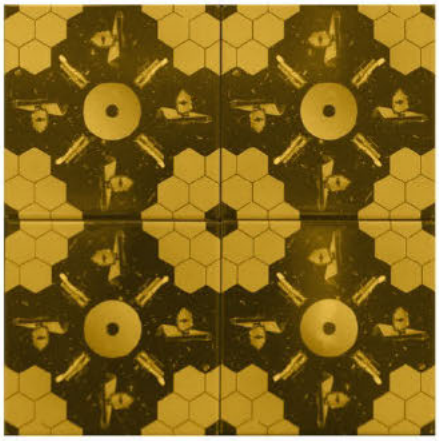
CENTRO DE ASTROFÍSICA UNIVERSIDADE DO PORTO

RELATÓRIO DE GESTÃO E CONTAS



Centro de Astrofísica
da Universidade do Porto

U.PORTO

ANO 2024

Versão aprovada pela Assembleia Geral na reunião de 2025-05-23.

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Relatório de Gestão

Caracterização da Associação

O Centro de Astrofísica da Universidade do Porto (CAUP) é uma associação científica com personalidade jurídica, tendo sido constituída em 4 de Maio de 1989 como instituição privada sem fins lucrativos, pela Universidade do Porto (U.Porto). Tem o estatuto de utilidade pública desde setembro de 1991.

A Associação tem por objetivo apoiar e promover a formação e investigação na área de Astronomia/Astrofísica e da instrumentação associada, quer através de iniciativas próprias, quer colaborando de forma independente com entidades públicas e/ou privadas, nomeadamente através do estabelecimento de parcerias, protocolos e intercâmbios nacionais e/ou internacionais, bem como desenvolver infraestruturas laboratoriais relacionadas com a área de atividade do CAUP.

Constituem fins do CAUP apoiar e promover, designadamente:

- A atividade de investigação científica fundamental e aplicada em Astronomia/Astrofísica através de projetos nele desenvolvidos, bem como a aquisição de conhecimentos básicos de caráter interdisciplinar, que abram novas perspetivas à investigação aplicada;
- A Astronomia/Astrofísica no país através da organização de conferências, cursos de curta duração, seminários e outras atividades similares;
- A formação de pessoal científico e técnico, podendo conduzir à elaboração de dissertações de mestrado ou teses de doutoramento;
- O ensino em Astronomia/Astrofísica, nomeadamente a nível de licenciatura e pós-graduação;
- A divulgação científica na área de Astronomia/Astrofísica.

Órgãos Sociais

Durante o ano de 2024, após eleições, houve mudança na composição dos Órgão Sociais do CAUP.

Os elementos que estiveram em funções até 31 de outubro de 2024 foram:

Mesa da Assembleia Geral

Presidente	Universidade do Porto (representada por Pedro N. S. Rodrigues)
Vice-Presidente	Mário J. P. F. G. Monteiro
Secretário	Sérgio A. G. Sousa

Direção

Presidente	Jarle Brinchmann
Vogal	Pedro T. P. Viana
Vogal	Margarida M. S. Cunha

Conselho Fiscal

Presidente	Filipe A. L. Pires
Relator	Universidade do Porto (Marlene S. A. T. Rebelo)
Vogal	Jorge Filipe S. Gameiro

Os elementos que assumiram funções a partir de 1 de novembro de 2024 foram:

Mesa da Assembleia Geral

Presidente	Universidade do Porto (representada por Pedro N. S. Rodrigues)
Vice-Presidente	Nuno M. C. Santos
Secretário	João J. F. G. A. Lima

Direção

Presidente	Mário J. P. F. G. Monteiro
Vogal	Margarida M. S. Cunha
Vogal	Sérgio A. G. Sousa

Conselho Fiscal

Presidente	Filipe A. L. Pires
Relator	Universidade do Porto (Marlene S. A. T. Rebelo)
Vogal	Jorge Filipe S. Gameiro

Os membros do **Conselho Consultivo** em 2024 foram:

Moira Jardine (University of St Andrews)

Mark McCaughrean (European Space Agency)

Yannick Mellier (Institut d'Astrophysique de Paris)

Francesco Pepe (Observatoire de l'Université de Genève)

Os Associados do CAUP a 31 de dezembro de 2024 eram:

- Associados Fundadores (1): Universidade do Porto
- Associados Efetivos (24): Ângela R. G. dos Santos, Catarina G. G. Lobo, Carlos J. A. P. Martins, Daniel F. M. Folha, Filipe A. L. Pires, Jarle Brinchmann, João J. F. G. A. Lima, Jorge F. S. Gameiro, Margarida M. S. Cunha, Manuel A. S. Monteiro, Maria Teresa V.T. Lago, Mário J. P. F. G. Monteiro, M. S. Nanda Kumar, Nuno M. C. Santos, J. Paulo Maurício de Carvalho, Pedro P. Avelino, Pedro T. P. Viana, Polychronis Papaderos, Ricardo S. S. C. Reis, Sérgio A. G. Sousa, Susana C. C. Barros, Tiago J. L. C. E. Campante, Vardan Adibekyan, Vitor M. M. Costa

As alterações na lista de associados que foram validadas na reunião da Assembleia Geral de 2024-12-13 foram:

- Saídas (2): António J. C. da Silva, Pedro R. L. Figueira
- Entradas (4): Ângela R. G. dos Santos, Susana C. C. de Barros, Tiago J. L. C. E. Campante, Vardan Adibekyan

Instalações

O CAUP está instalado no edifício que acolhe o Planetário do Porto, edifico este que é propriedade da U.Porto após a extinção da Fundação para a Ciência e o Desenvolvimento (FCD) em 2013, com uma área total útil de 3580 m^2. O espaço atribuído ao CAUP resulta do financiamento atribuído pelo Ministério da Ciência e Tecnologia para a construção do edifício planeado de raiz para albergar o CAUP e o Planetário do Porto.

O espaço dedicado para uso do CAUP é de 915 m^2, correspondendo a gabinetes, salas de seminários e reuniões, armazéns, sala de rede, biblioteca, observatório e Astroteca. A área restante é ocupada pelo Planetário, sendo uma parte desta partilhada, nomeadamente o átrio e o auditório (60 lugares).

O CAUP é responsável pela gestão científica, educacional e administrativa do Planetário do Porto, de acordo com o contrato sobre o exercício de poderes públicos assinado com a U.Porto em julho de 2013.

Recursos Humanos

O CAUP tem recursos humanos próprios que, no final de 2024, correspondiam a um total de 39 colaboradores com contrato de trabalho. Estes podem ser agrupados por tipo de contrato e área de trabalho da seguinte forma (a 31 de dezembro de 2024):

Contratos sem termo (total de 14):

Investigação:

1) Jorge H. C. Martins – *programador científico*

Divulgação:

2) Adriana Silva – *técnico*
3) Elsa M. P. S. Moreira – *técnico*
4) Paulo J. T. Pereira – *assessor gráfico*
5) Filipe A. L. Pires – *especialista*
6) Ricardo S. S. C. Reis – *técnico*

Informática:

7) Manuel A. S. Monteiro – *especialista*

Administração e Serviços:

8) Argentina M. T. Pereira – *técnico*
9) Carlos A. G. Gonçalves – *porteiro*
10) Elsa M. P. P. Silva – *técnico*
11) Ernesto J. Silva – *porteiro*
12) Fernando M. S. Soares – *porteiro*
13) Joana Bateira – *técnico*
14) Sara Ramos – *técnico*

Contratos a termo (total de 25):

Investigação:

1) Abhishek Chougule – *investigador júnior*
2) Ana S. Paulino Afonso – *investigador júnior*
3) André M. A. C. V. Silva – *investigador júnior*
4) Ângela R. G. Santos – *investigador júnior*
5) Carlos J. A. P. Martins – *investigador principal*
6) Clara Sousa e Silva – *investigador auxiliar*
7) Eduardo A. S. Cristo – *investigador júnior*
8) João Gomes da Silva – *investigador júnior (terminou a 31 de dezembro)*
9) José C. Fonseca – *investigador auxiliar*
10) Lara G. Sousa – *investigador júnior*
11) L. Filipe Pereira – *investigador júnior*
12) Margarida M. S. Cunha – *investigador principal*
13) Olivier D. S. Demangeon – *investigador júnior*
14) Patricio Lagos – *investigador júnior*
15) Pedro Moreno – *programador científico*
16) Polychronis Papaderos – *investigador principal*
17) Sérgio A. G. Sousa – *investigador principal*
18) Susana C. C. Barros – *investigador júnior*
19) Thomas C. Scott – *investigador júnior*
20) Tiago J. L. C. E. Campante – *investigador auxiliar*
21) Vardan Zh. Adibekyan – *investigador auxiliar*
22) William Dethier – *investigador júnior*

Divulgação:

23) Diogo de Magalhães Sant'Ana - *técnico*
24) Francisco Miguel Gonçalves - *técnico*
25) Rodrigo Oliveira – *auxiliar técnico*

Além de contratos de trabalho, o CAUP acolhe igualmente bolseiros, quer através de contratos de bolsa próprios quer sendo instituição de acolhimento de bolseiros da FCT (ver relatório de atividades) e ainda dois professores em mobilidade estatutária:

- Ilídio A. P. M. Costa
- Marisa F. G. O. Santos

Síntese da Atividade

A atividade do CAUP é estruturada em torno das iniciativas desenvolvidas no âmbito das unidades funcionais, estando atribuída uma missão específica a cada uma destas unidades:

- **Unidade de Investigação (UnI)**: coordena todas as iniciativas e atividades que estão associadas à investigação, nomeadamente seminários, conferências, reuniões de trabalho, participação em projetos científicos e/ou de instrumentação, participação em consórcios nacionais e internacionais nas áreas de investigação relevantes, participação em comités científicos, etc. Com a criação da unidade de investigação Instituto de Astrofísica e Ciência do Espaço (IA), financiada pela FCT a partir de 2015, as competências da UnI do CAUP passaram a ser delegadas na Coordenação do IA. O IA tem como instituição de gestão: CAUP, FCiências.ID, UCoimbra, FCUL.
- **Unidade de Formação (UnF):** coordena/apoia todas as atividades de formação organizadas pelo CAUP ou que têm a sua participação/colaboração, nomeadamente formação universitária (licenciatura, mestrado e doutoramento), formação contínua, cursos avançados e organização de eventos que visam reforçar a qualidade da formação oferecida pelo CAUP.
- **Núcleo de Divulgação (ND):** organiza todas as atividades de divulgação e promoção da cultura científica, incluindo as do Planetário do Porto – Centro Ciência Viva, e outras iniciativas para o público e escolas que são oferecidas pelo CAUP regularmente. Também coordena a participação do CAUP em projetos nacionais e internacionais de divulgação científica e assegura ainda a componente de imagem/grafismo e de comunicação do CAUP. Esta unidade integra e co-coordena o Grupo de Comunicação de Ciência do IA.
- **Unidade de Administração e Serviços (UnAS):** assegura todas as funções e tarefas de apoio administrativo às atividades do CAUP e sua gestão. Garante o bom funcionamento das instalações e equipamentos, incluindo os serviços de Tecnologias da Informação e Comunicação (TIC), e dá apoio à gestão das atividades, projetos e eventos na componente de contabilidade e administração. Esta unidade trabalha em proximidade com a Coordenação do IA por forma a garantir uma boa gestão desta unidade de investigação.

A descrição detalhada da atividade desenvolvida em 2024 no âmbito de cada uma destas unidades é apresentada na componente de relatório de atividades.

Situação Económico-Financeira

Em 2024 voltamos a ter um resultado líquido positivo, consequência de um resultado operacional positivo decorrente da boa execução dos financiamentos existentes ao longo do ano.

O montante global de gastos teve um aumento face a 2023, situando-se acima de dois milhões de euros, acompanhando o aumento significativo dos rendimentos que voltaram a ser superiores aos gastos, como se ilustra na Figura 1. O capital próprio teve uma ligeira subida, enquanto as disponibilidades no final do ano tiveram uma descida significativa, situando-se agora a acima de um milhão e quatrocentos mil euros.

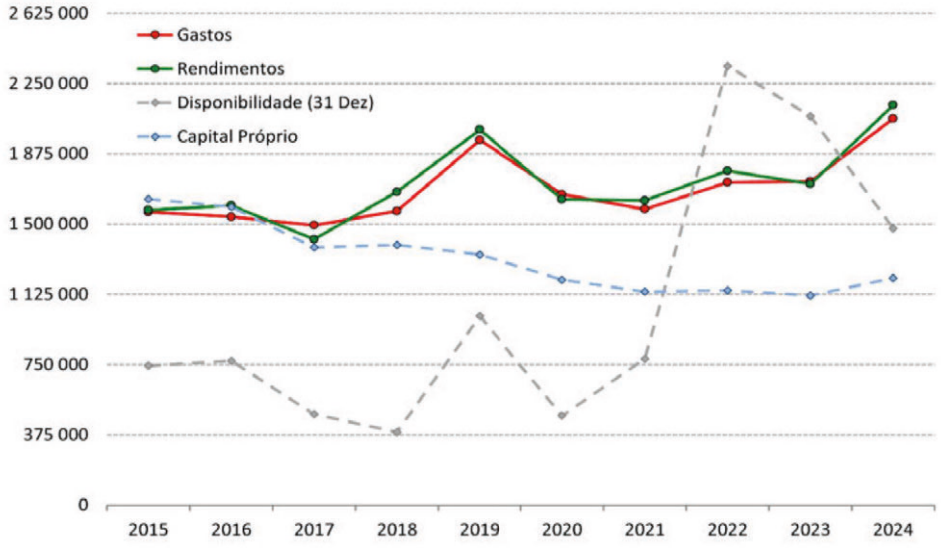


Figura 1: Evolução dos Gastos (linha vermelha) e dos Rendimentos (linha verde), para o exercício por ano fiscal, desde 2015. Os valores dados estão em euros. Também se indica as disponibilidades (linha cinzenta) existentes a 31 de dezembro de cada ano e o capital próprio (linha azul).

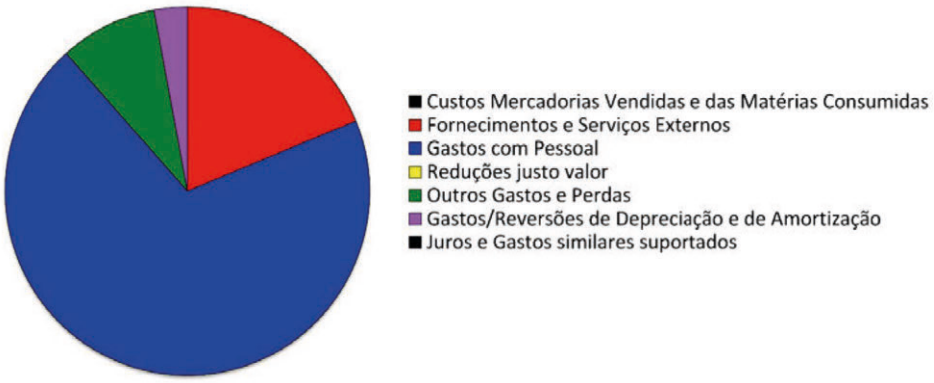


Figura 2: Distribuição dos Gastos do exercício de 2024, correspondendo a um total de 2 062 884,12 euros.

Figura 3: Distribuição dos Rendimentos do exercício de 2024, correspondendo a um total de 2 134 974,32 euros.

Uma fração significativa dos custos é, muito naturalmente, em recursos humanos, quer através de despesas com o pessoal, quer através da contratação de bolseiros. Esta fração voltou a ter uma subida em 2024 consequência da consolidação das atividades face aos anos anteriores. A Figura 2 ilustra o peso relativo das diferentes componentes de gastos nas contas em 2024. A maior componente das despesas do CAUP continua a ter lugar por via de financiamento assegurado através de projetos (Figura 3), pelo que tais despesas não representam um custo continuado além do contrato de financiamento aprovado.

O CAUP depende maioritariamente de financiamentos externos provenientes da Fundação para a Ciência e a Tecnologia (FCT), da Comissão Europeia (CE) e de outras entidades (ver a Figura 4).

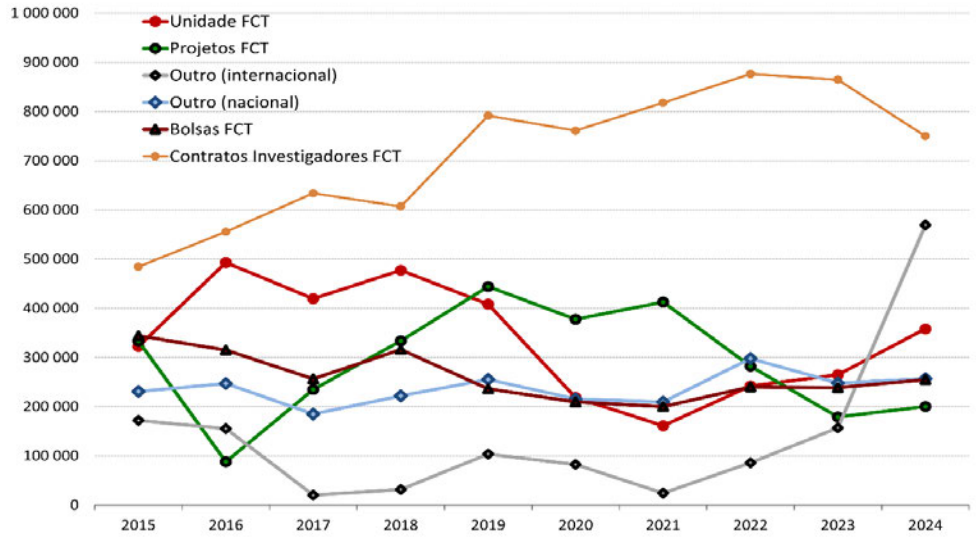


Figura 4: Distribuição das fontes de financiamento para o exercício, por ano fiscal, desde 2015.

O financiamento proveniente da Unidade I&D continuou a subir em 2024, sobretudo devido à conclusão da execução das atividades previstas para o período de financiamento. O financiamento de projetos FCT registou uma ligeira subida, consequência do término de vários projetos e do atraso no arranque das atividades dos projetos que tiveram o seu início durante o ano. O financiamento nacional proveniente de outras fontes teve uma ligeira subida, mantendo-se praticamente ao nível do ano anterior. No que respeita a outros fundos internacionais verificou-se uma subida significativa, consequência do aumento de atividade no projeto FIERCE com financiamento ERC.

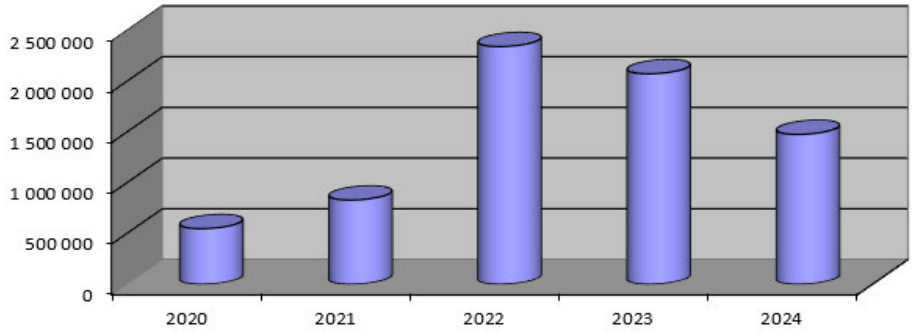
O financiamento correspondente aos contratos FCT continuou com a tendência de descida registada em 2023 devida ao término de contratos realizados no âmbito da norma transitória do DL 57/2016. No ano de 2024, esta componente correspondeu a um total de 750 000 euros (17 investigadores envolvidos). Uma outra fonte de financiamento indireto provém das bolsas de investigação atribuídas diretamente pela FCT cujo valor global teve uma ligeira subida em relação a 2023. Estas, embora não sendo executadas através do CAUP, representam um financiamento importante das atividades de investigação e formação, cuja obtenção é apenas possível através do apoio do CAUP. Em 2024, esta componente correspondeu a um total de 254 900 euros (19 alunos de doutoramento e 1 BGCT na área da divulgação e promoção da cultura científica). O peso das duas componentes (contratos de investigador FCT e bolsas FCT) é

também indicado na Figura 4. À semelhança do que acontece com os salários dos docentes, os montantes das bolsas FCT não são incluídos nas contas do CAUP.

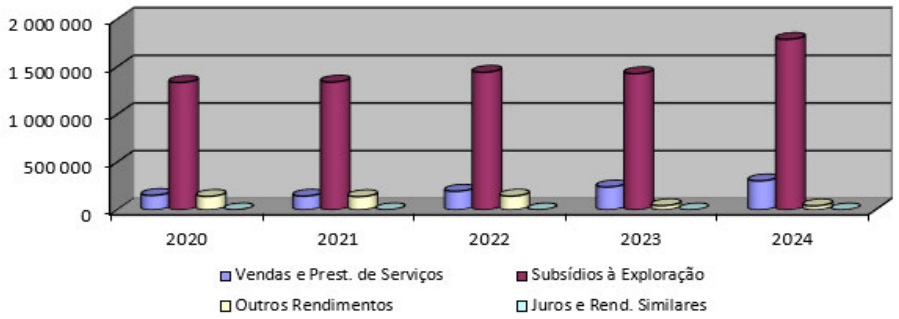
Indicadores Económico-Financeiros

Nesta seção fornecem-se alguns dos indicadores económico-financeiros das contas de 2024, em comparação com os 4 anos anteriores.

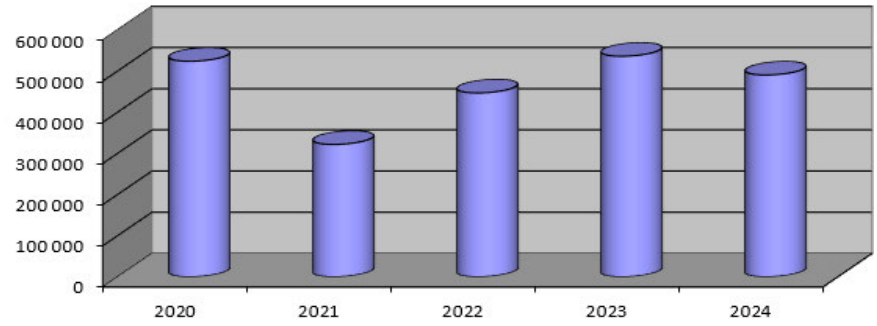
Meios Financeiros Liquidos	2020	2021	2022	2023	2024
Caixa	35	35	35	35	35
Depósitos Bancários	477 264	781 028	2 343 397	2 075 049	1 377 358
Outros Instrumentos Financ.	70 824	49 381	0	0	100 165
TOTAIS	548 123	830 444	2 343 432	2 075 084	1 477 558



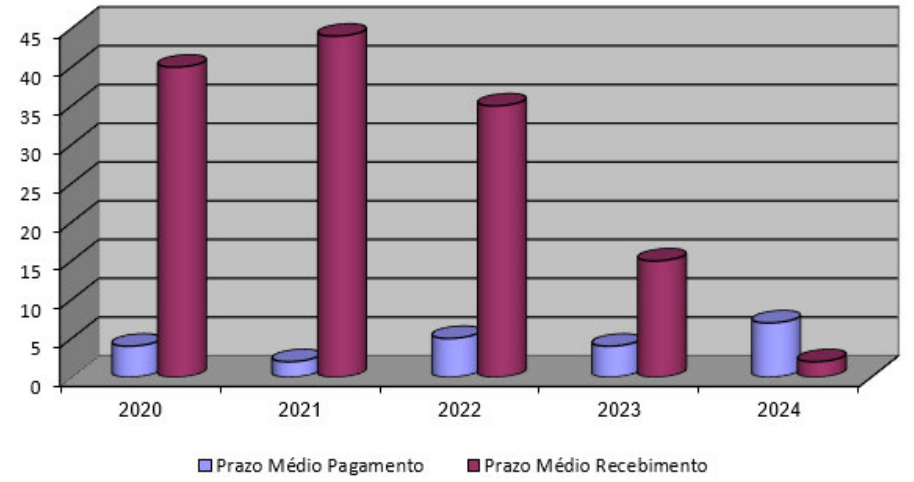
Evolução dos Rendimentos	2020	2021	2022	2023	2024
Vendas e Prest. de Serviços	152 362	144 550	195 424	240 581	304 356
Subsídios à Exploração	1 336 622	1 340 789	1 444 064	1 428 904	1 788 065
Outros Rendimentos	141 325	138 792	144 239	44 523	42 543
Juros e Rend. Similares	1 275	1 271	673	10	10
TOTAIS	1 631 584	1 625 402	1 784 400	1 714 018	2 134 974



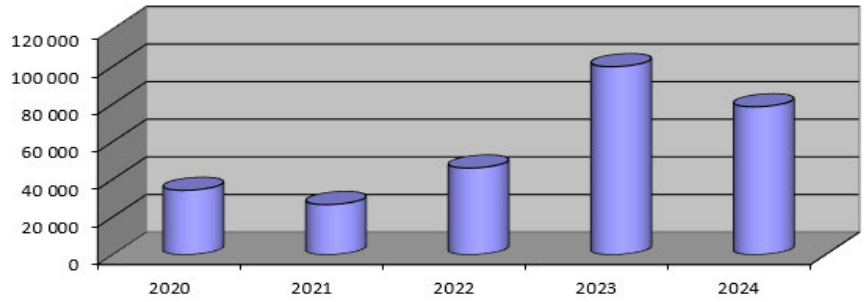
Fornecedores e Outros Passivos Correntes	2020	2021	2022	2023	2024
Fornecedores	886	375	2 663	3 761	7 696
Outros Passivos Correntes	522 785	321 333	444 147	532 187	482 685
TOTAIS	523 671	321 708	446 810	535 948	490 380



Tesouraria	2020	2021	2022	2023	2024
Prazo Médio Pagamento	4	2	5	4	7
Prazo Médio Recebimento	40	44	35	15	2



Activo Fixo	2020	2021	2022	2023	2024
Aquisições	34 248	26 668	46 110	100 010	78 668
TOTAIS	34 248	26 668	46 110	100 010	78 668



Obrigações Fiscais

A Direção informa que a situação perante a Segurança Social e as Finanças se encontra regularizada, pelo que não existe qualquer dívida vencida.

Perspetivas

Ao longo dos últimos anos o CAUP tem contado com uma baixa percentagem de financiamento proveniente da Comissão Europeia. A atribuição duma ERC Advanced Grant ao Nuno M. C. Santos em 2022 e com início de aplicação em 2023 tem, por isso, particular relevância. Porém, é fundamental assegurar que este não é um caso isolado procurando ativamente taxas de sucesso mais elevadas neste importante instrumento de financiamento. Está a ser feito, e planeamos reforçar, um esforço para estimular candidaturas dos investigadores ao Horizonte Europa e ao financiamento do ERC. Temos também conseguido assegurar financiamento para atividades relacionadas com missões espaciais (PLATO, CHEOPS) através do mecanismo PRODEX.

No final de 2023 teve início uma nova avaliação das unidades de investigação, sendo fundamental para o CAUP que o IA continue a ser classificado como "Excelente". Os resultados provisórios anunciados pela FCT confirmam que é essa a classificação sendo proposto um financiamento ligeiramente superior ao período anterior. A investigação permanece num nível elevado e a componente de divulgação continua a ter um excelente desempenho. Estas são as componentes essenciais para que o IA possa agora aproveitar este novo período para consolidar a sua liderança e reforçar os pontos fortes que tem. O CAUP continuará a contribuir para que assim seja.

O CAUP, no âmbito do IA, continuará a tentar atrair, nacional e internacionalmente, excelentes candidatos, capazes de obter bolsas individuais de doutoramento e contratos de trabalho para investigação ao nível de pós-doutoramento.

Para fortalecer a capacidade de participação em grandes projetos internacionais, foi instalado de forma definitiva o SyNaPSE, grupo de redes, serviços e software científico. Embora transversal, este grupo trabalha em estreita proximidade com o grupo de instrumentação, alavancando a sua capacidade de resposta a compromissos internacionais.

Desde 2013 que o CAUP é responsável pela gestão administrativa do Planetário do Porto, acumulando-a com a gestão educativa e científica, como especificado no contrato assinado com a U.Porto. Esta gestão garante uma forte sinergia entre a investigação científica e a divulgação, que se constitui como uma mais-valia no cumprimento do seu objetivo estatutário de contribuir para a divulgação científica em Astronomia e Astrofísica, proporcionando a possibilidade de continuar a atrair o interesse de jovens para esta área do conhecimento em particular, bem como em geral para as áreas STEM, e a contribuir para a literacia científica da população.

O Planetário teve um bom ano em 2024 e esperamos uma continuação em 2025. No entanto, planeamos aumentar ligeiramente o preço dos bilhetes, pelo que temos de estar atentos à capacidade das escolas para participarem nos eventos. Esperamos continuar com o sucesso dos últimos anos na criação de novas sessões de Planetário, mas para isso será provavelmente necessário identificar novas fontes de financiamento.

Em 2024 o CAUP teve dois projetos financiados na área da divulgação: Instalação da Escola Ciência Viva, Monotorização dos Clubes Ciência Viva nas Escolas, com contribuições significativas da Ciência Viva – Agência Nacional para a Cultura Científica e Tecnológica, uma imagem da importância dada a esta área de atuação.

No final de 2024 a Universidade do Porto fez a atualização de todo o sistema de projeção do Planetário do Porto, um investimento de cerca de 220 mil euros. Esta atualização era necessária porque o sistema tinha 10 anos de uso diário. Os projetores estavam descontinuados e sem garantias de reparação em caso de avaria, no sistema informático com exceção das placas gráficas a situação era semelhante. O Planetário corria o risco de ter uma falha critica e fechar por um período de tempo indeterminado.

A Universidade também já acordou avançar com a adaptação do espaço que era a cafetaria, para se instalar uma AstroLab do Futuro, pelo que em 2025 se irá trabalhar nesse sentido ampliando significativamente as capacidades do Planetário de acolher grupos de estudantes num leque diversificado de atividades (incluindo em Laboratórios).

Aplicação dos Resultados

É convicção da Direção que o Relatório de Gestão e os demais documentos de prestação de contas retratam de forma clara e apropriada, nos aspetos materialmente relevantes, a posição financeira e o resultado das operações da entidade contabilística do CAUP.

Pelo referido, e tendo em conta que no exercício findo em 31 de dezembro de 2024 se apurou um Resultado Líquido do Exercício positivo, no montante de 72 090,20 euros (setenta e dois mil e noventa euros e vinte cêntimos), a Direção propõe:

1) que sejam aprovados o Relatório de Gestão e os demais documentos de prestação de contas;
2) que a totalidade do 'Resultado Líquido do Exercício' seja transferida para 'Resultados Transitados'.

[redacted]

Prof. Doutor Mário J. P. F. G. Monteiro

(Presidente)

[redacted]

Doutora Margarida M. S. Cunha

(Vogal)

[redacted]

Doutor Sérgio A. G. Sousa

(Vogal)

Porto, 15 de abril de 2025.

Report of Activities

This component of the report describes the main initiatives and results obtained during the year 2024. The activity of CAUP is structured around Units: these are Research, Training, Outreach and Administration and Services. Each Unit has a Head, and a clearly defined mission. The activities within each Unit are described in the sections below. The appendices list some of the major indicators of the activity.

Human Resources

By the end of 2024 the team included:

• **37 Researchers** – corresponding to

12 Lecturers (5.55 FTE): Catarina G. G. Lobo (FCUP), Daniel F. M. Folha (IUCS-CESPU), Ilídio André P. M. Costa (AE Santa Bárbara[1]), Jarle Brinchmann (FCUP), J. Paulo Maurício de Carvalho (FCUP), Jorge F. Gameiro (FCUP), João J. G. Lima (FCUP), Maria Teresa V. T. Lago (FCUP, Retired), Mário J. P. F. G. Monteiro (FCUP), Nuno C. Santos (FCUP), Pedro P. Avelino (FCUP), Pedro T. P. Viana (FCUP)

25 Research Positions (24.20 FTE): Abhishek Chougule, Ana S. Paulino Afonso, André Miguel A. C. V. Silva, Ângela R. G. Santos, Carlos J. A. P. Martins, Clara Sousa Silva, Eduardo A. S. Cristo, João Gomes da Silva, Jorge H. C. Martins, José C. Fonseca, L. Filipe Pereira, Lara G. Sousa, Margarida S. Cunha, Marta Cortesão, Olivier D. S. Demangeon, Patricio Lagos, Pedro Figueira (ESO), Pedro Moreno, Polychronis Papaderos, Sérgio A. G. Sousa, Susana C. C. Barros, Tiago J. L. C. E. Campante, Tom C. Scott, Vardan Zh. Adibekyan, William Dethier

• **29 PhD students**

Afonso M. A. Vale, Afonso Morgado Mota, Alba Barka, Alexandre Branco, Ana F. S. Barros, Ana Rita Costa Silva, Andreas W. Neitzel, Bárbara M. T. B. Soares, Carmen San Nicolás Martinéz, Catarina M. J. Marques, Clara Marie Winckler, Daniel A. D. Vaz, David Grüber, Eduardo Campos Gonçalves, Inês Martins Rolo, Jennifer Peralta Lucero, João D. F. Dias, José Rodrigues, Maya Shemesh, Miguel T. Clara, Nuno M. Rosário, Paulina M. Zaworska, Pedro Alexandre C. Cunha, Pedro M. H. Branco, Ricarda Heilemann, Rúben A. R. Costa, Sergei Mukovnikov, Shedrach Obumneme Chiaha, Yuri C. Damasceno

• **11 Outreach staff (9.3 FTE)**

Adriana Silva, Diogo de Magalhães Sant'Ana, Elsa M. P. S. Moreira, Filipe A. L. Pires, Francisco Miguel Gonçalves, Ilídio André P. M. Costa, Marisa Santos, Paulo J. T. Pereira, Ricardo S. S. C. Reis, Rodrigo Oliveira, Tania F. S. Cunha

• **9 Supporting staff (6.6 FTE)**

Adriana Silva, Argentina M. T. Pereira, Carlos A. G. Gonçalves, Elsa M. P. P. Silva, Ernesto J. Silva, Fernando M. S. Soares, Joana Bateira, Manuel A. S. Monteiro, Sara Ramos

CAUP also had 1 external support staff (legal adviser, corresponding to a total of 0.1 FTE).

CAUP also provides support to students enrolled in the 1st Cycle (Licenciatura em Física and others), 2nd Cycle (Mestrado em Astronomia & Astrofísica and others), and 3tr Cycle (Programa Doutoral em Astronomia and other), at the Faculdade de Ciências da U.Porto (FCUP) and students from other universities/institutes.

Several CAUP researchers collaborate in some courses of the 2nd Cycle (Mestrado em Astronomia & Astrofísica) and of the 3rd Ciclo (Programa Doutoral em Astronomia).

[1] Middle and high school teacher deployed at CAUP: Planetário do Porto – Centro Ciência Viva

The major changes in the team (researchers with a PhD) during 2024 were:

Abhishek Chougule	started his contract on 1 November
André M. A. C. V. Silva	started his contract on 1 November
Eduardo A. S. Cristo	started his contract on 1 November
Elisa Delgado Mena	ended her contract on 31 August
Jean Michel Gomes	ended his contract on 10 April
João N. T. Gomes da Silva	ended his contract on 31 December
Marta Cortesão	started her contract on 14 June
William Dethier	started his contract on 9 February

UnI – Research Unit

Research in CAUP is structured according to the organisation of the research unit Instituto de Astrofísica e Ciências do Espaço (IA), into five research groups. The description below covers general activities of IA having the participation by CAUP members. The description is kept general, reflecting what has been reported by IA.

Towards the detection and characterization of other Earths

Activities of the team were centred around i) the detection, detailed characterization, and study of exoplanet systems and their host stars, and ii) the study of Solar System bodies (with a focus on their atmospheres), seen also as a stepping-stone towards the understanding of exoplanet atmospheres. Exoplanet research has been mostly centred in the Porto node of IA, while Solar System research is divided in planet atmospheres (centred in Lisbon) and the study of minor bodies (centred in Coimbra). Active collaborations exist between the three nodes, namely in the study of planetary atmospheres (Porto-Lisbon) and the study of solar system exospheres (Lisbon-Coimbra).

In this context, the team focused on tackling high impact questions such as: How diverse are planetary systems in the Galaxy? How frequent are rocky, temperate planets orbiting other Suns? Are there other habitable planets?

To answer these questions, the team concentrated its activities on:

1) the search and detailed characterization of exoplanets, including the study of their atmospheres, using state-of-the-art high-resolution spectroscopy and space-based photometric data;
2) the study of astrophysical sources of "noise" that hinder the detection and characterization of planets, as well as developing methods to correct/model them, keeping in mind the end goal of detecting and characterizing rocky planets orbiting other suns;
3) the study of the star-planet connection to better characterize planetary systems, their properties, and formation processes;
4) the exploration of new avenues in the study of Solar System minor bodies (tracers of Solar System formation) as well as in planet atmospheres (focused on Venus, Mars, and Jupiter), aiming at understanding their dynamics and chemistry;
5) the understanding of habitability conditions as well as the study of extremophiles, interfacing Solar System/exoplanet research with microbiology.

This latter research activity has seen its debut in 2024, with the hiring of one researcher (microbiology) and one PhD student (working in the interface between exoplanet research and microbiology). This represents a significant step forward in the development of Astrobiology at IA and CAUP.

A significant part of this research is based on our top-level (leading) scientific participation in different international consortia. While our participation in the ESPRESSO project is fading out (the GTO is now over), from the ongoing projects we highlight ESA's CHEOPS mission (now well within its first extension until 2026), the NIRPS spectrograph (@ESO's 3.6m), as well as the soon-to-be-commissioned (2025) PoET telescope (entirely led by IA and funded through an ERC grant). All these projects serve as stepping-stones for the science opportunities raised by future projects and missions (on which the team is also involved) including ESA's PLATO (2026), ANDES@ESO's ELT (2031), ESA's ARIEL (2029) and EnVision (2031), as well as (further ahead) NASA's Habitable Worlds Observatory (HWO) an ESO's PCS (for the ELT). Our high-level participation in all these projects assures continuity, reinforces the existing strategy, and allows the team to be in the forefront of planetary system's science for the next decade and beyond.

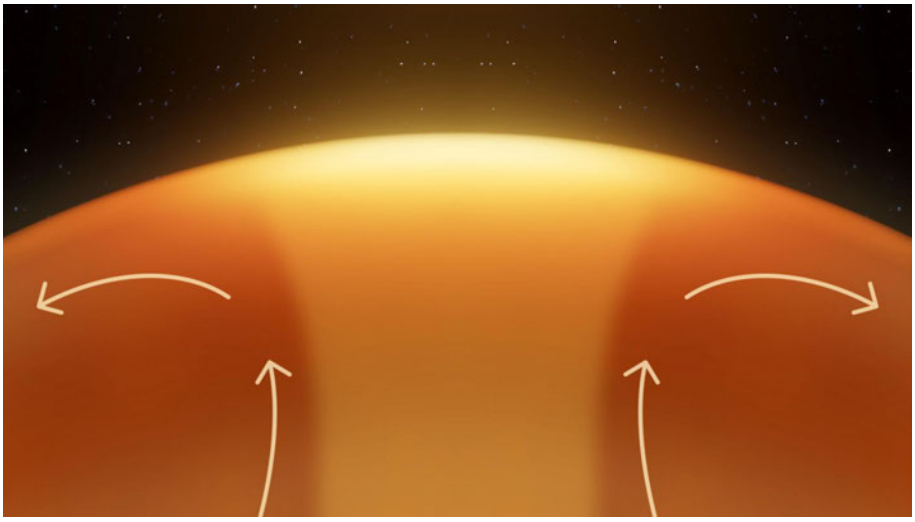
Scientific Highlights

In 2024, a total of 12 first author papers were published by the team, and 7 Press-Releases were made by IA announcing scientific results or other major activities (e.g. issuing from ongoing instrumentation projects) with a relevant scientific participation of the team. One of these Press-Releases was also issued by ESA and another one by ESO. Below we highlight two of these, which are of relevance to CAUP.

Exo-climatology of the planet WASP76b

In the last few years, exoplanet WASP-76 b's has been thoroughly studied by researchers at IA. At 637 light years from us, WASP-76b orbits its host star 12 times closer than Mercury orbits the Sun, making of it one of the hottest exoplanets known to date. Due to tidal effects, WASP-76b is also tidally locked to its star, meaning that one of its sides is always facing it. Therein, given the very high temperatures (around 2400 K), elements like iron are expected to be in the gas state. These and other properties made WASP-76b particularly relevant to explore the physics of exoplanet atmospheres, and has already led to several results led by the IA team (including the unexpected detection of Barium).

In 2024, two new papers, both led by IA researchers, have set the foundation for understanding the global climate of this giant exoplanet.



Schematic representation of the motion of iron winds in the hotspot of exoplanet WASP-76 b, moving from the lower to the upper layers of the atmosphere. (Credit: Tania Cunha (Planetário do Porto – Centro Ciência Viva)/Instituto de Astrofísica e Ciências do Espaço).

The first of these studies (that led to an ESA Press Release), led by researcher O. Demangeon, was based on the analysis of exquisite photometric data obtained with the CHEOPS mission. In particular, the analysis of 3 phase curves, 20 occultations, and 6 transits of WASP-76b allowed to detect what may be the first signature of the "glory" effect in the atmosphere of an exoplanet. The effect, similar to a rainbow, occurs when light is reflected off clouds made up of a perfectly uniform but so far unknown substance. While the reason for the "glory" effect to be observed is not entirely clear, this detection exemplifies the state-of-the-art research presently possible with data from missions like CHEOPS.

A second paper, led by the PhD student Ana Rita Costa Silva, fused data obtained with the ESPRESSO spectrograph to investigate the light emitted by the dayside of the planet. In particular, inspired by previous studies where we found iron in other regions of the planet, the team searched for the signature of iron atoms in emission. To our surprise, we did not only found the presence of iron in the illuminated side of the planet, but also found that the iron lines are blue-shifted, evidence of iron winds in the region of the "Hot Spot" on this hot jupiter – a location highly irradiated by the star that accumulates a lot of heat.

All these studies open several questions about the mechanisms behind the observed signatures. New perspectives to study WASP-76b will come from future missions such as PLATO, ARIEL, and ANDES@ELT, all on which the team is strongly involved.

A planet orbiting the closest single star to our Sun

Using the ESPRESSO spectrograph, a team with a strong contribution from IA researchers has discovered an exoplanet orbiting Barnard's star, the closest single star to our Sun. On this newly discovered exoplanet, which has at least half the mass of Venus, a year lasts just over three Earth days.

Artist view of the planet Barnard b, with the star in the background. Credit: ESO/M- Kornmesser.

Barnard's star is the second-closest stellar system — only 6 light years away from us — and the closest individual star. In the context of our strong particilation in the ESPRESSO project, Barnard's star has been one of our favourite targets. Owing to its proximity, it is a primary target in the search for Earth-like exoplanets.

The data, obtained between May 2019 and July 2023, was then analyzed using a specific software developed by IA's PhD student André Silva, allowing us to extract the best radial velocity information. Together with a detailed modelling of the timeseries, taking into account the signatures of stellar activity, these allowed to detect the presence of a sub-Earth mass planet with an orbital period of 3.15d in a closely circular orbit with a semi-major axis of 0.02 AU. Additional signals were found, but so far they are not significant.

This result illustrated both the capabilities of the ESPRESSO spectrograph, but also the relevance of the data analysis methods for the detection of the lowest mass planets.

Thematic line meetings, Journal Clubs and other activities

In 2024, as for the previous years, the IA-planet line maintained a regular journal club and team meeting agenda. Team meetings and journal clubs are organized every two weeks. Meetings include a presentation of "general information", as well as a short presentation of the work being carried out by one PhD student and one researcher, followed by discussion. This format helps the whole team to be acquainted with the research that is being carried out and helps the students to develop presentation skills and identify potential problems and solutions in their research project. Journal clubs include the presentation of recent research papers, followed by discussions.

All this information is kept up-to-date in the new team web pages (http://planetas.iastro.pt).

All regular team meetings and journal clubs were performed remotely via Zoom, to assure a smooth participation from team members in all 3 nodes (Porto, Coimbra, and Lisboa). People in the Porto node usually attended the meetings together in the same room (and common Zoom connection).

We also organised our annual team meeting (called "2-DEMOC"). This year's event took place in Porto. A SWOT analysis was done and discussed, where the team strategy and plans (both scientific and organisational) were discussed.

Along with the participation in several Scientific Organizing Committees of international conferences, the team worked in the organization of 4 international conferences/workshops. The 2nd PoET workshop was organized in November. A Science Team Meeting of the ARIEL consortium was also organized in Lisbon (also in November). The organization of two major international conferences is also ongoing - Extreme Precision Radial Velocities 6 (Summer 2025) and Exoplanets 6 (Summer 2026).

Team members actively participated in different public outreach activities, including public talks and debates in schools and online, as well as other outreach events. In this context, the team has also kept updating a public outreach page on Planetary Systems (https://outrosmundos.iastro.pt), where information in Portuguese is provided about planetary system's science as well as the discoveries where the team is involved.

In 2024, 4 PhD and 3 MSc thesis linked with CAUP researchers were successfully concluded (several other PhD and MSc are ongoing). A number of undergraduate students also worked with the IA team @ CAUP in different projects.

In 2024, team funding came mostly from IA "strategic funding" as well as from 2 running FCT (PEX) projects and one ERC Advanced Grant. An Advanced Computational Project was also approved. The team is presently waiting for the results of two application from the 2023 "FCT Research Projects call". We also highlight that 2 ERC projects were submitted in 2024 (one for a Starting Grant and one for a Synergy Grant).

Furthermore, funding for our participation in the CHEOPS, PLATO, ARIEL, and ANDES projects was secured through PRODEX. We note, however, the PRODEX funding covers only the "project level activities".

We would further like to highlight the strong collaborative work done in 2024 to foster collaborations of IA-Planet team members with other groups in the institute. This particularly concerns collaborations with the Stellar and Instrumentation groups. Collaborations with the stellar group include the characterization of planet host stars, stellar spectroscopy, and asteroseismology, the study of solar and stellar activity, and Galactic chemical evolution. Instrumentation group collaborations touch several aspects related with the development of new instruments and related software, such as PoET, NIRPS, CHEOPS, PLATO, ANDES, and PCS. Collaborations with other groups, namely cosmology and science communication, have also been done, respectively, through common instrumentation interests and through the communication of science results.

Nuno Santos

Group Leader

Towards a comprehensive study of stars

Our activity during 2024 was distributed across three main research lines: Sun and Heliosphere, Stellar Physics, and Stellar Populations.

Sun and Heliosphere research line. This research line focuses on studying the solar atmosphere as well as the influence of solar activity on the heliosphere and the Earth's atmosphere, also known as Space Weather. We continued to participate and collaborate in several national and international projects. Group members lead the Portuguese participation in the SWATNet MSCA Innovative Training Network, are actively contributing to the European Solar Telescope, are developing a coupled thermosphere-ionosphere model for the Atlantic mid-latitude regions in a partnership with MIT, and are investigating the consequences of the rapid secular drift of the northern magnetic dip pole. Furthermore, we have been contributing to the definition of the scientific priorities of the PoET telescope concerning solar and stellar physics.

Stellar Physics research line. This research line focuses on understanding the physical processes that take place in stars, from the stellar interior to the surface. The exploitation of asteroseismic data from TESS (NASA) is being carried out in the context of the TESS Asteroseismic Science Consortium (TASC), in which our team is strongly involved, with representation on the Steering Committee and co-leadership of one of its working groups. Furthermore, our team continues to be strongly involved in the preparation of the stellar science component of PLATO (ESA), with responsibilities in the design, implementation, and validation of sections of the Stellar Analysis System (SAS) pipeline, leading work packages in the framework of both the PLATO Science Management (PSM) and the PLATO Data Center (PDC). The team also continued to actively contribute to the Ariel (ESA) consortium, in the context of which we coordinate a working group responsible for determining the fundamental parameters of the mission's target stars.

Our research also included studies of low-mass stellar and substellar populations in young clusters and star-forming regions in the Milky Way, with the goal of understanding the main formation channels of brown dwarfs and free-floating planetary-mass objects, together with their potential dependence on the star-forming environment.

Stellar Populations research line. This research line focuses on the precise characterization of solar-type and red-giant stars, which provides valuable information that can be readily applied to several areas of research, including Galactic archaeology and Galactic chemical evolution. We continued to be actively engaged in several international consortia, including ANDES@ELT, the Maunakea Spectroscopic Explorer (MSE), ESPRESSO@VLT, and NIRPS@ESO 3.6-m Telescope. We highlight the team's involvement in ANDES@ELT, where we play a role in the development of the scientific priorities and the definition of top level requirements for the instrumentation.

Scientific highlights for 2024

Automated sunspot detection and solar wind forecasting

The implementation of automated methods for sunspot detection is essential to achieve better objectivity, efficiency, and accuracy in identifying sunspots and analyzing their morphological properties. A sought-for application is the contouring of sunspots. In Bourgeois et al. (2024, Solar Physics, 299, 10), the authors constructed sunspot contours from Solar Dynamics Observatory (SDO)/Helioseismic and Magnetic Imager (HMI) intensity images by means of an automated method based on the application of mathematical morphology (see Fig. 1). The method was applied to high-resolution data (SDO intensitygrams), with a good agreement obtained between the measured sunspot areas and those provided by two standard reference catalogs. The method appears to be robust for sunspot identification, and the analysis suggests its application to more complex and irregular-shaped solar structures, such as polarity inversion lines inside delta-sunspots.

Solar wind forecasting is a core component of Space Weather, a field that has been the target of many novel machine-learning approaches. The continuous monitoring of the Sun has provided an ever-growing ensemble of observations, facilitating the development of forecasting models that predict solar wind properties on Earth and other celestial objects within the solar system. This enables us to prepare for and mitigate the effects of solar wind-related events on Earth and space. The performance of some simulation-based solar wind models, however, depends heavily on the quality of the initial guesses used as initial conditions. In Barros et al. (2024, Engineering Applications of Artificial Intelligence, 133, 108266), the authors aimed at improving the accuracy of these initial conditions by employing a Recurrent Neural Network model. The study's findings confirmed that Recurrent Neural Networks can generate better initial guesses for the simulations, resulting in faster and more stable simulations.

We note that both these works were led by PhD students in our group.

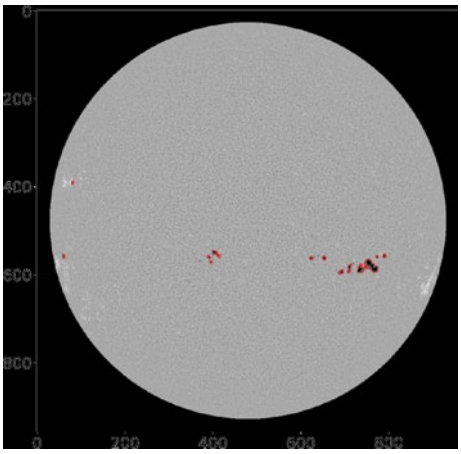


Figure 1: Sunspot contours overlaid on an SDO/HMI intensity image. From Bourgeois et al. (2024).

Advances in observational and theoretical asteroseismology

Fueled by space photometry, asteroseismology is vastly benefiting the study of cool main-sequence stars, which exhibit convection-driven solar-like oscillations. Even so, the tiny oscillation amplitudes in K dwarfs continue to pose a challenge to space-based asteroseismology. A viable alternative is offered by the lower stellar noise in Doppler observations. In Campante et al. (2024, Astronomy & Astrophysics, 683, L16), the authors presented the definite detection of solar-like oscillations in the bright K5 dwarf ε Indi based on time-intensive observations collected with the ESPRESSO spectrograph at the VLT, thus making it the coolest seismic dwarf ever observed. The peak amplitude of radial modes is 2.6±0.5 cm/s, or a mere 14% of the solar value (see Fig. 2). Measured mode amplitudes are ∼2 times lower than predicted from a nominal L/M scaling relation and favor a scaling closer to (L/M)1.5 below 5500 K, carrying important implications for our understanding of the coupling efficiency between pulsations and near-surface convection in K dwarfs. This detection conclusively shows that precise asteroseismology of cool dwarfs is possible down to at least the mid-K regime using next-generation spectrographs on large-aperture telescopes, effectively opening up a new domain in observational asteroseismology. A press release was issued by IA accompanying the publication of this article.

Sharp structural variations induce specific signatures on stellar pulsations that can be studied to infer localized information on the stratification of a star. This information is key to improve our understanding of the physical processes that lead to these structural variations and how to model them. In Cunha et al. (2024, Astronomy & Astrophysics, 687, A100), the authors revisited and extended the analysis of the signatures of different types of buoyancy glitches in gravity-mode and mixed-mode pulsators presented in earlier works, including glitches with step-like, Gaussian-like, and Dirac-δ-like shapes. In particular, they provided analytical expressions for the perturbations to the periods and showed that these can be reliably used in place of the expressions provided for the period spacings, with the advantage that the use of the new expressions does not require modes with consecutive radial orders to be observed. They further discussed the impact on the glitch signature of considering a glitch in the inner and outer half of the g-mode cavity, emphasizing the break of symmetry that takes place in the case of mixed-mode pulsators.

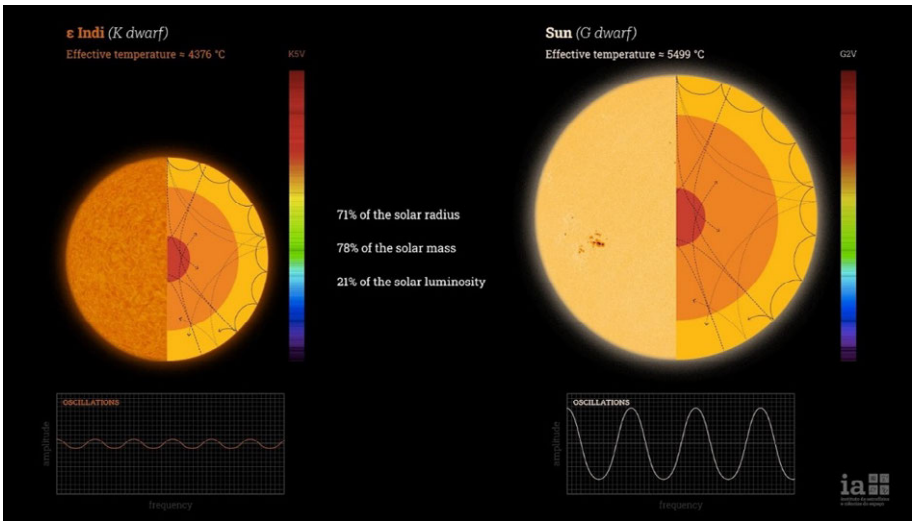


Figure 2: Infographics comparing ε Indi with the Sun. Credit: Paulo Pereira (IA).

Towards improved stellar models

Modeling of chemical transport mechanisms is crucial for the accurate characterization of stars. Atomic diffusion is one such process, being commonly included in stellar models. However, it is usually neglected for F-type or more massive stars because it produces surface abundance variations that are unrealistic. Additional mechanisms to counteract atomic diffusion must therefore be considered. It has been demonstrated that turbulent mixing can prevent excessive variation in surface abundances, while it can be calibrated to mimic the effect of radiative acceleration on iron. In Moedas et al. (2024, Astronomy & Astrophysics, 684, A113), the authors evaluated the effect of calibrated turbulent mixing on the characterization of a sample of F-type stars and how stellar parameter estimates compare with those obtained when chemical transport mechanisms are neglected. They found a greater dispersion in the inferred values of mass, radius, and age for the more massive stars in their sample due to the absence of atomic diffusion in one of the two model grids used. This work ultimately shows that a proper modeling of microscopic transport processes is crucial for the accurate estimation of stellar fundamental parameters, which is not only true for G-type stars but also for F-type stars. This work was led by a PhD student in our group.

Hosts of 2 international events on Asteroseismology

We organized the 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop (TASC8/KASC15) in Porto. TASC8/KASC15 served as a platform for the comprehensive review and discussion of the latest findings in the field of asteroseismology, with the focus being placed on new ways of improving the physics in stellar models (aspects such as convection, angular momentum transport, magnetic fields, and mixing were thoroughly addressed). There were a total of 214 registered participants, of which 189 on-site and 25 online. Conference proceedings were published here.

The conference was followed by a Doctoral School, again organized by members of our research group. The Porto Summer School on Asteroseismology (PSSA) brought together 50 students and 13 invited lecturers. Students from institutes from all over the world attended the School, namely, from Europe (33), Oceania (6), North America (5), Asia (5), and Africa (1). School proceedings were published here.

Other activities

In 2024, the group maintained a strong research and academic presence through a variety of initiatives. Several national and international funded projects were active or launched, including those under FCT (3 exploratory research projects and 6 ongoing CEEC contracts), regional (2), cooperation (1), and European (1) programs. Academic achievements included the successful defense of 2 PhD theses and 3 MSc dissertations. The group also played a leading role in organizing 3 international conferences/workshops and a doctoral school. Scientific exchange was fostered through visits from 9 researchers from institutions worldwide. Outreach remained a key aspect, with multiple media engagements (7 press releases/news articles) and a collaboration with National Geographic Portugal (2 articles) highlighting the group's visibility and impact.

Regular meetings and activities

We hold biweekly group meetings, a forum for discussing strategic decisions and everyday issues. These are held together with the Journal Club. Moreover, we hold science meetings on a biweekly basis (alternating them with the group meetings), a forum for presenting and discussing ongoing work. In 2024, we had two more installments of Stars Day (one in May and the other in December), a biannual in-person meeting with a strong social component. Stars Day events are fully organized by our students.

Communication

The group website is regularly updated, containing the latest news as well as information on research and activities.

Tiago Campante

Group Leader

The assembly history of galaxies resolved in space and time

In 2024, the Group continued to successfully implement its scientific strategy, making significant progress in investigating the formation history of galaxies and their structural components, the genesis and growth of super-massive black holes (SMBHs) in galactic nuclei and their influence on the assembly history of galaxies, the origin and implications of starburst activity and the role of the environment on galaxy evolution.

These scientific objectives, pursued by a team of 13 researchers, 13 collaborators and 10 students, are served by the IA participation with leadership roles in the ESO instrument consortia of MOONS@VLT, BlueMUSE@VLT, MOSAIC@ELT of ESO, and ESA missions with key importance for the Group's strategy (Euclid, NewAthena), as well as by the parallel development of highly optimized computational tools for the scientific exploitation of multi-wavelength data for galaxies near and far.

The growth of SMBHs and their observational manifestations as Active Galactic Nuclei (AGN) is being investigated by the Group both at highest redshifts and in the nearby universe. The emergence of the very first powerful AGN in the Universe, and how they shaped the earliest galaxy evolution is being studied through sub-mm observations with IRAM and the revolutionary ALMA, and by post-processing cosmological simulations to obtain quantitative predictions on the number and detectability of early SMBHs at X-ray and radio wavelengths. Building upon its expertise on the analysis and interpretation of multi-wavelength data, and as part of a coherent strategic roadmap, the Group has developed new observational discriminators for proto-AGN at the Epoch of Reionization (EoR) that are now successfully applied by the team. It also acts as a strong driver in the development of ASKAP's Evolutionary Map of the Universe survey, through the IA-lead Key Science Project "Radio AGN in the EoR" and is represented at the Board and Science team level in ESA's future X-ray mission, NewAthena.

At low and intermediate redshift (z), the AGN phenomenon is being studied using the currently most powerful telescopes and instruments, most notably the Multi Unit Spectroscopic Explorer (MUSE) at ESO-VLT. Special emphasis is being laid on the study of quasars surrounded by gigantic Lyman-α halos and the definition of new diagnostics for constraining the physical conditions and excitation mechanisms in the nebular component of these extreme environments. This line of research is further supported by a comparative analysis of gas kinematics and excitation properties obtained from integral field spectroscopy (IFS) with predictions from cosmological simulations incorporating AGN feedback, and through IA's spectral synthesis code FADO. The latter, together with other IA-developed tools, 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 its operation at the end of 2025. During 2024, the team continued having a key involvement in the preparation of guaranteed time observations with MOONS and in the definition of strategies for the reduction and analysis of data from it. IA researchers assume major roles in several MOONS Science and Technical Working Groups (WGs), including the co-leadership of the AGN WG and the technical WG-1, and have an active role 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 important field of the activities of the Group centers on spatially resolved investigations of galaxies with IFS and deep multi-band photometry. Using MUSE and the CALIFA and MaNGA IFS galaxy surveys, as well as data from the Hubble Space Telescope (HST) and the James Webb Space Telescope (JWST), team members are investigating a wide range of fundamental issues in extragalactic research, including the build-up history of galaxy bulges and the physical drivers of their inside-out star formation quenching, the spatial and temporal progression of starburst activity and starburst-driven feedback processes in galaxies, the mechanisms facilitating and regulating the escape of Lyman-α and Lyman-continuum radiation from galaxies, age and metallicity patterns in spiral and elliptical galaxies, cooling flows and ram pressure stripping effects in galaxy clusters, and the nature of ultra-faint galaxies. The activities of the team also encompass the development of Machine Learning tools for the identification of high-z AGN and the characterization of galaxies from the Euclid Galaxy Legacy Survey, which is co-led by IA.

Scientific Highlights for 2024

Physical characterization of high-redshift galaxies in the era of Euclid and JWST

The advent of Euclid and JWST, and the availability of large multi-wavelength data sets for galaxies near and far have led to the intensification of team's activities toward the physical characterization of high-z galaxies and the exploration of the morphological and structural evolution of galaxies across z. Several parallel efforts of our team have focused on the development of ML tools for the unambiguous identification of high-z AGN and the automated characterization of galaxies on the basis of their morphology and spectral energy distribution (SED).

i) Building on ML techniques for the classification of astronomical sources in Humphrey et al. (2022,2023) and Cunha & Humphrey 2022, Cunha et al. (2024, A&A 687, 269) have developed a 'few-shot' learning approach for the identification and classification of rare-object classes using limited training data (200 sources). This approach, integrated in the new AMELIA pipeline, uses a transfer-learning based approach with decision trees, distance-based, and deep

learning methods to build a powerful new galaxy classifier. The performance of AMELIA was validated on the problem of identifying QSO2s at $1 \leq z \leq 2$ (in the so-called 'redshift desert') using SDSS and WISE photometry, achieving a F1-score above 0.8 in a supervised approach. In turn, application of this new tool permitted identification of a sub-population of dusty [NeV]λ3426Å emitters at $z \sim 1.1$, which are highly likely to contain obscured AGNs. This was confirmed using X-ray and radio cross-matching to validate the AGN classification.

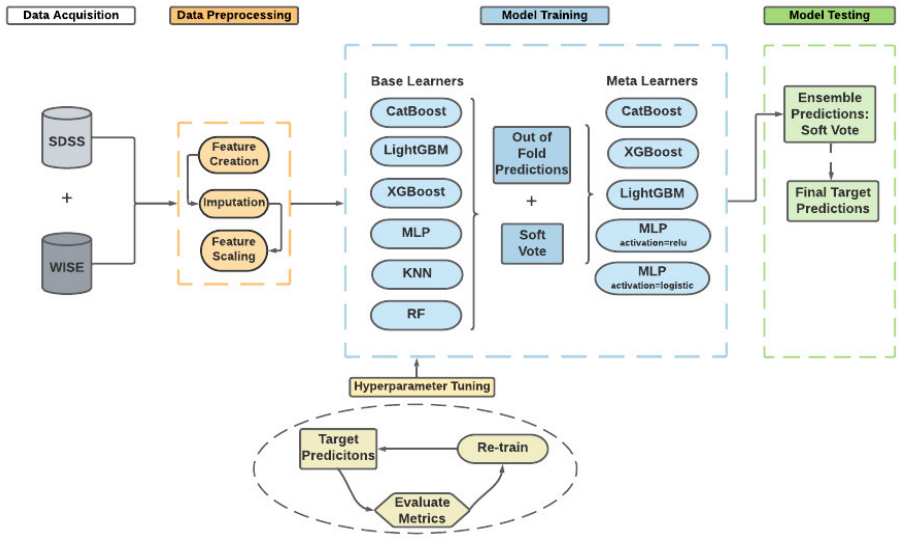
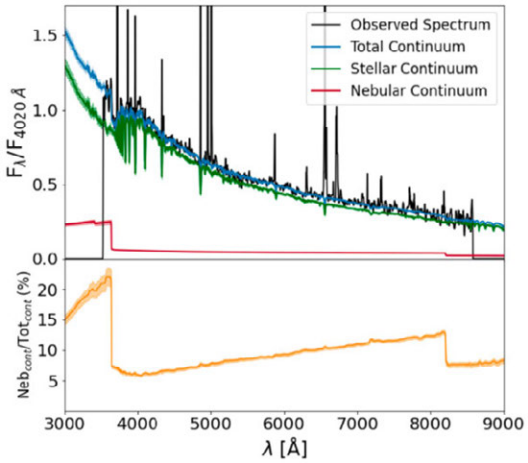


Fig. 4: Flow diagram for the AMELIA pipeline. The process begins with the assembly of SDSS and WISE data. As seen in the orange box, feature creation is used to generate optical, optical-IR, and IR colours. The imputation method is applied to the training set and followed by feature scaling due to the use of different algorithms. The blue box shows a description of the model training: Each base learner is first loosely optimised for generalisation. Subsequently, out-of-fold predictions are combined with the average predictions from the base learners, utilising a soft-vote mechanism for the training of the meta-learners. The predictions from the meta-learners are then combined through ensembling, using a soft-vote fusion that results in the final predictions for the test set (from Cunha et al. 2024).

ii) Another line of ML-supported research by the team centers on Lyman-α-emitting (LAE) galaxies. Paulino-Afonso, in the framework of the FLAEMING project that she initiated in 2022, has trained ML algorithms on multi-band galaxy surveys like COSMOS towards the identification of high-z LAE candidates. This project proved to be particularly successful, as it allows LAE classification with an accuracy of about 90% using only optical and near-infrared fluxes. The application of this model to the COSMOS field allowed the prediction of the existence of ~3500 new LAE candidates not detected by the SC4K survey, effectively doubling the existing sample of such sources. Two parallel projects used a) gradient-boosting algorithms trained from COSMOS2020 and SC4K to improve LAE identification (Afonso Vale, 2024, MSc thesis, University of Porto), and b) Convolutional Neural Networks for the search of LAEs from broadband image data. These research activities strongly benefit from GPUs awarded to Paulino-Afonso through the NVIDIA Academic Hardware Grant Program.

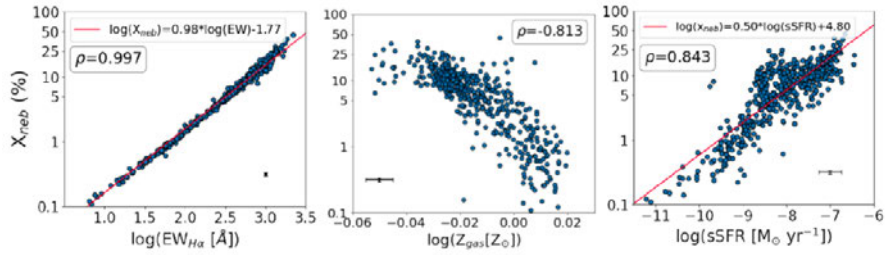
Studies of the star formation history of galaxies through spectral modeling

The team's studies with the upcoming MOONS@VLT at the cosmic noon will focus on active galaxies with a strong nebular contribution. In preparation for the spectroscopic investigation of evolutionary and chemical properties of galaxies in this critical cosmic epoch around z~1, the team has investigated in Miranda et al. (2024, A&A, in press) an empirical threshold with respect to the nebular contribution, above which there is a significant impact on the estimation of physical properties of galaxies when conventional (purely stellar) spectral fitting codes are used. To this end, a sample of galaxies from SDSS-DR7 with a wide range of star-forming activity was studied and spectral modeling was carried out with two conceptually distinct spectral fitting tools: one that self-consistently models both stellar and nebular emission and ensures that the best-fitting star formation and chemical enrichment history obtained reproduces the observed nebular characteristics of a galaxy (FADO; Fig. 5), and another that lacks such a self-consistency concept (STARLIGHT) and was applied using a purely stellar base. This comparative analysis has revealed that the reddish nebular continuum begins to significantly bias determinations of the physical properties of galaxies results when it exceeds ~8%, of the total visual emission, which corresponds to an equivalent width of EW(Hα)~500 Å and EW(Hβ)~110 Å.



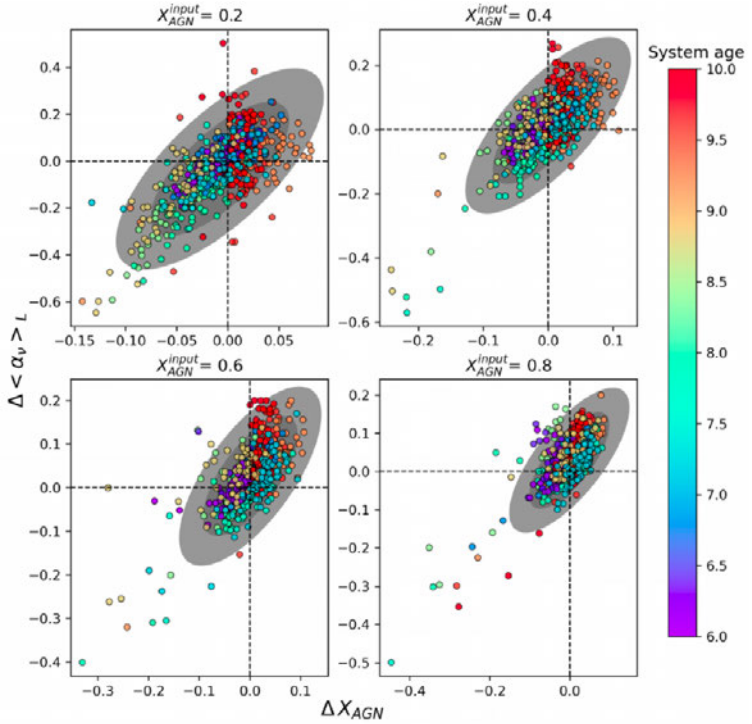
Spectral fit with FADO to a galaxy with a fractional contribution Xneb=10% of nebular-to-total continuum emission in the optical. Upper panel: observed spectrum (black line) and total, stellar and nebular continuum (blue, green and red lines, respectively). Bottom panel: ratio between the nebular and total continuum as a function of wavelength (from Miranda et al. 2024, A&A, in press).

Various scaling relations were also empirically investigated, e.g., the connection between Xneb and EW(Hα), EW([OIII]) and specific star formation rate (sSFR). An interesting finding that should be further investigated using spectra for higher-z galaxies is the anti-correlation between Xneb and gas-phase metallicity (Fig. 6).



Relation between Xneb and Hα equivalent width (left), specific star formation (middle) and gas-phase metallicity (right). From Miranda et al. (2024, A&A, in press).

Finally, in anticipation of studies with MOONS of the physical mechanisms responsible for the gradual cessation ("quenching") of star formation (SF) activity since z∼1, it is of particular importance to develop spectral fitting tools capable of investigating the role of negative AGN feedback on the SFH of galaxies. For this reason, as part of a recently completed PhD project (A. Chougule 2024, PhD thesis, University of Porto), the team has continued the development and testing of a slightly modified version of FADO that allows a power-law component approxima-ting the featureless AGN continuum to be self-consistently included in the spectral fitting. This tool was tested on both synthetic and observed SDSS spectra of Seyfert 2 galaxies. Synthetic spectra were computed assuming two SFHs (instantaneous burst and continuous SF) and include a varying luminosity fraction XAGN (between 0 and 1) of the AGN power law at 4020 Å, for an AGN spectral index αν from 0 to -2. These synthetic spectral also included the kinematical broadening of emission lines arising from the AGN and were simulated for different signal-to-noise ratios.



Difference between the estimated and the true luminosity contribution ΔXAGN and the spectral index Δ<αν>L of an AGN component for synthetic spectra referring to an instantaneously formed galaxy with an age between 1 Myr and 10 Gyr. The top left, top right, bottom left and bottom right panels correspond to models with AGN fraction of 0.2, 0.4, 0.6, and 0.8, respectively. The ellipses show 1σ, 2σ and 3σ regions (darker to lighter) with their eccentricity being defined by the covariance of the variables. The colour bar shows the age of the system. (from Chougule 2024, PhD thesis, University of Porto).

A series of extensive tests, completed this year and summarized in the PhD thesis of A. Chougule, has shown that the self-consistency concept of FADO allows, in principle, first-order estimates of the AGN contribution XAGN when the spectral index αν is approximately known, and vice versa. The expectation that the self-consistency fitting concept of FADO can, after further refinements, be applied to Seyfert2 galaxy spectra is indirectly supported by the fact that fitting SDSS spectra reveals a trend towards an increasing equivalent width of high-excitation emission lines (HeIIλ4676 Å, [NeV]3426 Å) with increasing XAGN. These emission lines document the presence of hard ionizing radiation with a photon energy >54 eV, indicating an AGN.

Starburst activity and starburst-driven galactic outflows & LyC escape

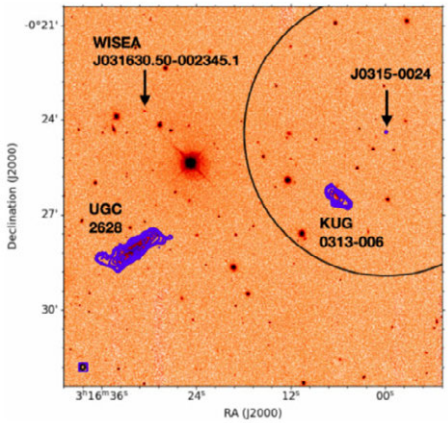
Starburst activity, prevalent at high redshift, is a major driver of stellar mass growth and chemical enrichment of galaxies and is closely linked to production and escape of Lyman continuum (LyC) radiation that led to the reionization of the Universe. Therefore, understanding the spatial and temporal progression of this phenomenon and its role in galaxy evolution is of utmost importance.

Continuing spatially resolved studies of starburst galaxies, the team has used high-quality IFS data from MUSE to investigate the starburst-driven feedback in a selected sample of blue compact dwarf (BCD) galaxies. These studies focused mainly on the chemical properties of the extended diffuse ionized gas emission (DIG) in these systems (Lagos et al., in prep.) and ionized gas kinematics in the luminous starburst galaxy ESO 400-43 (Lassen et al. A&A, submitted). In a parallel study (Papaderos et al.), IFS data and evolutionary synthesis models were used to investigate LyC photon production on sub-galactic scales. It was found that the anti-correlation between LyC photon escape fraction and EW(Hα), originally established for early-type galaxies (Papaderos et al. 2013), also holds for starburst galaxies.

Further insight into the mechanisms facilitating the escape of LyC and Lyα radiation from starburst galaxies and the UV properties of these systems has been gained from the HST COS Legacy Archive Spectroscopic SurveY (CLASSY) project. In particular, a detailed study of 45 local starburst galaxies by Mingozzi et al. (2024, ApJ 962, 95) has shown that the combination of C III] λλ1907,9Å He II λ1640Å and O III] λ1666Å can be a powerful tool to discriminate between SF, shocks, and AGN at subsolar metallicities. This new set of UV diagnostics, developed on local low-metallicity starburst galaxies, have great potential for the study of young, chemically unevolved galaxies in the early universe.

Role of the environment on galaxy evolution

The IA researcher C. Lobo participated in a study that is using S-PLUS data to map the Hα+[NII] emission in 77 Fornax galaxy members up to three virial radii of the cluster. These emission line maps, together with the results of a morphological analysis of the galaxies, aim at assessing the impact of environmental effects on cluster ga-laxies in different subregions of the cluster.



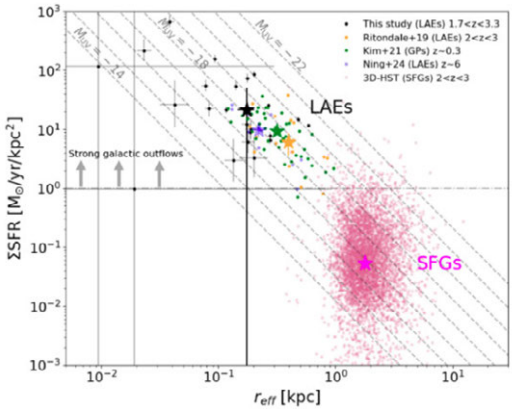
HI surface density and velocity map (left and right, respectively) of the BCD J0315–0024 and its companions KUG 0313–006, UGC 2628, and WISEA J031630.50–002345.1 (from Scott et al. 2024).

Analysis of a new catalogue of relatively isolated metal-rich BCDs from SDSS with the IA-developed spectral synthesis code FADO has inferred the position of these systems on the mass-metallicity relation and allowed the conclusion that the chemical self-enrichment of these systems is internally driven by mild episodes of SF rather than external interactions (Guo .. Scott, Lagos et al. 2024, MNRAS, 528 6593). In a parallel project, VLA B and C configuration data were used to study the HI kinematics of four extremely metal-poor BCDs with cometary morphology (Scott et al., 2024, A&A 692, A51). These interferometric observations suggest that one of these systems is undergoing a merger, while the other three show signs of a weak tidal interaction with a near neighboor. These results reinforce the view that starburst activity in part of BCDs is triggered by gravitational perturbations.

On larger spatial scales, J. Brinchmann has been involved in a project using MUSE to study the properties of galaxies in cosmic filaments at intermediate redshift ($0.3 < z < 0.8$). A detailed analysis of 1419 galaxies in 14 such massive structures indicates that galaxies are preprocessed in groups of increasing mass before entering rich groups and clusters (Epinat et al. 2024, A&A 683, A205).

Structural and kinematical evolution of galaxies

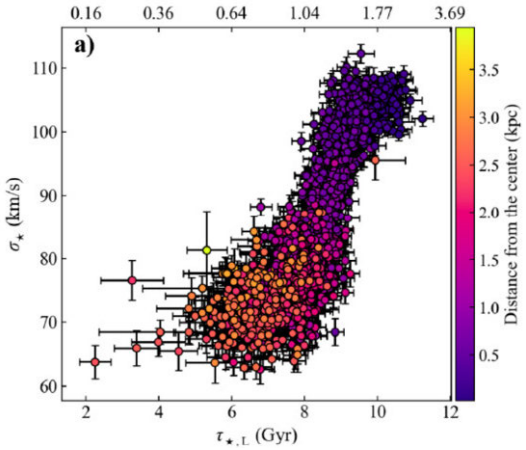
The team has continued studies of the assembly history of galaxies and their structural components (bulge, bar, disk) using advanced image decomposition tools and high-quality data from HST, JWST and Euclid. IA-researcher A. Paulino-Afonso performed a comparative analysis of Lyman-α emitters (LAEs) using an extensive dataset of 3045 LAEs from the entire COSMOS field. This project led to the conclusion that these systems are characterized by compact sizes (effective radii reff) of ∼1 kpc and high emission-line rest-frame equivalent widths, suggesting a high star formation surface density ΣSFR. This conclusion was corroborated through a recent investigation by Kim et al. with the participation of Paulino-Afonso (Fig. 11).



Star formation surface density ΣSFR vs. Size (effective radius reff) for LAEs compared to typical star-forming galaxies (SFGs). It can be seen that LAEs are characterized by a high ΣSFR exceeding 1 M⊙ yr-1 kpc-2 (dashed horizontal line) and a reff < 1 kpc. This suggests that compact morphology plays a crucial role in facilitating the escape of Lyα photons. (from Kim ... Paulino-Afonso et al., in prep.).

IA collaborator F. Buitrago (University of Valladolid) and P. Papaderos, with their student V. Alonso-Rodríguez, have studied how the observed reff and Sérsic exponent η of galaxy vary with redshift when simulated back to z∼5.4. They showed that observational determinations of these structural parameters strongly depends on the redshift of a galaxy and the photometric filter it is observed with. One consequence of this observational effect is that bulge-dominated galaxies (η>2.5) appear disk-dominated (η∼1) systems at high redshift.

Another study has addressed the mechanisms that shape the stellar velocity dispersion in the nearby late-type spiral galaxy NGC 4030. IA collaborator I. Breda (University of Vienna) and J. Brinchmann have used high-quality IFS data from MUSE to compare the stellar velocity dispersion σ✶ of the young stellar component in star-forming spiral arms with that in older intra-arm regions. This study has revealed for the first time in a galaxy outside the Local Group a striking grand design spiral pattern in the σ✶ map, and found that young stars born in HII regions are characterized by a lower velocity dispersion than the surrounding older regions where star-formation is less active. The age-velocity relation (AVR; Fig. 11) derived in this study offers an important observational reference for evaluating various theoretical concepts about stellar-dynamical heating mechanisms in galaxies.



Age vs stellar velocity dispersion relation for the spiral galaxy NGC 4030 (from Breda ... Brinchmann et al. 2024, A&A 692, L10)

Group meetings, Journal Clubs and other activities:

In 2024, the team was able to significantly increase its productivity, further expand internal synergies, and enter into new collaborations. Throughout the year, the team maintained a busy schedule with weekly briefings to discuss its scientific work. In addition, the regular weekly Journal Clubs were continued, in which the latest scientific results, mostly non-IA, were discussed. In addition, the team organized a two-day internal workshop (November 2024) to discuss current research and key goals for the coming years.

Participants of the conference organized by the IA "Beyond the Edge of the Universe: Latest results from the deepest astronomical surveys" (Sintra, October 2024)

The dynamism of the team is also reflected in the continuous development and intensive scientific exploitation of machine learning tools with relevance to its scientific activities within Euclid, JWST, MOONS@VLT, MOSAIC@ELT and BlueMUSE@VLT, as well as in the organization of the conference "Beyond the Edge of the Universe: Latest results from the deepest astronomical surveys" (Sintra, 21-25 October 2024) and the co-organization of the conference "Science with the Hubble and James Webb Space Telescopes VII: Stars, Gas & Dust in the Universe" (Porto, April 29 to May 2).

Polychronis Papaderos

Group Leader

Unveiling the dynamics of the Universe

The activity of the cosmology group was focused on testing the validity of the current standard cosmological model, looking to answer the question: Do we need new physics to understand the Universe? Specifically, does Einstein's general relativity accurately describe gravitation? Is a cosmological constant the correct explanation for the currently observed accelerated expansion of the Universe? Is the Standard Model of particle physics all we need to adequately describe the early Universe? We do this by exploring tests to Einstein's general relativity, delving into the detailed structure of the dark sector and investigating observational signatures of topological defects networks. Our contributions involve our continuing participation in various international consortia. ESA's Euclid mission (in operation), LISA (2035 launch), ESO's ESPRESSO (in operation) and ANDES (2028). We are also looking to increase our participation in SKAO (2027). This year the team centered its activities on:

1. Euclid is a mission dedicated to the exploration of the dark universe through the measurement of the properties of the cosmological large-scale structure. IA is strongly involved in this mission, participating in the consortium board, in various Science Working Groups and in the Survey Design. Euclid started to execute the Wide and Deep surveys in February 2024. Euclid members are now focusing on the preparation for the first Data Release using observations up to June 2025. Our team is involved in some of the theory key projects.

2. Putting the present standard cosmological constant model to the test is one of the strongest objectives of our group. Towards this goal, we explored extensions to Einstein's general relativity and their observational signatures and worked on observational signatures of dynamical dark energy models with couplings to the dark matter, or to neutrinos. Most of this work is aligned with the goals of the BEYLA FCT project.

3. The first detection of gravitational waves in 2015 opened a new era for astronomical observations. Several of our members have dedicated their time to studying the stochastic gravitational wave background that can be generated from topological defects, namely cosmic strings and domain wall networks. This background can possibly be detected by the LISA space telescope and building a database of cosmic string signals is crucial towards this goal.

4. The observational measurement of the fine structure constant at different redshifts presents a direct form of testing the validity of its constancy. This is something that the ESPRESSO spectrograph is particularly suited to doing and will be significantly improved with ANDES. With ANDES there is also the possibility of a direct measurement of the expansion rate of the Universe from observing the redshift drift. Several of our members are directly involved in exploring these possibilities.

Scientific Highlights for 2024

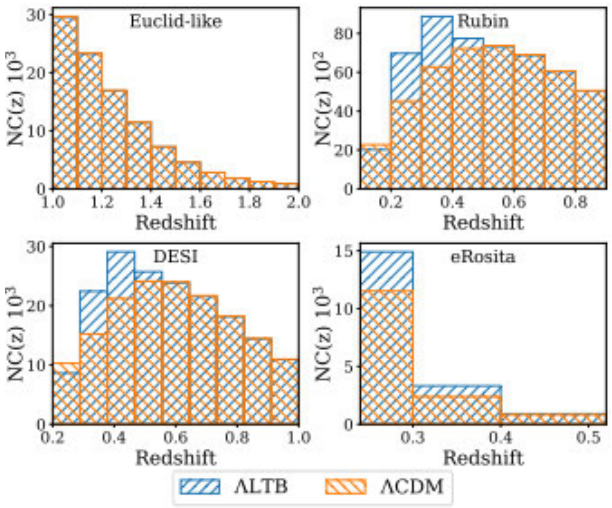
Large-scale structure constraints on cosmology

The cosmological principle —a fundamental assumption that the Universe is uniform and isotropic at large scales— is one of the cornerstones of the modern cosmology, making it of paramount importance to observationaly test its validity.

In a novel approach, a research team including IA members A. Carvalho, A. da Silva, J. P. Mimoso, C. J. A. P. Martins and N. J. Nunes, has used galaxy cluster counts to probe potential large-scale inhomogeneities in the Universe (Ziad et al., A&A, 2024). The study simulated future 'Stage-IV' galaxy surveys, and applied corrections to the mass function using N-body simulations of a Lemaître-Tolman-Bondi (LTB) cosmology.

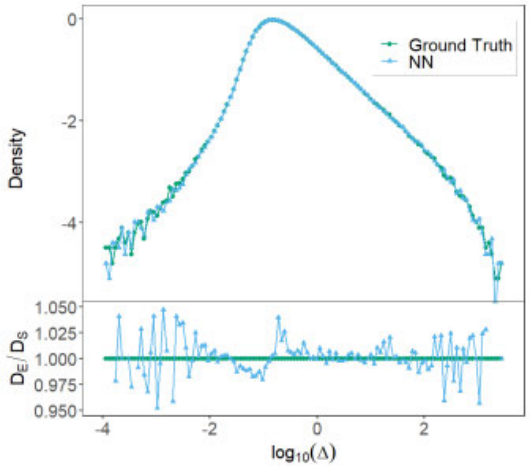
Using this LTB model enhanced with a cosmological constant and cold dark matter, the team discovered that upcoming galaxy cluster surveys could improve constraints on cosmological parameters by approximately 50%. This significant advancement represents a ±20% improvement over previous methods using geometrical and structural growth probes.

The research suggests that galaxy cluster abundances can serve as sensitive indicators of cosmic inhomogeneity. Next-generation surveys will provide unprecedented opportunities to scrutinize the cosmological principle, potentially revealing subtle deviations from the assumed universal uniformity that could revolutionize our understanding of cosmic structure.



Comparing the simulated cluster number counts in different redshift bins for different surveys between the standard ΛCDM model and a ΛLTB model.

N-body simulations are powerful for studying large-scale structure evolution but are computationally expensive, limiting their use in exploring broad parameter spaces. On a separate paper (Conceição et al., A&A, 2024), IA members M. Conceição and A. da Silva with collaborators have shown that machine learning can be used to create fast, accurate matter density field emulations. The authors developed an emulator that combines dimensionality reduction (via principal component analysis) and supervised learning to predict density fields based on cosmological parameters like dark matter density (Ωm) and redshift (z). The method reduces computation time by three orders of magnitude, achieving results within a few percent of N-body simulations for power spectra and bispectra. This approach could enable rapid generation of density cubes for various cosmological models, facilitating large-scale applications like parameter inference for missions such as ESA/NASA's Euclid.



Comparison of the overdensity contrast, ϱ/<ϱ>, between the Neural Network emulation (DE) and the ground truth coming from an N-body simulation (DS).

Unveiling Primordial Topological Defects: LISA's Gravitational Wave Template Databank

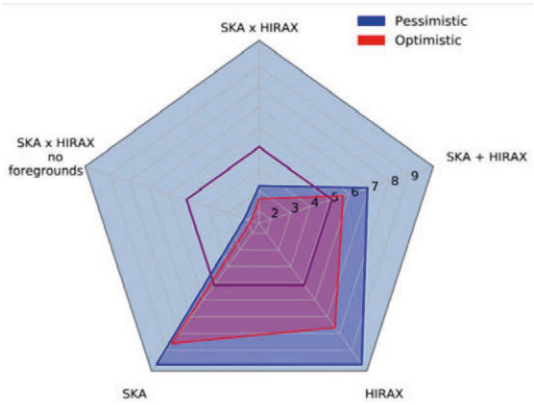
The Laser Interferometer Space Antenna (LISA) mission represents a pioneering approach to detecting gravitational wave backgrounds generated by cosmic strings—topological defects potentially formed during the universe's earliest moments. In the LISA article arXiv:2405.03740 researchers, including IA member L. Sousa and collaborator I. Y. Rybak, have developed a comprehensive template databank for gravitational wave detection, incorporating both analytical and numerically simulated templates from advanced Nambu-Goto string network simulations.

This research is significant because it can forecast LISA's detection capabilities for these exotic gravitational wave signals. By constructing sophisticated search templates, the team can estimate the experimental reach and parameter reconstruction precision for potential cosmic string observations. Detecting these gravitational wave backgrounds could provide unprecedented insights into fundamental physics at extremely high energy scales, potentially probing conditions near the grand unification energy of approximately 10^{11} GeV.

The work demonstrates critical advancements in gravitational wave astronomy, showcasing LISA's potential to test fundamental models of cosmic string formation and reveal new relativistic degrees of freedom in the early universe. By developing flexible search strategies and assessing detection sensitivities down to incredibly low string tension levels, the research bridges theoretical predictions with observational constraints, offering a promising pathway to understanding the most fundamental aspects of cosmic evolution.

Probing the Primordial Universe with Next-Gen Radio Telescopes

The quest to understand cosmic inflation remains a central challenge in modern cosmology, with researchers developing innovative techniques to probe the fundamental physics of the universe's earliest moments. A study done with the participation of IA member J. Fonseca (arXiv:2406.00117) introduces a novel correlation statistic that significantly enhances our ability to measure primordial non-Gaussianity—a key characteristic of quantum fluctuations during the inflationary epoch.



Marginalized forecasts of σ(flocNL) from the bimodal bispectrum (SKA x HIRAX) with and without foreground cut. Two versions are shown with an optimistic and a pessimistic kmax choice. For comparison, forecasts for each survey and for the summed signal (no cross corrrelation) are also shown. The purple line is the Planck 2018 constraint.

Next-generation radio telescope arrays offer unprecedented opportunities to map the universe's large-scale structure by examining neutral hydrogen distributions across different redshifts. By ingeniously combining interferometric and single-dish observational modes, researchers demonstrate here a method to measure the squeezed bispectrum with remarkable precision and efficiency.

The proposed approach promises to surpass existing measurements from missions like Planck and Euclid, potentially constraining primordial non-Gaussianity with unprecedented accuracy. By utilizing only a small subset of observable triangular configurations, the method could achieve a σ(flocNL) of approximately 3, opening new windows into understanding the quantum origins of cosmic structure.

This work represents a significant methodological advancement in cosmological observation, offering a flexible technique applicable to various signals that manifest in squeezed configuration measurements.

Other activities

The Cosmology Group maintained its dynamic research environment through weekly "Cosmoclub" journal discussions, fostering critical scientific discourse and keeping our team engaged with latest developments in the field. These are always done with a zoom connection between all the nodes. Additionally, the group strengthened its internal collaboration through two dedicated in-person group meetings, providing valuable opportunities for detailed discussion of ongoing research projects and future initiatives.

We also had in 2024 the organization of two significant international meetings at the Porto node: the 11th LISA Cosmology Working Group Meeting and the SKAO Cosmology Science Working Group Meeting. These events strengthened our role in two major upcoming observational facilities and enhanced our international research collaborations. We also organized in December the Cosmonata meeting with a zoom link between the Lisbon and Porto nodes. In March 2024 we organized in the Lisbon node a meeting of the Survey Operations Support Team of Euclid (lead by IA member I. Tereno).

The group demonstrated strong commitment to public engagement through various outreach activities in partnership with the Science Communication Team and Ciência Viva. The historic first public release of Euclid's images provided a unique opportunity for public engagement, with team members featuring in television appearances and participating in special outreach events to share these groundbreaking observations with the public.

Tiago Barreiro

Group Leader

Instrumentation and Systems

For the Instrumentation Group 2024 was somehow a consolidation year, especially in the area of software where the group had a significant increase with the inclusion of several CAUP's SyNaPSE members. The group continues with a very intense level of activity, sometimes above what our human resources can cope with, in great part due to the way several project schedule change.

As seen in this report, there was a significant progress during this year, achieving some important milestones in several project and starting promising future ones.

During 2024, the following instruments had engineering and implementation activities at IA:

- For the European Southern Observatory (ESO): MOONS, ANDES, BlueMUSE and PoET.

- For the European Space Agency (ESA): EUCLID, CHEOPS, PLATO, ARIEL and ATHENA.

During this year, we also participated in the preparation of project preparation of applications or in the preliminary definition of concepts of a few projects namely: HRMOS, RISTRETTO and PCS for ESO and ASSET-wE for the Subaru Telescope (Japan) and started a new project with the industry, Quantum Comm, for ESA.

Currently the AISG 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.

In terms of Human Resources, the group had the integration of a Mechanical Engineer (a need that was previously identified as a handicap). On the software side, 4 new (partial) members were integrated, and André Silva concluded his PhD and is now a researcher. Also, Ricardo Gafeira integrated (partially) the area os solar instrumentation.

In terms of themes of research, supported by background expertise in Astronomy Instruments / Space missions and consolidated by the work PhD students supervised by AISG researchers, the team is explored:

a) Stabilization of calibration light sources for High Accuracy Photometry Instruments resulting from research and develop a device that senses the light source fluctuations and modulates the beam, both in flux and in spectra, to produce a sufficiently stable source, a truly impressive challenge when stabilization levels of few ppm are required over long periods of observation.

b) Development of a solar telescope that will allow the detail study of the Sun (using it a proxy to understand the sources of noise that affect the observations of other stars). For that, it is fundamental to be able to obtain disk-resolved, HR spectra, opening a whole new path for the detection and characterization of Earth-like planets orbiting other Suns. Implementation of seeing measurement techniques for daytime seeing for solar observations.

c) Development of miniaturized Cross dispersed echelle spectrographs operating in the VIS and UV with the Size Weight and Power (SWaP) requirements for a SmallSat solution and the required spectral resolution to allow the study of this less explored spectral range.

d) Study of space debris detection algorithms in a standalone platform, with the goal to implement and test a star tracker that can be used for space debris detection. The methodological approach consists of selecting the most appropriate debris detection algorithms, adding automatic photometry measurements, developing a standalone platform, implementing the algorithms in the platform, selecting the low-cost materials capable of withstanding the harsh space environment, and optimizing the algorithms to work in different scenarios.

Following is listed the activity detail of the running projects.

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 2023. 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 2024, we had several integration and test missions in UKATC, Scotland, that concluded with the Preliminary Acceptance in Europe, by ESO, in December. The next year will comprise the preparation of the instrument for shipment and installation at the ESO Paranal Observatory.

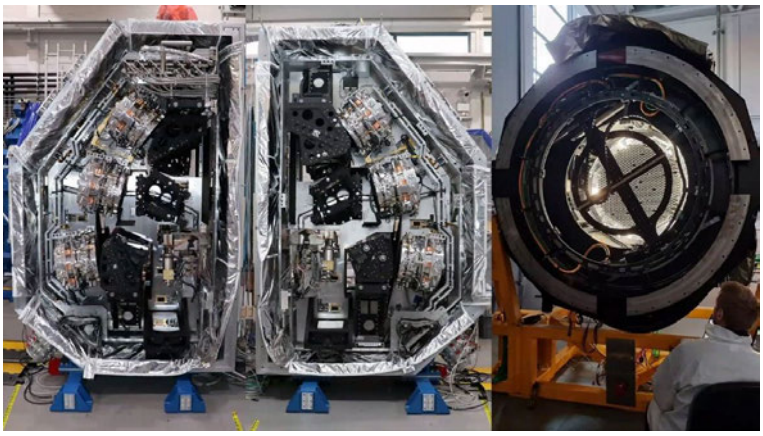


Figure: The ESO MOONS Instrument with its Spectrograph and the RFE.

ANDES (ESO)

ANDES, formerly known as HIRES, is the project for a high-resolution spectrograph to be installed at the ESO E-ELT telescope. The concept of ANDES is being developed by a consortium that comprises several institutes in different European countries, as well as USA, Canada, Brazil and Chile. The Portuguese participation in this consortium is done through IA that is leading the "front end" subsystem 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.

2024 was a very busy successful year for ANDES. The team participated/organized the system engineering meeting to prepare for the subsystems Preliminary Design Review (PDR). The meeting was held in Lisbon at the faculty of sciences between 9 and 11 of July 2024.

On October 3, 2024, the Front-End team had a pre-subsytem PDR with ESA, in the context of the Prodex fundings. The review was held in Lisbon at the faculty of sciences. The review was successful and essential to prepare to the main PDR.

On October 29-30, 2024, the Front-End PDR was held in Lisbon at the faculty of sciences. The PDR was successful as it was the first time such an experiment is held at the level of ANDES, and ESO. We are currently taking care of all the action items to be prepared for the ANDES system PDR, to be held in October 2025 (TBC).

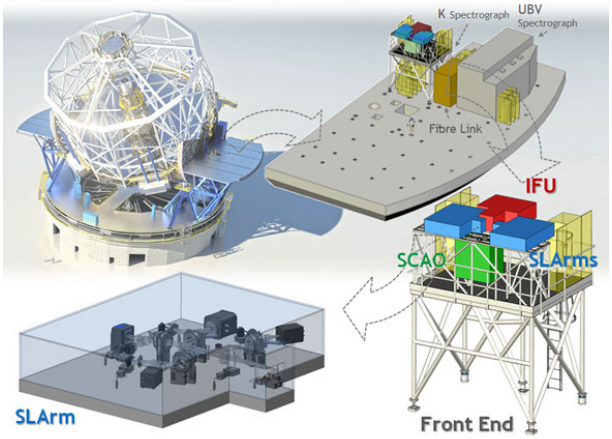


Figure: ANDES, with its Front End, at the ESO Extremely Large Telescope.

PoET (ESO)

The detection and characterisation of other Earths, planets with the physical conditions to hold liquid water and thus potential life-sustaining environments, is a bold objective of present-day astrophysics. This quest is however severely challenged by astrophysical "noise" from the host stars. To approach this problem, we started in 2022 a new project to build a dedicated facility, the Paranal solar Espresso Telescope (PoET). This telescope will be linked to the ESPRESSO spectrograph (ESO) and allow to acquire simultaneously disk-integrated (sun-as-a-star) and arcsecond level disk-resolved observations of the Sun at a spectral resolution R~200000. The project is funded by the European Union (ERC, FIERCE, 101052347). And it is a Portuguese project.

During 2024, the project had its preliminary design concluded, comprising the telescope, its dome and the front ends (scientific payloads developed by IA). The Detailed Design phase started in the end of 2024 and will be concluded in

the first trimester of 2025 where the payload parts will start the integration and tests. The telescope was already procured and is currently being built at Officina Stellare in Italy.

BlueMUSE (ESO)

IA has been invited to participate in the ESO-BLueMUSE instrument, which is a blue-optimized, medium spectral resolution, panoramic integral field spectrograph based on the MUSE instrument, proposed for the Very Large Telescope (installed at Nasmith platform level). Phase A of this project is scheduled for the beginning of 2024, but preparatory works already took place during 2023.

With an optimized transmission down to 350 nm, BlueMUSE builds upon the heritage of MUSE but includes both obvious and novel improvements (e.g., improved stability with better temperature control and automated alignment processes). Along with all the core subsystems supporting the increased performance of BlueMUSE, the instrument shall be managed at hardware and software level according to the new standards currently in use at the VLT.

The team's main activities were carried out within the scope of the Instrument Control Software and Instrument Control Electronics work packages. They participated in one in-person consortium meeting and several remote conferences, supporting efforts leading to the PHASE A milestone review, which is scheduled for February 2025.

EUCLID (ESA)

Euclid is ESA's mission dedicated to the exploration of the dark universe through the measurement of the properties of the cosmological large-scale structure. IA is strongly involved in this mission, participating in the consortium board, in the consortium coordination group, in the publication groups, in various science working groups, and leading the survey operations support team.

In 2024, IA's Instrumentation and Systems Group continued its long-standing participation in the preparation of the Survey Design, focusing on the development of the ECTile software. This software computes the mission's Reference Survey Definition (RSD), i.e., it produces schedules of the Euclid Deep and Wide surveys, including implementation of all calibrations, compliant with all constraints and requirements. The IA-computed reference survey is the basis of the operational survey to be executed by the Euclid satellite during the nominal science observations phase (NSOP).

February 14th marked the start of the NSOP, and the activities in 2024 started with the computation of RSD_2024A in January, the first computed survey to be used in actual observations. A satellite in space is subject to adversities of various sources including solar activity, ice contamination produced by out-gassing, guiding problems, or instrument commanding issues, resulting in a number of failed observations or images of degraded quality. The activities in 2024 were mostly focused on developing a new version of ECTile capable of copying with the NSOP critical needs of survey repairing and rescheduling. First, a survey repair tool was implemented to surgically correct patches from the previously computed survey. This tool wa used to generate the second survey RSD_2024B. Then, a survey replanning capability was implemented, now to enable the computation of a new survey taking into account the observations already acquired. This tool was used in the generation of the third survey RSD_2024C. Finally, the survey recovery capability was added to ECTile, enabling the re-scheduling of failed observations when computing a new survey. At the end of the year, all these new functionalities are tested and ready to use in the generation of the fourth reference survey, to be named RSD_2025A and to be delivered in January 2025, just in time for the forthcoming Euclid first data release.

A second workshop on ECTile usage and survey generation was organized in FCUL (March 2024). In October, ESA announced the first page of Euclid's cosmic atlas obtained from the NSOP images. In terms of funding, the development of the new version of ECTile was made in the framework of a specific contract with ESA, and SOST is funded through PRODEX.

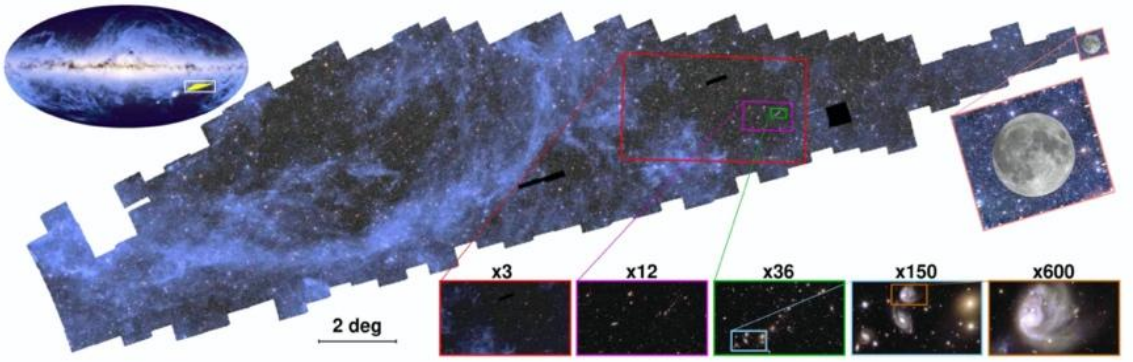


Figure: The first page of Euclid's cosmic atlas covering 132 deg2 of the Southern Sky with data acquired during two weeks of the NSOP.

E-CHEOPS (ESA)

The Characterising Exoplanet Satellite (CHEOPS) is 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 were responsible for the calibration of the pipeline until the end of the nominal mission.

In 2024, CHEOPS continues to run well within specifications and continues to get scientific observations of high precision. IA gave full maintenance support to the data reduction pipeline during the CHEOPS extension of the mission. In the beginning of the 2024 we have identified and hired the person to be dedicated to this task. We have also updated and performed the release 15.0.0 of the pipeline which allowed the change of the reference platform on a new server to process all the CHEOPS data. In the last trimester of 2024, we have also signed a change request that allowed to adjust the funding for our participation in the first extension of the mission which ends in 2026 instead of 2025 which was initially defined.

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 instrumentation team has leadership of several work packages for the development of software for the Plato Data Centre (PDC) as well as in the development of the Optical Ground Segment (OGSE) component to test and calibrate the PLATO cameras on ground.

On the hardware side, our participation includes the development of the OGSE. In 2024, the team has most of all supported the activities concerning the OGSE previously delivered to CSL (Belgium), as well as (through a direct contract with ESA) the development of a second OGSE, which was already commissioned to ESTEC. Small adaptations to the light source are now on course, in order to be able to use this system to perform tests and verification with the Plato FM telescopes.

On the software side, the team kept developing four different components (and leadership of respective work packages) related with the Plato Data Centre (PDC): Target star CCD position calculation, Planet candidate ranking and false positive modelling, Model Grid Acquisition, and Target Preparation Tool. All activities went smoothly.

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.

The main activities Instrumentation group in ARIEL, and together with the OGSE team led by Oxford University, were associated to the design of part of OGSE system, associated to the illumination module and reference detector subsystem working in the Visible /Near Infrared part of the spectrum. The reference detector function is to monitor the light source fluctuations and to provide source stability data required to detrend the results from the ARIEL instruments during calibration and verification procedure.

The main focus of this project were focused in the development and design activities of the OGSE, leading to the Critical Design Review milestone that took place (with success) in October 2024.

ATHENA (ESA)

The group of Instrumentation of IA is leading the international consortium for the development of the Athena mission on-board metrology system, in the sequence of the approval of activity proposal to the ESA tender, which had the kick-off in June 2020.

The function of the system being developed by the IA team is of measuring the exact pointing of the Athena mirror during the process of switching focus between the X-IFU and WFI Athena instruments. The level of accuracy required for this task is at the level of a fraction of an arcsecond.

The Athena OBM project had its final presentation and final review in December 2024. The review took place at ESA and was considered successful, with the indication that the current contract could be extended next year (2025) with studies and development activities in the scope of NewAthena mission.

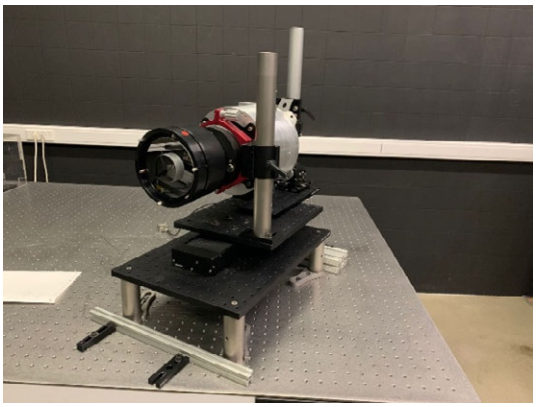


Figure: OBM camera during the verification tests

Starting projects and preparations for the future (CAUP involvement)

HRMOS - High Resolution Multi Object Spectrograph is an instrument that is being proposed for ESO VLT in the framework of the new instrumentation expected for the decade 2030s. The key science areas that will be addressed include Nucleocosmochronology, Galactic Science, Dwarf galaxies and Local Group, Star clusters and Stellar astrophysics, Exoplanets in crowded environments, and young stars. The preliminary designs points for spectrograph covering significant wavelength regions in the bands U, V, and R, reaching a resolution of 80000 with the multiplexing of 50-100 stars simultaneously.

In 2024 we were invited and became part of the HRMOS consortium. During this year we have mostly worked on the scientific motivation but have also started to participate in the technical meetings. For the development of this instrument, we will be managing the work package dedicated to the software data reduction of the instrument and possibly some wok package in the Front-End.

ASSET-wE – Approaching Systematic characteriSation of Earth-Twins with ESPRESSO is a project that aims at providing a comprehensive program to well characterise sub-Neptunes and Earth-like planets in both hemispheres, and for that proposes to build a new ESPRESSO-like facility for the Subaru@Hawaii telescope in the northern hemisphere. The consortium is led by the Swiss Geneva Observartory and includes INAF from Italy ABC from Japan and IA. An ERC-Synergy grant was submitted end of 2024.

Highlights for 2024

- On December 2024, MOONS had its Preliminary Acceptance in Europe Review, approved by ESO, concluding the integration and test phase, that will be followed by the shipment and installation in the ESO Paranal Observatory.
- ANDES Front-End, under IA responsibility, has his Sub-System Preliminary Desing Review (first subsystem in the ANDES instrument) on November 2024, milestone that will be followed by the full system PDR mid-2025.
- On November 24th 2024, the team from the instrumentation group of IA delivered a final presentation at ESA-ESTEC, marking the conclusion of an activity that led to the development of an onboard metrology system prototype for the Athena instrument. ESA's board deemed the work highly successful and mentioned the possibility of continuing the project for the New-Athena mission.

Alexandre Cabral

Group Leader

UnF – Training Unit

Head (for 2012-2024): Carlos J. A. P. Martins

The CAUP Training Unit provides support for those studying astronomy and astrophysics related subjects at U. Porto. CAUP offers a unique environment for research projects and training at all levels, whether provided in-house, supplied to schools and other partners, or benefiting from our extensive international network of collaborators and partners.

Some of the unit-specific activities and outcomes during 2024 were as follows:

- Doctoral level:
  - A total of 7 PhD theses were successfully defended in the calendar year 2024: A. Chougle, E. Cristo, A. Karnavas, S. Morais, N. Moedas, A. Silva, T. Silva
  - As of 31 December, CAUP was host to 29 ongoing PhD research projects.

- Masters level:
  - A total of 9 Master dissertations were successfully defended in the calendar year 2024, of which 5 in astronomy (C. António, P. Branco, Y. Damasceno, E. Gonçalves, A. Vale, S. Veiga) and 3 in physics (R. Costa, T. Miranda, J. Pestana).
  - As of 31 December, CAUP was host to 13 Master dissertation projects.

- Undergraduate level:
  - CAUP runs an extremely active program of research internships for undergraduate (and first-year masters) students, most (though not all) in the context of FCUP's PEEC program. A total of 24 such internships were active in 2024. Some of these students published the results of their work in peer-reviewed publications (sometimes as first authors) and also presented them in oral communications at international and national scientific meetings.
  - As of 31 December, 20 internships were either in progress or scheduled to start in early 2024.

- Future projects:
  - A list of research projects offered by CAUP researchers for the academic year 2024-25 was compiled and published in a CAUP Projects Booklet, available at the CAUP website (and in printed form at selected events). This lists both projects intended for PhD theses and Master dissertations and those intended for undergraduate internships. The 2024 edition was released in conjunction with the 2024 Astronomy Students Day, which was held on 24 May

- Senior training:
  - One CAUP advanced course was organized: Python for Astronomers (J. Martins, A. Silva) and Phi in the Sky - Astrophysical probes of fundamental physics (C. Martins).
  - One continuing education course, mostly aimed at high-school teachers but open to others (undergraduate or high-school students, etc.) was taught, The Physics of Everyday Life (C. Martins, January-March).

- Junior training:
  - In 2024 we organized the thirteenth edition of the AstroCamp (scientific director C. Martins). This is a selective residential school/summer camp for highly motivated high-school students which took place on 4-18 August, at the CEIA in Paredes de Coura, and included 11 students. (A 12th one was offered a place, but had to withdraw, at a time when a replacement was no longer feasible.) Camp activities for the students included lectures (30h) and practical classes (18h), observations, community service, and other leisure activities. This edition was the first in the new format of the AstroCamp, which is now a 3-year program, with students being able to apply and enter the program in their 10th grade (or equivalent in the 45 eligible countries); the program starts with the aforementioned 2-week school, and subject to a sufficiently good performance student can remain in the program for the following two academic years, participating in a series of remote and (occasionally) in person activities.
  - In July we hosted two-week internships for 6 secondary school students, in the context of the AstroCamp, the Ciência Viva's OCJF project, and other partnerships.

- Other activities:
  - In October-November 2024 we participated in the International Space Week's 'Space Goes to School' event, organized by Ciência Viva's ESERO office, giving more than 60 in person and online talks across continental Portugal as well as in the Azores and Madeira islands.

ND – Outreach Unit

Head (for 2009-2024): Filipe A. L. Pires, who is also the Executive Director of the Porto Planetarium.

Context

For the outreach group, the year 2024 saw a consolidation in the number of people who took part in all the activities carried out: 65 892 in 2024 compared to 65 554 in 2023. This is the third consecutive year of growth and is a new record.

However, there was a decrease in visitors to the Porto Planetarium, both in sessions and in educational workshops: visitors to sessions 32 304 in 2024 compared to 33 653 in 2023; visitors to educational workshops 16 435 in 2024 compared to 19 002 in 2023. This decrease is due to the greater difficulties that school groups have in leaving school and is transversal to the entire network of Ciência Viva Centers, where there was a decrease in visitors of around 20%.

The Porto Planetarium increased the offering of sessions with the acquisition of the license for a new session " Supermassive black holes " a session on the current state of research into these mysterious objects that arouse great curiosity among the public. For the first time, the Portuguese version, translation and narration were done in collaboration with the Planetário Casa das Ciência de Braga, thus reducing costs.

Human Resources

During 2024, the human resources allocated to the Outreach Unit were:

- 5 CAUP contracts at 1.0 full time equivalent (FTE): Filipe Pires, Paulo Pereira, Ricardo Reis, Elsa Moreira and Francisco Miguel Gonçalves. One CAUP contract at 0.8 FTE to outreach unit: Adriana Silva;
- 1 Gestão Ciência e Tecnologia (BGCT) grants (direct FCT contracts), via Ciência Viva national agency, for Planetarium activities, at 1 fte: Tânia Cunha;
- 2 teachers in "Mobilidade Estatutária" (deployed teacher), under a public servant contract with the Ministry of Education, via Ciência Viva national agency, for Planetarium activities, at 1 fte: Ilídio André Costa, José Dantas (until July).

Regular Activities at the Porto Planetarium

Educational offer for schools: the offer implemented in 2017 continued to expand in 2024 with the following number of participants:

- Planetarium shows: 32 304 visitors in 2024 (33 653 in 2023);
- Hands-on Laboratories: 16 435 visitors in 2024 (19 002 in 2023).

Other Regular Activities and activities in schools

- Portable Planetarium: planetarium sessions presented for a total of 9 770 in 2024 (6 044 in 2023) children.
- Workshops, observations, talks and hands-on activities for a total of 7 383 participants.

Special Events

Encontro Regional dos Clubes Ciência Viva do Planetário do Porto – CCV 2024

As part of the monitoring and strengthening of regional partnerships in the Network of Ciência Viva Clubs in Schools and with the aim of improving their skills in STEAM areas, the Planetário do Porto - Centro Ciência Viva (PP-CCV), in partnership with the Instituto de Astrofísica e Ciências do Espaço (IA) - Universidade do Porto, organized the Jornadas de Ciência Viva, a regional meeting of the Ciência Viva Clubs in Schools that we accompany.

Mais perto das Estrelas

Monthly sessions organised by Planetário do Porto consist of an introductory planetarium session to the night sky and observations of the night sky with small telescopes. Total number of 600 participants.

Music concerts inside the dome

In 2024, the planetarium hosted two musical shows (NEGENTROPIA: O Último Homem na Terra Devastada, Hyper-Objects: Música Acusmática em Conexão) one of them a post-techno opera. In total we had 270 visitors.

Especial Dia Mundial da Criança 2024

World Children's Day is a special celebration that reminds us of the importance of caring for and protecting the very young, providing them with a safe and healthy environment in which to grow and thrive. As we honour this date, we should also reflect on the responsibility we have to preserve our planet as a sustainable home for children and future generations. The Porto Planetarium has joined the celebration with free admission to all screenings on June 1st, accompanied by the exhibition "Explora o Espaço com LEGO SPACE".

Dia Internacional dos Museus 2024

Every year since 1977, the International Council of Museums has organised International Museum Day (IMD), which represents a unique moment for the international museum community. On this day, participating museums plan creative events and activities related to the International Museum Day theme, engage with their public and highlight the importance of the role of museums as institutions that serve society and its development. Planetário do Porto - CCV joined the celebrations by hosting a day full of activities including a talk about the thrilling exploration into the world of asteroids and meteorites, on May 18, the initiative had 500 participants.

Dia Nacional dos Cientistas 2024

In 2016, through Assembly of the Republic Resolution No. 228/2016, May 16 was established as National Scientists' Day. The date coincides with the birthday of the former Minister of Science and Higher Education José Mariano Gago, with the aim of celebrating and recognizing the historic, relevant and innovative contribution of the scientific community to the advancement of knowledge, progress and well-being of society. The Porto Planetarium joined in the national celebrations which this year took place in Porto, at the Rosa Mota pavilion.

Dia Internacional da Luz 2024

The Planetário do Porto - Centro Ciência Viva / Instituto de Astrofísica e Ciências do Espaço - Universidade do Porto, are partners of UNESCO and the Network for Astronomy School Education (NASE) in celebrating the *International Day of Light*. In this activity, schools, their students and teachers from all over the world have carried out various activities throughout 2024 to mark this anniversary.

Ciência Viva no Verão em Rede

In 2024, the Porto Planetarium took part in the Ciência Viva no Verão em Rede program with 6 events, a multidisciplinary event between geology and astronomy organized at Lavadores beach, 2 night observation sessions and 3 workshops to search for micrometeorites. Total number of participants was 124 people.

26º Aniversário do Planetário do Porto / Dia Nacional da Cultura Científica 2024

On November 24th, Portugal celebrated the National Day of Scientific Culture. On the same day, the Porto Planetarium celebrated its 26th anniversary. To celebrate the date, the Planetarium was open with free sessions throughout the day, including a showing of the movie "Abism" by James Cameron, it received around 145 participants.

O Espaço vai à Escola

Initiative promoted by ESERO-PT during the World Space Week. IA and CAUP contributed with **talks** (presential and online). The IA is the institute that contributes the most lectures to the program, with more researchers participating and reaches out to more students.

8ª Concentração de telescópios de Moimenta da Beira

Organised by the Sciences Club of Moimenta da Beira, this astronomy event included a public talk by an IA researcher (Nuno Santos) and astronomical observations with telescopes by IA's Science Communication group. The event took place in Moimenta da Beira on 10, 11 and 12 May 2024, and received 300 people.

FOLIO

The central theme of the Óbidos International Literature Festival in 2024 was the 500th anniversary of the birth of Camões. The Porto Planetarium was present with the session "O Céu dos Lusíadas".

O Dia Mais Curto: a Festa da Curta-Metragem 2024

Every year, between December 21st and 22nd, Winter arrives in the Northern Hemisphere of the Earth. This transition, known as the Winter Solstice, also marks the shortest day of the year, which inspired the creation of the festival celebrating the shortest and most original format of Cinema worldwide: The Shortest Day.

Islândia – Natureza Ígnea

Public presentation of the documentary "Iceland - Igneous Nature" produced by Paulo Ferreira.

Dia Mundial do Sono no Planetário do Porto

As part of the celebration of World Sleep Day, the Planetário do Porto - Centro Ciência Viva joined forces with the Center for Neuroscience and Cell Biology of the University of Coimbra to launch the series of animations for hemispheric projection (360º) 'A good sleep under the stars'.

Ciência e Liberdade – debate dos 50 anos do 25 de Abril

On the 50th anniversary of April 25th, Planetário do Porto - CCV promoted a debate with the certainty of an enriching and fruitful conversation, with contributions on the importance of freedom and knowledge for the cultural development of society. With the participation of:

João Teixeira Lopes, Sociologist, Professor at the Faculty of Letters of the University of Porto

Pedro Olavo Simões, Journalist, Editor of JN História magazine

Orfeu Bertolami, Theoretical physicist, Professor at the Faculty of Sciences of the University of Porto

Sandra Sousa moderation, Journalist, RTP

Pode o céu cair-nos na cabeça?

Special event celebrating Asteroid Day

Explora o Espaço com LEGO: SPACE no Planetário do Porto

The LEGO™ Group and Planetário do Porto - CCV challenge children to explore space... in their own way.

The LEGO® SPACE temporary exhibition is available in the atrium of the Planetário do Porto - CCV from May 25 to August 3, 2024. This exhibition features some of the LEGO sets from the SPACE collection, such as moon carts, bases on Mars, modular space stations and rockets.

Em Nome do Centro das margens e dos que Nelas Habitam

Immersive fulldome video projection made by Ana Pinheiro and Hugo Aston, as part of the Project-Multimedia course of the Fine Arts degree at FBAUP.

Hoje Quem Manda Sou Eu – troca de diretores na Rede de Centros Ciência Viva 2024

"Hoje Quem Manda Sou Eu" is an initiative organized by Ciência Viva and taking place throughout the country's network of Ciência Viva Centres on 24, 25 and 26 October 2024, in which all the centers change directors at the same time. For three days, this exchange of chairs will bring different programs that will challenge the teams of each Ciência Viva Centre and provide inspiring experiences for visitors.

Porto Planetarium - CCV welcomed Cristina Veiga-Pires (director of the Algarve Ciência Viva Center)

Museu do Côa - Centro Ciência Viva hosted Filipe Pires (executive director of Planetário do Porto - CCV)

The program included a session of strategic and board games, a playful approach to themes such as Space and the Environment, as well as an immersive lecture on the Ria Formosa. To bring the event to a memorable close, science met fiction with a unique take on the "Star Wars" universe.

Porto/Post/Doc 2024 @ Planetário do Porto CCV

In 2024, Porto/Post/Doc once again embarked on a journey through the universe of immersive films in partnership with the Planetário do Porto - CCV.

O Abismo, de James Cameron: sessão do JRAAS Cinema Cycle

In this special session we delve into the parallels between deep ocean exploration and space exploration, proposing a work in which the seabed is a space analogous to what lies beyond our planet; not only are the life forms found in the Earth's deepest biomes almost alien in their adaptations to the environment, but the seabed offers us insights into the appearance of the first unicellular life forms on Earth and therefore opens a window for us to understand how life can sprout on the surface of other planets.

Teaching of Courses, Short Courses or others

Oficina de formação (50 horas), PP-CCV, Metodologias Orientadas para a Resolução de Problemas, janeiro e fevereiro.

Oficina de formação (50 horas), PP-CCV, A astronomia como ciência portal para a aprendizagem: o Inquiry Based Learning sustentado em ciência contemporânea, novembro (ainda em execução).

Curso (25 horas), PP-CCV, Compreender a Terra através do Espaço, julho a novembro.

Curso (25 horas), Boticas, Compreender a Terra através do Espaço, novembro a dezembro.

Curso (25 horas), PP-CCV, Compreender a Terra através do Espaço - II, julho a novembro.

Ação de Curta Duração (6 horas), online para Moçambique, Curso NASE Astronomia I, abril.

Ação de Curta Duração (6 horas), online para Moçambique, Curso NASE Astronomia II, abril.

Ação de Curta Duração (4 horas), Escola Secundária Filipa de Vilhena, Descobrir o Universo com Telescópios Escolares VI, 22 de maio.

Ação de Curta Duração (4 horas), (Agrupamento de Escolas n.º 1 do Marco de Canaveses, Descobrir o Universo com Telescópios Escolares VII, 2 de outubro.

Ação de Curta Duração (4 horas), online, Descobrir o Universo com Telescópios Escolares XXII, 19 de outubro.

Ação de Curta Duração (4 horas), online, James Webb Space Telescope: uma nova janela para o universo, 23 de novembro.

Ação de Curta Duração (4 horas), Universidade de Aveiro, Astronomia de Bolso, 18 de julho.

Ação de mentoria (3 horas), PP-CCV, Com a verdade me enganas: a astronomia escondida, 15 de fevereiro.

Ação de Curta Duração (4 horas), Universidade de Aveiro, Astronomia com ciência(s), 9 de julho.

Ação de Curta Duração (4 horas), Faculdade de Ciências da Universidade do Porto, A Astronomia como Ciência Portal para o Ensino I, 7 de dezembro.

Ação de Curta Duração (4 horas), Agrupamento de Escolas Gomes Monteiro, Noite de Estrelas: brilhando em família, 16 de novembro.

Ação de Curta Duração (4 horas), PP-CCV, A Ciência dos Centros de Ciência, 20 de

dezembro.

Press Releases and news

In 2024 we produced 11 news items in total, distributed as follows:

- 2 international press releases created by us
- 4 national versions of international press releases (3 ESO + 1 ESA)
- 2 national press releases
- 1 news article for the website/social media
- 2 press notes

UnAS – Administration and Services Unit

Head (for 2012-2024): Manuel A. S. Monteiro

This Unit integrates all supporting services necessary to build an efficient and effective set of resources that provide adequate support for the different activities in CAUP and IA.

The year was marked by an increase in the number of events with high in-person participation, which represented an additional challenge in managing available resources.

Cybersecurity continued to face significant challenges, driven by increasingly sophisticated phishing and malware threats.

CAUP's IT infrastructure continued the updating process started in 2023 with the implementation of a new electrical infrastructure and UPS system, allowing greater security and availability for both users and visitors.

During this year:

- One staff member continues to be dedicated to support the principal investigators of european and national projects, and as a project manager for the research unit IA;
- One staff member continues to be dedicated to public procurement and human resources;
- Installation of a new electrical infrastructure and UPS system in the datacenter;
- Installation of a new video conferencing system in the meetings room;
- Installation of a new large format interactive display in the classes/seminars room.

Regarding project management, the overall activity of the year included:

- Preparation and submission to FCT of 7 pedidos de pagamento;
- Preparation and submission to FCT of 11 pedidos de pagamento for Investigador FCT;
- Preparation and submission to Ciência Viva of 5 pedidos de pagamento;
- Preparation and submission of 5 pedidos de pagamento for other funding.

Regarding human resources, the overall activity of the year included:

- 8 Research work contracts;
- 12 Research fellowship contracts;
- 25 Academic internship contracts;
- 3 Work contracts.

The staff has participated in specific training actions/events, including:

- Sessão de informação - FCT: Concurso para Projetos de IC&DT e Projetos Exploratórios em Todos os Domínios Científicos 2024 - FPCEUP, Porto; 18 January (Elsa Silva)
- Sessão de esclarecimento: concurso de projetos de investigação científica e desenvolvimento tecnológico (IC&DT) em todos os domínios científicos - Online; 22 January (Elsa Silva)
- PTDC 2023 | Concursos para financiamento de projetos de I&D em todos os Domínios Científicos - Online; 22 February (Elsa Silva)
- Ação Formação "Atualização da Plataforma anoGov | Implementação das Portarias n.º 318-A/2023 e n.º 318-B/2023" - Online; 1 March (Joana Bateira)
- Sessão de informação: RGPD: Orientações e procedimentos para a investigação na U.Porto - FDUP, Porto; 22 March (Elsa Silva)
- Decoding Horizon Europe lump sum model - Expert Insights - Online; 8 May (Elsa Silva)
- Demonstração das funcionalidades da Plataforma Eletrónica de Contratação Pública anoGov - CAUP, Porto; 17 May (Argentina Pereira, Elsa Silva, Joana Bateira)
- Horizon Dashboard: Construindo dashboards de apoio à decisão e monitorização do desempenho de qualquer unidade orgânica ou instituição - Online; 23 May (Elsa Silva)
- Reporte de projetos financiados - interoperabilidade entre sistemas de informação (estruturas de I&D associadas U.Porto e SIGARRA) - Reitoria UP, Porto; 28 May (Elsa Silva)
- Certificates on the financial statements (CFS) in Horizon Europe - Online; 26 June (Elsa Silva)
- As Parcerias do Horizonte Europa – oportunidades e estratégias para a Investigação e Inovação - Online; 24 September (Elsa Silva)
- Woman XXI | International Conference on Woman - ISSSP, Porto; 26 and 27 September (Elsa Silva)

- Café de ideias para ideais "Acessibilidade, diversidade, Equidade e Inclusão" - CAUP, Porto; 24 October (Elsa Silva)
- ESO Seminar on "Instrument Control Systems 2024" - Munique, Alemanha; 25 to 28 November (Manuel Monteiro)
- Lump sum budgeting – How to prepare the mandatory detailed budget table? - Online; 9 December (Elsa Silva)
- Horizon Europe personnel cost calculation – The step-by-step approach! - Online; 10 December (Elsa Silva)
- Typical mistakes in Horizon Europe proposals – Showcasing negative comments from Evaluation Summary Reports (ESRs) - Online; 11 December (Elsa Silva)
- Flash session: A Política de Ciência Aberta da U.Porto: atualização e normas no âmbito da I&D - Online; 17 December (Elsa Silva)
- Everyone is invited!: Gender and diversity take inclusion to another level - CAUP, Porto; 20 December (Elsa Silva)

Some major research indicators

Research projects and grants

Research projects/programs

During 2024 there were 12 funded projects in CAUP, which provided most of the funds available for research related expenses, as well as for outreach and basic expenses. The research projects that in 2024 were supported by national and European funds are:

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

- *FInding ExoeaRths: tackling the ChallengEs of stellar activity (FIERCE)* (ERC GAP-101052347); PI: **Nuno Santos**; start date: 01 October 2022 – end date: 30 September 2027
- *Euclid Legacy Science Advanced analysis tools (ELSA) (ERC GAP-101135203)*; PI: **Nuno Santos**; start date: 01 October 2022 – end date: 30 September 2027

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

- *Dark matter and metals in galaxies (DarkMAGE)* (PTDC/FIS-AST/4862/2020); PI: **Jarle Brinchmann**; start date: 01 September 2021 – end date: 31 August 2025
- *Phi in the Sky: Astrophysical probes of fundamental physics* (PTDC/FIS-AST/4862/2020); PI: **Carlos Martins**; start date: 01 January 2023 – end date: 31 December 2025
- *Using Ap stars as LABoratories for probing chemical transport mechanisms, with ultra-precise space-based photometry* (2022.03993.PTDC); PI: **Margarida Cunha**; start date: 10 March 2023 – end date: 09 March 2025
- *Star-exoplanet compositional link: towards realistic characterization of terrestrial planets* (2022.06962.PTDC); PI: **Vardan Adibekyan**; start date: 01 January 2023 – end date: 31 December 2024
- *Cool Stars in the near-Infrared* (2022.04416.PTDC); PI: **Elisa Delgado Mena**; start date: 01 January 2023 – end date: 31 December 2024
- *Uncovering the nature of cosmic strings* (2022.03495.PTDC); PI: **Lara Sousa**; start date: 01 January 2023 – end date: 30 June 2024

(iii) Infrastructure funded projects (FCT):

- *R&D Unit 2020-2023: Instituto de Astrofísica e Ciências do Espaço* (UIDB/04434/2020 & (UIDP/04434/2020); PI: Francisco Lobo; start date: 01 January 2020 – end date: 31 December 2024

(iv) Other projects:

- *PLATO OGSE and PDC* (ESA Contract No. 4000133026); PI: **Nuno Santos**; start date: 1 January 2018 – end date: 31 December 2025
- *ANDES@ELT* (ESA Contract No. 4000143136); PI: **Nuno Santos**; start date: 01 January 2023 – end date: 31 December 2025
- *e-CHEOPS: Extending the CHEOPS mission* (ESA Contract No. 4000142255); PI: Sérgio Sousa; start date: 01 October 2023 – end date: 31 December 2025

Outreach and educational projects

During 2024, there were 6 funded outreach/educational projects in CAUP, which provide funds available for outreach and/or education related expenses. These were:

- *AstroCamp 2024*; PI: **Carlos Martins**; start date: 01 January 2024 – end date: 31 December 2024
- *Ocupação Científica dos Jovens nas Férias 2024*; PI: **Carlos Martins**; start date: 01 January 2024 – end date: 31 December 2024
- *Formação ESERO 2024*; PI: **Filipe Pires**, **Ilídio Lopes**; start date: 01 January 2024 – end date: 31 December 2024
- *Rede de Escolas Ciência Viva* (RE-C06-i04.02 - Impulso Jovem Steam, PRR_ID73); PI: **Filipe Pires**; start date: 01 March 2023 – end date: 30 June 2025
- *Rede de Escolas Ciência Viva* (RE-C06-i04.02 - Impulso Jovem Steam, PRR_ID6); PI: **Filipe Pires**; start date: 01 September 2023 – end date: 30 September 2025

Research grants

Several grants that have been active in 2024 with financial support of CAUP or with CAUP as the host institution.

The ongoing Post-Doctoral grants were:

1. Marta Cortesão, Research fellowship - postdoctoral (CIAAUP-05/2024-BIPD), CAUP, 14 June 2024

The ongoing research grants for PhD students were:

1. Afonso M. A. Vale, Research assistantship grant for PhD degree (CIAAUP-15/2024-BI-D), CAUP, 01 November 2024
2. Pedro M. H. Branco, Research assistantship grant for PhD degree (CIAAUP-14/2024-BI-D), CAUP, 01 November 2024
3. Eduardo Campos Gonçalves, Research assistantship grant for PhD degree (CIAAUP-09-2024-BI-D), CAUP, 01 October 2024
4. Yuri C. Damasceno, Research assistantship grant for PhD degree (2024.01038.BD), Fundação para a Ciência e a Tecnologia, 01 October 2024
5. Inês Martins Rolo, Research assistantship grant for PhD degree (2024.01287.BD), Fundação para a Ciência e a Tecnologia, 01 September 2024
6. Jennifer Peralta Lucero, Research assistantship grant for PhD degree (CIAAUP-22/2023-BI-D), CAUP, 15 December 2023
7. Clara Marie Winckler, Research assistantship grant for PhD degree (UI/BD/154758/2023), Fundação para a Ciência e a Tecnologia, 01 December 2023
8. Alba Barka, Research assistantship grant for PhD degree (CIAAUP-21/2023-BI-D), CAUP, 01 November 2023
9. Ricarda Heilemann, Research assistantship grant for PhD degree (CIAAUP-18/2023-BI-D), CAUP, 01 October 2023
10. Catarina M. J. Marques, Research assistantship grant for PhD degree (2023.03984.BD), Fundação para a Ciência e a Tecnologia, 01 October 2023
11. Carmen San Nicolás Martinéz, Research assistantship grant for PhD degree (CIAAUP-12/2023-BI-D), CAUP, 15 September 2023
12. Afonso Morgado Mota, Research assistantship grant for PhD degree (2024.02676.BD), Fundação para a Ciência e a Tecnologia, 01 September 2023
13. Daniel A. D. Vaz, Research assistantship grant for PhD degree (2022.13277.BD), Fundação para a Ciência e a Tecnologia, 01 January 2023
14. Pedro Alexandre C. Cunha, Research assistantship grant for PhD degree (2022.11477.BD), Fundação para a Ciência e a Tecnologia, 01 September 2022
15. Bárbara M. T. B. Soares, Research assistantship grant for PhD degree (2022.11805.BD), Fundação para a Ciência e a Tecnologia, 01 September 2022
16. Sergei Mukovnikov, PhD grant (UI/BD/152220/2021), Fundação para a Ciência e a Tecnologia, 15 January 2022
17. Ana Rita Costa Silva, PhD grant (2021.07856.BD), Fundação para a Ciência e a Tecnologia, 01 October 2021
18. João D. F. Dias, PhD grant (SFRH/BD/150990/2021), Fundação para a Ciência e a Tecnologia, 01 February 2021
19. Nuno M. Rosário, PhD grant (2020.05472.BD), Fundação para a Ciência e a Tecnologia, 01 February 2021
20. Miguel T. Clara, PhD grant (2020.07530.BD), Fundação para a Ciência e a Tecnologia, 01 October 2020

The completed research grants for PhD students in 2024 were:

1. Eduardo A. S. Cristo, PhD grant (PRT/BD/152703/2022), Fundação para a Ciência e a Tecnologia, 01 January 2022 to 02 July 2024
2. Nuno A. M. Moedas, PhD grant (UI/BD/152075/2021), Fundação para a Ciência e a Tecnologia, 15 September 2021 to 06 November 2024
3. André Miguel A. C. V. Silva, PhD grant (2020.05387.BD), Fundação para a Ciência e a Tecnologia, 01 January 2021 to 09 July 2024
4. David Grüber, PhD grant (2020.07632.BD), Fundação para a Ciência e a Tecnologia, 01 October 2020 to 30 September 2024
5. Abhishek Chougule, PhD grant (PD/BD/150439/2019), Fundação para a Ciência e a Tecnologia, 01 October 2019 to 31 January 2024
6. Tomás de Azevedo Silva, PhD grant (PD/BD/150416/2019), Fundação para a Ciência e a Tecnologia, 01 October 2019 to 31 January 2024

The ongoing research grants for master students were:

1. Iuna Maya Dreyer, Research assistantship grant for MSc degree (CIAAUP-12/2024-BI-M), CAUP, 01 November 2024
2. Pedro Belo Barbosa, Research assistantship grant for MSc degree (CIAAUP-13/2024-BI-M), CAUP, 01 November 2024

The completed research grants for master students in 2024 were:

1. Rúben A. R. Costa, Research assistantship grant for MSc degree (CIAAUP-01/2024-BI-M), CAUP, 15 January 2024 to 14 July 2024
2. Bruno Francisco Parracho, Research assistantship grant for MSc degree (CIAAUP-25/2023-BI-M), CAUP, 01 January 2024 to 30 June 2024
3. Teresa Oliveira Miranda, Research assistantship grant for MSc degree (CIAAUP-26/2023-BI-M), CAUP, 01 January 2024 to 30 June 2024
4. Yuri C. Damasceno, Research assistantship grant for MSc degree (CIAAUP-20/2023-BI-M), CAUP, 01 November 2023 to 30 April 2024
5. Inês Martins Rolo, Research assistantship grant for MSc degree (CIAAUP-15/2023-BI-M), CAUP, 01 October 2023 to 30 June 2024
6. Pedro M. H. Branco, Research assistantship grant for MSc degree (CIAAUP-16/2023-BI-M), CAUP, 01 October 2023 to 31 March 2024
7. Eduardo Campos Gonçalves, Research assistantship grant for MSc degree (CIAAUP-17/2023-BI-M), CAUP, 01 October 2023 to 31 March 2024
8. Joana Raquel A. Teixeira, Research assistantship grant for MSc degree (CIAAUP-11/2023-BI-M), CAUP, 15 July 2023 to 14 January 2024

The ongoing Science and Technology Management Grants were:

1. Tania F. S. Cunha, Science and Technology Management Grant (SFRH/BGCT/143136/2019), Fundação para a Ciência e a Tecnologia, 01 February 2019

Scientific production and actions

The scientific output of CAUP in 2024 was (see below):

- Papers in referred journals 157
- Papers in proceedings 16
- Communications in international meetings 88
- Communications in national meetings 15
- Observing runs 17

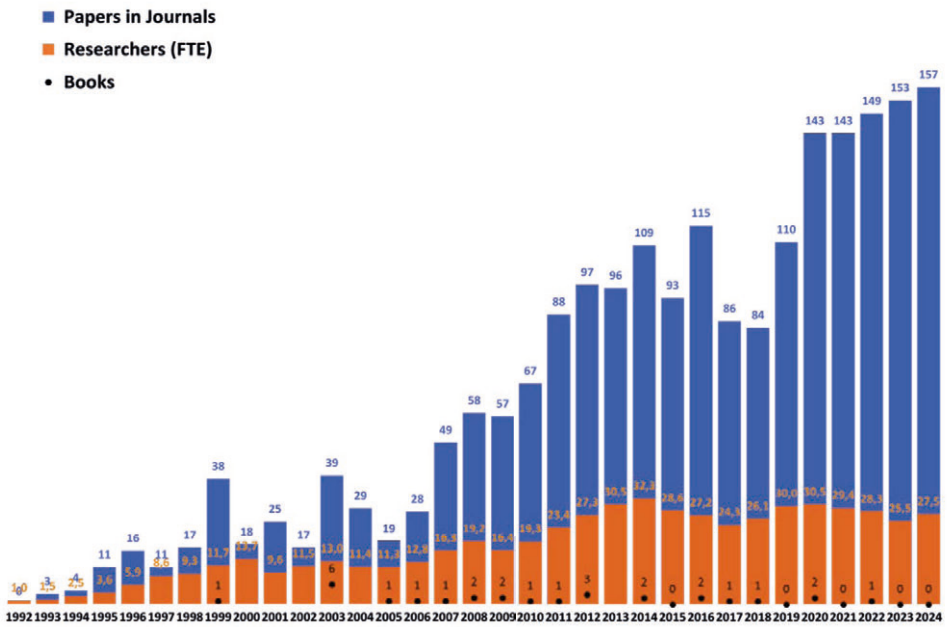


Figure 5: Blue bars – CAUP Publications in refereed journals per year; Orange bars – number of researchers with a PhD in full-time-equivalent (FTE) units; dots – books edited/published per year.

The h-index of CAUP is 156 (for a total of 135 887 accumulated citations).

If only refereed papers – as defined by ISI – are considered, the average number of citations per article is above 59. The evolution of this number over the years can be seen in Figure 7. The curve shows that the quality of the papers produced by CAUP (as measured by the average number of citations) continues to increase steadily.

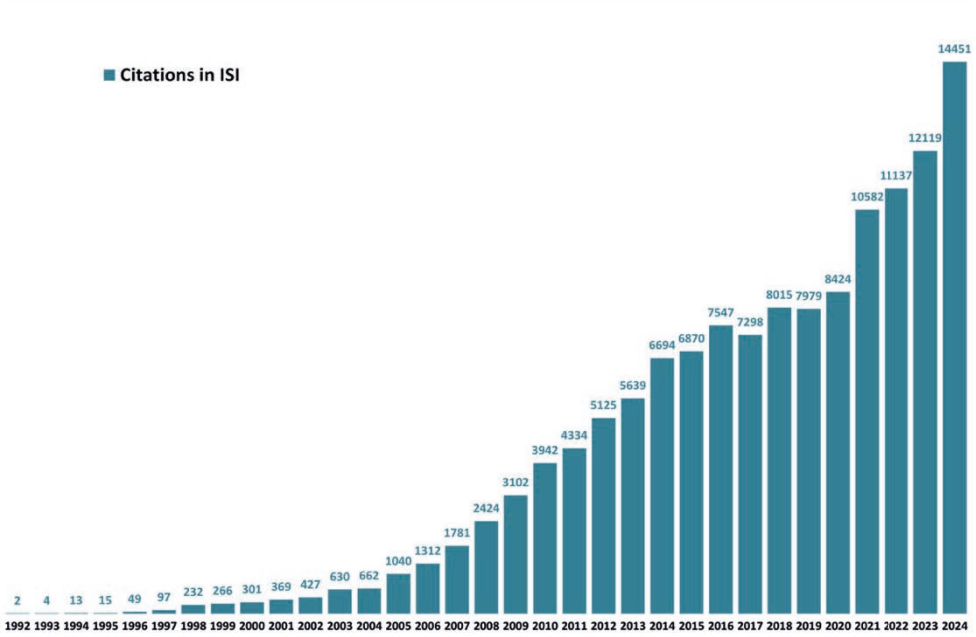


Figure 6: Citations per year from ISI using all entries in the database with CAUP/IA-U.Porto in the affiliation.

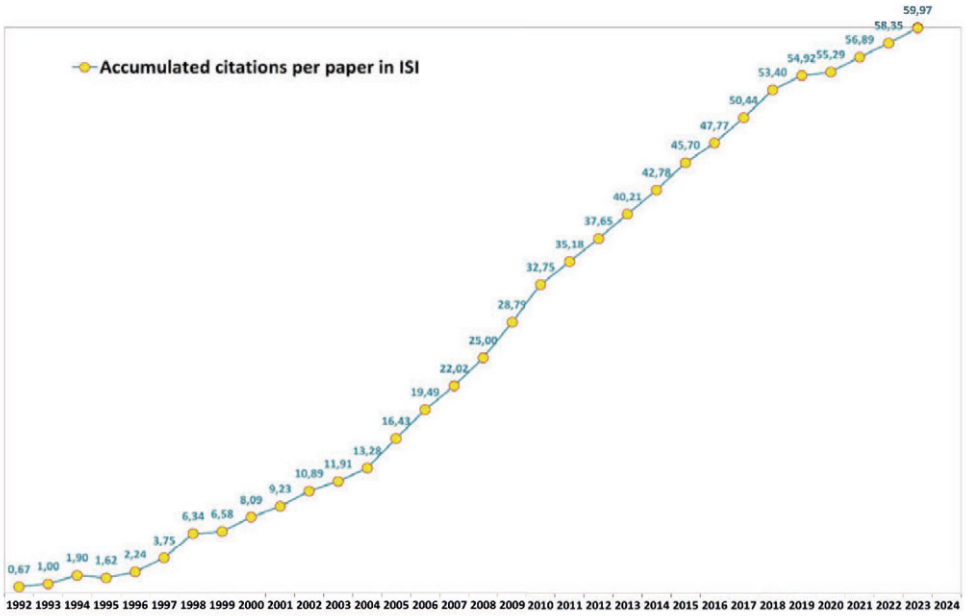


Figure 7: Accumulated citations per paper in ISI using all entries in the database with CAUP in the affiliation.

During 2024 CAUP organized, or co-organized, the following conferences, workshops, meetings or schools:

- *SKA Cosmology SWG Annual Meeting*; 15 to 17 January 2024; Porto, Portugal
- *IA-ON11*; Instituto de Astrofísica e Ciências do Espaço 11th internal workshop; 24 to 25 January 2024; Lisboa, Portugal
- *4th Planetary Systems Day @IA*; 30 January 2024; Porto, Portugal
- *Stars Day 3.5*; 24 May 2024; Observatório Geofísico e Astronómico da Universidade de Coimbra, Portugal
- *11th LISA Cosmology Working Group Workshop*; 17 to 21 June 2024; Porto, Portugal
- *ApLAB Workshop*; 11 to 12 July 2024; Porto, Portugal
- *8th TESS/15th Kepler Asteroseismic Science Consortium Workshop*; 15 to 19 July 2024; Porto, Portugal
- *Porto Summer School on Asteroseismology: From Pixels to Stellar Ages*; 21 to 26 July 2024; Azurara, Vila do Conde, Portugal

- *Beyond ΛCDM with the ELT and space facilities*; 5th Azores School on Observational Cosmology 7th Azores International Advanced School in Space Sciences; 2 to 8 September 2024; Angra do Heroísmo, Açores, Portugal
- *PoET Workshop #2*; 23 to 25 October 2024; Porto, Portugal
- *Stars Day 2024*; 20 December 2024; Porto, Portugal
- *COSMONATA 2024*; 23 December 2024; Porto/Lisboa/Online, Portugal

Several team members also integrated the scientific organising committees of international Meetings/Conferences and have continued to serve as referees in all major international astronomy research journals. Several members of CAUP were also involved in activities within international Consortia and/or Working Groups.

In 2024 some members of the Research Unit served as National Delegates to European Organizations (ESA, ESO), served individually as experts in several international organisations, integrate on an individual basis European Commission Research Structures, or integrate the Scientific Committees, Commissions and/or Working Groups of the International Astronomical Union (IAU). CAUP researchers also served as evaluators for FCT panels (projects and/or grants) and in panels of several European programmes.

In 2024, CAUP received 38 visitors to develop collaborative work with team members, most of them being supported under the ongoing exchange programmes and projects, and organised 17 scientific seminars + 7 further organised by IA/U.Lisboa or IA/U.Coimbra with CAUP participation, as well as frequent journal clubs in the various groups, the majority online.

Refereed publications in 2024

1. S. Cristiani, G. Cupani, A. Trost, V. D'Odorico, F. Guarneri, G. Lo Curto, M. Meneghetti, P. Di Marcantonio, **J. P. Faria**, J. I. González Hernández et al. (*including:* **C. J. A. P. Martins**, **N. C. Santos**, **S. G. Sousa**), 2024; *Probing the small-scale structure of the intergalactic medium with ESPRESSO: spectroscopy of the lensed QSO UM673*; Monthly Notices of the Royal Astronomical Society, 528, 4, 15
2. **V. Zh. Adibekyan**, **S. G. Sousa**, **E. Delgado Mena**, **N. C. Santos**, G. Israelian, **S. C. C. Barros**, Z. Martirosyan, A. A. Hakobyan, 2024; *Density discrepancy between transit-timing variations and radial velocity: Insights from the host star composition*; Astronomy & Astrophysics, 683, A159, 6
3. **V. Zh. Adibekyan**, M. Deal, C. Dorn, I. Dittrich, **B. Soares**, **S. G. Sousa**, **N. C. Santos**, B. Bitsch, C. Mordasini, **S. C. C. Barros** et al. (*including:* **T. L. Campante**, **E. Delgado Mena**, **O. D. S. Demangeon**, **P. Figueira**, **N. A. M. Moedas**), 2024; *Linking the primordial composition of planet building disks to the present-day composition of rocky exoplanets*; Astronomy & Astrophysics, 692, A67, 12
4. B. Akinsanmi, **S. C. C. Barros**, M. Lendl, L. Carone, P. E. Cubillos, A. Bekkelien, A. Fortier, H. -G. Florén, A. Collier Cameron, G. Boué et al. (*including:* **S. G. Sousa**, **O. D. S. Demangeon**, **N. C. Santos**), 2024; *The tidal deformation and atmosphere of WASP-12 b from its phase curve*; Astronomy & Astrophysics, 685, A63, 24
5. B. Akinsanmi, M. Lendl, G. Boué, **S. C. C. Barros**, 2024; *Effects of tidal deformation on planetary phase curves*; Astronomy & Astrophysics, 682, A15, 15
6. J. -M. Almenara, X. Bonfils, E. M. Bryant, A. Jordán, G. Hébrard, E. Martioli, A. C. M. Correia, N. Astudillo-Defru, C. Cadieux, L. Arnold et al. (*including:* **S. C. C. Barros**, **J. Gomes da Silva**, **J. H. C. Martins**), 2024; *TOI-4860 b, a short-period giant planet transiting an M3.5 dwarf*; Astronomy & Astrophysics, 683, A166, 16
7. A. Alqasim, N. Grieves, **N. M. Rosário**, D. Gandolfi, J. H. Livingston, **S. G. Sousa**, K. A. Collins, J. Teske, M. Fridlund, J. A. Egger et al. (*including:* **S. C. C. Barros**, **O. D. S. Demangeon**, **N. C. Santos**), 2024; *TOI–757 b: an eccentric transiting mini–Neptune on a 17.5–d orbit*; Monthly Notices of the Royal Astronomical Society, 533, 1, 1
8. R. I. Anderson, G. Viviani, S. Shetye, N. Mowlavi, L. Eyer, L. Palaversa, B. Holl, S. Blanco-Cuaresma, K. Kravchenko, M. Pawlak et al. (*including:* **P. Figueira**), 2024; *VELOcities of CEpheids (VELOCE). I. High-precision radial velocities of Cepheids*; Astronomy & Astrophysics, 686, A177, 42
9. **A. Antoniadis-Karnavas**, **S. G. Sousa**, **E. Delgado-Mena**, **N. C. Santos**, **D. T. Andreasen**, 2024; *ODUSSEAS: Upgraded version with new reference scale and parameter determinations for 82 planet-host M dwarf stars in SWEET-Cat*; Astronomy & Astrophysics, 690, A58, 16
10. A. Armeni, B. Stelzer, A. Frasca, C. F. Manara, F. M. Walter, J. M. Alcalá, P. Schneider, A. Sicilia-Aguilar, J. Campbell-White, E. Fiorellino, **J. F. Gameiro**, M. Gangi, 2024; *Evidence for magnetic boundary layer accretion in RU Lup. A spectrophotometric analysis*; Astronomy & Astrophysics, 690, A225, 19
11. **P. P. Avelino**, 2024; *Particles and their fluids in nontrivial matter extensions to general relativity*; Physical Review B, 859
12. **P. P. Avelino**, 2024; *Sound speed as a source of the gravitational field in modified gravity*; Physical Review D, 110, 2
13. M. Ballardini, Y. Akrami, F. Finelli, D. Karagiannis, B. Li, Y. Li, Z. Sakr, D. Sapone, A. Achúcarro, M. Baldi et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **I. Tereno**), 2024; *Euclid: The search for primordial features*; Astronomy & Astrophysics, 683, A220, 22
14. O. Balsalobre-Ruza, J. Lillo-Box, D. Barrado, A. C. M. Correia, J. P. Faria, **P. Figueira**, A. Leleu, P. Robutel, **N. C. Santos**, E. Herrero-Cisneros, 2024; *The TROY project III. Exploring co-orbitals around low-mass stars*; Astronomy & Astrophysics, 689, A53, 19

15. K. Barkaoui, F. J. Pozuelos, C. Hellier, B. Smalley, L. D. Nielsen, P. Niraula, M. Gillon, J. De Wit, S. Müller, C. Dorn et al. (*including:* **A. Soubkiou**), 2024; *An extended low-density atmosphere around the Jupiter-sized planet WASP-193 b*; Nature Astronomy, 8, 909
16. F. S. Barros, P. A. Graça, **J. J. G. Lima**, R. Pinto, A. Restivo, M. Villa, 2024; *Using Recurrent Neural Networks to improve initial conditions for a solar wind forecasting model*; Engineering Applications of Artificial Intelligence, 133, C
17. N. Billot, S. Hellmich, W. Benz, A. Fortier, D. Ehrenreich, C. H. Broeg, A. Heitzmann, A. Bekkelien, A. Brandeker, Y. Alibert et al. (*including:* **S. C. C. Barros**, **O. Demangeon**, **N. C. Santos**, **S. G. Sousa**), 2024; *In-situ observations of resident space objects with the CHEOPS space telescope*; Journal of Space Safety Engineering, 11, 3
18. A. Bonfanti, M. Brady, T. G. Wilson, J. Venturini, J. A. Egger, A. Brandeker, **S. G. Sousa**, M. Lendl, A. E. Simon, D. Queloz et al. (*including:* **V. Zh. Adibekyan**, **N. C. Santos**, **S. C. C. Barros**, **O. D. S. Demangeon**), 2024; *Characterising TOI-732 b and c: New insights into the M-dwarf radius and density valley*; Astronomy & Astrophysics, 6832, A66, 28
19. L. Borsato, D. Degen, A. Leleu, M. J. Hooton, J. A. Egger, A. Bekkelien, A. Brandeker, A. Collier Cameron, M. N. Günther, V. Nascimbeni et al. (*including:* **S. C. C. Barros**, **O. D. S. Demangeon**, **N. C. Santos**, **S. G. Sousa**), 2024; *Characterisation of the warm-Jupiter TOI-1130 system with CHEOPS and a photo-dynamical approach*; Astronomy & Astrophysics, 689, A52, 21
20. **T. Boulet**, 2024; *A catalogue of asteroseismically calibrated ages for APOGEE DR17. The predictions of a CatBoost machine learning model based on the [Mg/Ce] chemical clock and other stellar parameters*; Astronomy & Astrophysics, 685, A66, 26
21. **A. Branco**, **P. Machado**, **O. Demangeon**, **T. de Azevedo Silva**, S. Jaeggli, T. Widemann, P. Tanga, 2024; *Transmission Spectroscopy Along the Transit of Venus: A Proxy for Exoplanets Atmospheric Characterization*; Atmosphere, 15, 12
22. S. N. Breton, A. F. Lanza, S. Messina, I. Pagano, L. Bugnet, E. Corsaro, R. A. Garcia, S. Mathur, **A. R. G. Santos**, S. Aigrain, 2024; *Measuring stellar surface rotation and activity with the PLATO mission. I. Strategy and application to simulated light curves*; Astronomy & Astrophysics, 689, A229, 19
23. W. Broussard, E. W. Schwieterman, S. Ranjan, **C. Sousa-Silva**, A. Fateev, C. T. Reinhard, 2024; *The Impact of Extended H2O Cross Sections on Temperate Anoxic Planet Atmospheres: Implications for Spectral Characterization of Habitable Worlds*; Acta Applicandae Mathematicae
24. G. Bruno, I. Pagano, G. Scandariato, H.-G. Florén, A. Brandeker, G. Olofsson, P. F. L. Maxted, A. Fortier, S. G. Sousa, S. Sulis et al. (*including:* **S. C. C. Barros**, **O. D. S. Demangeon**, **N. C. Santos**), 2024; *Detailed cool star flare morphology with CHEOPS and TESS*; Astronomy & Astrophysics, 686, A239, 27
25. C. Cadieux, M. Plotnykov, R. Doyon, D. Valencia, F. Jahandar, L. Dang, M. Turbet, T. J. Fauchez, R. Cloutier, C. Cherubim et al. (*including:* **S. C. C. Barros**, **E. Delgado Mena**, **N. C. Santos**), 2024; *New Mass and Radius Constraints on the LHS 1140 Planets: LHS 1140 b Is either a Temperate Mini-Neptune or a Water World*; The Astrophysical Journal Letters, 960, 1, 31
26. M. S. Cagliari, B. R. Granett, L. Guzzo, M. Bethermin, M. Bolzonella, S. de la Torre, P. Monaco, M. Moresco, W. J. Percival, C. Scarlata et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**), 2024; *Euclid: Testing photometric selection of emission-line galaxy targets*; Astronomy & Astrophysics, 689, A166, 19
27. **T. L. Campante**, H. Kjeldsen, Y. Li, M. N. Lund, **A. M. Silva**, E. Corsaro, **J. Gomes da Silva**, **J. H. C. Martins**, **V. Zh. Adibekyan**, **T. de Azevedo Silva** et al. (*including:* **M. S. Cunha**, **E. A. S. Cristo**, **J. P. Faria**, **M. J. P. F. G. Monteiro**, **A. W. Neitzel**, **N. C. Santos**, **S. G. Sousa**), 2024; *Expanding the frontiers of cool-dwarf asteroseismology with ESPRESSO. Detection of solar-like oscillations in the K5 dwarf ϵ Indi*; Astronomy & Astrophysics, 683, L16, 10
28. S. Casas, J. Lesgourgues, N. Schöneberg, V. M. Sabarish, L. Rathmann, M. Doerenkamp, M. Archidiacono, E. Bellini, S. Clesse, N. Frusciante et al. (*including:* **J. Brinchmann**, **J. Dinis**, **I. Tereno**), 2024; *Euclid: Validation of the MontePython forecasting tools*; Astronomy & Astrophysics, 682, A90, 33
29. N. Castro, P. M. Weilbacher, M. M. Roth, P. A. Crowther, A. Monreal-Ibero, **J. Brinchmann**, G. Micheva, 2024; *Outflow from the very massive Wolf-Rayet binary Melnick 34*; Astronomy & Astrophysics, 691, A346, 9
30. A. Castro-González, J. Lillo-Box, A. C. M. Correia, **N. C. Santos**, D. Barrado, M. Morales-Calderón, E. Shkolnik, 2024; *Signs of magnetic star-planet interactions in HD 118203. TESS detects stellar variability that matches the orbital period of a close-in eccentric Jupiter-sized companion*; Astronomy & Astrophysics, 684, A160, 19
31. A. Castro-González, J. Lillo-Box, D. J. Armstrong, L. Acuña, A. Aguichine, V. Bourrier, S. Gandhi, **S. G. Sousa**, **E. Delgado-Mena**, A. Moya et al. (*including:* **V. Zh. Adibekyan**, **N. C. Santos**, **S. C. C. Barros**), 2024; *TOI-5005 b: A super-Neptune in the savanna near the ridge*; Astronomy & Astrophysics, 691, A233, 28
32. J. R. C. C. C. Correia, **C. J. A. P. Martins**, **F. C. N. Q. Pimenta**, 2024; *Evolution of current-carrying string networks*; Physical Review B, 855
33. **A. R. Costa Silva**, **O. D. S. Demangeon**, **N. C. Santos**, D. Ehrenreich, C. Lovis, H. Chakraborty, M. Lendl, F. A. Pepe, S. Cristiani, R. Rebolo et al. (*including:* **V. Zh. Adibekyan**, **T. de Azevedo Silva**, **E. A. S. Cristo**, **P. Figueira**, **C. J. A. P. Martins**, **A. M. Silva**, **S. G. Sousa**), 2024; *ESPRESSO reveals blueshifted neutral iron emission lines on the dayside of WASP-76 b*; Astronomy & Astrophysics, 689, A8, 15
34. **M. S. Cunha**, **Y. C. Damasceno**, **J. Amaral**, **A. J. G. Falorca**, J. Christensen-Dalsgaard, **P. P. Avelino**, 2024; *Buoyancy glitches in pulsating stars revisited*; Astronomy & Astrophysics, 687, A100, 17

35. **P. A. C. Cunha**, **A. Humphrey**, **J. Brinchmann**, **S. G. Morais**, **R. Carvajal**, **J. M. Gomes**, **I. Matute**, **A. Paulino-Afonso**, 2024; *Identifying type II quasars at intermediate redshift with few-shot learning photometric classification*; Astronomy & Astrophysics, 687, A269, 20
36. R. da Silva, C. Danielski, **E. Delgado Mena**, L. Magrini, D. Turrini, K. Biazzo, M. Tsantaki, M. Rainer, K. G. Helminiak, S. Benatti et al. (*including:* **V. Zh. Adibekyan**, **N. Sanna**), 2024; *Ariel stellar characterisation. II. Chemical abundances of carbon, nitrogen, and oxygen for 181 planet-host FGK dwarf stars*; Astronomy & Astrophysics, 688, A193, 20
37. **Y. C. Damasceno**, J. V. Seidel, B. Prinoth, A. Psaridi, E. Esparza-Borges, M. Stangret, **N. C. Santos**, M. R. Zapatero-Osorio, Y. Alibert, R. Allart et al. (*including:* **A. R. Costa Silva**, **E. A. S. Cristo**, **C. J. A. P. Martins**, **S. G. Sousa**), 2024; *The atmospheric composition of the ultra-hot Jupiter WASP-178 b observed with ESPRESSO*; Astronomy & Astrophysics, 689, A54, 18
38. A. De Cia, E. Zackrisson, A. Kordt, L. Izzo, J. Li, R. Maiolino, A. Marconi, P. Richter, A. Saccardi, S. Salvadori et al. (*including:* **P. Papaderos**), 2024; *Galaxy formation and symbiotic evolution with the inter-galactic medium in the age of ELT-ANDES*; Experimental Astronomy, 58, 3
39. **O. D. S. Demangeon**, P. E. Cubillos, V. Singh, T. G. Wilson, L. Carone, A. Bekkelien, A. Deline, D. Ehrenreich, P. F. L. Maxted, B.-O. Demory et al. (*including:* **S. G. Sousa**, **S. C. C. Barros**, **N. C. Santos**), 2024; *Asymmetry in the atmosphere of the ultra-hot Jupiter WASP-76 b*; Astronomy & Astrophysics, 684, A27, 35
40. **W. Dethier**, B. Tessore, 2024; *Assessing the residual biases in high-resolution transit absorption spectra correction*; Astronomy & Astrophysics, 688, L30, 6
41. **J. D. F. Dias**, N. Schöneberg, L. Vacher, **C. J. A. P. Martins**, S. Vinzl, 2024; *A speed limit on tachyon fields from cosmological and fine-structure data*; Journal of Cosmology and Astroparticle Physics, 11, 030, 30
42. D. Dragomir, B. Nicholson, N. L. Eisner, **S. G. Sousa**, K. A. Collins, S. B. Howell, C. Ziegler, C. Hellier, B. C. Addison, S. Ballard et al. (*including:* **N. C. Santos**), 2024; *HD 21520 b: a warm sub-Neptune transiting a bright G dwarf*; Monthly Notices of the Royal Astronomical Society, 534, 4, 3744
43. J. A. Egger, H. P. Osborn, D. Kubyshkina, C. Mordasini, Y. Alibert, M. N. Günther, M. Lendl, A. Brandeker, A. Heitzmann, A. Leleu et al. (*including:* **S. G. Sousa**, **S. C. C. Barros**, **O. Demangeon**, **J. Rodrigues**, **N. C. Santos**), 2024; *Unveiling the internal structure and formation history of the three planets transiting HIP 29442 (TOI-469) with CHEOPS*; Astronomy & Astrophysics, 688, A223, 30
44. B. N. Engelbrecht, M. G. Santos, **J. Fonseca**, Y. Li, J. Wang, M. O. Irfan, S. E. Harper, K. Grainge, P. Bull, I. P. Carucci, 2024; *Radio frequency interference from radio navigation satellite systems: simulations and comparison to MeerKAT single-dish data*; Monthly Notices of the Royal Astronomical Society, 536, 1, 1035
45. B. Epinat, T. Contini, W. Mercier, L. Ciesla, B. C. Lemaux, Sean D. Johnson, J. Richard, **J. Brinchmann**, L. A. Boogaard, D. Carton, 2024; *MAGIC: MUSE gAlaxy Groups In COSMOS – A survey to probe the impact of environment on galaxy evolution over the last 8 Gyr*; Astronomy & Astrophysics, 683, A205, 27
46. J. I. Espinoza-Retamal, G. Stefánsson, C. Petrovich, R. Brahm, A. Jordán, E. Sedaghati, **J. Peralta Lucero**, M. Tala-Pinto, D. J. Muñoz, G. Boyle, R. Leiva, V. Suc, 2024; *HATS-38 b and WASP-139 b Join a Growing Group of Hot Neptunes on Polar Orbits*; The Astronomical Journal, 168, 4
47. Euclid Collaboration, D. Sciotti, S. Gouyou Beauchamps, V. F. Cardone, S. Camera, I. Tutusaus, F. Lacasa, A. Barreira, M. Bonici, A. Gorce et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. LII. Forecast impact of super-sample covariance on 3×2pt analysis with Euclid*; Astronomy & Astrophysics, 691, A318, 24
48. Euclid Collaboration, S. Paltani, J. Coupon, W. G. Hartley, A. Alvarez-Ayllon, F. Dubath, J. J. Mohr, M. Schirmer, J. -C. Cuillandre, G. Desprez et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**), 2024; *Euclid preparation. XXXI. The effect of the variations in photometric passbands on photometric-redshift accuracy*; Astronomy & Astrophysics, 681, A66, 18
49. Euclid Collaboration, L. Leuzzi, M. Meneghetti, G. Angora, R. B. Metcalf, L. Moscardini, P. Rosati, P. Bergamini, F. Calura, B. Clément et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XXXIII. Characterization of convolutional neural networks for the identification of galaxy-galaxy strong-lensing events*; Astronomy & Astrophysics, 681, A68, 23
50. Euclid Collaboration, G. F. Lesci, M. Sereno, M. Radovich, G. Castignani, L. Bisigello, F. Marulli, L. Moscardini, L. Baumont, G. Covone et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XXXVII. Galaxy colour selections with Euclid and ground photometry for cluster weak-lensing analyses*; Astronomy & Astrophysics, 684, A139, 19
51. Euclid Collaboration, A. C. Deshpande, T. D. Kitching, A. Hall, M. L. Brown, N. Aghanim, L. Amendola, S. Andreon, N. Auricchio, M. Baldi et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation XXXVI. Modelling the weak lensing angular power spectrum*; Astronomy & Astrophysics, 684, A138, 23
52. Euclid Collaboration, A. Fumagalli, A. Saro, S. Borgani, T. Castro, M. Costanzi, P. Monaco, E. Munari, E. Sefusatti, A. Le Brun et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **I. Tereno**, **C. S. Carvalho**), 2024; *Euclid preparation. XXXV. Covariance model validation for the two-point correlation function of galaxy clusters*; Astronomy & Astrophysics, 683, A253, 19
53. Euclid Collaboration, G. Jelic-Cizmek, F. Sorrenti, F. Lepori, C. Bonvin, S. Camera, F. J. Castander, R. Durrer, P. Fosalba, M. Kunz et al. (*including:* **J. Brinchmann**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P.**

Martins), 2024; *Euclid preparation. XL. Impact of magnification on spectroscopic galaxy clustering*; Astronomy & Astrophysics, 685, A167, 23

54. Euclid Collaboration, A. Pezzotta, C. Moretti, M. Zennaro, Azadeh Moradinezhad Dizgah, M. Crocce, E. Sefusatti, I. Ferrero, K. Pardede, A. Eggemeier et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation XLI. Galaxy power spectrum modelling in real space*; Astronomy & Astrophysics, 687, A216, 40
55. Euclid Collaboration, E. Lusso, S. Fotopoulou, M. Selwood, V. Allevato, G. Calderone, C. Mancini, M. Mignoli, M. Scodeggio, L. Bisigello et al. (*including:* **A. Humphrey**, **J. Brinchmann**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XXXVIII. Spectroscopy of active galactic nuclei with NISP*; Astronomy & Astrophysics, 685, A108
56. Euclid Collaboration, T. Castro, S. Borgani, M. Costanzi, J. Dakin, K. Dolag, A. Fumagalli, A. Ragagnin, A. Saro, A. M. C. Le Brun et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XXXIX. The effect of baryons on the halo mass function*; Astronomy & Astrophysics, 685, A109, 17
57. Euclid Collaboration, M. Sereno, S. Farrens, L. Ingoglia, G. F. Lesci, L. Baumont, G. Covone, C. Giocoli, F. Marulli, S. Miranda La Hera et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XLII. A unified catalogue-level reanalysis of weak lensing by galaxy clusters in five imaging surveys*; Astronomy & Astrophysics, 689, A252, 25
58. Euclid Collaboration, B. Bose, P. Carrilho, M. Marinucci, C. Moretti, M. Pietroni, E. Carella, L. Piga, B. S. Wright, F. Vernizzi et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XLIV. Modelling spectroscopic clustering on mildly nonlinear scales in beyond-ΛCDM models*; Astronomy & Astrophysics, 689, A275, 29
59. Euclid Collaboration, S. Serrano, P. Hudelot, G. Seidel, J. E. Pollack, E. Jullo, F. Torradeflot, D. Benielli, R. Fahed, T. Auphan et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XLVIII. The pre-launch Science Ground Segment simulation framework*; Astronomy & Astrophysics, 690, A103, 38
60. Euclid Collaboration, A. Kashlinsky, R. G. Arendt, M. L. N. Ashby, F. Atrio-Barandela, R. Scaramella, M. A. Strauss, B. Altieri, A. Amara, S. Andreon et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XLVI. The near-infrared background dipole experiment with Euclid*; Astronomy & Astrophysics, 689, A294, 26
61. Euclid Collaboration, L. Scharré, M. Hirschmann, G. De Lucia, S. Charlot, F. Fontanot, M. Spinelli, L. Xie, A. Feltre, V. Allevato et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XLV. Optical emission-line predictions of intermediate-z galaxy populations in GAEA for the Euclid Deep and Wide Surveys*; Astronomy & Astrophysics, 689, A276, 33
62. Euclid Collaboration, B. Aussel, S. J. Kruk, M. Walmsley, M. Huertas-Company, M. Castellano, C. J. Conselice, M. Delli Veneri, H. Domínguez Sánchez, P.-A. Duc et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XLIII. Measuring detailed galaxy morphologies for Euclid with machine learning*; Astronomy & Astrophysics, 689, A274, 26
63. Euclid Collaboration, F. Dournac, A. Blanchard, S. Ilic, B. Lamine, I. Tutusaus, A. Amara, S. Andreon, N. Auricchio, H. Aussel et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation: XLVII. Improving cosmological constraints using a new multi-tracer method with the spectroscopic and photometric samples*; Astronomy & Astrophysics, 691, A30, 16
64. Euclid Collaboration, L. Bisigello, M. Massimo, C. Tortora, S. Fotopoulou, V. Allevato, M. Bolzonella, C. Gruppioni, L. Pozzetti, G. Rodighiero et al. (*including:* **P. A. C. Cunha**, **A. Humphrey**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**), 2024; *Euclid preparation. XLIX. Selecting active galactic nuclei using observed colours*; Astronomy & Astrophysics, 691, A1, 24
65. Euclid Collaboration, G. Congedo, L. Miller, A. N. Taylor, N. J. G. Cross, C. A. J. Duncan, T. D. Kitching, N. Martinet, S. Matthew, T. Schrabback et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation: LIII. LensMC, weak lensing cosmic shear measurement with forward modelling and Markov Chain Monte Carlo sampling*; Astronomy & Astrophysics, 691, A319, 28
66. Euclid Collaboration, T. Castro, A. Fumagalli, R. E. Angulo, S. Bocquet, S. Borgani, M. Costanzi, J. Dakin, K. Dolag, P. Monaco et al. (*including:* **A. C. da Silva**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. L. Calibration of the halo linear bias in Λ(ν)CDM cosmologies*; Astronomy & Astrophysics, 691, A62, 20
67. A. Fortier, A. E. Simon, C. H. Broeg, G. Olofsson, A. Deline, T. G. Wilson, P. F. L. Maxted, A. Brandeker, A. Collier Cameron, M. Beck et al. (*including:* **S. G. Sousa**, **S. C. C. Barros**, **O. Demangeon**, **N. C. Santos**), 2024; *CHEOPS in-flight performance. A comprehensive look at the first 3.5 yr of operations*; Astronomy & Astrophysics, 687, A302, 43
68. A. V. Freckelton, D. Sebastian, A. M. J. Mortier, A. H. M. J. Triaud, P. F. L. Maxted, L. Acuña, D. J. Armstrong, M. Battley, T. A. Baycroft, I. Boisse et al. (*including:* **S. G. Sousa**), 2024; *BEBOP V. Homogeneous stellar analysis of potential circumbinary planet hosts*; Monthly Notices of the Royal Astronomical Society, 531, 4, 13
69. M. Fridlund, I. Georgieva, A. Bonfanti, Y. Alibert, C. M. Persson, D. Gandolfi, M. Beck, A. Deline, S. Hoyer, G. Olofsson et al. (*including:* **S. G. Sousa**, **A. Antoniadis-Karnavas**, **V. Zh. Adibekyan**, **S. C. C. Barros**, **O.**

D. S. Demangeon, **N. C. Santos**), 2024; *Planets observed with CHEOPS. Two super-Earths orbiting the red dwarf star TOI-776*; Astronomy & Astrophysics, 684, A12, 17

70. N. Frusciante, F. Pace, V. F. Cardone, S. Casas, I. Tutusaus, M. Ballardini, E. Bellini, G. Benevento, B. Bose, P. Valageas et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**), 2024; *Euclid: Constraining linearly scale-independent modifications of gravity with the spectroscopic and photometric primary probes*; Astronomy & Astrophysics, 690, A133, 22
71. J. I. González Hernández, A. Suárez Mascareño, **A. M. Silva**, A. K. Stefanov, J. P. Faria, H. M. Tabernero, A. Sozzetti, R. Rebolo, F. Pepe, **N. C. Santos** et al. (*including:* **P. Figueira**, **V. Zh. Adibekyan**, **C. J. A. P. Martins**, **S. G. Sousa**), 2024; *A sub-Earth-mass planet orbiting Barnard's star*; Astronomy & Astrophysics, 690, A79, 36
72. M.-J. Goupil, C. Catala, R. Samadi, K. Belkacem, R.-M. Ouazzani, D. R. Reese, T. Appourchaux, S. Mathur, J. Cabrera, A. Börner et al. (*including:* **N. A. M. Moedas**, **M. S. Cunha**), 2024; *Predicted asteroseismic detection yield for solar-like oscillating stars with PLATO*; Astronomy & Astrophysics, 683, A78, 24
73. **D. Grüber**, L. Sousa, **P. P. Avelino**, 2024; *Stochastic gravitational wave background generated by domain wall networks*; Physical Review D, 110, 2
74. M. G. Guarcello, E. Flaccomio, J. F. Albacete-Colombo, V. Almendros-Abad, K. Anastasopoulou, M. Andersen, C. Argiroffi, A. Bayo, E. S. Bartlett, N. Bastian et al. (*including:* **K. Muzic**), 2024; *EWOCS-I: The catalog of X-ray sources in Westerlund 1 from the Extended Westerlund 1 and 2 Open Clusters Survey*; Astronomy & Astrophysics, 682, A49, 22
75. F. Guarneri, L. Pasquini, V. D'Odorico, S. Cristiani, G. Cupani, P. Di Marcantonio, J. I. González Hernández, **C. J. A. P. Martins**, A. Suárez Mascareño, D. Milaković et al. (*including:* **N. C. Santos**, **S. G. Sousa**), 2024; *Fundamental physics with ESPRESSO: a new determination of the D/H ratio towards PKS1937-101*; Monthly Notices of the Royal Astronomical Society, 529, 2, 15
76. Y. Guo, R. Bacon, L. Wisotzki, T. Garel, J. Blaizot, J. Schaye, J. Matthee, F. Leclercq, L. A. Boogaard, J. Richard et al. (*including:* **J. Brinchmann**), 2024; *Spatially resolved spectroscopic analysis of Lyα haloes. Radial evolution of the Lyα line profile out to 60 kpc*; Astronomy & Astrophysics, 691, A66, 9
77. A. Hacker, R. F. Díaz, D. J. Armstrong, J. Fernández Fernández, S. Müller, **E. Delgado Mena**, **S. G. Sousa**, **V. Zh. Adibekyan**, K. G. Stassun, K. A. Collins et al. (*including:* **N. C. Santos**), 2024; *TOI-2374 b and TOI-3071 b: two metal-rich sub-Saturns well within the Neptunian desert*; Monthly Notices of the Royal Astronomical Society, 532, 2, 22
78. J. -. Harre, A. M. S. Smith, **S. C. C. Barros**, V. Singh, J. Korth, A. Brandeker, A. Collier Cameron, M. Lendl, T. G. Wilson, L. Borsato et al. (*including:* **N. M. Rosário**, **O. Demangeon**, **N. C. Santos**, **S. G. Sousa**), 2024; *Hints of a close outer companion to the ultra-hot Jupiter TOI-2109 b*; Astronomy & Astrophysics, 692, A254, 21
79. N. Heidari, I. Boisse, N. Hara, T. G. Wilson, F. Kiefer, G. Hébrard, F. Philipot, S. Hoyer, K. G. Stassun, G. W. Henry et al. (*including:* **N. C. Santos**, **O. D. S. Demangeon**, **J. Rodrigues**), 2024; *The SOPHIE search for northern extrasolar planets. XIX. A system including a cold sub-Neptune potentially transiting a V = 6.5 star HD 88986*; Astronomy & Astrophysics, 681, A55, 37
80. M. J. Hobson, F. Bouchy, B. Lavie, C. Lovis, **V. Zh. Adibekyan**, C. Allende Prieto, Y. Alibert, **S. C. C. Barros**, A. Castro-González, S. Cristiani et al. (*including:* **P. Figueira**, **C. J. A. P. Martins**, **J. Rodrigues**, **N. C. Santos**, **S. G. Sousa**), 2024; *Three super-Earths and a possible water world from TESS and ESPRESSO*; Astronomy & Astrophysics, 688, A216, 22
81. D. L. Holdsworth, **M. S. Cunha**, M. Lares-Martiz, D. W. Kurtz, V. Antoci, S. Barceló Forteza, P. De Cat, A. Derekas, C. Kayhan, D. Ozuyar, 2024; *TESS Cycle 2 observations of roAp stars with 2-min cadence data*; Monthly Notices of the Royal Astronomical Society, 527, 4, 32
82. M. Hon, D. Huber, Y. Li, T. S. Metcalfe, T. R. Bedding, J. M. J. Ong, A. Chontos, R. A. Rubenzahl, S. Halverson, R. A. Garcia et al. (*including:* **T. L. Campante**), 2024; *Asteroseismology of the Nearby K Dwarf σ Draconis Using the Keck Planet Finder and TESS*; The Astrophysical Journal, 975, 1
83. M. Huertas-Company, K. G. Iyer, E. Angeloudi, M. B. Bagley, S. L. Finkelstein, J. S. Kartaltepe, E. J. McGrath, R. Sarmiento, J. Vega-Ferrero, P. A. Haro et al. (*including:* **F. Buitrago**), 2024; *Galaxy morphology from $z \sim 6$ through the lens of JWST*; Astronomy & Astrophysics, 685, A48, 28
84. F. Jahandar, R. Doyon, E. Artigau, N. J. Cook, C. Cadieux, D. Lafreniere, T. Forveille, J.-F. Donati, P. Fouqué, A. Carmona et al. (*including:* **J. Gomes da Silva**), 2024; *Comprehensive High-resolution Chemical Spectroscopy of Barnard's Star with SPIRou*; The Astrophysical Journal, 966, 1
85. H. Jansen, M. Tewes, T. Schrabback, N. Aghanim, A. Amara, S. Andreon, N. Auricchio, M. Baldi, E. Branchini, M. Brescia et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**), 2024; *Euclid: Improving the efficiency of weak lensing shear bias calibration Pixel noise cancellation and the response method on trial*; Astronomy & Astrophysics, 683, A240, 23
86. D. Karagiannis, R. Maartens, **J. Fonseca**, S. Camera, C. Clarkson, 2024; *Multi-tracer power spectra and bispectra: formalism*; Journal of Cosmology and Astroparticle Physics, 2024, 034
87. P. M. Kelly, J. Jobel, O. Eiger, A. Abd, T. E. Jeltema, P. A. Giles, D. L. Hollowood, R. D. Wilkinson, D. J. Turner, S. Bhargava et al. (*including:* **P. T. P. Viana**), 2024; *Dark energy survey year 3 results: miscentring calibration and X-ray-richness scaling relations in redMaPPer clusters*; Astronomy & Astrophysics, 533, 1, 16
88. J. M. Kirk, D. Ward-Thompson, J. Di Francesco, P. André, D. W. Bresnahan, V. Könyves, K. A. Marsh, M. Griffin, N. Schneider, A. Men'shchikov et al. (*including:* **P. M. Palmeirim**), 2024; *Herschel Gould Belt Survey in*

Taurus – II. A census of dense cores and filaments in the TMC1 regio; Monthly Notices of the Royal Astronomical Society, 532, 4, 4661

89. M. Koller, B. Ziegler, B. I. Ciocan, S. Thater, J. T. Mendel, E. Wiśniowski, A. J. Battisti, K. E. Harborne, C. Foster, C. P. Lagos et al. (*including:* **P. Papaderos**), 2024; *The MAGPI survey: The interdependence of the mass, star formation rate, and metallicity in galaxies at $z \sim 0.3$*; Astronomy & Astrophysics, 689, A315, 15
90. J. Korth, P. Chaturvedi, H. Parviainen, I. Carleo, M. Lendl, E. W. Guenther, G. Nowak, C. M. Persson, P. J. MacQueen, A. J. Mustill et al. (*including:* **O. Demangeon**), 2024; *TOI-1408: Discovery and Photodynamical Modeling of a Small Inner Companion to a Hot Jupiter Revealed by Transit Timing Variations*; The Astrophysical Journal Letters, 971, 2
91. A. Krenn, D. Kubyshkina, L. Fossati, J. A. Egger, A. Bonfanti, A. Deline, D. Ehrenreich, M. Beck, W. Benz, J. Cabrera et al. (*including:* **S. G. Sousa**, **V. Zh. Adibekyan**, **S. C. C. Barros**, **O. D. S. Demangeon**, **N. C. Santos**), 2024; *Characterisation of the TOI-421 planetary system using CHEOPS, TESS, and archival radial velocity data*; Astronomy & Astrophysics, 686, A301, 20
92. D. W. Kurtz, G. Handler, D. L. Holdsworth, **M. S. Cunha**, H. Saio, T. Medupe, S. J. Murphy, J. Krüger, E. Brunsden, V. Antoci, 2024; *HD 60435: the star that stopped pulsating*; Monthly Notices of the Royal Astronomical Society, 536, 3, 2103
93. A. Leleu, J. -B. Delisle, L. Delrez, E. M. Bryant, A. Brandeker, H. P. Osborn, N. Hara, T. G. Wilson, N. Billot, M. Lendl et al. (*including:* **S. C. C. Barros**, **O. Demangeon**, **N. C. Santos**, **S. G. Sousa**), 2024; *Photo-dynamical characterisation of the TOI-178 resonant chain. Exploring the robustness of transit-timing variations and radial velocity mass characterisations*; Astronomy & Astrophysics, 688, A211, 21
94. M. Libralato, L. Bedin, M. Griggio, D. Massari, Anderson, J., J.-C. Cuillandre, A. Ferguson, A. Lançon, S. S. Larsen, M. Schirmer et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**), 2024; *Euclid: High-precision imaging astrometry and photometry from Early Release Observations I. Internal kinematics of NGC6397 by combining Euclid and Gaia data*; Astronomy & Astrophysics, 692, A96, 23
95. Euclid Collaboration, A. Enia, M. Bolzonella, L. Pozzetti, **A. Humphrey**, **P. A. C. Cunha**, W. G. Hartley, F. Dubath, S. Paltani, X. Lopez Lopez et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. LI. Forecasting the recovery of galaxy physical properties and their relations with template-fitting and machine-learning methods*; Astronomy & Astrophysics, 691, A175, 26
96. J. Lillo-Box, D. W. Latham, K. A. Collins, D. J. Armstrong, D. Gandolfi, E. L. N. Jensen, A. Castro-González, O. Balsalobre-Ruza, B. Montesinos, **S. G. Sousa**, 2024; *K2-399 b is not a planet. The Saturn that wandered through the Neptune desert is actually a hierarchical eclipsing binary*; Astronomy & Astrophysics, 689, L8, 14
97. Z. Liu, Sean D. Johnson, J. I. -. Li, G. C. Rudie, J. Schaye, H.-W. Chen, **J. Brinchmann**, S. Cantalupo, M. C. Chen, W. Kollatschny, 2024; *The first comprehensive study of a giant nebula around a radio-quiet quasar in the $z < 1$ Universe*; Monthly Notices of the Royal Astronomical Society, 527, 3, 5429
98. M. N. Lund, S. Basu, A. Bieryla, L. Casagrande, D. Huber, S. Hekker, L. Viani, G. R. Davies, **T. L. Campante**, W. J. Chaplin, 2024; *The K2 Asteroseismic KEYSTONE sample of Dwarf and Subgiant Solar-Like Oscillators I. Data and Asteroseismic parameters*; Astronomy & Astrophysics, 688, A13, 22
99. M. Lundkvist, H. Kjeldsen, T. R. Bedding, M. J. McCaughrean, R. P. Butler, D. Slumstrup, **T. L. Campante**, C. Aerts, T. Arentoft, H. Bruntt et al. (*including:* **J. Gomes da Silva**), 2024; *Low-amplitude Solar-like Oscillations in the K5 V Star epsilon Indi A*; The Astrophysical Journal, 964, 2
100. Y. Guo, C. Sengupta, **T. C. Scott**, **P. Lagos**, Y. Luo, 2024; *Catalogue of nearby blue and near-solar gas metallicity SDSS dwarf galaxies*; Monthly Notices of the Royal Astronomical Society, 528, 4, 14
101. **C. M. J. Marques**, **C. J. A. P. Martins**, B. Gilabert López, 2024; *Watching the Universe's acceleration era with the SKAO*; Monthly Notices of the Royal Astronomical Society, 527, 4, 11
102. **C. J. A. P. Martins**, R. J. Cooke, J. Liske, M. T. Murphy, P. Noterdaeme, T. M. Schmidt, J. Alcaniz, **C. S. Alves**, S. Balashev, S. Cristiani et al. (*including:* **C. M. J. Marques**, **M. A. F. Melo e Sousa**, **N. J. Nunes**), 2024; *Cosmology and fundamental physics with the ELT-ANDES spectrograph.*; Experimental Astronomy, 57, 5, 31
103. **C. J. A. P. Martins**, **M. A. F. Melo e Sousa**, S. Q. Fernandes, **C. M. J. Marques**, 2024; *Impact of spatial curvature on forecast constraints from standard and differential redshift drift measurements*; Physics of the Dark Universe, 47
104. **C. J. A. P. Martins**, **A. M. M. Vieira**, 2024; *Current and future cosmological impact of microwave background temperature measurements*; Physics of the Dark Universe, 44
105. S. Mathur, **A. R. G. Santos**, 2024; *Perspectives on the physics of late-type stars from beyond low earth orbit, the moon and mars*; npj Microgravity, 10, 1
106. J. Matthee, C. Golling, R. Mackenzie, G. Pezzulli, S. Lilly, J. Schaye, R. Bacon, H. Kusakabe, T. Urrutia, L. A. Boogaard et al. (*including:* **J. Brinchmann**), 2024; *Large-scale excess H i absorption around $z \approx 4$ galaxies detected in a background galaxy spectrum in the MUSE eXtremely deep field*; Monthly Notices of the Royal Astronomical Society, 529, 3, 2794
107. L. Mignon, X. Delfosse, X. Bonfils, N. Meunier, N. Astudillo-Defru, G. Gaisne, T. Forveille, F. Bouchy, G. Lo Curto, S. Udry et al. (*including:* **N. C. Santos**), 2024; *Radial velocity homogeneous analysis of M dwarfs observed with HARPS. I. Exoplanet detection and candidates*; Astronomy & Astrophysics, 689, A32, 33
108. D. Milaković, J. K. Webb, P. Molaro, C.-C. Lee, P. Jethwa, G. Cupani, M. T. Murphy, L. Welsh, V. D'Odorico, S. Cristiani et al. (*including:* **C. J. A. P. Martins**, **N. J. Nunes**, **N. C. Santos**, **S. G. Sousa**), 2024; *Isotopic*

abundance of carbon in the DLA towards QSO B1331+170; Monthly Notices of the Royal Astronomical Society, 534, 1, 12

109. M. Mingozzi, B. L. James, D. A. Berg, K. Z. Arellano-Córdova, A. Plat, C. Scarlata, A. Aloisi, R. O. Amorín, **J. Brinchmann**, S. Charlot, 2024; *CLASSY. VIII. Exploring the Source of Ionization with UV Interstellar Medium Diagnostics in Local High-z Analogs*; The Astrophysical Journal, 962, 1
110. **N. A. M. Moedas**, **D. Bossini**, M. Deal, **M. S. Cunha**, 2024; *Characterisation of FG-type stars with improved transport of chemical elements*; Astronomy & Astrophysics, 684, A113, 17
111. A. Mourato, **J. P. Faria**, R. Ventura, 2024; *Automatic sunspot detection through semantic and instance segmentation approaches*; Engineering Applications of Artificial Intelligence, 129
112. **S. Mukovnikov**, **L. Sousa**, 2024; *Ultrahigh frequency gravitational waves from cosmic strings with friction*; Physical Review D, 110, 6
113. E. Nabbie, C. X. Huang, J. A. Burt, D. J. Armstrong, E. E. Mamajek, **V. Zh. Adibekyan**, **S. G. Sousa**, E. Lopez, D. Thorngren, J. Fernández Fernández et al. (*including:* **J. Gomes da Silva**, **J. Rodrigues**), 2024; *Surviving in the Hot-Neptune Desert: The Discovery of the Ultrahot Neptune TOI-3261b*; The Astronomical Journal, 168, 3
114. V. Nascimbeni, L. Borsato, P. Leonardi, **S. G. Sousa**, T. G. Wilson, A. Fortier, A. Heitzmann, G. Mantovan, R. Luque, T. Zingales et al. (*including:* **S. C. C. Barros**, **O. D. S. Demangeon**, **N. C. Santos**), 2024; *The K2-24 planetary system revisited by CHEOPS*; Astronomy & Astrophysics, 690, A349, 16
115. M. Nguyen, **V. Zh. Adibekyan**, 2024; *On the formation of super-Jupiters: core accretion or gravitational instability?*; Astrophysics and Space Science, 369, 122
116. **B. Nsamba**, A. Weiss, J. Kamulali, 2024; *Uniform characterization of an ensemble of main-sequence benchmark stars: effect of Gaia-based data on grid search models*; Monthly Notices of the Royal Astronomical Society, 536, 3, 2558
117. A. V. Oza, J. V. Seidel, H. J. Hoeijmakers, A. Unni, A. Y. Kesseli, C. A. Schmidt, T. Sivarani, A. Bello-Arufe, A. Gebek, M. Meyer zu Westram et al. (*including:* **S. G. Sousa**), 2024; *Redshifted Sodium Transient near Exoplanet Transit*; The Astrophysical Journal Letters, 973, 2
118. I. Pagano, G. Scandariato, V. Singh, M. Lendl, D. Queloz, A. E. Simon, **S. G. Sousa**, A. Brandeker, A. C. Cameron, S. Sulis et al. (*including:* **S. C. C. Barros**, **O. D. S. Demangeon**, **N. C. Santos**), 2024; *Constraining the reflective properties of WASP-178 b using CHEOPS photometry*; Astronomy & Astrophysics, 682, A102, 15
119. L. Palethorpe, A. A. John, A. M. J. Mortier, J. Davoult, T. G. Wilson, K. Rice, A. C. Cameron, Y. Alibert, L. A. Buchhave, L. Malavolta et al. (*including:* **A. M. Silva**), 2024; *Confronting compositional confusion through the characterization of the sub-Neptune orbiting HD 77946*; Monthly Notices of the Royal Astronomical Society, 529, 4, 3323
120. H. Parviainen, F. Murgas, E. Esparza-Borges, A. Peláez-Torres, E. Palle, R. Luque, M. R. Zapatero-Osorio, J. Korth, A. Fukui, N. Narita et al. (*including:* **A. Soubkiou**), 2024; *TOI-2266 b: A keystone super-Earth at the edge of the M dwarf radius valley*; Astronomy & Astrophysics, 683, A170, 13
121. V. M. Passegger, A. Suárez Mascareño, R. Allart, J. I. González Hernández, C. Lovis, B. Lavie, **A. M. Silva**, H. M. Müller, H. M. Tabernero, S. Cristiani et al. (*including:* **N. C. Santos**, **V. Zh. Adibekyan**, **S. C. C. Barros**, **P. Figueira**, **C. J. A. P. Martins**, **N. J. Nunes**, **J. Rodrigues**, **S. G. Sousa**), 2024; *The compact multi-planet system GJ 9827 revisited with ESPRESSO*; Astronomy & Astrophysics, 684, A22, 28
122. **L. F. Pereira**, S. K. Grunblatt, A. Psaridi, **T. L. Campante**, **M. S. Cunha**, **N. C. Santos**, **D. Bossini**, D. Thorngren, C. Hellier, F. Bouchy, 2024; *TESS giants transiting giants V – two hot Jupiters orbiting red giant hosts*; Monthly Notices of the Royal Astronomical Society, 527, 3, 13
123. **F. C. N. Q. Pimenta**, **C. J. A. P. Martins**, 2024; *Scaling solutions for current-carrying cosmic string networks*; Physical Review D, 110, 2, 15
124. G. Piotto, T. Zingales, L. Borsato, J. A. Egger, A. C. M. Correia, A. E. Simon, H.-G. Florén, **S. G. Sousa**, P. F. L. Maxted, D. Nardiello et al. (*including:* **V. Zh. Adibekyan**, **N. C. Santos**, **S. C. C. Barros**, **O. Demangeon**), 2024; *Architecture of TOI-561 planetary system*; Monthly Notices of the Royal Astronomical Society, 535, 3, 2763
125. B. Prinoth, H. J. Hoeijmakers, B. M. Morris, M. K. Alam, D. Kitzmann, E. Sedaghati, J. V. Seidel, E. K. H. Lee, B. Thorsbro, N. W. Borsato et al. (*including:* **Y. C. Damasceno**), 2024; *An atlas of resolved spectral features in the transmission spectrum of WASP-189 b with MAROON-X*; Astronomy & Astrophysics, 685, A60, 33
126. A. Psaridi, H. P. Osborn, F. Bouchy, M. Lendl, L. Parc, N. Billot, C. H. Broeg, **S. G. Sousa**, **V. Zh. Adibekyan**, O. Attia et al. (*including:* **E. Delgado Mena**, **N. C. Santos**, **S. C. C. Barros**, **O. Demangeon**), 2024; *Discovery of two warm mini-Neptunes with contrasting densities orbiting the young K3V star TOI-815*; Astronomy & Astrophysics, 685, A5, 24
127. F. Rescigno, G. Hébrard, A. Vanderburg, A. W. Mann, A. M. J. Mortier, S. Morrell, L. A. Buchhave, K. A. Collins, C. R. Mann, C. Hellier et al. (*including:* **O. D. S. Demangeon**), 2024; *A hot mini-Neptune and a temperate, highly eccentric sub-Saturn around the bright K-dwarf TOI-2134*; Monthly Notices of the Royal Astronomical Society, 527, 3, 22
128. I. U. Roederer, J. D. Alvarado Gómez, C. Allende Prieto, **V. Zh. Adibekyan**, D. S. Aguado, P. J. Amado, E. M. Amazo-Gómez, M. Baratella, S. A. Barnes, T. Bensby, 2024; *The discovery space of ELT-ANDES. Stars and stellar populations*; Experimental Astronomy, 57, 17, 46
129. **I. M. Rolo**, **E. Delgado Mena**, M. Tsantaki, **J. Gomes da Silva**, 2024; *The enigma of Li-rich giants and its relation with temporal variations observed in radial velocity and stellar activity signals*; Astronomy & Astrophysics, 688, A68, 13

130. **N. M. Rosário**, **O. D. S. Demangeon**, **S. C. C. Barros**, D. Gandolfi, J. A. Egger, L. M. Serrano, H. P. Osborn, M. Beck, W. Benz, H. -G. Florén et al. (*including:* **N. C. Santos**, **S. G. Sousa**, **V. Zh. Adibekyan**), 2024; *Precise characterisation of HD 15337 with CHEOPS: A laboratory for planet formation and evolution*; Astronomy & Astrophysics, 686, A282, 16
131. **I. Yu. Rybak**, **C. J. A. P. Martins**, P. Peter, E. P. S. Shellard, 2024; *Cosmic microwave background signatures from current-carrying cosmic strings*; Physical Review D, 110, 2
132. R. Saglia, K. Mehrgan, S. De Nicola, J. Thomas, M. Kluge, R. Bender, D. Delley, P. Erwin, M. Fabricius, B. Neureiter et al. (*including:* **J. Brinchmann**, **J. Dinis**, **I. Tereno**), 2024; *Euclid: The r_h-M_* relation as a function of redshift I. The 5×10^9 $M_\odot$ black hole in NGC 1272*; Astronomy & Astrophysics, 692, A124, 12
133. R. K. Saito, M. Hempel, J. Alonso-García, P. W. Lucas, D. Minniti, S. Alonso, L. Baravalle, J. Borissova, C. Caceres, A.-N. Chené et al. (*including:* **M. S. N. Kumar**), 2024; *The VISTA Variables in the Vía Láctea extended (VVVX) ESO public survey: Completion of the observations and legacy*; Astronomy & Astrophysics, 689, A148, 19
134. Z. Sakr, **A. S. C. Carvalho**, **A. C. da Silva**, J. García-Bellido, **J. P. Mimoso**, D. Camarena, S. Nesseris, **C. J. A. P. Martins**, N. J. Nunes, D. Sapone, 2024; *Constraining ΛLTB models with galaxy cluster counts from next-generation surveys*; Astronomy & Astrophysics, 683, A230, 9
135. S. J. A. J. Salmon, V. Van Grootel, S. Sulis, Gy. M. Szabó, A. Brandeker, C. H. Broeg, D. Ehrenreich, S. Hoyer, **S. G. Sousa**, F. Kiefer et al. (*including:* **S. C. C. Barros**, **O. Demangeon**, **N. C. Santos**), 2024; *HR 10 as seen by CHEOPS and TESS. Revealing δ Scuti pulsations, granulation-like signal and hint for transients*; Astronomy & Astrophysics, 690, A73, 18
136. **A. R. G. Santos**, D. Godoy-Rivera, A. J. Finley, S. Mathur, R. A. Garcia, S. N. Breton, A.-M. Broomhall, 2024; *Kepler main-sequence solar-like stars: surface rotation and magnetic-activity evolution*; Frontiers in Astronomy and Space Sciences, 11, 36
137. M. G. Santos, S. Camera, Z. Chen, S. Cunnington, **J. Fonseca**, 2024; *Cosmology with ESO–SKAO Synergies*; The Messenger, 193, 20
138. **T. C. Scott**, E. Brinks, C. Sengupta, **P. Lagos**, 2024; *High-resolution HI mapping of nearby extremely metal-poor blue compact dwarf galaxies*; Astronomy & Astrophysics, 692, A51, 16
139. J. Serrano Bell, R. F. Díaz, G. Hébrard, E. Martioli, N. Heidari, **S. G. Sousa**, I. Boisse, J. -M. Almenara, J. Alonso-Santiago, **S. C. C. Barros** et al. (*including:* **O. D. S. Demangeon**, **N. C. Santos**), 2024; *TOI-1199 b and TOI-1273 b: Two new transiting hot Saturns detected and characterized with SOPHIE and TESS*; Astronomy & Astrophysics, 684, A6, 20
140. T. Signor, G. Rodighiero, L. Bisigello, M. Bolzonella, K. Caputi, E. Daddi, G. De Lucia, A. Enia, L. Gabarra, C. Gruppioni et al. (*including:* **A. Humphrey**, **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**), 2024; *Euclid: Identifying the reddest high-redshift galaxies in the Euclid Deep Fields with gradient-boosted trees*; Astronomy & Astrophysics, 685, A127, 18
141. Z. L. de Beurs, A. Vanderburg, E. Thygesen, J. E. Rodriguez, X. Dumusque, A. M. J. Mortier, L. Malavolta, L. A. Buchhave, C. J. Shallue, S. Zieba et al. (*including:* **A. M. Silva**), 2024; *Characterization of K2-167 b and CALM, a new stellar activity mitigation method*; Monthly Notices of the Royal Astronomical Society, 529, 2, 1047
142. V. Singh, G. Scandariato, A. M. S. Smith, P. E. Cubillos, M. Lendl, N. Billot, A. Fortier, D. Queloz, **S. G. Sousa**, S. Csizmadia et al. (*including:* **O. D. S. Demangeon**, **N. C. Santos**, **S. C. C. Barros**), 2024; *CHEOPS observations of KELT-20 b/MASCARA-2 b: An aligned orbit and signs of variability from a reflective day side*; Astronomy & Astrophysics, 683, A1, 25
143. K. L. Chubb, S. Robert, **C. Sousa-Silva**, S. N. Yurchenko, N. Allard, V. Boudon, J. Buldyreva, B. Bultel, A. Coustenis, A. Foltynowicz, 2024; *Data availability and requirements relevant for the Ariel space mission and other exoplanet atmosphere applications*; RAS Techniques and Instruments, 3, 1, 636
144. L. Sousa, 2024; *Cosmic strings and gravitational waves*; General Relativity and Gravitation, 56, 105
145. **S. G. Sousa**, **V. Zh. Adibekyan**, **E. Delgado-Mena**, **N. C. Santos**, B. Rojas-Ayala, **S. C. C. Barros**, **O. D. S. Demangeon**, S. Hoyer, G. Israelian, A. M. J. Mortier, **B. Soares**, M. Tsantaki, 2024; *SWEET-Cat: A view on the planetary mass-radius relation*; Astronomy & Astrophysics, 691, A53, 8
146. M. I. Swayne, P. F. L. Maxted, A. H. M. J. Triaud, **S. G. Sousa**, A. Deline, D. Ehrenreich, S. Hoyer, G. Olofsson, I. Boisse, A. Duck et al. (*including:* **S. C. C. Barros**, **O. D. S. Demangeon**, **N. C. Santos**), 2024; *The EBLM Project– XI. Mass, radius, and effective temperature measurements for 23 M-dwarf companions to solar-type stars observed with CHEOPS*; Monthly Notices of the Royal Astronomical Society, 528, 4, 25
147. S. O. Souza, M. Valentini, C. Chiappini, A. Pérez-Villegas, J. Montalbán, **D. Bossini**, B. Barbuy, Y. Elsworth, R. A. Garcia, 2024; *Tracing Back a Second-generation Star Stripped from Terzan 5 by the Galactic Bar*; The Astrophysical Journal Letters, 977, 2
148. A. Suárez Mascareño, V. M. Passegger, J. I. González Hernández, D. J. Armstrong, L. D. Nielsen, C. Lovis, B. Lavie, **S. G. Sousa**, **A. M. Silva**, R. Allart et al. (*including:* **N. C. Santos**, **V. Zh. Adibekyan**, **S. C. C. Barros**, **O. D. S. Demangeon**), 2024; *TESS and ESPRESSO discover a super-Earth and a mini-Neptune orbiting the K-dwarf TOI-238*; Astronomy & Astrophysics, 685, A56, 32
149. S. Sulis, I. J. M. Crossfield, A. Santerne, M. Saillenfest, **S. G. Sousa**, D. Mary, A. Aguichine, M. Deleuil, **E. Delgado Mena**, S. Mathur et al. (*including:* **V. Zh. Adibekyan**, **N. C. Santos**), 2024; *A low-mass sub-Neptune planet transiting the bright active star HD 73344*; Astronomy & Astrophysics, 688, A14, 25

150. S. Sulis, L. Borsato, S. Grouffal, H. P. Osborn, A. Santerne, A. Brandeker, M. N. Günther, A. Heitzmann, M. Lendl, M. Fridlund et al. (*including:* **S. C. C. Barros**, **O. Demangeon**, **N. C. Santos**, **S. G. Sousa**), 2024; *HIP 41378 observed by CHEOPS: Where is planet d?*; Astronomy & Astrophysics, 686, L18, 6
151. **E. A. S. Cristo**, E. Esparza-Borges, **N. C. Santos**, **O. Demangeon**, E. Palle, A. Psaridi, V. Bourrier, **J. P. Faria**, R. Allart, **T. de Azevedo Silva** et al. (*including:* **P. Figueira**, **C. J. A. P. Martins**, **S. G. Sousa**), 2024; *An ESPRESSO view of the HD 189733 system. Broadband transmission spectrum, differential rotation, and system architecture*; Astronomy & Astrophysics, 683, A28
152. E. Todarello, M. Regis, J. Reynoso-Cordova, M. Taoso, **D. A. D. Vaz**, **J. Brinchmann**, M. Steinmetz, S. L. Zoutendijk, 2024; *Robust bounds on ALP dark matter from dwarf spheroidal galaxies in the optical MUSE-Faint survey*; Journal of Cosmology and Astroparticle Physics, 2024, 043, 18
153. Euclid Collaboration, K. Tanidis, V. F. Cardone, M. Martinelli, I. Tutusaus, S. Camera, N. Aghanim, A. Amara, S. Andreon, N. Auricchio et al. (*including:* **J. Brinchmann**, **A. C. da Silva**, **J. Dinis**, **I. Tereno**, **C. S. Carvalho**, **C. J. A. P. Martins**), 2024; *Euclid preparation. XXXIV. The effect of linear redshift-space distortions in photometric galaxy clustering and its cross-correlation with cosmic shear*; Astronomy & Astrophysics, 683, A17, 15
154. J. Wendeborn, C. C. Espaillat, T. Thanathibodee, C. Robinson, C. V. Pittman, N. Calvet, J. Muzerolle, F. M. Walter, J. Eislöffel, E. Fiorellino et al. (*including:* **J. F. Gameiro**), 2024; *A Multiwavelength, Multiepoch Monitoring Campaign of Accretion Variability in T Tauri Stars from the ODYSSEUS Survey. III. Optical Spectra*; The Astrophysical Journal, 972, 1
155. F. Wragg, S. Kamann, S. Saracino, M. Latour, S. Dreizler, S. Martens, A. Seth, **D. A. D. Vaz**, G. van de Ven, 2024; *Studying binary systems in Omega Centauri with MUSE – I. Detection of spectroscopic binaries*; Monthly Notices of the Royal Astronomical Society, 535, 1, 781
156. S. Zazzera, **J. Fonseca**, T. Baker, C. Clarkson, 2024; *Magnification and evolution bias of transient sources: GWs and SNIa*; Journal of Cosmology and Astroparticle Physics, 2024, 095, 28
157. F. Zhong, N. R. Napolitano, C. Heneka, R. Zambelli, F. E. Bauer, N. Bouche, J. Comparat, Y. Kim, J. Krogager, M. Longhetti et al. (*including:* **A. Humphrey**), 2024; *Galaxy Spectra neural Network (GaSNet). II. Using deep learning for spectral classification and redshift predictions*; Monthly Notices of the Royal Astronomical Society, 532, 1, 22

Proceedings published in 2024

1. E. Artigau, F. Bouchy, R. Doyon, F. Baron, L. Malo, F. Wildi, F. Pepe, N. J. Cook, S. Thibault, V. Reshetov et al. (*including:* **N. C. Santos**, **M. Abreu**, **S. C. C. Barros**, **A. Cabral**, **E. A. S. Cristo**, **J. Gomes da Silva**, **E. Delgado-Mena**, **P. Figueira**, **A. R. Costa Silva**, **B. Wehbé**); 2024; *NIRPS first light and early science: breaking the 1 m/s RV precision barrier at infrared wavelengths*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096
2. **I. A. P. M. da Costa**, P. Jadhav, R. Murthy; 2024; *Online literacy assessment also as a learning strategy: a proposal for astronomy*; 18th International Technology, Education and Development Conference; (Eds.)Chova, Luis Gómez; Martínez, Chelo González; Lees, Joanna, IATED Academy, INTED2024 Proceedings, 4346
3. N. Costa, **F. S. Barros**, **J. J. G. Lima**, R. F. Pinto, A. Restivo; 2024; *Leveraging Physics-Informed Neural Networks as Solar Wind Forecasting Models*; 32nd European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, i6doc.com
4. P. Di Marcantonio, E. Stempels, E. Giro, V. Alberti, M. Amate, V. Baldini, F. Baron, J. Brynnel, **A. Cabral**, B. Chazelas et al. (*including:* **M. A. Monteiro**, **B. Wehbe**); 2024; *ANDES, the high-resolution spectrograph for the ELT: project management for the preliminary design phase*; Modeling, Systems Engineering, and Project Management for Astronomy XI; (Eds.)Sébastien Elias Egner, Scott Roberts, SPIE, Proceedings of the SPIE, 13099, 14
5. P. Jadhav, **I. A. P. M. da Costa**, R. Murthy; 2024; *Astronomy Literacy Test (ALT): A Proposal Diagnostic Test for Astronomy Literacy*; Proceedings for the 5th Shaw-IAU Workshop on Astronomy for Education; (Eds.)Samantha Brown-Sevilla, Eduardo Penteado, Sophie Bartlett, Niall Deacon, Tshiamiso Makwela, Tilen Zupan, Rebecca Sanderson, and Vivek Reddy Pininti, Publications of the IAU Office of Astronomy for Education, 65
6. M. Landoni, **M. A. Monteiro**, P. Di Marcantonio, A. Zanutta, L. Origlia, E. Mason, R. Cirami, V. Baldini, A. Balestra, G. Calderone; 2024; *ANDES, the high resolution spectrograph for the ELT: the software ecosystem*; Software and Cyberinfrastructure for Astronomy VIII; (Eds.)Jorge Ibsen; Gianluca Chiozzi, SPIE, Proceedings of the SPIE, 13101
7. **I. M. Leite**, **A. Cabral**, **N. C. Santos**, **A. M. Silva**, **A. Oliveira**, **B. Wehbé**, **D. Castro Alves**, **J. H. C. Martins**, **M. Abreu**, **M. A. Monteiro**, **P. Moreno**, **R. Gafeira**; 2024; *PoET, the Paranal solar ESPRESSO Telescope: a spatially resolved Sun in a high-resolution spectrograph*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096, 6
8. L. Malo, F. Baron, A.-S. Poulin-Girard, P. Vallée, J. St-Antoine, D. Brousseau, H. Auger, V. Reshetov, F. Wildi, M. Sordet et al. (*including:* **N. C. Santos**, **M. Abreu**, **S. C. C. Barros**, **A. Cabral**, **J. Coelho**, **E. A. S. Cristo**, **J. Gomes da Silva**, **E. Delgado-Mena**, **J. P. Faria**, **A. R. Costa Silva**, **B. Wehbé**); 2024; *NIRPS near-infrared spectrograph: AITV phase at ESO3.6m/La Silla*; Ground-based and Airborne Instrumentation for

Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096, 19

9. A. Marconi, **M. Abreu**, **V. Zh. Adibekyan**, V. Alberti, S. Albrecht, J. Alcaniz, M. Aliverti, C. Allende Prieto, J. D. Alvarado Gómez, **C. S. Alves** et al. (*including:* **S. C. C. Barros**, **A. Cabral**, **O. Demangeon**, **C. M. J. Marques**, **C. J. A. P. Martins**, **J. H. C. Martins**, **M. A. F. Melo e Sousa**, **M. A. Monteiro**, **N. J. Nunes**, **P. Papaderos**, **N. C. Santos**, **S. G. Sousa**, **B. Wehbé**); 2024; *ANDES, the high resolution spectrograph for the ELT: science goals, project overview, and future developments*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096
10. **J. B. V. Marques**, **I. A. P. M. da Costa**, M. Gomes; 2024; *What do people really talk about inside the dome? A detailed look at planetarium communication topics.*; Proceedings for the 5th Shaw-IAU Workshop on Astronomy for Education; (Eds.)Samantha Brown-Sevilla, Eduardo Penteado, Sophie Bartlett, Niall Deacon, Tshiamiso Makwela, Tilen Zupan, Rebecca Sanderson, and Vivek Reddy Pininti, Publications of the IAU Office of Astronomy for Education, 126
11. **A. Cabral**, **B. Wehbé**, **M. Abreu**, M. Aliverti, **M. A. Monteiro**, **J. Coelho**, A. Zanutta, E. M. A. Redaelli, E. Oliva, P. Di Marcantonio, **N. C. Santos**, A. Marconi; 2024; *ANDES, the high-resolution spectrograph for the ELT: the front-end and its seeing limited arms*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096, 12
12. J. Richard, R. Giroud, F. Laurent, D. Krajnović, A. Jeanneau, R. Bacon, **M. Abreu**, A. Adamo, R. Araujo, N. F. Bouché et al. (*including:* **J. Brinchmann**, **M. A. Monteiro**); 2024; *The Blue Multi Unit Spectroscopic Explorer (BlueMUSE) on the VLT: science drivers and overview of instrument design*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096, 20
13. N. Sanna, B. L. Canto Martins, A. de Medeiros Martins, E. Oliva, I. C. Leão, A. Turchi, J. R. de Medeiros, F. Rossi, A. Brucalassi, B. Chazelas et al. (*including:* **M. A. Monteiro**); 2024; *ANDES, the high-resolution spectrograph for the ELT: the exposure time calculator*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant; Kentaro Motohara; Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096
14. A. Scaudo, M. Genoni, G. Li Causi, L. Cabona, M. Landoni, S. Campana, P. Schipani, R. Claudi, M. Aliverti, A. Baruffolo et al. (*including:* **M. A. Monteiro**); 2024; *End-to-end simulation framework for astronomical spectrographs: SOXS, CUBES, and ANDES*; Modeling, Systems Engineering, and Project Management for Astronomy XI; (Eds.)Sébastien Elias Egner; Scott Roberts, SPIE, Proceedings of the SPIE, 13099
15. **B. Wehbé**, **M. Abreu**, **A. M. Silva**, **A. Cabral**, **N. C. Santos**; 2024; *Implementation of a seeing measurement device for the PoET solar telescope*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096, 11
16. A. Zanutta, **M. Abreu**, M. Aliverti, A. Balestra, O. Bellido-Tirado, A. Brucalassi, L. Cabona, **A. Cabral**, B. Chazelas, I. Coretti et al. (*including:* **M. A. Monteiro**, **B. Wehbe**); 2024; *ANDES, the high-resolution spectrograph for the ELT: system architecture design of Phase-B-one*; Ground-based and Airborne Instrumentation for Astronomy X; (Eds.)Julia J. Bryant, Kentaro Motohara, Joël R. D. Vernet, SPIE, Proceedings of the SPIE, 13096, 23

International Scientific Communications in 2024

1. **V. Zh. Adibekyan**; 2024; *Linking the primordial composition of stars to the present-day composition of their rocky exoplanets*; Kick-off meeting of COST Action "The birth of solar systems", Torun, Poland
2. **V. Zh. Adibekyan**; 2024; *Linking the primordial composition of stars to the present-day composition of their rocky exoplanets*; Cool Stars 22, San Diego, USA
3. **V. Zh. Adibekyan**; 2024; *Linking the primordial composition of stars to the present-day composition of their rocky exoplanets*; ESP2024: PLATO Planetary Systems - Formation to observed architectures, Catania, Italy
4. **T. Boulet**; 2024; *A catalogue of asteroseismically calibrated ages for APOGEE DR17*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
5. **A. Cabral**, **B. Wehbe**, **M. Abreu**, M. Aliverti, **M. A. Monteiro**, **J. Coelho**, A. Zanutta, E. M. A. Redaelli, E. Oliva, P. Di Marcantonio, **N. C. Santos**, A. Marconi; 2024; *ANDES, the high-resolution spectrograph for the ELT: the front-end and its seeing limited arms*; SPIE Astronomical Telescopes and Instrumentation - Ground-based and Airborne Instrumentation for Astronomy X, Yokohama, Japan
6. **T. L. Campante**; 2024; *Ages and masses of Ariel FGK stars: stellar models, empirical relations and Machine Learning techniques*; Ariel Consortium Meeting 2024, Tartu, Estonia
7. A. Castro-González, **O. Demangeon**, J. Lillo-Box; 2024; *Why so light? Exploring TOI-244 b and the growing population of low-density super-Earths*; Exoplanets5, Leiden, Netherlands
8. **M. T. Clara**, **M. S. Cunha**, **P. P. Avelino**, **T. L. Campante**, S. Deheuvels, D. R. Reese; 2024; *The convective overshoot conundrum: Implications on the modelling of subgiant stars*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
9. C. Clarkson, **J. Fonseca**, S. Zazzera, T. Baker; 2024; *Gravitational waves and galaxies cross-correlations: a forecast on GW biases for future detectors*; XVII Black Holes Workshop, Aveiro, Portugal

10. **A. R. Costa Silva**, **O. Demangeon**, **N. C. Santos**, D. Ehrenreich, C. Lovis; 2024; *Probing the atmosphere of an ultra-hot Jupiter in the optical and infrared ranges*; JUnior Researchers' Assembly (JURA V), Murten, Switzerland
11. **A. R. Costa Silva**; 2024; *The dayside of WASP-76 b*; NIRPS Science meeting, Grenoble, France
12. **A. R. Costa Silva**, **O. Demangeon**, **N. C. Santos**, D. Ehrenreich, C. Lovis; 2024; *Blueshifted Fe I emission in dayside of WASP-76b detected with ESPRESSO*; Exoplanets5, Leiden, Netherlands
13. **A. R. Costa Silva**, **O. Demangeon**, **N. C. Santos**, D. Ehrenreich, C. Lovis; 2024; *Blueshifted Fe I emission in dayside of WASP-76b detected with ESPRESSO*; Two HoRSEs, Berlin, Germany
14. **A. R. Costa Silva**; 2024; *Characterising the atmosphere of an ultra-hot Jupiter*; 4th ExoClock Annual Meeting, Lisboa, Portugal
15. **R. Costa**, **T. L. Campante**, **M. J. P. F. G. Monteiro**; 2024; *Characterizing K dwarf stars through Asteroseismology and stellar modeling*; 11th Iberian Meeting on Asteroseismology, Lluc, Balearic Islands, Spain
16. **R. Costa**, **T. L. Campante**, **M. J. P. F. G. Monteiro**, **N. A. M. Moedas**; 2024; *Oscillations in cool-dwarf stars through the ESPRESSO spectrograph*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
17. **M. S. Cunha**; 2024; *Intermediate-mass stars as physics laboratories*; Crafoord Days 2024, Stockholm, Sweden
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19. **Y. C. Damasceno**; 2024; *Unravelling the Origin of Detected Species on WASP-178b with ESPRESSO*; Two HoRSEs, Berlin, Germany
20. **Y. C. Damasceno**, J. V. Seidel; 2024; *Unravelling the Origin of Detected Species on WASP-178b with ESPRESSO*; Exoplanets5, Leiden, Netherlands
21. **E. Delgado Mena**; 2024; *Stellar Chemical Abundances*; Two HoRSEs, Berlin, Germany
22. **E. Delgado Mena**; 2024; *NIRPS - Other Science Programs*; NIRPS Science meeting, , Online
23. **O. Demangeon**, P. E. Cubillos, V. Singh, T. G. Wilson, L. Carone; 2024; *CHEOPS reveals the presence of "clouds" at the Eastern terminator of WASP-76 b*; Exoplanets5, Leiden, Netherlands
24. **O. Demangeon**, P. E. Cubillos, V. Singh, T. G. Wilson, L. Carone; 2024; *CHEOPS reveals the presence of "clouds" at the Eastern terminator of WASP-76 b*; Two HoRSEs, Berlin, Germany
25. **O. Demangeon**, P. E. Cubillos, V. Singh, T. G. Wilson, L. Carone; 2024; *CHEOPS reveals the presence of "clouds" at the Eastern terminator of WASP-76 b*; EAS 2024, Padova, Italy
26. **W. Dethier**; 2024; *Stellar contaminations in high-resolution transit spectroscopy*; PoET Workshop #2, Porto, Portugal
27. **J. Fonseca**; 2024; *Synergies with other cosmological surveys*; SKA Cosmology SWG meeting 2024, Nice, France
28. **J. Fonseca**; 2024; *On cosmological clustering of Gravitational Wave events*; Spanish and Portuguese Relativity Meeting (EREP 2024), Coimbra, Portugal
29. **J. Gomes da Silva**; 2024; *Activity indicators for RV planet detection*; PSVWG workshop 1, Online
30. **J. Gomes da Silva**; 2024; *Magnetochronology in the age of PLATO*; PLATO WP120 Hands-On Workshop #4 (HOW#4), , Online
31. **D. Grüber**; 2024; *Stochastic Gravitational Wave Background Generated by domain wall networks*; 18th Iberian Cosmology Meeting (IberiCOS2024), Salamanca, Spain
32. **R. Heilemann**; 2024; *Simulations of Black Hole Clusters with Spins, Mergers and Recoil Kicks*; 18th Iberian Cosmology Meeting (IberiCOS2024), Salamanca, Spain
33. **R. Heilemann**; 2024; *Domain wall evolution beyond quartic potentials: The Christ-Lee and the Sine-Gordon potential*; VIII Cosmological Olentzero, Bilbao, Spain
34. **I. M. Leite**, **A. Cabral**, **N. C. Santos**, **A. M. A. C. V. Silva**, **A. Oliveira**, **B. Wehbe**, **D. Castro Alves**, **J. H. C. Martins**, **M. Abreu**, **M. A. Monteiro**, **P. Moreno**, **R. Gafeira**; 2024; *PoET, the Paranal solar ESPRESSO Telescope: a spatially resolved Sun in a high-resolution spectrograph*; SPIE Astronomical Telescopes and Instrumentation - Ground-based and Airborne Instrumentation for Astronomy X, Yokohama, Japan
35. M. Lykke Winther, J. L. Rørsted, I. W. Roxburgh, K. Verma, **M. S. Cunha**, A. Stokholm; 2024; *Epsilon differences, an improved surface-independent asteroseismic method*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
36. **P. Machado**, A. Branco, **O. Demangeon**, T. de Azevedo Silva, S. Jaeggli, T. Widemann, P. Tanga; 2024; *Transmission spectroscopy along the transit of Venus used for probing the atmosphere's upper layers and as a proxy for exoplanets atmosphere characterization*; Ariel Consortium Meeting 2024, Tartu, Estonia
37. L. Malo, F. Baron, A.-S. Poulin-Girard, P. Vallée, J. St-Antoine, D. Brousseau, H. Auger, V. Reshetov, F. Wildi, M. Sordet, et al. (*including:* **N. C. Santos**, **M. Abreu**, **S. C. C. Barros**, **A. Cabral**, **J. P. Coelho**, **E. A. S. Cristo**, **J. Gomes da Silva**, **E. Delgado Mena**, **J. P. Faria**, **P. Figuera**, **A. R. Costa Silva**, **B. Wehbe**); 2024; *NIRPS near-infrared spectrograph: AITV phase at ESO3.6m/La Silla*; SPIE Astronomical Telescopes and Instrumentation - Ground-based and Airborne Instrumentation for Astronomy X, Yokohama, Japan
38. **C. M. J. Marques**; 2024; *Detailed spectral modelling of the superbright quasar J2125-1719*; 18th Iberian Cosmology Meeting (IberiCOS2024), Salamanca, Spain

39. **C. J. A. P. Martins**; 2024; *The ESPRESSO Redshift Drift Experiment*; 18th Iberian Cosmology Meeting (IberiCOS2024), Salamanca, Spain
40. **C. J. A. P. Martins**; 2024; *Cosmological impact of SKA redshift drift measurements*; SKA Cosmology SWG meeting 2024, Nice, France
41. **C. J. A. P. Martins**; 2024; *Phi in the Sky: On the Cosmological Evolution of Domain Walls*; VIII Cosmological Olentzero, Bilbao, Spain
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45. **H. Miranda**, **C. Pappalardo**, **J. Afonso**, **P. Papaderos**, **C. Lobo**, **A. Paulino-Afonso**, **R. Carvajal**, **I. Matute**, **P. Lagos**, **D. D. Barbosa**; 2024; *To model or not to model: nebular continuum in galaxy spectra*; Deep24, Sintra, Portugal
46. **N. A. M. Moedas**; 2024; *Exploring 94 Ceti System*; 11th Iberian Meeting on Asteroseismology, Lluc, Balearic Islands, Spain
47. **N. A. M. Moedas**, R. A. Garcia, **D. Bossini**, M. Deal, **O. Demangeon**; 2024; *Unveiling the secrets of the 94 Ceti exoplanet-host system with TESS*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
48. **N. A. M. Moedas**, **D. Bossini**, M. Deal; 2024; *Stellar Characterisation using Single Value Parameter Method*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
49. B. Mosser, K. Belkacem, **M. S. Cunha**, S. Deheuvels, M. Matteuzzi, C. Pinçon, M. Takata; 2024; *New trees in the mixed-mode forest*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
50. **S. Mukovnikov**, **L. Sousa**; 2024; *Gravitational waves from cosmic strings with friction*; 18th Iberian Cosmology Meeting (IberiCOS2024), Salamanca, Spain
51. **S. Mukovnikov**, **L. Sousa**; 2024; *Gravitational waves from cosmic strings with friction*; BSM^2 - Beyond the Standard Model BrainStorming Meeting: Particle Physics and Cosmology interface, Vila do Conde, Portugal
52. **A. W. Neitzel**, **T. L. Campante**, **D. Bossini**, A. Miglio; 2024; *Intelligent Identification of Stellar Populations with Manifold Learning*; 11th Iberian Meeting on Asteroseismology, Lluc, Balearic Islands, Spain
53. **A. W. Neitzel**, **T. L. Campante**, **D. Bossini**, A. Miglio; 2024; *Identification of stellar populations through latent space projection*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
54. **P. Papaderos**; 2024; *Self-consistent spectral modeling of starburst galaxies in the era of integral field spectroscopy: some challenges*; CHEMICAL ABUNDANCES IN GASEOUS NEBULAE: Multi-Scale Metals Throughout the Universe, Sao Jose dos Campos, Brazil
55. **P. Papaderos**, G. Östlin; 2024; *On the challenge of interpreting color maps of high-z starburst galaxies with the JWST and Euclid*; Deep24, Sintra, Portugal
56. **P. Papaderos**; 2024; *On the challenge of interpreting color maps of high-z starburst galaxies with JWS*; Science with the Hubble and James Webb Space Telescopes VII: Stars, Gas & Dust in the Universe, Porto, Portugal
57. **I. M. Rolo**, **M. S. Cunha**, D. L. Holdsworth, **A. R. G. Santos**; 2024; *Finding and Characterizing Chemically Peculiar Stars with TESS*; 11th Iberian Meeting on Asteroseismology, Lluc, Balearic Islands, Spain
58. **I. M. Rolo**, **E. Delgado Mena**, M. Tsantaki, **J. Gomes da Silva**; 2024; *The Enigma of Li-Rich Giants and its Relation with RV and Stellar Activity Variations*; Cool Stars 22, San Diego, USA
59. **I. M. Rolo**, **M. S. Cunha**, D. L. Holdsworth, **A. R. G. Santos**; 2024; *Exploring the Properties of TESS Chemically Peculiar Stars*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
60. **C. San Nicolas Martinez**; 2024; *Refining the radial velocity method to uncover other Earths*; PoET workshop #2, Porto, Portugal
61. **A. R. G. Santos**; 2024; *Stellar Physics @ Institute of Astrophysics and Space Sciences*; 11th Iberian Meeting on Asteroseismology, Lluc, Balearic Islands, Spain
62. **A. R. G. Santos**; 2024; *The Paranal solar ESPRESSO Telescope: PoET*; ONG Science Meeting 2024, Tenerife, Spain
63. **A. R. G. Santos**; 2024; *Stochastic solar phenomena: insights into granulation and oscillation properties*; PoET Workshop #2, Porto, Portugal
64. **A. R. G. Santos**, S. Mathur, R. A. Garcia, A. -. Broomhall, R. Egeland, A. Jiménez, D. Godoy-Rivera, S. N. Breton, Z. R. Claytor, T. S. Metcalfe, **M. S. Cunha**, L. Amard; 2024; *Magnetic activity and its variability in the Sun and Solar-like stars*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal
65. **A. R. G. Santos**, D. Godoy-Rivera, S. Mathur, **M. S. Cunha**, R. A. Garcia; 2024; *Signature of the spin-down stalling in the Stellar magnetic activity*; 8th TESS/15th Kepler Asteroseismic Science Consortium Workshop, Porto, Portugal

66. **N. C. Santos**; 2024; *PoET: tackling the problem of stellar noise for the PLATO ground-based observation program*; ESP2024: PLATO Planetary Systems - Formation to observed architectures, Catania, Italy
67. **N. C. Santos**; 2024; *PoET: an overview*; PoET workshop #2, Porto, Portugal
68. **N. C. Santos**; 2024; *Tackling the challenges of stellar noise with PoET*; ARIEL Consortium Meeting, Lisboa, Portugal
69. **A. M. Silva**; 2024; *A fully-Bayesian model for RV extraction*; Exoplanets5, Leiden, Netherlands
70. **A. M. Silva**; 2024; *Observing strategies and their role in the improvement of RV analysis*; PoET workshop #2, Porto, Portugal
71. **A. M. Silva**; 2024; *The Paranal solar ESPRESSO Telescope - towards a resolved view of the Sun*; Exoplanets5, Leiden, Netherlands
72. **B. Soares**, **V. Zh. Adibekyan**; 2024; *From primordial composition of stars to the present-day compo- sition of their rocky exoplanets*; Molecules and planets in the outer Galaxy: is there a boundary of the Galactic Habitable Zone?, Florence, Italy
73. **B. Soares**; 2024; *Assessing the processes behind planet engulfment and its imprints*; Rocky Worlds III, Zurich, Switzerland
74. **B. Soares**; 2024; *Exploring the processes and consequences of planet engulfment*; PLANETS Kick-off Meeting, Torun, Poland
75. **L. Sousa**; 2024; *Modelling the Stochastic Gravitational Wave Background Generated by domain wall networks*; VIII Cosmological Olentzero, Bilbao, Spain
76. **S. G. Sousa**; 2024; *CHEOPS TS3 report*; CHEOPS Science Team Meeting #30, Marseille, France
77. **S. G. Sousa**; 2024; *CHEOPS TS3 report*; CHEOPS Science Team Meeting #31, , Online
78. **S. G. Sousa**; 2024; *CHEOPS TS3 report*; CHEOPS Science Team Meeting #32, Warwick, UK
79. **S. G. Sousa**; 2024; *CHEOPS TS3 report*; CHEOPS Science Team Meeting #33, , Online
80. **S. G. Sousa**; 2024; *Spectra from public archives*; PLATO WP120 Hands-On Workshop #4 (HOW#4), , Online
81. **S. G. Sousa**; 2024; *Spectra from PLATO FU and public archives*; PLATO WP122 ("Non-seismic parameters and model atmospheres") workshop, , Online
82. **C. Sousa-Silva**; 2024; *Spectroscopic Data: Promises and Problems for Planetary Atmospheres*; Two HoRSEs, Berlin, Germany
83. **C. Sousa-Silva**; 2024; *Spectroscopic Data: Promises and Problems for Atmospheric Studies*; New York Area Exoplanets Meeting, New York, USA
84. **D. A. D. Vaz**; 2024; *Dancing in the Dark: Exploring the Impact of Binary Stars on Understanding the Properties of the Faintest Galaxies*; Small Galaxies, Cosmic Questions - II, Durham, UK
85. **D. A. D. Vaz**; 2024; *Dancing in the Dark: Exploring the Impact of Binary Stars on Understanding the Properties of the Faintest Galaxies*; A decade of discoveries with MUSE and beyond, Garching, Germany
86. **D. A. D. Vaz**; 2024; *The Binary Fraction of Leo T*; 26th MUSE Consortium Science Busy Week, Liverpool, UK
87. **D. A. D. Vaz**; 2024; *Leo T Dissected with HST and MUSE*; Science with the Hubble and James Webb Space Telescopes VII: Stars, Gas & Dust in the Universe, Porto, Portugal
88. **B. Wehbe**, **M. Abreu**, **A. M. A. C. V. Silva**, **A. Cabral**, **N. C. Santos**; 2024; *Implementation of a seeing measurement device for the PoET solar telescope*; SPIE Astronomical Telescopes and Instrumentation - Ground-based and Airborne Instrumentation for Astronomy X, Yokohama, Japan

National Scientific Communications in 2024

1. **A. Barka**, **N. C. Santos**, **E. A. S. Cristo**, **A. R. G. Santos**, **J. Gomes da Silva**, **J. H. C. Martins**; 2024; *Modeling the Sun's Radial Velocity with SOAP using SDO observations: comparison With Helios Radial Velocity Data*; ENAA XXXIV, Guimarães, Portugal
2. **R. Carvajal**, **I. Matute**, **J. Afonso**, R. P. Norris, K. J. Luken, P. Sánchez-Sáez, **P. A. C. Cunha**, A. Humphrey, **H. Messias**, **S. Amarantidis**, **D. D. Barbosa**, H. A. Cruz, **H. Miranda**, **A. Paulino-Afonso**, **C. Pappalardo**; 2024; *Prediction of Radio AGN with Ensemble Machine Learning in multi-survey data*; Encontro Ciência 2024, Porto, Portugal
3. **R. Costa**, **T. L. Campante**, **M. J. P. F. G. Monteiro**; 2024; *Pushing the boundaries of cool-dwarf asteroseismology with ESPRESSO*; ENAA XXXIV, Guimarães, Portugal
4. **R. Costa**, **T. L. Campante**, **M. J. P. F. G. Monteiro**, **N. A. M. Moedas**; 2024; *Oscillations in cool-dwarf stars through the spectrograph ESPRESSO*; IJUP 2024, Porto, Portugal
5. **D. Grüber**; 2024; *About Domain Walls and Gravitational Waves*; IA-ON11, Lisboa, Portugal
6. **I. M. Leite**, **A. Cabral**, **N. C. Santos**, **A. M. Silva**, **A. Oliveira**, **B. Wehbe**, **D. Castro Alves**, **J. H. C. Martins**, **M. Abreu**, **M. A. Monteiro**, **P. Moreno**, **R. Gafeira**; 2024; *PoET, the Paranal solar ESPRESSO Telescope: a spatially resolved Sun in a high resolution spectrograph*; ENAA XXXIV, Guimarães, Portugal

7. **I. M. Leite**, **A. Cabral**, **N. C. Santos**, **A. M. Silva**, **A. Oliveira**, **B. Wehbe**, **D. Castro Alves**, **J. H. C. Martins**, **M. Abreu**, **M. A. Monteiro**, **P. Moreno**, **R. Gafeira**; 2024; *PoET, the Paranal solar ESPRESSO Telescope: a spatially resolved Sun in a high-resolution spectrograph*; Encontro Ciência 2024, Porto, Portugal
8. **T. O. Miranda**, **L. Sousa**; 2024; *Impact of small-scale structure on the stochastic gravitational wave background generated by cosmic strings*; IJUP 2024, Porto, Portugal
9. **A. Mota**, **N. C. Santos**, **M. Cortesão**; 2024; *Polar Environments and Radiation Resistance on Exoplanets: Implications for Astrobiology*; XVI Portuguese Conference of Polar Sciences, Guarda, Portugal
10. **A. W. Neitzel**, **T. L. Campante**, **D. Bossini**, A. Miglio; 2024; *Dissecting Stellar Populations with Manifold Learning*; ENAA XXXIV, Guimarães, Portugal
11. **I. M. Rolo**, **M. S. Cunha**, D. L. Holdsworth, **A. R. G. Santos**; 2024; *Exploring Chemically Peculiar Stars with Space Based Data from NASAs TESS Mission*; ENAA XXXIV, Guimarães, Portugal
12. **I. M. Rolo**, **E. Delgado Mena**, M. Tsantaki, **J. Gomes da Silva**; 2024; *The Enigma of Li-Rich Giants and its Relation with Radial Velocity and Stellar Activity Variations*; Encontro Ciência 2024, Porto, Portugal
13. **C. San Nicolas Martinez**; 2024; *Refining the radial velocity method to uncover other Earths*; ENAA XXXIV, Guimarães, Portugal
14. **A. R. G. Santos**; 2024; *Stellar rotation and magnetism*; Dias da Física, Porto, Portugal
15. **B. Soares**; 2024; *Neither icy nor terrestrial: Exploring the nature of steam worlds*; ENAA XXXIV, Guimarães, Portugal

Visitors in 2024

The researchers/lecturers that have visited CAUP in 2024 were:

1. Ana Achúcarro, University of Leiden, The Netherlands, 8 – 10 January 2024
2. Adalto Rodrigues Gomes, Universidade Federal do Maranhão, Brazil, 4 February – 1 March 2024
3. Fernando Buitrago, University of Valladolid, 7 – 9 February 2024
4. Victor Alonso Rodriguez, University of Valladolid, 7 – 9 February 2024
5. Marc Huertas-Company, Instituto de Astrofísica de Canarias, Spain, 8 – 9 February 2024
6. Victoria Antoci, Technical University of Denmark, Denmark, 13 – 21 February 2024
7. Virginia Bettio, University of Padova, Italy, 1 March – 31 May 2024
8. Jochen Liske, Universitat Hamburg, Germany, 6 – 9 March 2024
9. Julia Venturini, University of Geneva, Switzerland, 4 – 6 April 2024
10. Luc Binette, Instituto de Astronomía (UNAM), Maxico, 15 April 2024
11. Afonso Mota, Universidade de Lisbao, Portugal, 26 – 27 April 2024
12. Arpi Karapetyan, Alikhanian Yerevan Institute of Physics, Armenia, 10 May – 17 July 2024
13. Iulia Chifu, University of Goettingen, Germany, 2 – 7 June 2024
14. Bruno Rodriguez, Centro de Astrobiologia (CSIC/INTA), Spain, 3 – 6 June 2024
15. José Ricardo Correia, University of Helsinki, Finland, 14 – 21 June 2024
16. Joel Ong, University of Hawaii at Manoa, USA, 8 -12 July 2024
17. Daniel Holddsworth, University of Lancashire, United Kingdom, 9 – 21 July 2024
18. Donald Kurtz, University of Central Lancashire, United Kingdom, 10 – 20 July 2024
19. Oleg Kochukhov, Uppsala University, Sweden, 10 – 20 July 2024
20. Diego Bossini, Università di Padova, Italy, 10 – 28 July 2024
21. Morgan Deal, Laboratoire Univers et Particules de Montpellier (LUPM), 10 – 28 July 2024
22. Artur Hakobyan, Alikhanian Yerevan Institute of Physics, Armenia, 11 a 17 July 2024
23. Mariana Snachez, Leiden Observatory, The Netherlands, 16 – 19 July 2024
24. João Calhau, INAF, 17 – 18 July 2024
25. Dennis Stello, University of New South Wales, Australia, 22 – 26 July 2024
26. Christian Duque, Universidad Complutense de Madrid, Spain, 15 September – 15 December 2024
27. Andrew Collier Cameron, University of St. Andrews, Scotland, 21 – 25 October 2024
28. Vincent Bourrier, Observatoire de Genéve, Switzerland, 22 October 2024
29. Alex Pietrow, Leibniz-Institut fur Astrophysik (AIP), Germany, 22 – 26 October 2024
30. Mahmoudreza Oshagh, 22 – 27 October 2024
31. Hector Hugo Palomeque Dominguez, German Aerospace Center (DLR), Germany, 28 October - 6 December 2024
32. Diego Godoy Riviera, Instituto de Astrofísica de Canarias (IAC), Spain, 13 – 16 November 2024
33. Steve Cunnington, Jodrell Bank Centre for Astrophysics, United Kingdom, 4 – 7 December 2024
34. Mohammad Akhlaghi, Centro de Estuduios de Física del Cosmos de Aragón (CEFCA), Spain, 9 - 12 December 2024
35. Sepideh Eskandarlou, Centro de Estuduios de Física del Cosmos de Aragón (CEFCA), Spain, 9 - 12 December 2024
36. Rafael Guzmán, Instituto de Física de Cantabria, Spain, 10 - 12 December 2024
37. Beatriz Bordadágua, Heidelberg Institute for Theoretical Studies, Germany, 19 – 20 December 2024

38. Emma Gerakaki, Institute of Theoretical Astrophysics in Heidelberg, Germany, 4 December 2024 – 1 March 2025

Scientific Seminars in 2024

1. Achúcarro, A.; 2024; *Cosmic inflation, an update*
2. Antoci, V.; 2024; *A&F Stars as Astrophysical Laboratories*
3. Binette, L.; 2024; *The recently confirmed problem of gas temperature in active galactic nuclei*
4. Cunnington, S.; 2024; *Launching the ultra-large-scale era with the SKAO*
5. Eskandarlou, S.; 2024; *J-PAS: A journey through the halo of Alba, from tidal stars to ionized Gas*
6. Godoy-Rivera, D.; 2024; *Stellar Rotation: Calibrations, Applications, and Challenges of Gyrochronology*
7. Guzmán, R.; 2024; *The New ESA F-Class Mission to Investigate the Nature of Dark Matter*
8. Huertas-Company, M.; 2024; *Deep learning the physics of galaxy formation?*
9. Karapetyan, A. G.; 2024; *Constraining supernova Ia progenitors through their positions relative to host galaxy spiral arms*
10. Liske, J.; 2024; *Cosmological Conundrums*
11. Magalhães, S. I.; 2024; *Everyone is invited!: Gender and diversity take inclusion to another level*
12. Martins, C. J. A. P.; 2024; *Reaching new hights in fundmental cosmology with ANDES*
13. Muzic, K.; 2024; *Milky Way's substellar population*
14. Palle, E.; 2024; *Revolutionizing exoplanet science with ANDES at the ELT*
15. Rodriguez Del Pino, B.; 2024; *Resolving the interstellar medium in star-forming galaxies at z>3 with the GA-NIFS survey*
16. Sanchez, M.; 2024; *Rocky planets around M dwarfs: formation, evolution and probability of detection*
17. Venturini, J.; 2024; *The radius valley across spectral types and stellar multiplicity*

Observing runs during 2024

1. **A. R. Costa Silva (PI)**, R. Allart, **O. D. S. Demangeon**, F. Borsa, E. Palle, J. Lillo-Box, E. Herrero-Cisneros, M. R. Zapatero-Osorio, C. Lovis, H. Tabernero, **N. C. Santos**, **V. Adibekyan**, D. Ehrenreich, M. Steiner, **T. Azevedo Silva**, F. Pepe; *Emission spectroscopy survey of ultra hot Jupiters*; 112.25UT; ESPRESSO, Very Large Telescope (Paranal, European Southern Observatory); 7 February 2024, 10 March 2024, 31 March 2024, 1.34 nights (out of 3.55 nights in ESO P112) October 2023 - March 2024
2. **A. R. Costa Silva;** NIRPS Consortium; guaranteed time observations; NIRPS+HARPS, 3.6m telescope (La Silla, European Southern Observatory); 8 nights, 18-26 March 2024
3. **Scott T.C.**, Brinks E., Deshev B., Gyula J., **Lagos P.**, Minchin R., Sengupta C., Taylor R.; Abell 1367: *pre-processing in a cosmic filament*; MKT-23054, MeerKAT, 1 March 2024
4. **Machado, P**., **Silva, R**., Martins, Z., **Sousa-Silva, C**., **Brasil, F**., **Dias, J**., **Quirino, D**., **Ribeiro, J**., **Espadinha, D**.; *Unveiling Organic Chemistry on Enceladus' Water Ocean with High Resolution Spectroscopy*; ESO Observational Proposal: 114.279K.002; VLT/CRIRES+ observations of Enceladus; 18 October 2024 (1.5h).
5. **Carlos Martins**, Stefano Cristiani, Valentina D'Odorico, Paolo Molaro, Francesco Guarneri, Michael Murphy, Tobias Schmidt, Dinko Milakovic, L. Pasquini, Gaspare Lo Curto, **Catarina Marques**, Ricardo Genova-Santos, Guido Cupani, Carlos Allende Prieto, David Ehrenreich, **Pedro Figueira**, Jonay I. Gonzalez Hernandez, Christophe Lovis, Andrea Mehner, **Nelson Nunes**, Francesco Pepe, Rafael Rebolo, **Sergio Sousa**, Alessandro Sozzetti, S. Udry, Alejandro Suárez Mascareño, María Rosa Zapatero Osorio, **N.C. Santos**, Ennio Poretti, Giorgio Calderone, Andrea Grazian, Andrea Trost; *An ESPRESSO Redshift Drift Experiment*, Part IIa; 112.25K7; ESPRESSO - VLT; P112
6. **Carlos Martins**, Stefano Cristiani, Valentina D'Odorico, Paolo Molaro, Francesco Guarneri, Michael Murphy, Tobias Schmidt, Dinko Milakovic, L. Pasquini, Gaspare Lo Curto, **Catarina Marques**, Ricardo Genova-Santos, Guido Cupani, Carlos Allende Prieto, David Ehrenreich, **Pedro Figueira**, Jonay I. Gonzalez Hernandez, Christophe Lovis, Andrea Mehner, **Nelson Nunes**, Francesco Pepe, Rafael Rebolo, **Sergio Sousa**, Alessandro Sozzetti, S. Udry, Alejandro Suárez Mascareño, María Rosa Zapatero Osorio, **N.C. Santos**, Ennio Poretti, Giorgio Calderone, Andrea Grazian, Andrea Trost; *An ESPRESSO Redshift Drift Experiment*, Part IIb; 113.26FY; ESPRESSO - VLT; P113
7. Andrea Trost, Stefano Cristiani, Dinko Milakovic, Simona Di Stefano, **Catarina Marques**, Francesco Guarneri, Guido Cupani, Louise Welsh**, Carlos Martins**, Matteo Viel, Prakash Gaikwad, Andrea Grazian, Michael Murphy, Tobias Schmidt, Valentina D'Odorico, L. Pasquini, Vieri Cammelli; *ESPRESSO in the sky with diamonds: the small scale structure of the IGM with spectroscopy of lensed quasars*; 115.28E5; ESPRESSO - VLT; P115
8. **Sousa**, Mortier, **Santos**, Rojas Ayala, **Adibekyan**, Israelian, **Demangeon**, **Barros**, **Antoniadis Karnavas**, **Delgado Mena**, Tsantaki, **Soares**; *Know The Star To Know The Planet: Improving Sweet-Cat With Homogeneous Planet-Host Parameters*; UVES, VLT UT2, SM 113.26AQ.001; 112.25CZ.001
9. **Delgado Mena** et al. (as part of the NIRPS GTO Other Science proposals); *"NIRPS GTO - Other Science 3: Stellar activity impact on radial-velocity variations in K stars"*; 113.26KW-114.279B, NIRPS-ESO-3.6m; ESO period 113 and 114
10. **S. Sousa,** et al. (including, **Elisa Delgado Mena**); *"Know the star to know the planet: improving SWEET-CAT with homogeneous planet-host parameters"*; 112.25CZ-113.26AQ; UVES/VLT; period 112-113 service mode

11. K. Helminiak et al. (including, **Elisa Delgado Mena**); "*A precise characterisation of the ARIEL stars*"; 2024-1-MLT-010; SALT/HRS; period 2024B
12. **A. R. G. Santos**, T. S. Metcalfe, O. Kochukhov, **Tiago L. Campante**, **R. Gafeira**; *Constraints on Magnetic Braking and Dynamo Evolution from Spectropolarimetry of β Hydri*; ESO/HARPS; P113
13. Mousumi Das, **Daniel Vaz**, Amrutha S.; Observations of Leo T; Astrosat-UVIT; Cycle A13
14. **Tiago Campante; Rúben A. R. Costa**; Observation of the star HD 191408; ESPRESSO at the Paranal observatory; 17 September – 26 September 2024
15. **Campante, T. L**. (PI); Co-Is: **Santos, N. C., Adibekyan, V**., **Cunha, M. S**., et al.; *Expanding the frontiers of cooldwarf asteroseismology with ESPRESSO*; Program ID: 113.26FX; Echelle SPectrograph for Rocky Exoplanets and Stable Spectroscopic Observations (ESPRESSO) at the Very Large Telescope (VLT); Period 113
16. Rogerio Riffel, **Pedro Cunha**, Thaisa Storchi Bergmann, Alberto Rodriguez Ardila, **Jean Gomes**, **Andrew Humphrey**, **Jarle Brinchmann**, Luis Hahn, Marckelson Silva; *Studying emission line activity in a sample of machine learning-selected QSO2 in the redshift desert*; SOAR SO2024B-010, GOODMAN spectrograph at SOAR telescope; 1 September 2024, 3 September 2024, and 28 September 2024
17. Holdsworth, **Cunha** et al., *Defining a new chemically peculiar star catalogue*, HRS@SALT, January – December 2024 (128h); This is long-term programme to be continued over several semesters

External seminars by CAUP researchers in 2024

1. **Ana Rita Costa Silva**; *The dayside of WASP-76 b investigated with ESPRESSO*; Observatory of Geneva, Versoix, Switzerland; 14 June 2024
2. **Carlos J. A. P. Martins**; *Reaching new heights in fundamental cosmology with ANDES*; CAUP Seminar; 22 March 2024
3. **Carlos J. A. P. Martins;** *Does light gravitate?*; Cookie seminar; 25 September 2024
4. **Nuno C. Santos;** *"Un Nobel à procura de outros mundos"*; ISEP, Porto; 5 June 2024
5. **Nuno C. Santos**; *"À descoberta de outros mundos habitáveis"*; University of Porto, Departamento de Biologia (ciclo Biologia ao fim da tarde); 3 April 2024
6. **Nuno C. Santos**; *"Towards other Earths: some highlights and a few challenges"*, University of Porto, Departamento de Física e Astronomia, 28 February 2024
7. **Nuno C. Santos**; *"Exoplanet research with high resolution spectroscopy: some highlights and a few challenges"*, University of Tartu, Estonia, 18 January 2024
8. **Susana C. C. Barros**; *Detecting tidal deformation and decay*; Ahmedabad, India; January 2024
9. **André Miguel A. C. V. Silva**; *Towards an improvement in the characterization of stellar radial velocities*; ESA research seminar , European Space Agency (Madrid), Spain; May 2024
10. **André Miguel A. C. V. Silva**; *The (radial) velocity of stars - detection and characterization of exoplanets*; Café com Física, Departamento de Física da Universidade de Coimbra, Portugal; March 2024
11. **Afonso Morgado Mota**; *An Integrative Approach to Exoplanet Habitability: Joining Biology and Astrophysics*; University of Naples Federico II (online), Italy; 12 December 2024
12. **Olivier D. S. Demangeon**; *Asymmetry in the atmosphere of the ultra-hot Jupiter WASP-76 b*; Stockholm University (via zoom), Sweden; 4 December 2024
13. **Rúben A. R. Costa**; *From Pixels to Stellar Ages*; Porto Summer School on Asteroseismology, Vila do Conde, Portugal; 21 – 26 July 2024
14. **Rúben A. R. Costa**; *CESAM2K20 WORKSHOP II: Transport processes*; Paris, France; 14- 15 November 2024
15. **Bárbara M. T. B. Soares;** *Assessing the processes behind planet engulfment and its imprints*; Centre for Origin and Prevalence of Life (COPL) at ETH Zurich, Switzerland; 15 January 2024
16. **Bárbara M. T. B. Soares**; *How to swallow a planet: processes and consequences of planet engulfment*; St Andrews Centre for Exoplanetary Sciences (StACES) at the University of St Andrews, United Kingdom; 15 April 2024
17. **Margarida S. Cunha**; *Stars as physics laboratories*; Observatoire de la Côte d'Azur, Nice, France; 13 June 2024
18. **Jarle Brinchmann;** *"MUSE-Faint - Dissecting the faintest galaxies with MUSE"*; MPE Garching, Germany; 24 October 2024
19. **Jarle Brinchmann**; *"MUSE-Faint - Dissecting the faintest galaxies with MUSE"*; DFA Porto, Portugal; 27 November 2024

Outreach talks in 2024

1. Ana Rita Costa Silva, Talk at conference: Astronomy communication and influencing, Instagram, 24 de June 2024
2. Ana Rita Costa Silva, Communicating Astronomy with the Public 2024, Toulouse + online, France, 24 - 28 June 2024
3. Ana Rita Costa Silva, Poster at conference: Astronomy communication and influencing via Instagram, International Astronomical Union General Assembly 2024, Cape Town + online, South Africa, 6 - 15 August 2024
4. Ana Rita Costa Silva, Exoplanetas e a Procura por Vida Extraterrestre, O Espaço Vai À Escola (Ciência Viva/ESERO), Escola Básica Frei Bartolomeu dos Mártires, Viana do Castelo, 5 November 2024

5. Ana Rita Costa Silva, Exoplanetas e a Procura por Vida Extraterrestre, O Espaço Vai À Escola (Ciência Viva/ESERO), Escola Básica das Naus, Lagos, 5 November 2024
6. Ana Rita Costa Silva, Exoplanetas e a Procura por Vida Extraterrestre, O Espaço Vai À Escola (Ciência Viva/ESERO), Escola Secundária de Molelos, Tondela, 5 November 2024
7. Ana Rita Costa Silva, Exoplanetas e a Procura por Vida Extraterrestre, O Espaço Vai À Escola (Ciência Viva/ESERO), Escola Básica de Pevidém, Selho - São Jorge, Guimarães, 7 November 2024
8. Ana Rita Costa Silva, Exoplanetas e a Procura por Vida Extraterrestre, O Espaço Vai À Escola (Ciência Viva/ESERO), Escola Básica Sophia de Mello Breyner Andresen, Brandoa, Amadora, 7 November 2024
9. Ana Rita Costa Silva, Exoplanetas e a Procura por Vida Extraterrestre, O Espaço Vai À Escola (Ciência Viva/ESERO), Escola Básica Padre Alberto Neto, Rio de Mouro, Sintra, 8 November 2024
10. Ana Rita Costa Silva, Talk about the IA research group "Planetary Systems", Encontro Clubes Ciência Viva, Planetário do Porto/FCUP, Porto, Portugal, 7 December 2024
11. Carlos J. A. P. Martins, Testing General Relativity with the Eddington Experiment, CEIA-PPCB, 16 August 2024
12. Carlos J. A. P. Martins, A Física da Energia e do Aquecimento Global, ES Clara de Resende, Porto, 9 October 2024
13. Carlos J. A. P. Martins, A Física da Energia e do Aquecimento Global, ES de Rio Tinto, 11 October 2024
14. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES de Vilela, Paredes, 11 October 2024
15. Carlos J. A. P. Martins, A Física da Radioactividade e do Cancro, ES de Vouzela, 14 October 2024
16. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES Camilo Castelo Branco, Famalicão, 15 October 2024
17. Carlos J. A. P. Martins, A Física da Radioactividade e do Cancro, ES Fornos de Algodres, 16 October 2024
18. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES S. Pedro do Sul, 16 October 2024
19. Carlos J. A. P. Martins, A Física da Energia e do Aquecimento Global, ES Rocha Peixoto, Póvoa de Varzim, 17 October 2024
20. Carlos J. A. P. Martins, A Física do Big Bang, ES Aurélia de Sousa, Porto, 17 October 2024
21. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES de Pinhal de Rei, Marchinha Grande, 21 October 2024
22. Carlos J. A. P. Martins, A Física do Big Bang, ES Sebastião da Gama, Setúbal, 29 October 2024
23. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES Emídio Navarro, Almada, 29 October 2024
24. Carlos J. A. P. Martins, A Física da Radioactividade e do Cancro, Colégio Marista de Carcavelos, 30 October 2024
25. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES José Gomes Ferreira, Lisboa, 31 October 2024
26. Carlos J. A. P. Martins, A Física da Energia e do Aquecimento Global, ES Martinho Vaz de Castelo Branco, Póvoa de Sta. Iria, 31 October 2024
27. Carlos J. A. P. Martins, A Física da Energia e do Aquecimento Global, ES Públia Hortênsia Castro, Vila Viçosa, 4 November 2024
28. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES Fernando Namora, Amadora, 5 November 2024
29. Carlos J. A. P. Martins, A Física da Energia e do Aquecimento Global, ES de Castro Verde, 5 November 2024
30. Carlos J. A. P. Martins, A Física da Radioactividade e do Cancro, ES de Arga e Lima, Lanheses, 6 November 2024
31. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES Quinta das Palmeiras, Covilhã, 11 November 2024
32. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES João Gonçalves Zarco, Matosinhos, 12 November 2024
33. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES de Molelos, Tondela, 13 November 2024
34. Carlos J. A. P. Martins, A Física do Big Bang, ES de Airães, Felgueiras, 14 November 2024
35. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES À Beira Douro, Gondomar, 14 November 2024
36. Carlos J. A. P. Martins, A Física da Energia e do Aquecimento Global, ES António Aleixo, Portimão, 18 November 2024
37. Carlos J. A. P. Martins, A Física da Radioactividade e do Cancro, ES de Santa Maria Maior, Viana do Castelo, 19 November 2024
38. Carlos J. A. P. Martins, A Física da Gravidade e dos Satélites, ES Gaia Nascente, Oliveira do Douro, 25 November 2024
39. Catarina Lobo, "A nossa galáxia e as outras: uma viagem através do Universo", Escola Básica de Valadares, Vila Nova de Gaia, 24 October 2024
40. Catarina Lobo, "Dentro de um enxame... de galáxias!", Centro Interpretativo da Mulher Duriense, Armamar, 21 September 2024
41. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Escola Secundária de Alcanena, 14 October 2024

42. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Externato Liceal de Albergaria dos Doze, 16 October 2024
43. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Colégio da Trofa, 17 October 2024
44. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Escola Básica das Naus, 24 October 2024
45. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Escola Secundária Rainha Dona, 25 October 2024
46. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Colégio Casa Mãe, 5 November 2024
47. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Escola Secundária de São Pedro do Sul, 15 November 2024
48. Catarina M. J. Marques, Os Mistérios do nosso Universo: Em busca das respostas (O Espaço vai à Escola - ESERO), Remote, Escola Básica de Montenegro, 27 November 2024
49. Inês Martins Rolo, Receita para fazer uma estrela peculiar, Ignite IAstro – ArmaMarch, 21 September 2024
50. Nuno C. Santos, Palestra: "À procura de outras Terras", no âmbito das "Conferências de Arouca" (organização: Círculo Cultura e Democracia), 29 de November 2024
51. Nuno C. Santos, Palestra: "À procura de Novos mundos", Escola Secundária de Alfena – Valongo, 26 de November 2024
52. Nuno C. Santos, Palestra: "Outras terras no Universo?", Escola Secundária Serafim Leite, São João da Madeira, 22 November 2024
53. Nuno C. Santos, Mesa redonda: "Tecnologias e INovação", III Congresso de Ciências, FCUP, Porto, 31 October 2024
54. Nuno C. Santos, Palestra: "Outras terras no Universo?", Pavilhão do Conhecimento (no âmbito do ARIEL Consortium (remote participation), Lisboa, 30 October 2024
55. Nuno C. Santos, Palestra: "Um ESPRESSO para outros mundos", no evento Ignite Astro, Armamar, 21 September 2024
56. Nuno C. Santos, Mesa redonda: "À procura de outras terras no Universo", em "Noites no Pátio do Museu", 6.ª edição da Escola de Verão de Astronomia, IST, Portugal, (participação via Zoom), 3 September 2024
57. Nuno C. Santos, Palestra: "Outras Terras no Universo: uma aventura em Português"; na 8a Concentração de Telescópios de Moimenta da Beira, Portugal, 11 May 2024
58. Sérgio A. G. Sousa, Palestra Espaço vai à Escola: À descoberta de Exoplanetas com o CHEOPS e o ESPRESSO, Escola Básica Padre António Luis Moreira, Carvalhos, Vila Nova de Gaia, 9 October 2024
59. Sérgio A. G. Sousa, Palestra Espaço vai à Escola: À descoberta de Exoplanetas com o CHEOPS e o ESPRESSO, Escola Básica e Secundária À Beira Douro, Gondomar, 15 October 2024
60. Sérgio A. G. Sousa, Palestra Espaço vai à Escola, À descoberta de Exoplanetas com o CHEOPS e o ESPRESSO, Escola Secundária António Nobre, Porto, 17 October 2024
61. Sérgio A. G. Sousa, Palestra Espaço vai à Escola: À descoberta de Exoplanetas com o CHEOPS e o ESPRESSO, Colégio "Casa Mãe", Baltar, 21 October 2024
62. Sérgio A. G. Sousa, Palestra Espaço vai à Escola: À descoberta de Exoplanetas com o CHEOPS e o ESPRESSO, Escola Básica da Areosa, Porto, 14 November 2024
63. Sérgio A. G. Sousa, Palestra Espaço vai à Escola: À descoberta de Exoplanetas com o CHEOPS e o ESPRESSO, Escola Secundária de Senhora da Hora, Matosinhos, 21 November 2024
64. Sérgio A. G. Sousa, Palestra Ignite Astro: Tirar as medidas a exoplanetas, Armamar; 21 September 2024
65. Ângela R. G. Santos, No Mundo das Estrelas, Escola Ciência Viva - Encontro com o Cientista, Galeria da Biodiversidade, Porto, Portugal; 04 October 2024
66. Ângela R. G. Santos, No Mundo das Estrelas, Escola Ciência Viva - Encontro com o Cientista, Galeria da Biodiversidade, Porto Portugal; 07 June 2024
67. Ângela R. G. Santos, Astronomia de Carne e Osso, Masterclass - Com a verdade me enganas: a astronomia escondida, Portugal, 15 February 2024
68. Susana C. C. Barros, The solar system, Tangerina School, Porto, 19 of April 2024
69. Jorge H. C. Martins, Hora do Cientista, Galeria da biodiversidade da UP, 24 June 2024
70. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" presencial, Escola secundária Gonçalves Zarco, 16 October 2024
71. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" presencial, Escola Básica de Aver-o-Mar, Póvoa de Varzim, 6 de November 2024
72. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" presencial, Escola Básica de Aver-o-Mar, Póvoa de Varzim, 6 de November 2024
73. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" presencial, Escola Básica Dr. Carlos Pinto Ferreira, Junqueira Vila do Conde, 6 November 2024
74. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" online, Centro de Educação e Desenvolvimento Pina Manique - Casa Pia de Lisboa, 15 October 2024

75. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" online, Escola Secundária Viriato, Abraveses, Viseu, 28 October 2024
76. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" online, Escola Secundária Padre António Macedo, Santiago do Cacém, 30 October 2024
77. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" online, Escola Secundária Públia Hortênsia de Castro, Vila Viçosa, 4 November 2024
78. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" online, Escola Básica de Corroios, Seixal, 5 November 2024
79. André Miguel A. C. V. Silva, Palestra "Espaço vai à Escola 23" online, Escola Secundária de São Pedro do Sul;15 November 2024
80. Afonso Morgado Mota, As Ciências do Espaço e a Astrobiologia: Há vida noutros planetas?, Colégio Valsassina, Lisboa (80 participants), 25 November 2024
81. Afonso Morgado Mota, As Ciências do Espaço e a Astrobiologia: Há vida noutros planetas?, Escola EB2/3 Eugénio de Andrade, Porto (50 participants), 28 November 2024
82. Yuri C. Damasceno, Como procurar átomos nas profundezas do Universo, Maputo; 09 February 2024
83. José Fonseca, De onde viemos? O que somos? Para onde vamos?: Uma viagem sobre a percepção do Cosmos, Departamento de Física e Astronomia, OLIMPÍADAS NACIONAIS DE FÍSICA 2024, 20 April 2024
84. Ricardo S. S. C. Reis, O Céu dos Lusíadas, Escola Secundária Carolina Michaelis, Porto, 22 March 2024
85. Tiago J. L. C. E. Campante, Grupo de Investigação de Estrelas - Rumo a um estudo abrangente de estrelas (as part of the panel discussion on A ciência da Astronomia Contemporânea), Encontro Regional dos Clubes Ciência Viva do Planetário do Porto - CCV 2024, Porto, Portugal, 7 December 2024
86. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Ribeirão, 21 October 2024
87. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Póvoa de Varzim, 28 October 2024
88. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Trofa, 29 October 2024
89. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Trofa, 29 October 2024
90. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Felgueiras;30 October 2024
91. Bárbara M. T. B. Soares¸ Conhecer as estrelas do nosso céu!, Vila Nova de Gaia, 5 November 2024
92. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Maia, 6 November 2024
93. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Grijó, 18 November 2024
94. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Póvoa de Varzim, 19 November 2024
95. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Porto, 20 November 2024
96. Bárbara M. T. B. Soares, Conhecer as estrelas do nosso céu!, Porto, 22 November 2024
97. Ilídio André P. M. Costa, O Espaço vai à Escola, Escola Básica de São Paio, 14 November 2024
98. Ilídio André P. M. Costa, O Espaço vai à Escola, Escola Básica e Secundária de Albufeira, 29 October 2024
99. Ilídio André P. M. Costa, O Espaço vai à Escola, Escola Básica de Vouzela, 7 November 2024
100. Ilídio André P. M. Costa, O Espaço vai à Escola, Colégio de Lourdes, 31 October 2024
101. Ilídio André P. M. Costa, O Espaço vai à Escola, Escola Básica Júlio Dinis, Grijó, Vila Nova de Gaia, 11 November 2024
102. Ilídio André P. M. Costa, O Espaço vai à Escola, Jardim de Infância da Portelinha, 8 November 2024
103. Ilídio André P. M. Costa, O Espaço vai à Escola, Escola Secundária da Senhora da Hora, Matosinhos, 15 November 2024
104. Ilídio André P. M. Costa, O Espaço vai à Escola, Externato "Ribadouro", 15 November 2024
105. Jennifer Peralta Lucero, Pre-NEI, Ignite Astro, Armamar, 21 September 2024

Relatório de Contas

Balanço

Balanço individual em 31 de dezembro de 2024, valores em euro:

RUBRICAS	NOTAS	DATAS	
		31/12/2024	31/12/2023
ACTIVO			
Activo não corrente			
Activos fixos tangíveis	5	142 120,67	91 258,12
Activos intangíveis	4	11 095,12	14 275,42
Investimentos financeiros	15.2	15 953,20	15 953,20
		169 168,99	121 486,74
Activo corrente			
Inventários	6	4 109,99	4 161,55
Créditos a receber	8	1 316,90	9 806,06
Estado e Outros Entes Públicos	8	20 038,14	5 035,54
Diferimentos	8	10 404,26	3 084,95
Outros ativos correntes	8/15.1	2 900 218,93	2 987 325,64
Caixa e depósitos bancários	15.3	1 477 557,61	2 075 083,52
		4 413 645,83	5 084 497,26
Total do activo		**4 582 814,82**	**5 205 984,00**
FUNDOS PATRIMONIAIS E PASSIVO			
Fundos Patrimoniais			
Resultados transitados	8	1 079 214,01	1 092 400,94
Ajustamentos/Outras variações nos fundos patrimoniais	8	60 513,19	38 993,07
		1 139 727,20	1 131 394,01
Resultado líquido do período	8	72 090,20	-13 186,93
Total dos fundos patrimoniais		1 211 817,40	1 118 207,08
Passivo			
Passivo corrente			
Fornecedores	8	7 695,69	3 761,22
Estado e outros entes públicos	8	52 875,13	53 064,45
Diferimentos	8	2 827 742,10	3 498 764,68
Outros passivos correntes	8	482 684,50	532 186,57
		3 370 997,42	4 087 776,92
Total do passivo		3 370 997,42	4 087 776,92
Total dos fundos patrimoniais e do passivo		**4 582 814,82**	**5 205 984,00**

Demonstrações Financeiras

Alterações no capital

Demonstração individual das alterações nos fundos patrimoniais no período de 2023

DESCRIÇÃO		NOTAS	Fundos Patrimoniais atribuidos aos instituidores da entidade-mãe								Interesses que não controlam	Total dos fundos patrimoniais
			Fundos	Encedentes Técnicos	Reservas	Resultados Transitados	Excedentes de revalorização	Ajustamentos/Outras variações nos fundos patrimoniais	Resultado líquido do período	Total		
POSIÇÃO NO INÍCIO DO PERÍODO 2023	1					1045095,83		39349,75	61675,80	1146121,38		1146121,38
ALTERAÇÕES NO PERÍODO												
Primeira adopção de novo referencial contabilístico								0,00		0,00		0,00
Alterações de políticas contabilísticas												
Diferenças de conversão de demonstrações financeiras												
Realização de excedente de revalorização												
Excedentes de revalorização												
Ajustamentos por impostos diferidos												
Outras alterações reconhecidas nos fundos patrimoniais						47305,11		-356,68	-61675,80	-14727,37		-14727,37
	2					47305,11		-356,68	-61675,80	-14727,37		-14727,37
RESULTADO LÍQUIDO DO PERÍODO	3								-13186,93	-13186,93		-13186,93
RESULTADO INTEGRAL	4=2+3								-74862,73	-27914,30		-27914,30
OPERAÇÕES COM INSTITUIDORES NO PERÍODO												
Fundos												
Subsídios, doações e legados												
Distribuições												
Outras operações												
	5											0,00
POSIÇÃO NO FIM DO PERÍODO 2023	6=1+2+3+5					1092400,94		38993,07	-13186,93	1118207,08		1118207,08

Demonstração individual das alterações nos fundos patrimoniais no período de 2024

DESCRIÇÃO		NOTAS	Fundos Patrimoniais atribuidos aos instituidores da entidade-mãe								Interesses que não controlam	Total dos fundos patrimoniais
			Fundos	Encedentes Técnicos	Reservas	Resultados Transitados	Excedentes de revalorização	Outras variações nos fundos patrimoniais	Resultado líquido do período	Total		
POSIÇÃO NO INÍCIO DO PERÍODO 2024	6					1092400,94		38993,07	-13186,93	1118207,08		1118207,08
ALTERAÇÕES NO PERÍODO		2										
Primeira adopção de novo referencial contabilístico												
Alterações de políticas contabilísticas												
Diferenças de conversão de demonstrações financeiras												
Realização de excedente de revalorização												
Excedentes de revalorização												
Ajustamentos por impostos diferidos												
Outras alterações reconhecidas nos fundos patrimoniais						-13186,93		21520,12	13186,93	21520,12		21520,12
	7					-13186,93		21520,12	13186,93	21520,12		21520,12
RESULTADO LÍQUIDO DO PERÍODO	8								72090,20	72090,20		72090,20
RESULTADO INTEGRAL	9=7+8								85277,13	93610,32		93610,32
OPERAÇÕES COM INSTITUIDORES NO PERÍODO												
Fundos												
Subsídios, doações e legados												
Distribuições												
Outras operações												
	10											0,00
POSIÇÃO NO FIM DO PERÍODO 2024	6+7+8+10					1079214,01		60513,19	72090,20	1211817,40		1211817,40

Fluxos de Caixa

	NOTAS	PERÍODOS	
		31-12-2024	31-12-2023
Fluxos de Caixa das actividades operacionais-método directo			
Recebimento de Clientes e Utentes		312 844,85	249 664,52
Pagamentos de subsídios			
Pagamentos de apoios			
Pagamentos de bolsas		-115 688,21	-77 298,40
Pagamento a fornecedores		-379 038,83	-294 836,32
Pagamentos ao pessoal		-1 435 196,36	-1 259 949,09
Caixa gerada pelas operações		-1 617 078,55	-1 382 419,29
Pagamento/recebimento do imposto s/ rendimento			
Outros recebimentos/pagamentos		1 076 613,03	1 134 898,27
FLUXO DE CAIXA DAS ACTIVIDADES OPERACIONAIS		-540 465,52	-247 521,02
Fluxos de caixa das actividades de investimento			
Pagamentos respeitantes a :			
Activos fixos tangíveis		-116 593,35	-49 391,73
Activos intangíveis		0,00	-13 611,99
Investimentos financeiros		0,00	-1 631,39
Outros activos			
Recebimentos provenientes de:			
Activos fixos tangíveis			
Activos intangíveis			
Investimentos financeiros		0,00	2 020,54
Outros activos			
Subsídios ao investimento		59 522,81	41 789,96
Juros e rendimentos similares		10,15	10,15
Dividendos			
FLUXO DE CAIXA DAS ACTIVIDADES DE INVESTIMENTO		-57 060,39	-20 814,46
Fluxos de caixa das actividades de financiamento			
Recebimentos provenientes de:			
Financiamentos Obtidos			
Realização de fundos			
Cobertura de prejuízos			
Doações			
Outras operações de financiamento			
Pagamentos respeitantes a:			
Financiamento Obtidos			
Juros e gastos similares		0,00	-13,01
Dividendos			
Redução de fundos			
Outras operações de financiamento			
FLUXO DE CAIXA DAS ACTIVIDADES DE FINANCIAMENTO		0,00	-13,01
VARIAÇÃO DE CAIXA E SEUS EQUIVALENTES		-597 525,91	-268 348,49
EFEITO DAS DIFERENÇAS CÂMBIO			
CAIXA E SEUS EQUIVALENTES NO INICIO PERIODO		2 075 083,52	2 373 432,01
CAIXA E SEUS EQUIVALENTES NO FIM PERIODO		1 477 557,61	2 075 083,52

Resultados por natureza

RENDIMENTOS E GASTOS	NOTAS	PERIODOS	
		31/12/2024	31/12/2023
Vendas e serviços prestados	9	304 355,69	240 581,13
Subsídios, doações e legados á exploração	7	1 788 065,29	1 428 903,63
Custo das mercadorias vendidas e das matérias consumidas	6	-3,90	-1,80
Fornecimentos e serviços externos	10	-387 705,34	-307 010,26
Gastos com o pessoal	11	-1 436 241,63	-1 280 303,04
Aumentos/reduções justo valor	15.2		
Outros rendimentos	12	42 543,19	44 522,90
Outros gastos	13	-178 292,34	-89 971,44
Resultado antes de depreciações, gastos de financiamento e impostos		132 720,96	36 721,12
Gastos/reversões de depreciação e de amortização	5/6	-60 640,91	-49 905,19
Resultado operacional (antes de gastos de financiamento e impostos)		72 080,05	-13 184,07
Juros e rendimentos similares obtidos	9/14	10,15	10,15
Juros e gastos similares suportados	14	0,00	-13,01
Resultado antes de impostos		72 090,20	-13 186,93
Resultado líquido do período		72 090,20	-13 186,93

Anexo

Anexo às demonstrações financeiras do período findo em 31 de dezembro de 2024 (Montantes expressos em euros).

1. NOTA INTRODUTÓRIA

O Centro de Astrofísica da Universidade do Porto, contribuinte 502 216 450, com sede na Rua das Estrelas, s/n, no Porto, criado em maio de 1989 (Programa Mobilizador de Ciência e Tecnologia), iniciou as atividades em outubro de 1990.

É uma associação científica e técnica privada, sem fins lucrativos e reconhecida de utilidade pública.

Inscreve entre os seus objectivos apoiar e promover a Astronomia, nomeadamente:

- a investigação científica;
- a formação ao nível pós-graduado e universitário;
- o ensino da Astronomia ao nível não universitário (ensino básico e secundário);
- e a divulgação da ciência e promoção da cultura científica.

2. REFERENCIAL CONTABILÍSTICO DE PREPARAÇÃO DAS DEMONSTRAÇÕES FINANCEIRAS

As demonstrações financeiras anexas estão em conformidade com todas as normas que integram o Sistema de Normalização Contabilística para as Entidades do Sector Não Lucrativo (ESNL). Devem entender-se como fazendo parte daquelas normas as Bases para a Apresentação de Demonstrações Financeiras, os Modelos de Demonstrações Financeiras, o Código de Contas e as Normas Contabilísticas e de Relato Financeiro (NCRF-ESNL) e as Normas Interpretativas.

Sempre que o ESNL não responda a aspetos particulares de transações ou situações, são aplicadas supletivamente e pela ordem indicada, as Normas Internacionais de Contabilidade, adotadas ao abrigo do Regulamento (CE) nº. 1606/2002, do Parlamento Europeu e do Conselho, de 19 de julho; e as Normas Internacionais de Contabilidade (IAS) e Normas Internacionais de Relato Financeiro (IFRS), emitidas pelo IASB, e respetivas interpretações SIC-IFRIC.

Adoção pela primeira vez das Normas Contabilísticas e de Relato Financeiro (NCRF-ESNL)

Desde 01 de janeiro de 2010 até 31 de dezembro de 2011, o CENTRO DE ASTROFÍSICA elaborou e aprovou, demonstrações financeiras de acordo com o SNC, conforme legislação em vigor.

Em 31 de dezembro de 2012, a preparação destas demonstrações financeiras foi efetuada de acordo com o Sistema de Normalização Contabilística para as Entidades do Sector não Lucrativo (ESNL), não havendo no entanto lugar a quaisquer ajustamentos, nem foi afetada a comparabilidade dos exercícios.

3. PRINCIPAIS POLÍTICAS CONTABILÍSTICAS, ALTERAÇÕES NAS ESTIMATIVAS CONTABILÍSTICAS E ERROS

As principais políticas contabilísticas adoptadas na preparação das demonstrações financeiras anexas são as seguintes:

3.1- Bases de apresentação

As demonstrações financeiras anexas foram preparadas no pressuposto da continuidade das operações, a partir dos livros e registos contabilísticos da empresa, mantidos de acordo com as NCRF-ESNL em vigor à data da elaboração das demonstrações financeiras.

3.2 - Rédito

O rédito é mensurado pelo justo valor da contraprestação recebida ou a receber.

O rédito proveniente da prestação de serviços é reconhecido com referência à data da transacção, desde que as seguintes condições sejam satisfeitas:

- O montante do rédito pode ser mensurado com fiabilidade;
- É provável que benefícios económicos futuros associados à transacção fluam para o CENTRO DE ASTROFÍSICA.

3.3 – Subsídios e outros apoios

Os subsídios apenas são reconhecidos quando há uma certeza razoável de que o CENTRO DE ASTROFÍSICA irá cumprir com as condições de atribuição dos mesmos e de que os mesmos irão ser recebidos.

Os subsídios associados à aquisição de activos não correntes são reconhecidos inicialmente no capital próprio, sendo subsequentemente imputados numa base sistemática como rendimentos do exercício durante as vidas úteis dos activos com os quais se relacionam.

Outros subsídios são, de uma forma geral, reconhecidos como rendimentos de uma forma sistemática durante os períodos necessários para os balancear com os gastos que é suposto compensarem.

3.4- Ativos fixos tangíveis

Os ativos fixos tangíveis adquiridos até 31 de dezembro de 2009, encontram-se registados ao custo considerado, deduzido das correspondentes depreciações acumuladas.

Os activos fixos tangíveis adquiridos após essa data são inicialmente registados ao custo de aquisição o qual inclui o custo de compra, quaisquer custos directamente atribuíveis às actividades necessárias para colocar os activos na localização e condição necessárias para funcionarem da forma pretendida e, quando aplicável, a estimativa inicial dos custos de desmantelamento e remoção dos activos.

As depreciações são calculadas, após o momento em que o bem se encontra em condições de ser utilizado, de acordo com método da linha recta, em conformidade com o período de vida útil estimado para cada grupo de bens.

As taxas de depreciação utilizadas correspondem aos seguintes períodos de vida útil estimada:

Designação	Anos
Equipamento básico	4 – 10
Equipamento administrativo	3 – 10
Outros activos tangíveis	3 – 10

As vidas úteis e método de depreciação dos vários bens são revistos anualmente. O efeito de alguma alteração a estas estimativas é reconhecido na demonstração dos resultados prospectivamente.

As despesas de manutenção e reparação (dispêndios subsequentes) que não são susceptíveis de gerar benefícios económicos futuros são registadas como gastos no período em que são incorridos.

O ganho (ou a perda) resultante da alienação ou abate de um activo fixo tangível é determinado como a diferença entre o montante recebido na transacção e a quantia escriturada do activo e é reconhecido em resultados no período em que ocorre a alienação.

3.5 - Intangíveis

Os activos intangíveis adquiridos são registados ao custo deduzido de amortizações e perdas por imparidade acumuladas. As amortizações são reconhecidas numa base de linha recta durante a vida útil estimada dos activos intangíveis. As vidas úteis e método de amortização dos vários activos intangíveis são revistos anualmente. O efeito de alguma alteração a estas estimativas é reconhecido na demonstração dos resultados prospectivamente.

3.6 - Imparidade de activos fixos tangíveis e intangíveis

Em cada data de relato é efectuada uma revisão das quantias escrituradas dos activos fixos tangíveis e intangíveis da empresa com vista a determinar se existe algum indicador de que possam estar em imparidade. Se existir algum indicador, é estimada a quantia recuperável dos respectivos activos a fim de determinar a extensão da perda por imparidade (se for o caso).

Quando não é possível determinar a quantia recuperável de um activo individual, é estimada a quantia recuperável da unidade geradora de caixa a que esse activo pertence.

A quantia recuperável do activo ou da unidade geradora de caixa consiste no maior de entre o justo valor deduzido de custos para vender e o valor de uso. Na determinação do valor de uso, os fluxos de caixa futuros estimados são descontados usando uma taxa de desconto antes de impostos que reflicta as expectativas do mercado quanto ao valor temporal do dinheiro e quanto aos riscos específicos do activo ou da unidade geradora de caixa relativamente aos quais as estimativas de fluxos de caixa futuros não tenham sido ajustadas.

Sempre que a quantia escriturada do activo ou da unidade geradora de caixa for superior à sua quantia recuperável, é reconhecida uma perda por imparidade. A perda por imparidade é registada de imediato na demonstração dos resultados na rubrica de "Perdas por imparidade".

A reversão de perdas por imparidade reconhecidas em exercícios anteriores é registada quando há evidências de que as perdas por imparidade reconhecidas já não existem ou diminuíram, sendo reconhecida na demonstração de resultados na rubrica "Reversões de perdas por imparidade", e efectuada até ao limite da quantia que estaria reconhecida (líquida de amortizações) caso a perda não tivesse sido registada.

3.7 - Ativos e passivos financeiros

Os activos e os passivos financeiros são reconhecidos no balanço quando o CENTRO DE ASTROFÍSICA se torna parte das correspondentes disposições contratuais.

Clientes e dívidas de terceiros

As dívidas de clientes e de outros terceiros encontram-se registadas pelo seu valor nominal deduzido de eventuais perdas de imparidade. As perdas de imparidade correspondem à diferença entre a quantia inicialmente registada e o seu valor recuperável, sendo este o valor presente dos "cash-flows" esperados, descontados à taxa efectiva, as quais são reconhecidas na demonstração dos resultados do período em que são em que são estimadas.

Caixa e equivalentes a caixa

Os montantes incluídos na rubrica de caixa e seus equivalentes correspondem aos valores em caixa, depósitos á ordem e a prazo.

Contas a pagar

As contas a pagar são registadas pelo seu valor nominal dado que não vencem juros e o efeito do desconto é considerado imaterial.

3.8 - Juízos de valor críticos e principais fontes de incerteza associada a estimativas

Na preparação das demonstrações financeiras anexas foram efectuados juízos de valor e estimativas e utilizados diversos pressupostos que afectam as quantias relatadas de activos e passivos, assim como as quantias relatadas de rendimentos e gastos do período. Durante o decurso do ano de 2024, não ocorreram alterações de políticas contabilísticas ou estimativas relevantes, relativamente às utilizadas na preparação e apresentação das demonstrações financeiras do exercício findo em 31 de dezembro de 2023.

As estimativas e os pressupostos subjacentes foram determinados com base no melhor conhecimento existente à data de aprovação das demonstrações financeiras dos eventos e transacções em curso, assim como na experiência de eventos passados e/ou correntes.

Contudo, poderão ocorrer situações em períodos subsequentes que, não sendo previsíveis à data de aprovação das demonstrações financeiras, não foram consideradas nessas estimativas. As alterações às estimativas que ocorram posteriormente à data das demonstrações financeiras serão corrigidas de forma prospectiva. Por este motivo e dado o grau de incerteza associado, os resultados reais das transacções em questão poderão diferir das correspondentes estimativas.

Os principais juízos de valor e estimativas efectuadas na preparação das demonstrações financeiras anexas foram os seguintes:

Activos fixos tangíveis / estimativas de vidas úteis

As depreciações são calculadas sobre o custo de aquisição sendo utilizado o método da linha recta, a partir da data em que o activo se encontra disponível para utilização, utilizando-se as taxas que melhor reflectem a sua vida útil estimada. Os valores residuais dos ativos e as respetivas vidas úteis são revistos e ajustados, se necessário em cada data de relato.

3.9 - Acontecimentos subsequentes

Os acontecimentos após a data do balanço que proporcionem informação adicional sobre condições que existiam à data do balanço ("adjusting events") são reflectidos nas demonstrações financeiras. Os eventos após a data do balanço que proporcionem informação sobre condições que ocorram após a data do balanço ("non adjusting events") são divulgados nas demonstrações financeiras, se forem considerados materiais.

3.10 - Especialização dos exercícios

As receitas e despesas são registadas de acordo com o princípio da especialização de exercícios, pelo qual estas são reconhecidas á medida em que são geradas, independentemente do momento em que são recebidas ou pagas. As diferenças entre as receitas e despesas geradas e os correspondentes montantes facturados são registadas nas rubricas de diferimentos.

4. ACTIVOS INTANGÍVEIS

Durante os períodos findos em 31 de dezembro de 2024 e 31 de dezembro de 2023, o movimento ocorrido na quantia escriturada dos activos intangíveis, bem como nas respectivas amortizações acumuladas, foi o seguinte:

Activos intangíveis: quantias brutas escrituradas	Projectos de desenvolvimento	Programas de computador			Activos intangíveis em curso	Totais
	Outros		Marcas comerciais			
Saldo Inicial		4.077,14	31.104,89			35.182,03
Adições						
Revalorizações						
Transferências						
Alienações						
Sinistros						
Abates						
Saldo Final		4.077,14	31.104,89			35.182,03

Activos intangíveis: amortizações	Projectos de desenvolvimento	Programas de computador			Activos intangíveis em curso	Totais
	Outros		Marcas comerciais			
Saldo Inicial		4.077,14	16.829,47			20.906,61
Reforços			3.180,30			3.180,30
Reversões						
Alienações						
Sinistros						
Abates						
Saldo Final		4.077,14	20.009,77			24.086,91

5. ACTIVOS FIXOS TANGÍVEIS

Durante os períodos findos em 31 de dezembro de 2024 e 31 de dezembro de 2023, o movimento ocorrido na quantia escriturada dos activos fixos tangíveis, bem como nas respectivas depreciações acumuladas, foi o seguinte:

Activos fixos tangíveis: quantias brutas escrituradas	Equipamento básico	Equipamento de transporte	Equipamento administrativo	Outros activos fixos tangíveis	Activos fixos tangíveis em curso	Totais
Saldo Inicial	1.114.167,40	35.400,00	797.345,79	52.423,35		1.999.336,54
Adições	59.302,91		1.689,60	17 .675,52	29.655,13	108.323,16
Revalorizações						
Alienações						
Transferências						
Abates						
Saldo Final	1.173.470,31	35.400,00	799.035,39	70.098,87	29.655,13	2.107.659,70

Activos fixos tangíveis: depreciações	Equipamento básico	Equipamento de transporte	Equipamento administrativo	Outros activos fixos tangíveis	Activos fixos tangíveis em curso	Totais
Saldo Inicial	1.048.740,01	35.400,00	794.955,70	28.982,71		1.908.078,42
Reforços	49.811,08		2.805,06	4.844,47		57.460,61
Reversões						
Alienações						
Abates						
Saldo Final	1.098.551,09	35.400,00	797.760,76	33.827,18		1.965.539,03

6. CUSTO DAS MERCADORIAS VENDIDAS E MATÉRIAS CONSUMIDAS

O custo das mercadorias vendidas e das matérias consumidas reconhecido nos períodos findos 31 de dezembro de 2024 e em 31 de dezembro de 2023 é detalhado conforme segue:

CMVMC		Mercadorias	TOTAIS
Em 31.12.2024	Saldo Inicial	4.161,55	4.161,55
	Compras		
	Regularizações (+/-)	-47,66	-47,66
	Saldo Final	4.109,99	4.109,99
	CMVMC	3,90	3,90
Em 31.12.2023	Saldo Inicial	4.191,08	4.191,08
	Compras		
	Regularizações (+/-)	-27,73	-27,73
	Saldo Final	4.161,55	4.161,55
	CMVMC	1,80	1,80

7. SUBSÍDIOS E OUTROS APOIOS

O montante dos subsídios e outros apoios, reconhecidos nos períodos findos em 31 de dezembro de 2024 e em 31 de dezembro de 2023, é detalhado como se segue:

No que se refere aos subsídios relacionados com activos, os valores recebidos são reconhecidos como réditos à medida que os bens subsidiados vão sendo amortizados.

Os subsídios á exploração são reconhecidos como réditos, na medida em que o gasto é realizado.

Relação dos subsídios obtidos e outros apoios			Quantias Concedidas	
			2024	2023
Não reembolsáveis	Subsídios relacionados com activos	Estado e Outros Entes Públicos	50.935,30	31.049,83
		Outras Entidades	8.587,51	10.740,13
		Subtotais	59.522,81	41,789,96
	Subsídios à exploração	Estado e Outros Entes Públicos	1.336.378,13	1.304.411,19
		Outras Entidades	451.687,16	124.492,44
		Subtotais	1.788.065,29	1.428.903.63
		Totais	1.847.588,10	1.470.693.59

8. INSTRUMENTOS FINANCEIROS

CRÉDITOS A RECEBER						
	Quantia Nominal		Imparidade		Valor Líquido	
	2024	2023	2024	2023	2024	2023
Clientes Correntes	1.316,90	9.806,06			1.316,90	9.806,06
Clientes Cob. Duvidosa						
Totais	1.316,90	9.806,06	0.00	0,00	1.316,90	9.806,06

	OUTROS ATIVOS CORRENTES	
	2024	2023
Fornecedores (Saldos contrários)	1.330,50	
Adiant. e outras operações c/ pessoal		
Adiant. A fornecedores de investimentos		
Devedores por acréscimo de rendimentos		
Juros a receber		
Subsídios a receber		
Outros acréscimos de rendimentos	117.434,90	81.967,68
Outros devedores	2.781.453,53	2.905.357,96
Totais	2.900.218,93	2.987.325,64

	ESTADO E OUTROS ENTES PÚBLICOS	
	2024	2023
Finanças	5.145,11	22.339,80
Segurança Social e Fundo de Compensação	27.691,88	25.689,11
Totais	32.836,99	48.028,91
Saldos Devedores		
Retenção Imp. s/ Rendimento		
Iva Restituição	20.038,14	5.035,54
Iva a recuperar		
Restantes impostos		
Totais	20.038,14	5.035,54
Saldos Credores		
Corrente		
Retenção Imp. s/ Rendimento	15.147,50	16.105,00
Iva a pagar	10.035,75	11.270,34
Contribuições seg. social	27.691,88	25.689,11
Outras Tributações (Fundo de Compensação)		
Totais	52.875,13	53.064,45

	DIFERIMENTOS	
	2024	2023
Gastos a reconhecer		
Seguros	2.437,38	404,23
Outros gastos diferidos	7.966,88	2.680,72
Totais	10.404,26	3.084,95
Rendimentos a reconhecer		
Subsídios	2.826.771,37	3.497.786,21
Outros rendimentos	970,73	978,47
Totais	2.827.742,10	3.498.764,68

	OUTROS PASSIVOS CORRENTES	
	2024	2023
Não correntes		
Clientes (saldos contrários)		
Pessoal		
Fornecedores de investimentos		
Totais	0,00	0,00
Correntes		
Clientes (saldos contrários)		
Pessoal		
Fornecedores de investimentos	24.310,05	32.580,24
Credores por acréscimos de gastos		
Remunerações a pagar	201.336.79	186.402,94
Outros acréscimos de gastos	230,51	1.782,51
Outros Credores	256.807,15	311.420,88
Totais	482.684,50	532.186,57

	FORNECEDORES	
	2024	2023
Fornecedores, conta corrente	7.695,69	3.761,22
Fornecedores, títulos a pagar		
Fornecedores, faturas em rec. conf.		
Totais	7.695,69	3.761,22

MOVIMENTOS NAS RUBRICAS DE FUNDOS PATRIMONIAIS				
	Saldo Inicial	Aumentos	Reduções	Saldo Final
Fundos				
Reservas				
Resultados transitados	1.092.400,94		13.186,93	1.079.214,01
Excedentes de revalorização				
Outras variações nos fundos patrimoniais	38.993,07	59.522,81	38.002,69	60.513,19
Resultado liquido do exercício	-13.186,93	72.090,20	-13.186,93	72.090,20
Totais	1.118.207,08	131.613,01	38.002,69	1.211.817,40

9. RÉDITO

Em 31 de dezembro de 2024 e em 31 de dezembro de 2023 os réditos apresentavam a seguinte composição:

Quantias dos réditos reconhecidas no período	2024	2023
	Réditos reconhecidos no período	Réditos reconhecidos no período
Venda de bens	14,82	6.83
Prestação de serviços	304.340,87	240.574,30
Juros	10,15	10,15
Royalties		
Dividendos		
Totais	304.365,84	240.591,28

10. FORNECIMENTOS E SERVIÇOS EXTERNOS

A rubrica de "Fornecimentos e serviços externos" em 31 de dezembro de 2024 e 31 de dezembro de 2023 é detalhada conforme se segue:

Fornecimentos e Serviços Externos	2024	2023
Subcontratos	3.900,00	3.150,00
Serviços Especializados:	**44.611,92**	**38.086,44**
Trabalhos Especializados	13.284,00	16.886,77
Publicidade e propaganda	413,28	619,92
Vigilância e Segurança	510,45	521,83
Honorários	16.290,00	4.800,00
Conservação e Reparação	13.353,76	14.350,73
Outros Serviços Especializados	760,43	907,19
Materiais	**16.452,17**	**35.702,07**
Energia e fluídos	**1.490,41**	**1.533,63**
Deslocações, Estadas e Transportes	**264.540,36**	**202.890,89**
Serviços Diversos:	**56.710,48**	**25.647,23**
Rendas e Alugueres	5.732,69	4.866,00
Comunicação	86,94	68,70
Seguros	2.792,40	3.254,28
Contencioso e notariado	665,56	35,00
Limpeza, higiene e conforto		
Outros Serviços	47.432,89	17.423,25
Totais	387.705,34	307.010,26

11. GASTOS COM O PESSOAL

A rubrica de "Gastos com o pessoal" em 31 de dezembro de 2024 e em 31 de dezembro de 2023 detalha-se da seguinte forma:

Gastos com o Pessoal	2024	2023
Remunerações do Pessoal	1.165.423,88	1.048.772,79
Encargos sobre Remunerações	249.102,07	223.823,17
Seguro de acidentes de trabalho e doenças profissionais	6.126,77	5.567,68
Outros gastos com Pessoal	15.588,91	2.139,40
Totais	1.436.241,63	1.280.303,04

O nº. médio de pessoas ao serviço em 2023 foi de 35 e em 2024 de 37.

12. OUTROS RENDIMENTOS

A composição da rubrica de "Outros rendimentos e ganhos" em 31 de dezembro de 2024 e 31 de dezembro de 2023 é conforme se segue:

Outros Rendimentos	2024	2023
Descontos de pronto pagamento		0,01
Rendimentos e ganhos rest. Activos financeiros		8,15
Rendimentos e ganhos em Inv. não financeiros		
Outros	42.543,19	44.514,74
Totais	42.543,19	44.522,90

13. OUTROS GASTOS

A decomposição da rubrica de "Outros gastos e perdas" em 31 de dezembro de 2024 e em 31 de dezembro de 2023 é conforme se segue:

Outros Gastos	2024	2023
Impostos	58,53	56,57
Perdas em Inventários		
Gastos e Perdas em Investimentos Não Financ.		922,29
Outros	178.233,81	88.992,58
Totais	178.292,34	89.971,44

14. JUROS E OUTROS RENDIMENTOS E GASTOS SIMILARES

Os gastos e perdas de financiamento em 31 de dezembro de 2024 e 31 de dezembro de 2023 são detalhados conforme se segue:

Juros e Rendimentos Similares Obtidos	2024	2023
Juros Depósitos	10,15	10,15
Outros		
Totais	10,15	10,15

Juros e Gastos Similares Suportados	2024	2023
Juros Suportados		13,01
Diferenças de câmbio desfavoráveis		
Outros		
Totais	0,00	13,01

15. OUTRAS INFORMAÇÕES

15.1. Investimentos Financeiros

INVESTIMENTOS FINANCEIROS						
	Quantia Nominal		Imparidade		Valor Liquido	
	2024	2023	2024	2023	2024	2023
Fundo Compensação	15.953,20	15.953,20			15.953,20	15.953,20
Totais	15.953,20	15.953,20	0,00	0,00	15.953,20	15.953,20

15.2 Desagregação dos valores inscritos na rúbrica caixa e depósitos bancários

Caixa, Depósitos e Outros Inst. Financeiros	2024	2023
Caixa	35,00	35,00
Depósitos Bancários	1.477.522,61	2.075.048,52
Total	1.477.557,61	2.075.083,52

16. ACONTECIMENTOS APÓS A DATA DO BALANÇO

Não são conhecidos eventos posteriores a 31 de dezembro de 2024 que possam influenciar a apresentação e interpretação das demonstrações financeiras reportadas a esta data.

17. DATA DE AUTORIZAÇÃO PARA EMISSÃO

As demonstrações financeiras do exercício findo em 31 de dezembro de 2024 foram aprovadas pela Direcção e autorizadas para emissão em 15-04-2025.

Relatório e Parecer do Conselho Fiscal

A versão do relatório e parecer do Conselho Fiscal aprovada em Assembleia Geral é anexada abaixo.

RELATÓRIO E PARECER DO CONSELHO FISCAL

Senhores Associados do Centro de Astrofísica da Universidade do Porto,

Em conformidade com a legislação em vigor e com o mandato que nos foi confiado, vimos submeter à vossa apreciação o nosso Relatório e Parecer que abrange a atividade por nós desenvolvida e os documentos de prestação de contas do CAUP – Centro de Astrofísica da Universidade do Porto, relativos ao exercício findo em 31 de dezembro de 2024, os quais são da responsabilidade da Direção.

Acompanhamos a evolução da atividade do Centro, da sua contabilidade e o cumprimento do normativo legal e estatutário em vigor, tendo recebido da Direção e serviços do CAUP todas as informações e esclarecimentos solicitados.

No âmbito das nossas funções analisamos o Relatório de Gestão da Direção e as contas do exercício findo em 31 de dezembro de 2024, que compreendem o Balanço (que evidencia um total de 4.582.814,82 Euros e um total dos Fundos Patrimoniais de 1.211.817,40 Euros, incluindo um Resultado Líquido do Período positivo de 72.090,20 Euros), a Demonstração dos Resultados por Natureza, a Demonstração das Alterações nos Fundos Patrimoniais, a Demonstração dos Fluxos de Caixa e o respetivo Anexo, composto pelas notas explicativas.

A análise dos documentos acima referidos permite concluir pela boa compreensão da situação financeira do CAUP em 31 de dezembro de 2024, assim como pela satisfação das disposições legais e estatutárias aplicáveis.

Face ao referido, o Conselho Fiscal do CAUP – Centro de Astrofísica da Universidade do Porto, pronuncia-se com o seguinte parecer:

Que seja aprovado o Relatório de Gestão, a proposta nele expressa, bem como as Contas referentes ao ano findo a 31 de dezembro de 2024.

Porto, 17 de abril de 2025

Presidente,

[redacted]

(Dr. Filipe Pires)

Vogal,

[redacted]

(Prof. Jorge F. Gameiro)

Relator,

[redacted]

(Dra. Marlene Rebelo)