmore, S. Randich, A. Vallenari, E. J. Alfaro et al. (*including:* **S. G. Sousa**), 2018; *The Gaia-ESO Survey: matching chemodynamical simulations to observations of the Milky Way*; Monthly Notices of the Royal Astronomical Society, 473, 1, 185
138. G. Tinetti, P. Drossart, P. Eccleston, P. Hartogh, A. Heske, J. Leconte, G. Micela, M. Ollivier, G. L. Pilbratt, L. Puig et al. (*including:* **P. Machado**), 2018; *A chemical survey of exoplanets with ARIEL*; Experimental Astronomy, 46, 1, 135
139. M. Tsantaki, **D. T. Andreasen**, **G. D. C. Teixeira**, **S. G. Sousa**, **N. C. Santos**, **E. Delgado Mena**, G. Bruzual, 2018; *Atmospheric stellar parameters for large surveys using FASMA, a new spectral synthesis package*; Monthly Notices of the Royal Astronomical Society, 473, 4
140. O. Vaduvescu, L. Hudin, T. Mocnik, F. Char, A. Sonka, V. Tudor, I. Ordonez-Etxeberria, M. Díaz Alfaro, R. Ashley, R. Errmann et al. (*including:* **F. López Martínez**, **A. Paulino-Afonso**), 2018; *280 one-opposition near-Earth asteroids recovered by the EURONEAR with the Isaac Newton Telescope*; Astronomy and Astrophysics, 609, A105, 10
141. T. Van Reeth, J. S. G. Mombarg, S. Mathis, A. Tkachenko, J. Fuller, D. M. Bowman, B. Buysschaert, C. Johnston, **A. García Hernández**, J. Goldstein, R. H. D. Townsend, C. Aerts, 2018; *Sensitivity of gravito-inertial modes to differential rotation in intermediate-mass main-sequence stars*; Astronomy and Astrophysics, 618, A24, 14
142. L. Venuti, L. Prisinzano, G. G. Sacco, E. Flaccomio, R. Bonito, F. Damiani, G. Micela, M. G. Guarcello, S. Randich, J. Stauffer et al. (*including:* **S. G. Sousa**), 2018; *The Gaia-ESO Survey and CSI 2264: Substructures, disks, and sequential star formation in the young open cluster NGC 2264*; Astronomy and Astrophysics, 609, A10, 24
143. A. Verhamme, T. Garel, E. Ventou, N. Bouché, E. C. Herenz, J. Richard, R. Bacon, K. B. Schmidt, M. Maseda, R. A. Marino et al. (*including:* **J. Brinchmann**), 2018; *Recovering the systemic redshift of galaxies from their Lyman alpha line profile*; Monthly Notices of the Royal Astronomical Society: Letters, 478, 1, L60
144. **M. Vicinanza**, V. F. Cardone, R. Maoli, R. Scaramella, X. Er, 2018; *Increasing the lensing figure of merit through higher order convergence moments*; Physical Review D, 97, 2
145. M. Villar-Martín, A. Cabrera-Lavers, **A. Humphrey**, **M. S. Silva**, C. Ramos Almeida, J. Piqueras-Lopez, B. Emonts, 2018; *A 100 kpc nebula associated with the 'Teacup' fading quasar*; Monthly Notices of the Royal Astronomical Society, 473, 2, 2302
146. B. Vollmer, **C. Pappalardo**, M. Soida, A. Lançon, 2018; *Two uneven sisters I. NGC 4388 – a strongly constrained ram-pressure stripping event*; Astronomy and Astrophysics, 620, A108, 22
147. **M. Vrard**, T. Kallinger, B. Mosser, C. Barban, F. Baudin, K. Belkacem, **M. S. Cunha**, 2018; *Amplitude and lifetime of radial modes in red giant star spectra observed by Kepler*; Astronomy and Astrophysics, 616, A94, 12
148. L. Wisotzki, R. Bacon, **J. Brinchmann**, S. Cantalupo, P. Richter, J. Schaye, K. B. Schmidt, T. Urrutia, P. Weilbacher, M. Akhlaghi, 2018; *Nearly all the sky is covered by Lyman-α emission around high-redshift galaxies*; Nature, 562, 7726
149. **D. Wittman**, N. Golovich, W. A. Dawson, 2018; *The Mismeasure of Mergers: Revised Limits on Self-interacting Dark Matter in Merging Galaxy Clusters*; The Astrophysical Journal, 869, 2, 15
150. R. Zambujal Ferreira, **P. P. Avelino**, 2018; *The fate of a universe driven by a linear potential*; Classical and Quantum Gravity, 35, 17, 4

Book chapters and Proceedings [26]

1. **V. Zh. Adibekyan**, **E. Delgado Mena**, **N. C. Santos**, **S. G. Sousa**, **P. Figueira**; 2018; *T_c-trend and terrestrial planet formation: The case of Zeta Reticuli*; IAU Symposium S330 (Astrometry and Astrophysics in the Gaia sky); (Eds.)Alejandra Recio-Blanco; Patrick de Laverny; Anthony G. A. Brown; Timo Prusti, Cambridge University Press, Volume 12, Page 391
2. **V. Zh. Adibekyan**, **S. G. Sousa**, **N. C. Santos**; 2018; *Characterization of Exoplanet-Host Stars*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds; (Eds.)Tiago L. Campante; Nuno C. Santos; Mário J. P. F. G. Monteiro, Springer, Volume 49, Series Astrophysics and Space Science Proceedings, Page 225
3. **S. C. C. Barros**, **J. P. S. Faria**; 2018; *Tutorial: Detecting Planetary Transits and Radial-Velocity Signals*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds; (Eds.)Tiago L. Campante; Nuno C. Santos; Mário J. P. F. G. Monteiro, Springer, Volume 49, Series Astrophysics and Space Science Proceedings, Page 267
4. **A. Cabral**, M. Aliverti, **J. Coelho**, **M. Abreu**, M. Riva, A. Marconi, L. Valenziano, E. Oliva; 2018; *ELT-HIRES, the High Resolution Spectrograph for the ELT: the design of the Front End*; Ground-based and Airborne Instrumentation for Astronomy VII; (Eds.)Christopher J. Evans; Luc Simard; Hideki Takami, SPIE, Volume 10702, Number 1070, Series Proceedings of the SPIE
5. **T. L. Campante**, **B. J. Barros**, **O. Demangeon**, H. Nóbrega, J. S. Kuszlewicz, **L. F. Pereira**, W. J. Chaplin, D. Huber; 2018; *Synergy between asteroseismology and exoplanet science: an outlook*; PHOST "Physics of Oscillating Stars" – a conference in honour of Prof. H. Shibahashi; (Eds.)J. Ballot; S. Vauclair; G. Vauclair, Zenodo
6. **T. L. Campante**; 2018; *An Introduction to Data Analysis in Asteroseismology*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds; (Eds.)Tiago L. Campante; Nuno C. Santos; Mário J. P. F. G. Monteiro, Springer, Volume 49, Series Astrophysics and Space Science Proceedings, Page 55
7. L. Clermont, J. Jacobs, P. Blain, **M. Abreu**, B. Vandenbussche, P. Royer, R. Huygen, J. P. Halain, A. Baeke; 2018; *Automatized alignment of the focal plane assemblies on the PLATO cameras*; Space Telescopes and Instrumentation

2018: Optical, Infrared, and Millimeter Wave; (Eds.)Makenzie Lystrup; Howard A. MacEwen; Giovanni G. Fazio; Natalie Batalha; Nicholas Siegler; Edward C. Tong, SPIE, Volume 10698, Series Proceedings of the SPIE

8. R. Content, Y. Wang, M. Roberto, M. E. Dickinson, H. C. Ferguson, L. Hillenbrand, W. Fraser, P. Behroozi, **J. Brinchmann**, A. Cimatti; 2018; *ATLAS probe for the study of galaxy evolution with 300,000,000 galaxy spectra*; Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave; (Eds.)Makenzie Lystrup;Howard A. MacEwen; Giovanni G. Fazio; Natalie Batalha; Nicholas Siegler; Edward C. Tong, SPIE, Volume 10698, Series Proceedings of the SPIE

9. **M. S. Cunha**; 2018; *Theory of Stellar Oscillations*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds; (Eds.)Tiago L. Campante; Nuno C. Santos; Mário J. P. F. G. Monteiro, Springer, Volume 49, Series Astrophysics and Space Science Proceedings, Page 27

10. **E. Delgado Mena**, M. Tsantaki, **V. Zh. Adibekyan**, **S. G. Sousa**, **N. C. Santos**, J. I. González Hernández, G. Israelian; 2018; *Abundance ratios & ages of stellar populations in HARPS-GTO sample*; IAU Symposium S330 (Astrometry and Astrophysics in the Gaia sky); (Eds.)Alejandra Recio-Blanco; Patrick de Laverny; Anthony G. A. Brown; Timo Prusti, Cambridge University Press, Volume 12, Page 156

11. P. Di Marcantonio, R. Cirami, G. Cupani, I. Di Varano, H. Drass, **P. Figueira**, M. A. F. de Souza, M. Genoni, O. A. Gonzalez, M. Landoni et al. (*including:* **M. A. Monteiro**, **S. G. Sousa**); 2018; *ELT high resolution spectrograph: phase-A software architecture study*; Software and Cyberinfrastructure for Astronomy V; (Eds.)Juan C. Guzman; Jorge Ibsen, SPIE, Volume 10707, Number 1070, Series Proceedings of the SPIE

12. P. Di Marcantonio, D. Sosnowska, G. Cupani, V. D'Odorico, C. Lovis, A. G. Segovia Milla, **S. G. Sousa**, J. I. González Hernández, G. Calderone, R. Cirami; 2018; *ESPRESSO data flow in operations: results of commissioning activities*; Observatory Operations: Strategies, Processes, and Systems VII; (Eds.)Alison B. Peck; Robert L. Seaman; Chris R. Benn, SPIE, Volume 10704, Number 1070, Series Proceedings of the SPIE

13. P. Gomez-Alvarez, X. Dupac, G. Buenadicha, R. Vavrek, J. Hoar, R. J. Laureijs, R. Scaramella, **J.-C. Cuillandre**, **J. Dinis**, J. Amiaux, **I. Tereno**; 2018; *The Euclid survey planning system*; Software and Cyberinfrastructure for Astronomy V; (Eds.)Juan C. Guzman; Jorge Ibsen, SPIE, Volume 10707, Series Proceedings of the SPIE

14. J. I. González Hernández, F. Pepe, P. Molaro, **N. C. Santos**; 2018; *ESPRESSO on VLT: An Instrument for Exoplanet Research*; Handbook of Exoplanets; (Eds.)Hans J. Deeg; Juan Antonio Belmonte, Springer International Publishing AG

15. T. Harko, **F. S. N. Lobo**, **J. P. Mimoso**, D. Pavón; 2018; *Irreversible matter creation processes through a nonminimal curvature-matter coupling*; Proceedings of the Fourteenth Marcel Grossmann Meeting; (Eds.)Massimo Bianchi; Robert T Jantzen; Remo Ruffini, World Scientific

16. **A. C. O. Leite**, **C. J. A. P. Martins**, P. Molaro, S. Monai, **C. S. Alves**, **T. A. Silva**, the ESPRESSO Science Team; 2018; *ESPRESSO's Early Commissioning Results and Performance Related to Tests of Fundamental Constant Stability*; Proceedings of the 53rd RENCONTRES DE MORIOND; (Eds.)Étienne Aug é; Jacques Dumarchez; Jean Trân Thanh Vân, ARISF

17. A. Marconi, C. A. Prieto, P. J. Amado, M. Amate, S. R. Augusto, S. Becerril , N. Bezawada, I. Boisse, F. Bouchy, **A. Cabral** et al. (*including:* **C. J. A. P. Martins**, **M. A. Monteiro**, **N. C. Santos**, **S. G. Sousa**); 2018; *ELT-HIRES, the high resolution spectrograph for the ELT: results from the Phase A study*; Ground-based and Airborne Instrumentation for Astronomy VII; (Eds.)Christopher J. Evans; Luc Simard; Hideki Takami, SPIE, Volume 10702, Number 1070, Series Proceedings of the SPIE

18. S. Morris, F. Hammer, P. Jagourel, C. J. Evans, M. Puech, G. B. Dalton, M. Rodrigues, R. Sanchez-Janssen, E. Fitzsimons, B. Barbuy et al. (*including:* **J. Afonso**); 2018; *The ELT-MOS (MOSAIC): towards the construction phase*; Ground-based and Airborne Instrumentation for Astronomy VII; (Eds.)Christopher J. Evans, Luc Simard, Hideki Takami, SPIE, Volume 10702, Series Proceedings of the SPIE

19. **B. Nsamba**, **T. L. Campante**, **M. J. P. F. G. Monteiro**, **M. S. Cunha**, B. M. Rendle, D. R. Reese, K. Verma; 2018; *Model physics in low-mass solar-type stars: atomic diffusion and metallicity mixture*; PHOST “Physics of Oscillating Stars” – a conference in honour of Prof. H. Shibahashi; (Eds.)J. Ballot; S. Vauclair; G. Vauclair, Zenodo

20. **A. R. G. Santos**, **T. L. Campante**, W. J. Chaplin, **M. S. Cunha**, M. N. Lund, R. Kiefer, D. Salabert, R. A. García, G. R. Davies, Y. Elsworth, R. Howe; 2018; *Seismic signatures of magnetic activity in solar-type stars observed by Kepler*; IAU Symposium S340 (Long-term Datasets for the Understanding of Solar and Stellar Magnetic Cycles); (Eds.)Dipankar Banerjee; Jie Jiang; Kanya Kusano; Sami Solanki, Cambridge University Press, Volume 13, Page 225

21. **N. C. Santos**; 2018; *Characterisation of exoplanet host stars: A window into planet formation*; IAU Symposium S330 (Astrometry and Astrophysics in the Gaia sky); (Eds.)Alejandra Recio-Blanco; Patrick de Laverny; Anthony G. A. Brown; Timo Prusti, Cambridge University Press, Volume 12, Page 369

22. **N. C. Santos**, **J. P. S. Faria**; 2018; *Exoplanetary Science: An Overview*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds; (Eds.)Tiago L. Campante; Nuno C. Santos; Mário J. P. F. G. Monteiro, Springer, Volume 49, Series Astrophysics and Space Science Proceedings, Page 165

23. **N. C. Santos**, L. A. Buchhave; 2018; *Accurate Stellar Parameters for Radial Velocity Surveys*; Handbook of Exoplanets; (Eds.)Hans J. Deeg; Juan Antonio Belmonte, Springer International Publishing AG

24. **S. G. Sousa**, **D. T. Andreasen**; 2018; *Tutorial: Measuring Stellar Atmospheric Parameters with ARES+MOOG*; Asteroseismology and Exoplanets: Listening to the Stars and Searching for New Worlds; (Eds.)Tiago L. Campante; Nuno C. Santos; Mário J. P. F. G. Monteiro, Springer, Volume 49, Series Astrophysics and Space Science Proceedings, Page 275

25. W. Taylor, M. Cirasuolo, **J. Afonso**, C. M. Carollo, C. J. Evans, H. Flores, R. Maiolino, S. Paltani, L. Vanzi, M. Abreu et al. (*including:* **A. Cabral**, **J. Coelho**, **M. Hayati**, **A. Oliveira**); 2018; *Rising MOONS: an update on the VLT's next multi-object*

spectrograph as it begins to grow; Ground-based and Airborne Instrumentation for Astronomy VII; (Eds.)Christopher J. Evans; Luc Simard; Hideki Takami, SPIE, Volume 10702, Number 1070, Series Proceedings of the SPIE, Page 20

26. M. Tsantaki, **D. T. Andreasen**, **G. D. C. Teixeira**, **S. G. Sousa**, **N. C. Santos**, **E. Delgado Mena**, G. Bruzual; 2018; *Stellar parameters with FASMA: a new spectral synthesis package*; IAU Symposium S330 (Astrometry and Astrophysics in the Gaia sky); (Eds.)Alejandra Recio-Blanco; Patrick de Laverny; Anthony G. A. Brown; Timo Prusti, Cambridge University Press, Volume 12, Page 271

International Scientific Communications [133]

1. **M. Abreu**; 2018; *Sensors in Astronomy: Requirements and Specifications*; SPOF Summer School: Topics in Optics for Space & Ground Based Astronomical Instruments, Lisboa, Portugal
2. **V. Zh. Adibekyan**; 2018; *Preparatory Observations for Teff and vsini*; PLATO WEEK 7, Cambridge, United Kingdom
3. **V. Zh. Adibekyan**; 2018; *Planet formation in the metal-poor environment*; Gravitational Instability: unsolved problems in forming planets, brown dwarfs and stellar companions, University of Leicester, UK
4. **J. Afonso**; 2018; *When critical mass catches up to strategy - the road for Portuguese Astronomy*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
5. **R. M. G. Albuquerque**, V. Cayatte, **J. F. Gameiro**, **J. J. G. Lima**, C. Sauty; 2018; *Simulating accretion and outflow regions in YSOs*; JETSET FP6, "Jet Simulations, Experiments, Theory" 10 years later, what is next?, Paris, France
6. **S. Amarantidis**; 2018; *The first Super Massive Black Holes: indications from models for future observations*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
7. **S. Amarantidis**; 2018; *Lyman continuum escape from AGN at the EoR: model predictions and observational diagnostics*; Escape of Lyman radiation from galactic labyrinths, Crete, Greece
8. **R. P. L. Azevedo**; 2018; *Perfect fluid Lagrangian and cosmological constraints on nonminimally coupled theories of gravity*; FUture Gravitational Alternatives Meeting, Valencia, Spain
9. **R. P. L. Azevedo**; 2018; *Perfect fluid Lagrangian and its cosmological implications in non- minimally coupled theories of gravity*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
10. **T. Barreiro**; 2018; *Removing the σ8 tension with coupled quintessence*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
11. B. J. Barros; 2018; *Traversable wormholes with 3-forms*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
12. **S. C. C. Barros**; 2018; *Characterization of long-period small planets in presence of stellar activity*; PLATO ESP2018: Stellar variability and its effect on the characterisation of small planets, Marseille, France
13. **S. C. C. Barros**; 2018; *Impact of stellar activity on the characterization of long period planets*; PLATO WEEK 7; Stellar variability and its effect on the characterisation of small planets, Cambridge, United Kingdom
14. **S. C. C. Barros**; 2018; *Update on False-Positive Modelling*; PLATO WEEK 7; Stellar variability and its effect on the characterisation of small planets, Cambridge, United Kingdom
15. **I. P. Breda**, **P. Papaderos**, **J. M. Gomes**; 2018; *Lyman continuum photon production in galaxy bulges*; Escape of Lyman radiation from galactic labyrinths, Crete, Greece
16. **I. P. Breda**, **P. Papaderos**; 2018; *The continuous rise of bulges out of galactic disk*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
17. **J. Brinchmann**; 2018; *Star formation deep and wide*; The Near, The Far, and The In-between: Synergy between low and high redshift galaxy evolution studies in the era of JWST and EUCLID, Noordwijk, Netherlands
18. **J. Brinchmann**; 2018; *Galaxies and AGNs*; Euclid Consortium Meeting, Bonn, Germany
19. **J. Brinchmann**; 2018; *Legacy science concerns for the survey*; Euclid Surveys, Sesto, Italy
20. **F. Buitrago**; 2018; *Studying Astronomy in Portugal and the IA, the best choice for your future career*; XIII Scientific Meeting of the Spanish Astronomical Society, Slamanca, Spain
21. **F. Buitrago**; 2018; *Accurate number densities and environment for compact and relic massive galaxies*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
22. **A. Cabral**, M. Aliverti, **J. Coelho**, **M. Abreu**, M. Riva, A. Marconi, L. Valenziano, E. Oliva; 2018; *ELT-HIRES, the High Resolution Spectrograph for the ELT: the design of the Front End*; SPIE Astronomical Telescopes + Instrumentation 2018, Austin, United States
23. **F. T. O. Cabral**; 2018; *Phase transition with U(1) symmetry breaking in Einstein- Cartan-Theory*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
24. **T. L. Campante**; 2018; *Synergy between asteroseismology and exoplanet science: an outlook*; PHOST: Physics of Oscillating Stars, Banyuls-sur-mer, France
25. **T. L. Campante**; 2018; *Synergy between asteroseismology and exoplanet science: an outlook*; Stars and Stellar Physics - The asteroseismic revolution, Vienna, Austria
26. **T. L. Campante**, **M. J. P. F. G. Monteiro**, **M. S. Cunha**; 2018; *Asteroseismic modelling of solar-type stars: internal systematics from input physics and surface correction methods*; First Light in a new Era of Astrophysics, Aarhus, Denmark

27. A. Carvalho, A. Krone-Martins, **A. C. da Silva**; 2018; *Unsupervised photometric galaxy clustering: Analysis of Euclid and DES bands with UPMASK*; IAU Symposium 348: 21st Century Astrometry: crossing the Dark and Habitable frontiers, Vienna, Austria
28. **D. M. L. Castelão**; 2018; *Testing structure formation in Unified Dark matter-energy models*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
29. **D. M. L. Castelão**; 2018; *Testing structure formation in Unified Dark matter-energy models*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
30. **J. R. C. C. C. Correia**, **C. J. A. P. Martins**; 2018; *General Purpose Graphics Processing Units - Anisotropic Domain Walls*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
31. **J. R. C. C. C. Correia**, **C. J. A. P. Martins**; 2018; *Anisotropic Domain Walls*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
32. **J. R. C. C. C. Correia**, **C. J. A. P. Martins**; 2018; *Cracks in the Sky – Cosmic String Evolution with CUDA*; Gravity@Prague 2018, Prague, Czech Republic
33. **J. R. C. C. C. Correia**, **C. J. A. P. Martins**; 2018; *Cracks in the sky: cosmic string evolution with CUDA*; Gravity@Prague 2018, Prague, Czech Republic
34. **M. Cortês**; 2018; *Irreversibility in Foundational Cosmology*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
35. **M. S. Cunha**; 2018; *Concluding remarks*; PHysics of Oscillating STars, Banyuls-sur-mer, France
36. **M. S. Cunha**, **I. M. Brandão**, K. Perraut, D. Shulyak; 2018; *Bolometric corrections and liminosities of roAP stars: preparing to explore the TESS roAP survey*; PHOST: PHysics of Oscillating STars, Banyuls-sur-mer, France
37. **E. Delgado Mena**; 2018; *Can we really detect planets around evolved massive stars?*; XIII Scientific Meeting of Spanish Astronomical Union, Salamanca, Spain
38. **E. Delgado Mena**; 2018; *Can we really detect planets around evolved massive stars?*; Merging giant-star asteroseismology with the fate of extrasolar planetary systems, London, UK
39. **E. Delgado Mena**; 2018; *Stellar dating using chemical abundances*; Workshop: A Revolution in Stellar Physics with Gaia and Large Surveys, Warsaw, Poland
40. **E. Delgado Mena**; 2018; *Derivation of parameters for M dwarfs*; NIRPS Science Meeting, Montreal, Canada
41. **E. Delgado Mena**; 2018; *Stellar dating using chemical abundances*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
42. **E. Delgado Mena**; 2018; *Stellar dating using chemical abundances*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
43. **O. Demangeon**; 2018; *Reflected light splinter*; ARIEL consortium meeting, Dublin, Ireland
44. **J. P. S. Faria**; 2018; *Realistic simulation of stellar radial velocities*; Observing the Sun as a Star, Göttingen, Germany
45. **A. C. S. Ferreira**; 2018; *Galactic disc populations with the GAIA-ESO Survey*; Workshop: A Revolution in Stellar Physics with Gaia and Large Surveys, Warsaw, Poland
46. **A. C. S. Ferreira**; 2018; *Galactic disc populations with the GAIA-ESO Survey*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
47. **N. Frusciante**; 2018; *Dark Energy, Modified Gravity and Figure of Merit Forecasts: The EFT*; Euclid WP1 Meeting, Lisboa, Portugal
48. **N. Frusciante**; 2018; *Cosmological tests of gravity beyond general relativity*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
49. **N. Frusciante**; 2018; *Healthy conditions for a stable gravity theory and their phenomenological implications*; FUture Gravitational Alternatives Meeting, Valencia, Spain
50. **N. Frusciante**; 2018; *Exploring Large Scale Structure observables with viable dark energy and modified gravity models*; Gravity and Cosmology 2018, Kyoto, Japan
51. **F. López Martínez**, **J. F. Gameiro**; 2018; *Analysis of the physical properties of jets/outflows in T Tauri stars*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
52. A. Brecht, S. W. Bougher, E. Yigit, **G. Gilli**; 2018; *Wave Impacts on the Venus Upper Atmosphere (above the cloud tops): Dataset and Recent GCM Model Simulations*; COSPAR 2018, Pasadena, California, USA
53. **G. Gilli**; 2018; *Exploring the atmosphere of Venus using a general circulation model*; Soft Matter in Astronomy and Astrophysics, Lisboa, Portugal
54. **G. Gilli**, S. Lebonnois, **P. Machado**, **V. Silva**, **R. Gonçalves**; 2018; *The puzzling transition region of Venus atmosphere studied by a ground-to-thermosphere 3D model*; XIII Scientific Meeting of Spanish Astronomical Union, Salamanca, Spain
55. **G. Gilli**, S. Lebonnois, F. Lefèvre; 2018; *The upper atmosphere of Venus: Venus Express observations versus LMD-VGCM*; Venus et la mission Venus Express a l'IPSL, Paris, France
56. **G. Gilli**, F. Forget, A. Spiga, T. Navarro, L. Montabone; 2018; *Impact of gravity waves on the middle atmosphere of Mars studied combining Global Climate modelling and Mars Climate Sounder observations*; European Planetary Science Congress 2018, Berlin, Germany
57. **R. Gonçalves**, **P. Machado**, T. Widemann, J. Peralta, S. Watanabe, A. Yamazaki, T. Satoh, M. Takagi, K. Ogohara, Y. J. Lee, H. Avet, **J. Silva**; 2018; *Akatsuki and TNG/HARPS-N coordinated wind measurements of cloud top Venus' atmosphere*; European Planetary Science Congress 2018, Berlin, Germany

58. **R. Gonçalves**, **P. Machado**, T. Widemann, J. Peralta; 2018; *Akatsuki (cloud-tracking) and TNG/HARPS-N (Doppler velocimetry) coordinated wind measurements of cloud top Venus atmosphere*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
59. **R. Gonçalves**, **P. Machado**, T. Widemann, J. Peralta, S. Watanabe, A. Yamazaki, T. Satoh, M. Takagi, K. Ogohara, Y. J. Lee, H. Avet, **J. Silva**; 2018; *Venus' cloud top wind measurements with TNG/HARPS-N and coordinated Akatsuki observations*; HoRSE : High Resolution Spectroscopy for Exoplanet atmospheres, Nice, France
60. E. C. Herenz, **P. Papaderos**, J. Hayes; 2018; *Possible Channels for Lyman Continuum Escape in the Halo of SBS 0335-52E revealed with VLT/MUSE*; Escape of Lyman radiation from galactic labyrinths, Crete, Greece
61. **S. Hojjatpanah**, **P. Figueira**, **N. C. Santos**, **V. Zh. Adibekyan**, **S. G. Sousa**, **E. Delgado Mena**; 2018; *Selected stars for radial velocity ESPRESSO survey*; Observing the Sun as a Star: Would we find the solar system if we saw it?, Göttingen, Germany
62. **A. Humphrey**; 2018; *Photoionization models for extreme Lya and HeII ratios in quasar halos*; Escape of Lyman radiation from galactic labyrinths, Kolymbari, Crete
63. **M. S. N. Kumar**, A. Sanchez-Monge, M. R. Krumholz, E. Keto, R. Cesaroni, M. T. Beltrán, L. T. Maud, **P. M. Palmeirim**; 2018; *Ionized accretion in very high-mass stars: accelerating and rotating infall*; The Wonders of Star Formation: A tribute to Hans Zinnecker, Edimburgh, United Kingdom
64. **M. S. N. Kumar**, A. Sanchez-Monge, R. Cesaroni, E. Keto, **P. M. Palmeirim**, M. T. Beltrán, L. T. Maud; 2018; *O-star formation, ionized accretion flow and radiation feedback in a filament-hub system*; Interstellar filament paradigm: On their formation, evolution, and role in star formation, Nagoya, Japan
65. **M. S. N. Kumar**, **G. D. C. Teixeira**; 2018; *Variability in young high-mass stars: a new window to star-disk-magnetosphere studies*; Magnetic field or turbulence: Which is the critical factor for the formation of stars and planetary disks?, National Tsing Hua University, Hsinchu, Taiwan
66. **F. López Martínez**, **J. F. Gameiro**; 2018; *Analysis of the Physical Properties of Jets/Outflows in T Tauri Stars*; XXXth General Assembly of the International Astronomical Union, Vienna, Austria
67. **F. López Martínez**, **J. F. Gameiro**; 2018; *Analysis of the physical properties of jets/outflows in T Tauri stars*; JETSET FP6, Jet Simulations, Experiments, Theory. 10 years later, what is next?, Meudon, France
68. **A. C. O. Leite**; 2018; *ESPRESSO early commissioning results and performance*; 53rd Rencontres de Moriond - 2018 Cosmology, Thuile, Italy
69. **A. C. O. Leite**; 2018; *Fundamental physics constraints from testing the stability of the fine-structure constant with the ELTs*; IAU Symposium 347: Early Science with ELTs (EASE), Vienna, Austria
70. **J. J. G. Lima**; 2018; *Tribute to Kanaris*; JETSET FP6, "Jet Simulations, Experiments, Theory" 10 years later, what is next?, Paris, France
71. **F. S. N. Lobo**; 2018; *Wormholes, warp drives and energy conditions*; Travelling through Pedro's universes: from Spectroscopy to Cosmology, Madrid, Spain
72. **F. S. N. Lobo**, **D. Rubiera-Garcia**; 2018; *Wormholes, Energy Conditions and Time Machines*; Fifteenth Marcel Grossmann Meeting, Rome, Italy
73. **F. S. N. Lobo**; 2018; *Novel couplings between nonmetricity and matter*; Fifteenth Marcel Grossmann Meeting, Rome, Italy
74. **P. Machado**, T. Widemann, J. Peralta, **R. Gonçalves**, M. Takagi, H. Avet, Y. J. Lee, **G. Gilli**, S. Watanabe, T. Satoh, K. Ogohara, A. Yamazaki; 2018; *Venus' Meridional wind flow from: Akatsuki/UVI, Venus Express/VIRTIS, TNG/HARPS-N and CFHT/ESPaDOnS*; European Planetary Science Congress 2018, Berlin, Germany
75. J. Ferreira, **P. Machado**; 2018; *Stellar occultations by Gaia astrometry: General perspectives for asteroids and TNO*; The Transneptunian Solar System Conference, Coimbra, Portugal
76. **J. Silva**, **P. Machado**, J. Peralta, R. Hueso, **G. Gilli**, **M. Silva**, **R. Gonçalves**; 2018; *Characterising Atmospheric Gravity Waves on the lower and upper cloud bank using Venus Express VMC and VIRTIS images*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
77. **J. Silva**, **P. Machado**, **R. Gonçalves**, **M. Silva**; 2018; *Characterisation of Atmosphere Dynamics and Structure with Doppler Velocimetry and High-Resolution Spectroscopy*; HoRSE : High Resolution Spectroscopy for Exoplanet atmospheres, Nice, France
78. **P. Machado**, **R. Gonçalves**, T. Widemann, **G. Gilli**; 2018; *Comparative study of circulation regimes of terrestrial planets' atmospheres*; HoRSE: High Resolution Spectroscopy for Exoplanet atmospheres, Nice, France
79. **C. J. A. P. Martins**; 2018; *Fundamental Physics and Cosmology in the Extremely Large Telescopes Era*; IAU Symposium 347: Early Science with ELTs (EASE), Vienna, Austria
80. **C. J. A. P. Martins**; 2018; *Fundamental Physics and Cosmology in the ELTs Era*; Current and Future Observational Facilities, Belgrade, Serbia
81. **C. J. A. P. Martins**; 2018; *To Scale, or Not to Scale*; Cosmic Topological Defects: Dynamics and Multi-Messenger Signatures, Leiden, Netherlands
82. **C. J. A. P. Martins**; 2018; *Constraining Late-time Dark Energy Phase Transitions*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
83. **I. Yu. Rybak**, A. Avgoustidis, **C. J. A. P. Martins**; 2018; *Phenomenology of cosmic strings with non-trivial internal structure*; Cosmic Topological Defects: Dynamics and Multi-Messenger Signatures, Leiden, Netherlands
84. **J. R. C. C. C. Correia**, **C. J. A. P. Martins**; 2018; *Cracks in the sky: Cosmic string evolution with CUDA*; Cosmic Topological Defects: Dynamics and Multi-Messenger Signatures, Leiden, Netherlands

85. **I. Matute**, **J. Afonso**, **S. Amarantidis**, **C. Pappalardo**, H. Messias; 2018; *Towards the first Radio Galaxies*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
86. **J. P. Mimoso**; 2018; *Beyond Physics*; Travelling through Pedro's universes: from Spectroscopy to Cosmology, Madrid, Spain
87. **A. Moliné**; 2018; *Characterization of dark matter subhalo structural properties*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
88. **A. Moliné**, M. Sánchez-Conde, S. Palomares-Ruiz, F. Prada; 2018; *Subhalo properties and implications for DM searches*; Halo Substructure and Dark Matter Searches, Universidad Autónoma de Madrid, Spain
89. **P. M. Palmeirim**; 2018; *Star formation and ionized regions in the Inner Galactic Plane*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
90. **P. M. Palmeirim**, **M. S. N. Kumar**; 2018; *The most Massive and Compact Protostellar sources (MaCPrOs) throughout the Galactic Plane*; Interstellar filament paradigm: On their formation, evolution, and role in star formation, Nagoya, Japan
91. **P. Papaderos**; 2018; *LI(N)ERS and Lyman continuum photon escape*; Escape of Lyman radiation from galactic labyrinths, Crete, Greece
92. **C. Pappalardo**; 2018; *Star-dust interplay in late type galaxies at z < 0.5*; JWST/Euclid synergies Conference, Noordwijk, Netherlands
93. **C. Pappalardo**; 2018; *The Portuguese Alma Center of Expertise: ALMA research in Portugal after 3 years*; JWST/Euclid synergies Conference, Noordwijk, Netherlands
94. **C. Pappalardo**; 2018; *Star-dust interplay in late type galaxies at z < 0.5*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
95. **A. Paulino-Afonso**; 2018; *From the end of the reionization to the peak of the star formation: what are the LAEs structures telling us?*; OPINAS Seminar, Garching bei München, Germany
96. **A. Paulino-Afonso**; 2018; *The role of mass and environment in galaxy evolution at z~1*; ESO Galaxy Cluster Discussion Group, Garching bei München, Germany
97. **A. Paulino-Afonso**; 2018; *The structural evolution of star-forming galaxies in the COSMOS field*; Lunch Tallk, Garching bei München, Germany
98. **A. Paulino-Afonso**; 2018; *Galaxy clusters mergers, shocks and turbulence: what are the effects on galaxy evolution?*; XXXth General Assembly of the International Astronomical Union, Vienna, Austria
99. **A. Paulino-Afonso**; 2018; *LAEs don't ever change?*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
100. **A. Paulino-Afonso**; 2018; *Mergers, shocks and turbulence and their effects on galaxy evolution*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
101. **A. Paulino-Afonso**; 2018; *LAEs: don't ever change? Ask me why!*; European Week of Astronomy and Space Science 2018, Liverpool, United Kingdom
102. **A. Paulino-Afonso**; 2018; *The role of mass and environment on the galaxy evolution at z~1*; European Week of Astronomy and Space Science 2018, Liverpool, United Kingdom
103. **A. Paulino-Afonso**; 2018; *The role of mass and environment in galaxy evolution at z~1*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
104. J. Peralta, R. Hueso, T. Imamura, Y. J. Lee, S. S. Limaye, **P. Machado**, K. McGouldrick, S. Murakami, K. Muto, M. Nakamura, H. Sagawa, A. Sánchez-Lavega, T. M. Sato, T. Satoh, E. F. Young; 2018; *Nightside winds at the middle-to-low clouds of venus with Akatsuki/IR2 and ground-based observations*; Japan Geoscience Union Meeting, Makuhari Messe, Chiba, Japan
105. **L. F. Pereira**, **T. L. Campante**, **M. S. Cunha**, **J. P. S. Faria**, **N. C. Santos**, **S. C. C. Barros**, **O. Demangeon**, J. S. Kuszlewicz; 2018; *Using Gaussian Processes to model granulation and oscillations in red-giant stars*; TASC4/KASC11 Workshop, Aarhus, Denmark
106. **S. N. Reis**; 2018; *Deep imaging of the most massive galaxies of the nearby Univer*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
107. **D. Rubiera-Garcia**; 2018; *On black holes in metric-affine theories of gravity with Ricci-based corrections*; Sigrav 2018 Black holes: Theory and Observations, Cagliari, Italy
108. **D. Rubiera-Garcia**; 2018; *Regular black holes in Palatini theories of gravity*; Teleparallel Universes in Salamanca, Salamanca, Spain
109. **D. Rubiera-Garcia**; 2018; *Structure and thermodynamics of charged nonrotating black holes in higher dimensions*; 1st Research Encounter for Synergetic Advances in Cosmology and Astrophysics Workshop, Bilbao, Spain
110. **D. Rubiera-Garcia**; 2018; *Astrophysical and cosmological aspects of metric-affine theories of gravity*; Fifteenth Marcel Grossmann Meeting - MG15, Rome, Italy
111. **D. Rubiera-Garcia**; 2018; *Non-singular black holes in Ricci-based theories of gravity*; XI Black Holes Workshop, Lisboa, Portugal
112. **I. Yu. Rybak**, A. Avgoustidis, **C. J. A. P. Martins**; 2018; *Collisions of cosmic strings with chiral currents*; Gravity@Prague 2018, Prague, Czech Republic
113. **I. Yu. Rybak**, A. Avgoustidis, **C. J. A. P. Martins**; 2018; *Collisions of cosmic strings with chiral currents*; GRAVITY@PRAGUE 2018, Prague, Czech Republic
114. **I. Yu. Rybak**, A. Avgoustidis, **C. J. A. P. Martins**; 2018; *Analytic approach to the cosmic (super)string network evolution with junctions*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal

115. **N. C. Santos**; 2018; *Top level requirements for astronomical instruments. Behind the scenes in exoplanet science*; 2018 SPOF Summer School, Lisboa, Portugal
116. **N. C. Santos**; 2018; *Exoplanets: a potential for Iberian collaborations*; XIII Scientific Meeting of Spanish Astronomical Union, Salamanca, Spain
117. **N. C. Santos**, **S. C. C. Barros**, M. Oshagh, **B. Akinsanmi**; 2018; *Detecting rings around exoplanets*; European Planetary Science Congress 2018, Berlin, Germany
118. **N. C. Santos**; 2018; *ESPRESSO: a short status report*; First NIRPS Science Meeting, Montreal, Canada
119. **T. C. Scott**; 2018; *Highly perturbed atomic and molecular gas in the nearby cluster Abell 1367*; European Week of Astronomy and Space Science 2018, Liverpool, United Kingdom
120. **L. M. Serrano**; 2018; *Estimating the albedo of the exoplanets in presence of stellar activity*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
121. **L. M. Serrano**; 2018; *Disentangling the albedo of the exoplanet from the stellar activity*; PLATO ESP2018: Stellar variability and its effect on the characterisation of small planets, Marseille, France
122. **L. M. Serrano**; 2018; *Estimating the albedo of the exoplanets in presence of stellar activity*; Exoplanets II, Cambridge, United Kingdom
123. **M. Silva**, **P. Machado**, A. Sánchez-Lavega, R. Hueso, J. Peralta, **D. Luz**; 2018; *Ground-based Doppler Velocimetry: wind measurements in Saturn's atmosphere with UVES/VLT*; European Planetary Science Congress 2018, Berlin, Germany
124. **M. Silva**, **P. Machado**, R. Hueso, S. Perez-Hoyos, D. Luz, E. Lellouch, J. Peralta; 2018; *Saturn atmosphere's dynamics with VLT/UVES high-resolution spectroscopy and cloud tracked winds from CASSINI/ISS observations*; XIII Scientific Meeting of the Spanish Astronomical Society, Salamanca, Spain
125. **L. Sousa**; 2018; *On the matter Lagrangian of particles and fluids*; IberiCOS 2018 13th Iberian Cosmology Meeting, Lisboa, Portugal
126. **L. Sousa**; 2018; *Update on strings project*; 5th LISA Cosmology Working Group Workshop, Helsinki, Finland
127. **L. Sousa**; 2018; *Signature of inflation in the stochastic gravitational wave background generated by cosmic string networks*; Cosmic Topological Defects: Dynamics and Multi-Messenger Signatures, Leiden, Netherlands
128. **I. Tereno**, **J. Dinis**; 2018; *Implementation of Calibrations in the Euclid Reference Survey*; Euclid Surveys, Sesto, Italy
129. **S. C. Ulmer-Moll**, **P. Figueira**, **N. C. Santos**; 2018; *Telluric corrections with TAPAS & Molecfit*; First Science Meeting – Montreal, Montreal, Canada
130. M. Vals, F. Forget, E. Millour, A. Spiga, A. Maattaanen, J Audouard, F. Montmessin, F. Lefèvre, C. Wang, A. Pottier, **G. Gilli**, V. Zakharov, D. Bardet, T. Navarro, J. B. Madeleine, L. Montabone, F. Gonzalez-Galindo; 2018; *Toward a new generation Mars Global Climate Model at LMD*; American Geophysical Union, Fall Meeting 2018, Washington, D.C., USA
131. **M. Vicinanza**; 2018; *Minkowski Functionals of convergence maps and the lensing Figure of Merit*; Euclid Consortium Meeting, Bonn, Germany
132. **M. Vrard**, **M. S. Cunha**; 2018; *Structural discontinuities in the core of red giant stars: effect on the mixed-mode pattern and how to measure it*; First Light in a new Era of Astrophysics, Aarhus, Denmark
133. **M. Vrard**, **M. S. Cunha**; 2018; *Discontinuities in the core of red giant stars: effect on the mixed-mode pattern and how to measure it*; What Physics can we learn from oscillating stars, Banyuls-sur-mer, France

National Scientific Communications [32]

1. **J. Afonso**; 2018; *Witnessing the birth of galaxies with SKA and SKA-percursors*; SKA Days PT, Lisboa, Portugal
2. **J. Afonso**; 2018; *Where will we be in ten years?*; NewSpace Atlantic Summit 2018, Pavilhão do Conhecimento, Lisboa, Portugal
3. **S. Amarantidis**; 2018; *The first Super Massive Black Holes: indications from models for future observations*; IA-ON5, Anadia, Portugal
4. **A. Antoniadis**; 2018; *Deriving stellar atmospheric parameters for M stars using high resolution spectra*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
5. **R. P. L. Azevedo**; 2018; *Perfect fluid Lagrangian and cosmological constraints on nonminimally coupled theories of gravity*; IA-ON5, Anadia, Portugal
6. **B. J. Barros**; 2018; *Kinetically coupled dark energy*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
7. **S. C. C. Barros**; 2018; *Extra-solar planets*; Física 2018, Covilhã, Portugal
8. **F. Buitrago**; 2018; *Indiana Jones and where to find galaxy relics*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
9. **J. Camacho**, **P. T. P. Viana**, **J. P. S. Faria**, **N. C. Santos**; 2018; *Mini-frame, a not so mini implementation of Gaussian process frameworks*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
10. **O. Demangeon**; 2018; *Science collaboration*; ARIEL Portuguese Consortium Meeting, Lisboa, Portugal
11. **J. P. S. Faria**; 2018; *Finding Earth-like planets around other stars*; 3ª Jornadas em Engenharia Física, Física, Física Médica e Astronomia 2018, Porto, Portugal
12. **A. C. S. Ferreira**; 2018; *Galactic disc populations with the GAIA-ESO Survey*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal

13. **A. C. S. Ferreira**; 2018; *Detecting metals in stars*; 3ª Jornadas em Engenharia Física, Física, Física Médica e Astronomia 2018, Porto, Portugal
14. G. Guerra, **A. C. da Silva**, **J. P. Mimoso**; 2018; *The large-scale isotropic and non-homogenous Universe: Fast semi-analytical structure formation simulations for Euclid studies*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
15. A. Carvalho, A. Krone-Martins, **A. C. da Silva**; 2018; *Unsupervised galaxy clustering with a modified version of UPMASK*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
16. **A. C. O. Leite**; 2018; *Toward stronger fundamental physics tests in the matter era*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
17. **P. Machado**; 2018; *Comparative study of circulation regimes on planetary atmospheres*; Soft Matter in Astronomy and Astrophysics, Lisboa, Portugal
18. **T. Magalhães**; 2018; *Solar Coherence Imaging*; IA-ON5, Anadia, Portugal
19. **C. J. A. P. Martins**; 2018; *Cosmoespresso goes to school*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
20. **I. Matute**, **C. Pappalardo**, **J. Afonso**, **S. Amarantidis**; 2018; *The Portuguese Alma Center of Expertise: ALMA research in Portugal after 4 years*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
21. **I. Matute**, **J. Afonso**, **S. Amarantidis**, **C. Pappalardo**, H. Messias; 2018; *Towards the first Radio Galaxies*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
22. **J. P. Mimoso**, **I. Ayuso**; 2018; *Is gravity a distortion of Λ?*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
23. **S. N. Reis**; 2018; *Deep imaging of the most massive galaxies of the nearby Universe*; IA-ON5, Anadia, Portugal
24. **N. C. Santos**, **V. Zh. Adibekyan**; 2018; *ESPRESSO and beyond: (Inter)National road-map for exoplanet sciences*; Ciência 2018, Lisboa, Portugal
25. **N. C. Santos**; 2018; *Portugal e os descobrimentos: à procura de outras Terras*; V encontro internacional da Casa das Ciências, Guimarães, Portugal
26. **L. Sousa**; 2018; *Cosmology with topological defects*; 3ª Jornadas em Engenharia Física, Física, Física Médica e Astronomia 2018, Porto, Portugal
27. **S. G. Sousa**; 2018; *Detection and Characterization of exoplanets*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
28. **G. D. C. Teixeira**; 2018; *Photometric variability of MYSOs in the VVV survey*; 4th IDPASC Students Workshop, Coimbra, Portugal
29. **M. Tsantaki**; 2018; *On the ionization balance of cool stars with spectroscopy*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
30. **S. C. Ulmer-Moll**; 2018; *How to erase our atmosphere's imprint in near-infrared spectra?*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
31. **S. C. Ulmer-Moll**, **N. C. Santos**, P. Figueira; 2018; *Exoplanet Mass-Radius relation using random forests*; XXVIII Encontro Nacional de Astronomia e Astrofísica, Coimbra, Portugal
32. **B. Wehbe**; 2018; *Atmospheric dispersion correction*; IA-ON5, Anadia, Portugal

Seminars at IA [43]

1. Avgoustidis, A.; 2018; *Understanding the Origins of our Universe*
2. Bedding, T. R.; 2018; *A Golden Age of Asteroseismology with Kepler*
3. Benetti, M.; 2018; *Tensions on LCDM cosmological model and model-independent constraints from BAO data*
4. Binette, L.; 2018; *Evidence of a temperature problem similar in the NLR as in HII regions*
5. Campante, T. L.; 2018; *Synergy between asteroseismology and exoplanet science: an outlook*
6. Cardesín Moinelo, A.; 2018; *From Mars Express to ExoMars: Why is Mars so important?*
7. Dorn, C.; 2018; *Interior characterization of Super-Earths & Mini-Neptunes and the case of Trappist-1.*
8. Elia, D.; 2018; *Building A Panoramic View of Star Formation Across the Milky Way through Recent Galactic Plane FIR/Sub-mm Surveys*
9. Furlanetto, C.; 2018; *Herschel-ATLAS and ALMA: when strong lensing meets interferometry*
10. Goddi, C.; 2018; *Imaging Black Holes with the Event Horizon Telescope*
11. Hilditch, D.; 2018; *The Critical Collapse of Gravitational Waves*
12. Hossain, M. W.; 2018; *Light mass Galileon models: Cosmological dynamics and perturbations*
13. Krone-Martins, A.; 2018; *The Fourth Paradigm in Astronomy: from ESA/Gaia and beyond*
14. Landim, R.; 2018; *Cosmic Transients, Einstein's Equivalence Principle and Dark Matter Halos*
15. Lebonnois, S.; 2018; *Exploring the deep atmosphere of Venus and the interactions between surface and atmosphere*
16. Llinares, C.; 2018; *Testing fundamental physics with astronomical observations*

17. Maggio, E.; 2018; *Exotic Compact Objects*
18. Maselli, A.; 2018; *Observational signatures of exotic compact objects*
19. Mendigutia, I.; 2018; *Star formation across different scales. Bridging the gap through accretion*
20. Messias, H.; 2018; *Multi-wavelength Observations of Dual AGN (MODA) – the cases of Mrk463 and NGC6240*
21. Michałowski, M. J.; 2018; *Massive stars formed in atomic hydrogen reservoirs*
22. Montalto, M.; 2018; *The PLATO Input Catalog in the era of Gaia/DR2*
23. Moore, C. J.; 2018; *Black Hole Binary Recoil Kicks*
24. Moura, F.; 2018; *Absorption of scalars by black holes in string theory*
25. Nerozzi, A.; 2018; *On tetrad approaches and gauge fixing in general relativity*
26. Pappalardo, C.; 2018; *Cycle 6, ALMA, PACE, and other stories*
27. Pavón, D.; 2018; *Constraints on the radiation temperature before inflation*
28. Pavón, D.; 2018; *The second law of thermodynamics at cosmic scales*
29. Pavón, D.; 2018; *Degrees of fredom of a black hole*
30. Perez-Hoyos, S.; 2018; *Clouds and aerosols in the atmospheres of the Solar System*
31. Rodriguez-Eugenio, N.; 2018; *Back to school (or why research centers should participate in science education)*
32. Rosa, J.; 2018; *BLASTs: Black hole Lasers powered by Axion SuperradianT instabilities*
33. Sánchez-Monge, Á.; 2018; *The physical and chemical structure of SgrB2. Studying the most massive cloud in the Galaxy*
34. Santos, M.; 2018; *Cosmology with MeerKAT*
35. Schmidt, F.; 2018; *Galaxy clustering: an effective field theory approach*
36. Sen, A.; 2018; *The price of shifting the Hubble Constant and evidence for dark energy evolution*
37. Smette, A.; 2018; *A general tool to correct telluric absorption lines*
38. Sotiriou, T.; 2018; *Strong gravity and fundamental physics: from no hair theorems to hairy black holes*
39. Sousa-Silva, C.; 2018; *Fantastical Biosignatures and How to Find Them*
40. Vílchez, J. M.; 2018; *Metallicity and evolution of star-forming galaxies populating different environments*
41. Veras, D.; 2018; *The growing field of post-main-sequence exoplanetary science*
42. Vicinanza, M.; 2018; *Higher-order statistics of weak lensing fields*
43. Von Marttens, R.; 2018; *Cosmology with interaction in the dark sector of the Universe*

Organization of Conferences [10]

1. Euclid Mission WP1; Lisbon WP1 Meeting; 15 to 16 March 2018; Lisboa, Portugal
2. IberiCOS 2018; 13th Iberian Cosmology Meeting; 26 to 28 March 2018; Lisboa, Portugal
3. 2-DEMOC 2018; “Towards the detection and characterization of other Earths” Thematic Line Internal Meeting; 29 to 30 May 2018; Anadia, Portugal
4. TROY meeting I; 23 to 24 July 2018; Porto, Portugal
5. Escape of Lyman radiation from galactic labyrinths; 11 to 14 September 2018; OAC, Kolymbari, Crete
6. IA-ON5; Instituto de Astrofísica e Ciências do Espaço 5th internal workshop; 15 to 16 October 2018; Anadia, Portugal
7. Unveiling the dynamics of the universe; Thematic Line meeting; 17 October 2018; Anadia, Portugal
8. ARIEL Portuguese Consortium Meeting; 7 November 2018; Lisboa, Portugal
9. Athena-WFI Consortium Meeting; 20 to 22 November 2018; Lisboa, Portugal
10. Soft Matter in Astronomy and Astrophysics; 4 December 2018; Lisboa, Portugal

Observing runs [51]

1. Adibekyan, Vardan Zh. et al; "ESPRESSO ultra-high-resolution spectra for Gaia benchmark stars"; 0102.D-0185 ESPRESSO/VLT; P102 service mode
2. Afonso, J.; Pappalardo, C; Bizzocchi, L; Garcia, P; Matute, I; Amarantidis, S; Messias, H.; Farrah, D.; “Confirmation of the first radio-selected galaxy found at the doorstep of the EoR”; 2017.1.01713.S; ALMA; 16 January 2018 to 21 August 2018
3. Boisse, I.; Bouchy, F.; Hébrard, G.; Delfosse, X.; Udry, S.; Bonfils, X.; Diaz, R.; Forveille, T.; Moutou, C.; Pepe, F.; Santerne, A.; Santos, N. C.; Ségransan, D.; Deleuil, M.; Mousis, O.; Brugger, B.; Hobson, M.; Demangeon, O.; Kiefer, F.; Bourrier, V.; Hara, N.; Stalport, M.; Lopez, T.; Dalal, S.; Mignon, L.; “Recherche et caractérisation des planètes extrasolaires dans l'hémisphère Nord”; 2018B_PNP005; SOPHIE@T193; 2018.03.31-2018.04.06

4. Brinchmann, J.; MUSE GTO; Ultrafaint dwarfs with MUSE; 100.D-0807; MUSE, VLT; 11-16 Feb 2018
5. Brinchmann, J.; MUSE GTO; Ultrafaint dwarfs with MUSE; 100.D-0807; MUSE, VLT; 14-19 Mar 2018
6. Brinchmann, J; MUSE GTO; Ultrafaint dwarfs with MUSE; 101.D-0300; MUSE, VLT; 11-19 Apr 2018
7. Brinchmann, J; MUSE GTO; Ultrafaint dwarfs with MUSE; 101.D-0300; MUSE, VLT; 10-13 May 2018
8. Brinchmann, J.; MUSE GTO; Ultrafaint dwarfs with MUSE; 101.D-0300; MUSE, VLT; 12-18 August 2018
9. Brinchmann, J.; MUSE GTO; Ultrafaint dwarfs with MUSE; 101.D-0300; MUSE, VLT; 05-15 September 2018
10. Brinchmann, J.; MUSE GTO; Ultrafaint dwarfs with MUSE; 102.D-0372; MUSE, VLT; 07-15 October 2018
11. Brinchmann, J.; MUSE GTO; Ultrafaint dwarfs with MUSE; 102.D-0372; MUSE, VLT; 06-12 December 2018
12. Brinchmann, J.; MUSE GTO; MUSE NFM Commissioning; N/A; MUSE, VLT; 17-21 June 2018
13. Delgado Mena, E. et al.; "Follow-up of planetary candidates in stellar open clusters"; 0100.C-0888; 0101.C-0274; HARPS/ESO-3.6m telescope; observing during 18-26 June (period 101)
14. Faria, João P. S.; Oshagh, M.; Demangeon, Olivier D. S.; Barros, S. C. C.; Camacho, J.; Adibekyan, Vardan Zh.; Santos, N. C.; Figueira, P.; Ulmer-Moll, S.; Sousa, Sérgio A. G.; Viana, P.; Solving the radial-velocity activity puzzle, one star at a time; ESPRESSO, VLT; Period 102
15. Hebrard, Guillaume et al, “Transit program”, SOPHIE OHP; 21-02-2018 to 28-02-2018
16. Hébrard, G.; Moutou, C.; Deleuil, M.; Almenara, J. M.; Barros, Susana C. C.; Boisse, I.; Bonfils, X.; Santerne, A.; Udry, S.; Nielsen, L.; Kiefer, F.; Bouchy, F.; Dalal, S.; Osborn, H.; Delfosse, X.; Forveille, T.; Demangeon, Olivier D. S.; Lopez, T.; “Caractérisation des planètes extrasolaires en transit (suite)”; 2018B_PNP004; SOPHIE@T193; 2018.10.29-2018.11.04
17. Kumar, M. S. Nanda; Beltran, M.; Cesaroni, R.; Hoare, M.; Keto, E.; Krumholz, M.; Lucas, P.; Maud, L.; Sanchez-Monge, A.; Walmsley, C.; “OB-star binary systems in formation”; 2017.1.01370.S, ALMA, Cycle 7
18. Kumar, M. S. Nanda; Borissova, J.; Cesaroni, R.; Garcia, P.; Grave, J.; Kuhn, M.; Kurtz, S.; Sanchez-Monge, A.; Wienen, M.; “A high-mass young star mimicking a redgiant”; 2018.1.00794.S, ALMA, Cycle 8
19. Leite, A. C. O.; CoIs: Messias, H.; Martins, C. J. A. P.; Molaro, P.; C3272: Toward stronger fundamental physics tests in the matter era; Australia Telescope Compact Array; 4 November 2018
20. Lorenzoni, S.; Caruana, J.; Bunker, A. J.; Stanway, E. R.; Wilkins, S. M.; Matute, I.; Exploring Reionization and Interacting Systems at z ~ 8; 0100.A-0870(A); Jan-Mar 2018
21. Lovis, Christophe and ESPRESSO GTO, ESPRESSO VLT; 16-11-2018
22. Machado, P.; VLT/UVES, Research of C3 on Titan's atmosphere, June 2018.
23. Machado, P.; VLT/UVES, Mars Global Dust Storm observations coordinated with ESA Mars Express space probe and Exomars, July 2018.
24. Machado, P.; VLT/UVES, Venus pericenter observations coordinated with Akatsuki space pobe, August/September 2018.
25. Machado, P.; CARMENES - Mars Global Storm observations in the infrared, Calar Alto Observatory observations coordinated with ESA Mars Express space probe, August 2018.
26. Machado, P.; CFHT/ESPaDOnS, Coordinated observations with UVI and LIR Akatsuki's instruments, Mauna Kea, Hawaii, August 2018.
27. Martins, Jorge H. C.; 198.C-0838 (PI: Bonfils); HARPS@ESO 3.6m telescope, La Silla/Paranal Observatory, Chile; 2018-07-06 to 2018-07-12
28. Martins, Jorge H. C.; 0101.C-623 (PI: Bouchy); HARPS@ESO 3.6m telescope, La Silla/Paranal Observatory, Chile; 2018-07-06 to 2018-07-12
29. Martins, Jorge H. C.; 0101.C-0721 (PI: Triaud); HARPS@ESO 3.6m telescope, La Silla/Paranal Observatory, Chile; 2018-07-06 to 2018-07-12
30. Martins, Jorge H. C.; 0101.C-0721 (PI: Santos); HARPS@ESO 3.6m telescope, La Silla/Paranal Observatory, Chile; 2018-07-06 to 2018-07-12
31. Martins, Jorge H. C.; 0101.C-0106 (PI: Martins); HARPS@ESO 3.6m telescope, La Silla/Paranal Observatory, Chile; 2018-07-06 to 2018-07-12
32. Martins, Jorge H. C.; 198.C-0169 (PI: Santerne); HARPS@ESO 3.6m telescope, La Silla/Paranal Observatory, Chile; 2018-07-06 to 2018-07-12
33. Matthee, J. et al. including Paulino Afonso, A.; LYRS-z2: A spectroscopic Lyman-alpha Reference Sample at the peak of cosmic star formation history; 0102.A-0652(A); VLT/XSHOOTER (UT2-Kueyen); October 1, 2018 - March 31, 2019, P102 (service mode)
34. Molaro, P.; CoIs: ESPRESSO Science Team; ESPRESSO tests of the invariance of fundamental physical constants, 1102.A-0852(A); ESPRESSO, VLT; 3-7 November 2018
35. Pappalardo, C.; Confirmation of the first radio-selected galaxy at the dootstep of the EoR; ALMA - PI: Afonso - 2017.1.01713.S; 2018 Jan
36. Sanchez, N.; Lopez-Martinez, F.; Gameiro, J. F.; de Albuquerque, R. M. G.; Environment effects on the properties of T Tauri stars jets/outflows in the Taurus-Auriga star forming region; 74-INT8/18B; IDS, Isaac Newton Telescope; 15-19 November 2018
37. Santos, N. C.; “ESPRESSO Commissioning”, ESOParanal, Chile, 27 April-5May 2018
38. Sarmento, Pedro I. T. K.; Delgado Mena, E.; ESO PID 0101.C-0106; HARPS @ La Silla, Chile; 18-26th June 2018
39. Serrano, Luisa M.; Help Astronomer for ESPRESSO GTO, November 2018
40. Scott, T. C.; Isaac Newton Telescope (INT) WFC 1’ x 5’ deep Ha imaging survey of A 1367 1 week proposal submitted and accepted as part of WEAVE cluster survey (PI: E. Brinks), 2018 September

41. Scott, T. C.; Big Telescope Alt-azimuth(BAT) 6m telescope, spectroscopic survey of galaxies and tidal debris in 5 dwarf–dwarf merging systems. (PI:Anna Saburova) submitted and accepted, 2018 September
42. Scott, T. C.; SALT spectroscopic proposal for three low surface brightness dwarf galaxies (proposal 2018-1-SCI-023) accepted and in observing cue, (PI: P. Lagos), 2018
43. Scott, T. C.; GMOS Gemini south GMOS–IFU proposal for four cometary XMP BCD galaxies, accepted(13.8hrs) GS-2018B-Q-207 (PI: P. Lagos) submitted and accepted, 2018
44. Scott, T. C.; GMOS Gemini north GMOS long slit spectroscopy proposal metal rich dwarf JBK 119, not approved (PI: C Sengupta), 2018
45. Scott, T. C.; HCT 2018 cycle 2 proposal submitted for observations of TDG candidates, P09 accepted 2 nights (PI: C. Sengupta), 2018
46. Scott, T. C.; GMRT cycle 34, Are metal rich blue diffuse dwarf galaxies evolved tidal dwarf galaxies? proposal accepted (24hrs), proposal ID: 34 058, (PI: C. Sengupta), 2018
47. Stroe, A.; Sobral, D.; Paulino Afonso, A.; Shocks and turbulence: the effect of disturbed environments on galaxy evolution; 0101.A-0036(A); VLT/FLAMES (UT2-Kueyen); April 1 - September 30, 2018, P101 (service mode)
48. Stroe, A. et al. including Paulino Afonso, A.; Galaxy evolution in the most massive high redshift cluster; 0101.A-0359(A); VLT/KMOS (UT1-Antu); April 1 - September 30, 2018, P101 (service mode)
49. Sousa, Sérgio A. G.; Santos, N. C.; Delgado Mena, E.; Adibekyan, Vardan Zh; Tsantaki, Maria; Ferreira, Andressa C. S.; Rojas-Ayala, Bárbara; Figueira, Pedro; Demangeon, Olivier D. S.; Mortier, A.; Israelian, Garik; Barros, Susana C. C.; Brandão, Isa M.; Antoniadis Karnavas, Alexandros; Faria, João P. S.; “Know the star to know the planet: improving the catalog of exoplanet host stars with homogeneous parameters and chemical abundances 5.5 hours with UVES at the ESO VLT UT2”, Paranal, ESO, Chile. (0102.C-0226)
50. Sousa, Sérgio A. G.; Santos, N. C.; Delgado Mena, E.; Adibekyan, Vardan Zh; Tsantaki, Maria; Ferreira, Andressa C. S.; Rojas-Ayala, Bárbara; Figueira, Pedro; Demangeon, Olivier D. S.; Mortier, A.; Israelian, Garik; Barros, Susana C. C.; Brandão, Isa M.; Antoniadis Karnavas, Alexandros; Faria, João P. S.; “Know the star to know the planet: improving the catalog of exoplanet host stars with homogeneous parameters and chemical abundances 10.1 hours with UVES at the ESO VLT UT2”, Paranal, ESO, Chile. (0101.C-0049)
51. Widemann, T.; Machado, P.; Lee, Yeon Joo; Gonçalves, R.; Ground and Space Coordinated observations of Venus atmosphere at different altitudes; ESPaDOnS/ Canada-France-Hawaii telescope; 18-21 August 2018

Outreach talks [135]

1. Afonso, J.; “Do Big Bang ao oceano de Galáxias”, Lisbon, Festival Antena 2 - Conferência/debate: "Explorar o Universo: viver fora da Terra", February 2018
2. Afonso, J.; “Galaxódromo”, Parlamento, May 2018
3. Afonso, J.; “Mais perto do Inatingível”, Planetário Calouste Gulbenkian - Lisboa, September 2018
4. Afonso, J.; “Sistema Solar e mais além...”, Escola EBJI Santo António (sala ano 4), June 2018
5. Akinsanmi, B.; “Detecting other worlds and their features”, Abuja Nigeria, August 2018
6. Barreiro, T.; “Universo misterioso”, Noites no Observatório, October 2018
7. Barros, B.; “Constituição e Evolução do Universo”, Escola Básica Ferreira de Castro, Lisbon, Portugal, December 2018
8. Barros, Susana C. C.; Universidade Junior, CAUP, July 2018
9. Brinchmann, J.; "Galaxy Evolution with Euclid"; Oude Sterrewacht, Leiden, the Netherlands; July 2018
10. Buitrago, F.; "A historia do nosso superuniverso" - Espaço vai à escola (Ciência Viva) - Escola Básica Natália Correia, Lisboa
11. Cabral, A.; Palestra: “Caçador de Planetas”, Noites no Observatório (Planetário Calouste Gulbenkian), November 2018
12. Cabral, A.; Palestra: “Grandes telescópios, espectrógrafos e a luz na busca de planetas extra solares”, Escola Secundária José Gomes Ferreira, Carnide - Lisboa, January 2018
13. Cabral, A.; Palestra: “Grandes telescópios, espectrógrafos e a luz na busca de planetas extra solares”, Colégio Manuel Bernardes, January 2018
14. Cabral, A.; Palestra: “Os grandes telescópios do Observatório Europeu do Sul”, 6ª Concentração de Telescópios, Moimenta da Beira, May 2018
15. Camacho, J.; “The search of exoplanets”; “Olimpíadas da Física” held at FCUP, Porto, May 2018
16. Campante, T. L.; Planetas ao som das estrelas; Dark Sky Party Alqueva 2018, Reguengos de Monsaraz, Portugal, July 2018
17. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola básica 2/3 de Avelar, Ansião; October 2018
18. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola Básica António Rodrigues Sampaio, Marinhas, Esposende; November 2018
19. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola Básica de Forjães, Esposende; November 2018
20. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola Básica e Secundária À Beira Douro, Medas/Gondomar; October 2018
21. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola Básica e Secundária de Nogueira, Lousada; October 2018
22. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola Básica e Secundária de Lousada Norte, Lustosa, Lousada; October 2018

23. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola Básica Ferreira Lapa, Sátão; November 2018
24. Carvalho, P. M.; “Da Idade da Magia a Galileu”; Escola Básica Grão Vasco, Viseu; October 2018
25. Carvalho, P. M.; “O Universo: Escalas e Conteúdo”; Escola Secundária da Trofa; October 2018
26. Carvalho, P. M.; “O Universo: Escalas e Conteúdo”; Escola Secundária Dr. António Granjo, Chaves; November 2018
27. Carvalho, P. M.; “Um Universo de Informação: a ‘Luz’”; Agrupamento de Escolas D. Maria II, Gavião/V. N. de Famalicão; October 2018
28. Carvalho, P. M.; “Um Universo de Informação: a ‘Luz’”; Escola Básica e Secundária de Moimenta da Beira; October 2018
29. Carvalho, P. M.; “Uma Viagem pelo Universo”; Escola Básica do Valado, Valongo; October 2018
30. Coelho, J.; “Optical Design Tools and Approaches, in: Topics in Optics for Space & Ground Based Astronomical Instruments”, 2018 SPOF Summer School, FCUL;September 2018
31. Delgado Mena, E.; “Somos feitos de poeira das estrelas”, Ignite-Astro Ciencia Viva, Lisboa, November 2018
32. Ferreira, V. M. C.; “Unveiling the Dark Side of the Universe”, CAUP, Astronomy Students Day, May 2018
33. Leite, A. C. O.; “Espectroscopia – Descodificando a luz dos Astros”, Escola Básica e Secundária Rodrigues de Freitas, Porto, October 2018.
34. Leite, A. C. O.; “Espectroscopia – Descodificando a luz dos Astros”, Colégio de Amorim, Amorim, October 2018
35. Leite, A. C. O.; “Espectroscopia – Descodificando a luz dos Astros”, Escola Secundária Dr. Joaquim Gomes Ferreira Alves, Valadares, October 2018.
36. Leite, A. C. O.; “Telescópios - Do Galileu aos ELT”s, Escola Básica Adriano Correia de Oliveira, Avintes, November 2018
37. Lima, João J. G.; “Mistérios do Sol e de Outras Estrelas”, Ignite Júnior, Porto, February 2018;
38. Lobo, C.; “A Via Láctea e as outras galáxias”, Amorim (Colégio de Amorim), November 2018
39. Lobo, C.; “A Via Láctea e as outras galáxias”, Oliveira do Douro (Escola Secundária Gaia Nascente), November 2018
40. Lobo, C.; “A Via Láctea e as outras galáxias”, Porto (Centro de Astrofísica da Universidade do Porto), July 2018
41. Lobo, C.; “A Via Láctea e as outras galáxias”, Porto (Centro de Astrofísica da Universidade do Porto), July 2018
42. Lobo, C.; “A Via Láctea e as outras galáxias”, Valongo (Escola Básica Vallis Longus), October 2018
43. Lobo, C.; “A Via Láctea e as outras galáxias”, Vila Nova de Gaia (Escola Básica Anes de Cernache), October 2018
44. Lobo, C.; “Afinal... o que se passa numa galáxia?”, Porto (FCUP), May 2018
45. Lobo, C.; “Buracos negros supermassivos: os monstros nos centros das galáxias!”, Lisboa (Planetário Calouste Gulbenkian), June 2018
46. Lobo, C.; “Dentro de um enxame... de galáxias!”, Guimarães (Auditório da Associação Comercial e Industrial de Guimarães), October 2018
47. Lobo, C.; “Dentro de um enxame... de galáxias!”, Lisboa (Auditório António Almeida Santos), May 2018
48. Lobo, C.; “Dentro de um enxame... de galáxias!”, Lisboa (Pavilhão do Conhecimento), November 2018
49. Lobo, F.; Palestra “2017 Nobel Prize in Physics for a discovery that shook the world”, Seminar LIP, March 2018
50. Lobo, F.; Palestra “2017 Nobel Prize in Physics for a discovery that shook the world”, Seminar Instituto de Medicina Molecular, June 2018
51. Lobo, F.; Palestra “Mistérios dos Buracos Negros”, Lisboa -- Planetário Calouste Gulbenkian – CCV, June 2018
52. Lobo, F.; Palestra “Ondas Gravitacionais: Uma descoberta que abalou o mundo”, Sec. de Astronomia – Coimbra, April 2018
53. Lobo, F.; Palestra: “A Física do Interstellar”, Projeto “Espaço vai à Escola”, Escola Secundária Seomara da Costa Primo, October 2018
54. Lobo, F.; Palestra: “A Física do Interstellar”, Projeto “Espaço vai à Escola”, Escola Básica e Secundária Padre Alberto Neto, November 2018
55. Lobo, F.; Palestra: “O Universo: sua formação e constituição”, Projeto “Espaço vai à Escola”, 23-10-2018, Escola Básica de Monte Abraão
56. Lobo, F.; Palestra: “O Universo: sua formação e constituição”, Projeto “Espaço vai à Escola”, Colégio Militar Largo da Luz, October 2018
57. Lobo, F.; Palestra: “O Universo: sua formação e constituição”, Projeto “Espaço vai à Escola”, Escola D. João V Rua Maria Lamas, November 2018
58. Lobo, F.; Palestra: “O Universo: sua formação e constituição”, Projeto “Espaço vai à Escola”, Escola Básica Domingos Jardo, November 2018
59. Lobo, F.; Palestra: “O Universo: sua formação e constituição”, Projeto “Espaço vai à Escola”, Escola Básica Colares, November 2018
60. Lobo, F.; Palestra: “O Universo: sua formação e constituição”, Projeto “Espaço vai à Escola”, Escola Básica D. Francisco Manuel de Melo, November 2018
61. Lobo, F.; Palestra: “O Universo: sua formação e constituição”, Projeto “Espaço vai à Escola”, Queluz, November 2018
62. Lobo, F.; Palestra: “ondas gravitacionais”, Projeto “Espaço vai à Escola”, Escola Secundária de Mem Martins, October 2018
63. Lopez-Martinez, F.; “Sobre la infancia y adolescencia de las estrellas”; Palencia, Spain; October 2018.
64. Machado, P.; "Encontro com o Cientista", Planetário Gulbenkian, November 2018.
65. Machado, P.; "Um Natal fora da Terra", Planetário Gulbenkian, December 2018.
66. Machado, P.; “Atmosferas Planetárias”, Planetário Gulbenkian, May 2018
67. Machado, P.; “Marte 2030” - Centro Cultural de Belém, December 2018.
68. Machado, P.; Ignite Parlamento, May 2018.

69. Machado, P.; Ignite Pavilhão do Conhecimento, October 2018.
70. Martins, C. J. A. P.; “A Física da Gravidade e dos Satélites”, E.S. João de Deus, Faro, January 2018
71. Martins, C. J. A. P.; “A Física da Gravidade e dos Satélites”, E.S. Quinta das Palmeiras, Covilhã, October 2018
72. Martins, C. J. A. P.; “A Física da Gravidade e dos Satélites”, E.S. D. João II, Setúbal, October 2018
73. Martins, C. J. A. P.; “A Física da Gravidade e dos Satélites”, E.S. José Falcão, Miranda do Corvo, October 2018
74. Martins, C. J. A. P.; “A Física da Gravidade e dos Satélites”, E.S. de Ponte de Sôr, October 2018
75. Martins, C. J. A. P.; “A Física da Gravidade e dos Satélites”, E.S. Dr. António Granjo, Chaves, November 2018
76. Martins, C. J. A. P.; “A Física da Vida e dos Extraterrestres”, E.S. Almeida Garrett, Vila Nova de Gaia, January 2018
77. Martins, C. J. A. P.; “A Física da Vida e dos Extraterrestres”, E.S. Filipa de Lencastre, Lisboa, January 2018
78. Martins, C. J. A. P.; “A Física da Vida e dos Extraterrestres”, E.R. José Dinis da Fonseca, Guarda, October 2018
79. Martins, C. J. A. P.; “A Física da Vida e dos Extraterrestres”, E.S. do Vale do Tamel, Barcelos, October 2018
80. Martins, C. J. A. P.; “A Física das Estrelas”, Colégio Júlio Dinis, Porto, January 2018
81. Martins, C. J. A. P.; “A Física das Estrelas”, E.S. de Castro Verde, November 2018
82. Martins, C. J. A. P.; “A Física das Estrelas”, E.S. Domingos Sequeira, Leiria, October 2018
83. Martins, C. J. A. P.; “A Física do Big Bang”, E.S. de Salvaterra de Magos, November 2018
84. Martins, C. J. A. P.; “A Física do Big Bang”, E.S. João de Deus, Faro, November 2018
85. Martins, C. J. A. P.; “A Física do Big Bang”, E.S. José Gomes Ferreira, Lisboa, January 2018
86. Martins, C. J. A. P.; “A Física do Big Bang”, E.S. José Régio, Vila do Conde, November 2018
87. Martins, C. J. A. P.; “A Física do Big Bang”, E.S. Laura Ayres, Quarteira, November 2018
88. Martins, C. J. A. P.; “A Física do Big Bang”, E.S. Sidónio Pais, Caminha, October 2018
89. Martins, C. J. A. P.; “A Física do Big Bang”, Rómulo – CCV U. Coimbra, February 2018
90. Martins, C. J. A. P.; “A Física do Big Bang”, Universidade Júnior, CAUP, July 2018
91. Martins, C. J. A. P.; “A Física do Big Bang”, Universidade Júnior, CAUP, July 2018
92. Martins, C. J. A. P.; “ELT – How to Prepare a Revolution”, CEIA-PPCB, Paredes de Coura, August 2018
93. Martins, C. J. A. P.; “Neptune and Vulcan”, CEIA-PPCB, Paredes de Coura, August 2018
94. Martins, C. J. A. P.; “Supercomputing, Science and Art”, CEIA-PPCB, Paredes de Coura, August 2018
95. Martins, C. J. A. P.; “The Physics of Sport”, CEIA-PPCB, Paredes de Coura, August 2018
96. Martins, C. J. A. P.; A Física da Gravidade e dos Satélites”, E.S. Cacilhas-Tejo, Almada, October 2018
97. Martins, Jorge H. C.; “Objetoteca Popular Itinerante” as a guest astronomer discussing the immensity of the Universe; (Feira dos Passarinhos, Porto, Portugal), August 2018:
98. Mimoso, J.; "Black Holes and Revelations", LIP, April 2018
99. Mimoso, J.; "Buracos Negros e Revelações", ADC Banco de Portugal, May 2018
100. Mimoso, J.; “Do Big Bang às Galáxias” at Biblioteca da Escola Professor Ruy Luís Gomes, Laranjeiro, February, 2018
101. Mimoso, J.; “Do Big Bang às Galáxias” at Escola Profissional Agrícola Fernando Barros Leal, Runa, Torres Vedras, November 2018.
102. Monteiro, M. J. P. F. G.; “Mistérios do Sol e de outras Estrelas”, Palestra da iniciativa
103. Monteiro, M. J. P. F. G.; “O Espacço: a última fronteira”, Palestra integrada no Ignite Astro, na Assembleia da República (no Dia Nacional dos Cientistas), Lisboa, May 2018
104. Nunes, N. J.; “The Autumn’s sky”, Escola Basica Vasco da Gama, Sines, November 2018
105. Nunes, N. J.; “The Autumn’s sky”, Escola Secundária Poeta Al Berto, Sines, November 2018
106. Nunes, N. J.; “The unbearable lightness of the Universe”, Noites no Observatório,, January 2018
107. O Projecto ELT – Como se prepara uma revolução, IberiCos 2018 Public Talk, Lisbon, March 2018
108. Rebordão, J; “The 2018 Nobel Prize in Physics: optical tweezers and Chirped Pulse Amplification”; FCUL / Physics Department, November 2018
109. Rubiera-Garcia, D.; Public talk: “Viaje al interior de un agujero negro”; Centro de Cultura Antiguo Instituto, Gijón, Spain, December 2018
110. Rubiera-Garcia, D.; Publick talk: “Agujeros negros, otros animales fantásticos y cómo encontrarlos”; Jardín Botánico, Valencia, Spain, October 2018.
111. Santos, N. C.; Debate na Feira das Profissões, Colégio Alemão do Porto, April 2018
112. Santos, N. C.; Dias Abertos FCUP: ação sobre Espectroscopia, 22 de February 2018
113. Santos, N. C.; Palestra e debate: “Mistérios dos Sistemas Planetários”, no evento “Vamos todos descobrir o Espaço!” organizado pela revista Visão Junior e pelo Instituto de Astrofísica e Ciências do Espaço (IA), Planetário do Porto, April 2018
114. Santos, N. C.; Palestra: “À procura de outras Terras”, TEDx Lamego, October 2018
115. Santos, N. C.; Palestra: “Exoplanetas: outros mundos”, na Universidade Júnior (Univ. Porto), Porto, July 2018
116. Santos, N. C.; Palestra: “Outras Terras no Universo?”, Observatório do Lago Alqueva, Monsaraz, December de 2018
117. Santos, N. C.; Palestra: “Outras Terras! Mais vida no Universo?”, no Centro Ciência Viva Rómulo de Carvalho, Coimbra, June 2018
118. Santos, N. C.; Palestra: “Portugal e os descobrimentos: à procura de outras Terras”, V encontro internacional da Casa das Ciências, Guimarães, July 2018
119. Santos, N. C.; Palestra: “Um ESPRESSO para outros mundos”, no evento Ignite Astro ‘especial’ na Assembleia da República, Lisboa, May 2018
120. Silva, J.; “Jupiter, Lord of the Heavens - A smaller ’solar’ system”; Planetarium Calouste Gulbenkian, September **2017**

121. Sousa, Sérgio A. G.; “À Descoberta de Planetas Extra-Solares”, Escola secundária José Régio, Vila do Conde, October 2018
122. Sousa, Sérgio A. G.; “À Descoberta de Planetas Extra-Solares”, Escola Básica Adriano Correia de Oliveira, Avintes, Vila Nova de Gaia, October 2018
123. Sousa, Sérgio A. G.; “À Descoberta de Planetas Extra-Solares”, Colégio de Ermesinde, Ermesinde, November 2018
124. Sousa, Sérgio A. G.; “Medindo Exoplanetas”, at Ignite Astro – Guimarães, October 2018
125. Tomar, Portugal, November 2018
126. Vrard, M.; University of Porto Fair, Communication towards high-school students, April 2018
127. Yun, J.; “Disrupção Climática”, Escola Secundária de Sesimbra, March 2018
128. Yun, J.; “Planeta Terra: Catástrofe em Câmara Lenta”, Empresa CENFIM, March 2018
129. Yun, J.; “Planeta Terra: Catástrofe em Câmara Lenta”, Empresa Turbomar, Sep 2018.
130. Yun, J.; “Planeta Terra: Catástrofe em Câmara Lenta”, Escola Secundária do Barreiro, May 2018
131. Yun, J.; “Planeta Terra: Catástrofe em Câmara Lenta”, Livraria Ler Devagar, May 2018.
132. Yun, J.; “Planeta Terra: Catástrofe em Câmara Lenta”, Observatório Astronómico da Universidade de Coimbra, 12 May 2018.
133. Yun, J.; “Planeta Terra: Catástrofe em Câmara Lenta”, Planetário Gulbenkian, February 2018.
134. Yun, J.; “Planeta Terra: Catástrofe em Câmara Lenta”, Rede AGRO da Universidade de Lisboa, 22 Jun. 2018.
135. Yun, J.; “Quiz de Astronomia”, Observatório do Lago do Alqueva, January 2018.

Reports [7]

1. Abreu, M.; Coelho, J.; Cabral, A.; "Hartmann test sensitivity report"; PLATO-UOL-PL-RP-0001
2. Abreu, M.; Coelho, J.; Cabral, A.; Alves, D.; "Optical ground support equipment at room temperature collimator design report"; PLATO-UOL-PL-RP-0002
3. Amiaux, J.; Burigana, C.; Cardone, V. F.; Carvalho, C. S.; Cuillandre, J. C.; da Silva, A.; De Rosa, A.; Dinis, J.; Hudelot, P.; Maiorano, E.; Maris, M.; Scaramella, R.; Tereno, I.; “Mission Operation Concept Document part B”, Euclid Technical Report EUCL-EC-RP-8-001, 146 pages
4. Cabral, A.; Ávila G.; Abreu, M.; “ESPRESSO, Coudé Train Maintenance Manual and Spare Part List”; VLT-TRE-ESP-13520-0257, Issue 1.0, 113 pages
5. Cabral, A.; Coelho, J.; “MOONS Technical Note on Field Corrector Update”, MON-RFE-WP1.1-0003 1.0, 15 pages
6. Cabral, A.; Hayati, M.; “MOONS RFE Earthquake Analysis”, VLT-TRE-MON-14620-1011 2.0, 210 pages
7. Franco,N.; Abreu, M.; Alves, D.; Almeida, R.; Costa, R.; Acef, O.; Duque, P.; "eLISA: TN12 – GSE Description; High-power Laser Head for a Gravitational Wave Observatory Mission"; LS-NGO-TNO-0012

External seminars by IA researchers [30]

1. Afonso, J.; Witnessing the birth of galaxies with the most powerful telescopes; Physics Department, Faculty of Sciences, University of Lisbon, Lisbon; October 2018
2. Barreiro T.; “Is dark energy really a constant”; Universidade de Aveiro; Portugal; November 2018
3. Brinchmann, J.; "Dwarfs seen by MUSE"; Göttingen; Germany; July 2018
4. Brinchmann, J.; "Everything but w. Legacy science with the Euclid space mission"; Aveiro; Portugal; April 2018
5. Buitrago, F.; “Indiana Jones and where to find galaxy relics”; Instituto de Astrofísica de Canarias, España, November 2018
6. Cabral, A.; “ESPRESSO, a rocky exoplanet hunter for the ESO-VLT”, Departamento de Física, Faculdade de Ciências da Universidade de Lisboa, October 2018
7. Cortes, M.; “The Universe that does not know the time”, Led journal club discussion presenting article by authors João Magueijo and Lee Smolin (https://arxiv.org/abs/1807.01520), December, 2018
8. de Albuquerque, R. M. G.; “Simulating accretion and outflow regions in YSOs”, Department of Astronomy, Alba Nova, University Centre, Stockholm, Sweden, May 2018
9. Gilli, G.; “Exploring the atmosphere of Venus, using a Global Circulation Model”, University of Aveiro, Portugal, May 2018
10. Gilli, G.; “Exploring the atmosphere of Venus, using a Global Circulation Model”, Faculdade de Ciências de Lisboa (FCUL), Portugal, March 2018
11. Gilli, G.; “How to simulate the atmosphere of different planets using (almost) similar numerical tools”; Faculdade de Ciências de Lisboa (FCUL), Seminarios de Astro-tecnologia, Lisboa, Portugal, May 2018
12. Kumar, M. S. Nanda; “Formation of O-stars: an ALMA view”, Institute of Astronomy, National Central University, Taoyuan, Taiwan, January 2018
13. Kumar, M. S. Nanda; “Formation of the very high mass stars”, Colloquium, Indian Institute of Astrophysics, Bangalore, India, February 2018
14. Kumar, M. S. Nanda; “Formation of the very high mass stars”, Tata Institute of Fundamental Research, Mumbai, India, February 2018

15. Kumar, M. S. Nanda; “High-mass star formation: A revised view”, Hong Kong University, November 2018
16. Kumar, M. S. Nanda; “High-mass star formation: A revised view”, Nagoya University, November 2018
17. Kumar, M. S. Nanda; “O star formation: ionized accretion flows”, Academia Sinica Institute of Astronomy & Astrophysics, Taipei, Taiwan, February 2018
18. Leite, A. C. O.; “Fundamental Laws of Nature - Variation of fundamental couplings”; Observatorio Astronomico di Trieste, Trieste, Italy; May 2018
19. Leite, A. C. O.; “Science with ESPRESSO: cosmology and fundamental physics at few m/s precision”; Osservatorio Astronomico di Brera, Merate, Italy; May 2018
20. Martins, C. J. A. P.; “Placing Stringent Constraints on the CMB Temperature at High Redshift with ESPRESSO”, ESPRESSO Science Team Workshop, Madrid, Spain, January 2018
21. Martins, C. J. A. P.; “The ESPRESSO Fundamental Couplings Science Case”, ESPRESSO Science Team Workshop, Madrid, Spain, January 2018
22. Palmeirim, P.; “Star formation along filaments and ionised HII bubble regions”; Nagoya University, Japan; March 2018
23. Pappalardo, C.; “The Portuguese ALMA Centre of Expertise: ALMA research in Portugal after 3 years”; Seminar FCUL - Lisbon (Portugal); March 2018
24. Reis, Sandra N.; “Deep imaging of the most massive galaxies of the nearby Universe”; Garching, Germany; July 2018
25. Rubiera-Garcia, D.; “Black holes and other compact objects in metric-affine Ricci-based theories of gravity”; Institute of Space Sciences, Barcelona, Spain, March 2018
26. Rubiera-Garcia, D.; “Black holes, other exotic beasts, and how to find them”; Lisbon University, Portugal, November 2018
27. Rubiera-Garcia, D.; “Nice, clean and easy: how spacetime singularities can be resolved within Palatini gravity”; Valencia University, Spain, December 2018
28. Rubiera-Garcia, D.; “Reissner-Nordström black holes and other compact objects in Palatini theories of gravity”; SISSA, Trieste, Italy, October 2018
29. Rubiera-Garcia, D.; “Surviving from a journey into a black hole”; (Webminar broadcasted in Youtube); Latin American Webminars in Physics, June 2018
30. Santos, N. C.; “PLATO PSM/PDC/Follow-Up interfaces”, PLATO Week 7, Cambridge, UK, December 2018

PhD completed [6]

1. João Faria; *Exoplanet detection in metal-poor star;: a fundamental test for planet formation models*; Supervisor(s): N. C. Santos, P. Figueira; 26 January 2018
2. Daniel Andreasen; *Determination of stellar parameters for M-dwarf stars: the NIR approach*; Supervisor(s): S. G. Sousa, N. C. Santos; 20 April 2018
3. Jorge Martins; *Characterizing the atmosphere of exoplanets through transmission and reflected light spectroscopy*; Supervisor(s): P. Figueira, N. C. Santos; 2 July 2018
4. Ana Rei; *The activity and evolution of low-mass Young Stellar Objects*; Supervisor(s): J. F. Gameiro; 24 July 2018
5. Leyla Ebrahimpour; *Characterizing dark energy with EUCLID data on galaxy clusters*; Supervisor(s): P. T. P. Viana; 12 December 2018
6. Ivan Rybak; *Cosmic Paleontology: Searching for Superstrings*; Supervisor(s): C. J. A. P. Martins, A. Avgoustidis (University of Nottingham); 18 December 2018

MSc Projects completed [10]

1. Águas, João M. S.; “A multiwavelength study of massive galaxy disks across cosmic time”; Advisers(s): Israel Matute; May 2018
2. Castelão, Diogo; “Testing cosmological structure formation in Unified Dark Matter-Energy models”; Advisers(s): Ismael Tereno; January 2018
3. Dréau, Guillaume; “On the determination of Helium abundance in red-giant stars”; Adviser(s): Mathieu Vrard; June 2018
4. Duarte, Felipe B.; “Tecno Specere”; Advisers(s): Paulo Pereira, Filipe Pires; December 2018
5. Guedes, Guilherme L. S. F.; “Gravitational wave background generated by a network of cosmic string created during primordial inflation”; Advisers(s): Lara Sousa; November 2018
6. Neves, Rita; “Dynamics in Loop Quantum Cosmology”; Advisers(s): Mercedes Martin Benito; July 2018
7. Santos, João G.; “Photometry Data Processing for ESA's CHEOPS Space Mission”; Adviser(s): Sérgio G. Sousa, João Fernandes (Universidade de Coimbra); Advisers(s): July 2018
8. Singh, Gyanender; “Selecting the best spectral lines for radial velocity and equivalent width measurements”, Advisers(s): Vardan Adibekyan; September 2018
9. Sleiman, Jana; “Search for exoplanetary phase-curve in K2 data”; Advisers(s): Olivier Demangeon; June 2018
10. Teixeira, Elsa; “Disformally coupled models of dark energy”; Advisers(s): Nelson Nunes, Ana Nunes; October 2018

BSc Traineeships/Projects completed [32]

(under the supervision of IA researchers)

1. Atayde, Luis; “Testing Generalized Covariant Galileon with cosmological data” (Internship-Scientific Initiation Studentship), February/July 2018
2. Atayde, Luis; “Voids and Clusters: Detection Algorithms and their Cosmological Application”, Departamento de Física, Faculdade de Ciências da Universidade de Lisboa, October 2018/February 2019
3. Caldeira, António; “Exploring the impact of modifications of gravity law on cosmological observables”, October 2017/February 2018
4. Clara, Miguel; “Primordial nucleosynthesis and varying constants” (PEEC), 2017/2018
5. Conceição, Miguel; “Estimação dos Campos de Densidade em Simulações Cosmológicas com Métodos de Aprendizagem Computacional Supervisionada”, Bachelor internship, Physics Department, Facultad de Ciências, Universidad de Lisboa, April/July 2018
6. Domingues, Gonçalo; Bolsa de Iniciação Científica
7. Dréau, Guillaume; “Determining helium abundances in evolved stars”, (Internship from Paris-Sud University), April/July 2018
8. Faria, Maria; “Redshift drift tests of modified gravity” (PEEC), 2017/2018
9. Guerra, Gonçalo; “Simulações semi-analíticas de estrutura cosmologia em modelos com simetria esférica homogéneos (FLRW) e não homogéneos (LTB)”, Laboratório de Astrofísica, Departamento de Física, Faculdade de Ciências da Universidade de Lisboa, October 2017/February 2018
10. Laranjinha, Francisco; “Modified gravity theories in light of gravitational wave constraints” (Laboratory of Astronomy), October/November 2018
11. López-Contreras, Javier; “GPU programming” (JiC Internships), 2018
12. Martins, Hugo; “Galaxy satellites in the Hubble Ultra Deep Field” (BIC project), May/July 2018
13. Martins, Pedro; “Estudo de Enxames Estelares Jovens no Infravermelho Próximo”, September/December 2018
14. Medeiros, Sofia, “Simulating the detection of exoplanet atmospheres using high resolution spectroscopy”, para a cadeira “Projeto em Astrofísica”, DFA/FCUP, February/June 2018
15. Mota, Bruno; “Searching for spatial variations of the fine-structure constant” (PEEC), 2017/2018
16. Nassauer, David; participating in the Delfos and Quark programmes and selected finalist in the Olympics of Mathematics, Physics and Informatics
17. Pereira, Cristiano J. G. N.; “Development of a new method for the determination of the ages of stars” (PEEC), March/June 2018
18. Prat, Maria; “Constraining dark energy phase transitions” (JiC Internships), 2018
19. Quirino, Diogo; “Improvement of the implementation of non-LTE parameterization in the LMD-Venus GCM” (program “Laboratory of Astrophysics”), August/October 2018
20. Rego, Gonçalo; “The Dark Side of the Universe” (OCJF Internships), July 2018
21. Reis, Mariana; Laboratory of Astrophysics; Physics Msc course
22. Rocha, Catarina I. S. A.; “Development of a new method for the determination of the ages of stars” (PEEC), March/June 2018
23. Rodrigues, Miguel; “Deviations from general relativity on non-linear cosmological scales”, October 2017/February 2018
24. Rodrigues, Miguel; “Deviations from General relativity on non-linear cosmological scales”, Laboratório de Astrofísica, Departamento de Física, Faculdade de Ciências da Universidade de Lisboa, October 2017/ February 2018
25. Santos, João; “Scaling solutions for wiggly strings” (PEEC), 2017/2018
26. Serejo, Ana; “The Dark Side of the Universe” (OCJF Internships), July 2018
27. Silva, Ana Rita; “Determination of sulphur abundances in the HARPS GTO planet search sample” (BIC project) September/December 2018
28. Silva, Carolina; “ESPRESSO Tests of the Universality of Physical Laws” (PEEC), 2017/2018
29. Silva, Tomás; “Watching the Universe Expand in Real Time” (PEEC), 2017/2018
30. Silva, Vasco; “Chemical Species as dynamical tracers of the upper atmosphere of Venus” (program “Laboratory of Astrophysics”); November 2017/January 2018
31. Vila, Meritxell; “Consistency of tests of stability of fundamental constants” (JiC Internships), 2018
32. Weigel, Diogo; “VIDE – Void finding and IDEntification”, Laboratório de Astrofísica, Departamento de Física, Faculdade de Ciências da Universidade de Lisboa, October 2017/ February 2018

COVER PICTURE ESPRESSO instrument achieves first light with all four Unit Telescopes © ESO/L. Calçada

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