

André M. Silva

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Short Bio

I am André Silva, a postdoctoral researcher at the Instituto de Astrofísica e Ciências do Espaço. My research spans instrumentation and exoplanetary science. I am currently working on the PoET solar telescope, leading the development of its observation software. In parallel, I focus on the development of novel algorithms for precise radial velocity extraction and analyze systematic effects that impact such measurements. Over the past three years, I have lectured an advanced course on Python, a Master's-level course on Bayesian statistics, and a PhD-level module on high-resolution spectroscopy.

Education

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| PhD | Faculdade de Ciências , Doctor's Degree in Astronomy | Universidade do Porto |
| • Thesis - A new paradigm for the estimation of precise stellar radial velocities | | |
| MsC | Faculdade de Ciências , Mestrado Integrado em Engenharia Física | Universidade do Porto |
| • Thesis - An expansion to the CHEOPS mission official pipeline. | | |

Awards

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| IAU PhD Prize 2024  | Division B | 2025 |
| • Awarded the PhD Prize 2024 from the International Astronomical Union (IAU) Division B (Facilities, Technologies, and Data Science) for the work developed during my PhD thesis. | | |

Experience

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| Instituto de Astrofísica e Ciências do Espaço , Post-doctoral researcher | CAUP |
| • Development of the observational software for the PoET solar telescope. | |
| Faculdade Ciências da Universidade do Porto , Invited Assistant Professor | Physics department |
| • Invited assistant Professor to teach a PhD-level unit on high-resolution spectroscopy | Nov 2024 – present |
| Faculdade de Ciências da Universidade de Lisboa , Post-doctoral researcher | FCTiencias.ID |
| • Development of software to measure day-time seeing, under the FIERCE ERC project | Aug 2024 – Nov 2024 |
| Faculdade Ciências da Universidade do Porto , Invited assistant | Physics department |
| • Invited assistant for the practical classes of MsC-level unit on Bayesian data analysis. | Feb 2024 – Sept 2024 |
| Instituto de Astrofísica e Ciências do Espaço , PhD fellow | Physics department |
| • FCT funding for the PhD thesis "A new paradigm for the estimation of precise stellar radial velocities" | 2019 – July 2024 |

Talks

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| Physis Week 2025 , Python for data analysis | Sept 2025 |
| ENAA XXXV  , A Quest to Detect a Star Velocity: Radial Velocity Extraction and Associated Challenges | Sept 2025 |
| EPRV6  , A systematic bias in template-based RV extraction algorithms | July 2025 |
| Planets throughout the Habitable Zone  , A systematic bias in template-based RV extraction algorithms | June 2025 |
| PoET workshop 2  , 2 talks: PoET observation software; Observing strategies and their role in the improvement of RV analysis | Nov 2024 |

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| TOI III 🔗 , Approaches for RV extraction – s-BART and the first steps towards a fully Bayesian model | July 2023 |
| EPRV 5 🔗 , Towards a fully Bayesian RV extraction model | Mar 2023 |
| Exoplanets 4 EPRV splinter , sBART application to the ESPRESSO WG1 targets | Feb 2023 |
| ESPRESSO science team meeting , s BART a semi Bayesian implementation of template matching for precise Radial Velocities | May 2022 |

Seminars

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| Astronomical Institute of the Czech Academy of Sciences , Avenues and challenges for radial velocity extraction – s-BART & PoET | Aug 2025 |
| Astronomy department, Uni. of Geneva , Avenues for radial velocity extraction – s-BART & PoET | Jan 2025 |
| ESA research seminar, European Space Agency (Madrid) , Towards an improvement in the characterisation of stellar radial velocities | May 2024 |
| Café com Física 🔗 Departamento de Física da Universidade de Coimbra , The (radial) velocity of stars - detection and characterisation of exoplanets | Mar 2024 |

Supervision

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| Clustering of spectral lines based on their parameters , Co-supervisor | MsC thesis Feb 2026 – present |
| Improved modelling of CCF profiles for activity-insensitive radial-velocity extraction , Supervisor | Undergraduate project Feb 2026 – present |
| Measuring Zeeman Broadening in Stellar Spectra , Co-supervisor | Undergraduate project July 2026 – present |
| Transforming H-alpha images of the Sun in astronomical seeing for the PoET solar telescope , Supervisor | Undergraduate project Feb 2025 – July 2025 |
| Looking at the Sun, finding other Earths - Identification of Solar Regions , Co-supervisor | MsC thesis Oct 22 - Nov 23 |
| Development of a GUI interface for the exploitation of data from the s-BART pipeline , Co-supervisor | Undergraduate project Feb 2024 – July 2024 |
| Solar-to-sky coordinate conversion for PoET operations , Co-supervisor | Undergraduate project Feb 2024 – July 2024 |
| Exoplanet detection through a new model for the correction of instrumental effects , Co-supervisor | Undergraduate project Feb 2024 – July 2024 |
| Development of a tool for the normalization of stellar spectra - application to ESPRESSO data , Co-supervisor of BII project with ref CIAAUP-03/2023-BII 🔗 | Funded project Feb 2024 – July 2024 |
| A new activity proxy for finding other Earths , Co-supervisor | Bachelors project Nov 2022 – Feb 2023 |
| An analysis of the performance of CHEOPS mission pipelines - the DRP and archi , Co-supervisor | Bachelors project Feb 2020 – June 2020 |

First Author Publications

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| ASTRA: A Python Package for Cross-Instrument Stellar and Telluric Template Construction André M. Silva et al; (JOSS, 10.21105/joss.09413 🔗) | 2026 |
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| A systematic bias in template-based radial velocity extraction algorithms | 2025 |
| André M. Silva et al; (A&A, 10.1051/0004-6361/202554955  | |
| A novel framework for semi-Bayesian radial velocities through template matching | 2022 |
| André M. Silva et al; (A&A, 10.1051/0004-6361/202142262  | |
| archi: pipeline for light curve extraction of CHEOPS background stars | 2020 |
| André M. Silva et al; (Monthly Notices of the Royal Astronomical Society, 10.1093/mnras/staa1443  | |

Co-authored Publications

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| Gas-depleted planet formation occurred in the four-planet system around the red dwarf LHS 1903 | 2026 |
| Wilson et al; (Science, 10.1126/science.adl2348  | |
| A comprehensive study on radial velocity signals using ESPRESSO: Pushing precision to the 10 cm/s level | 2025 |
| Figueira et al; (A&A, 10.1051/0004-6361/202553869  | |
| TOI-2322: Two transiting rocky planets close to the stellar rotation period and its first harmonic | 2025 |
| Hobson et al; (A&A, 10.1051/0004-6361/202555614  | |
| Synthesizing Sun-as-a-star flare spectra from high-resolution solar observations | 2025 |
| De Wilde et al; (A&A, 10.1051/0004-6361/202554870  | |
| Two neighbours of the ultra-short-period Earth-sized planet K2-157 b in the warm Neptunian savanna | 2025 |
| Castro-González et al; (A&A, 10.1051/0004-6361/202554736  | |
| PoET: the Paranal solar ESPRESSO Telescope | 2025 |
| Santos et al; (Published in The Messenger vol. 194, 10.18727/0722-6691/5381  | |
| TOI-512: Super-Earth transiting a K-type star discovered by TESS and ESPRESSO | 2025 |
| Rodrigues et al; (A&A, 10.1051/0004-6361/202452887  | |
| TESS and HARPS-N unveil two planets transiting TOI-1453: A super-Earth and one of the lowest mass sub-Neptunes | 2025 |
| Stalport et al; (A&A, 10.1051/0004-6361/202452969  | |
| A Planet Candidate Orbiting near the Hot Jupiter TOI-2818 b Inferred through Transit Timing | 2025 |
| McKee et al; (ApJ, 10.3847/1538-4357/adac63  | |
| Revisiting the multi-planetary system of the nearby star HD 20794: Confirmation of a low-mass planet in the habitable zone of a nearby G-dwarf | 2025 |
| Nari et al; (A&A, 10.1051/0004-6361/202451769  | |
| A sub-Earth-mass planet orbiting Barnard's star: No evidence of transits in TESS photometry | 2025 |
| Stefanov et al; (A&A, 10.1051/0004-6361/202452450  | |
| KOBE-1: The first planetary system from the KOBE survey: Two planets likely residing in the sub-Neptune mass regime around a late K-dwarf | 2025 |
| Balsalobre-Ruza et al; (A&A, 10.1051/0004-6361/202452631  | |
| Detecting and characterising exoplanets with HARPS-N | 2024 |
| Rice et al; (Proc. IAU, 10.1017/S1743921324001741  | |
| Characterization of K2-167 b and CALM, a new stellar activity mitigation method | 2024 |
| De Beurs et al; (Monthly Notices of the Royal Astronomical Society, 10.1093/mnras/stae207  | |

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| Expanding the frontiers of cool-dwarf asteroseismology with ESPRESSO: Detection of solar-like oscillations in the K5 dwarf ϵ Indi | 2024 |
| Campante et al; (A&A, 10.1051/0004-6361/202449197  | |
| TESS and ESPRESSO discover a super-Earth and a mini-Neptune orbiting the K-dwarf TOI-238 | 2024 |
| Suárez Mascareño et al; (A&A, 10.1051/0004-6361/202348958  | |
| Confronting compositional confusion through the characterisation of the sub-Neptune orbiting HD 77946 | 2024 |
| Palethorpe et al; (Monthly Notices of the Royal Astronomical Society, 10.1093/mnras/stae707  | |
| The compact multi-planet system GJ 9827 revisited with ESPRESSO | 2024 |
| Passegger et al; (A&A, 10.1051/0004-6361/202348592  | |
| Implementation of a seeing measurement device for the PoET solar telescope | 2024 |
| Wehbé et al; (Proc. SPIE, 10.1117/12.3017481  | |
| PoET, the Paranal solar ESPRESSO Telescope: a spatially resolved Sun in a high resolution spectrograph | 2024 |
| Leite et al; (Proc. SPIE, 10.1117/12.3016776  | |
| ESPRESSO reveals blueshifted neutral iron emission lines on the dayside of WASP-76 b | 2024 |
| Costa Silva et al; (A&A, 10.1051/0004-6361/202449935  | |
| A sub-Earth-mass planet orbiting Barnard's star | 2024 |
| González Hernández et al; (A&A, 10.1051/0004-6361/202451311  | |
| Two temperate Earth-mass planets orbiting the nearby star GJ1002 | 2023 |
| Mascareño et al; (A&A, 10.1051/0004-6361/202244991  | |
| An unusually low-density super-Earth transiting the bright early-type M-dwarf GJ 1018 (TOI-244) | 2023 |
| Castro-González et al; (A&A, 10.1051/0004-6361/202346550  | |
| KOBESim: A Bayesian observing strategy algorithm for planet detection in radial velocity blind-search surveys | 2023 |
| Balsalobre-Ruza et al; (A&A, 10.1051/0004-6361/202243938  | |
| Automatic model-based telluric correction for the ESPRESSO data reduction software: Model description and application to radial velocity computation | 2022 |
| Allart et al; (A&A, 10.1051/0004-6361/202243629  | |
| A candidate short-period sub-Earth orbiting Proxima Centauri | 2022 |
| Faria et al; (A&A, 10.1051/0004-6361/202142337  | |
| The KOBE experiment: K-dwarfs Orbited By habitable Exoplanets: Project goals, target selection, and stellar characterization | 2022 |
| Lillo-Box et al; (A&A, 10.1051/0004-6361/202243898  | |
| HD22496b: the first ESPRESSO standalone planet discovery | 2021 |
| Lillo-Box et al; (A&A, 10.1051/0004-6361/202141714  | |

Posters

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| The Paranal solar ESPRESSO Telescope - towards a resolved view of the Sun | 2024 |
| André M. Silva et al, Leiden, Exoplanets 5 | |
| A fully-Bayesian model for RV extraction | 2024 |
| André M. Silva et al, Leiden, Exoplanets 5 | |

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| Navigating Through a Sea of Activity – A Portuguese Solar Telescope | 2024 |
| André M. Silva et al, Lisbon, ENAA XXXV | |
| A Bayesian template matching approach applied to HARPS : towards the improvement of the RV precision | 2021 |
| André M. Silva et al, Online, European Astronomical Society Annual meeting 2021 | |
| A semi-Bayesian implementation of template matching for precise Radial Velocities | 2021 |
| André M. Silva et al, Online, Statistical challenges in Modern astronomy VII | |
| A semi-Bayesian implementation of template matching for precise Radial Velocities | 2021 |
| André M. Silva et al, Online, Encontro Ciência 21 | |
| ARCHI: pipeline for light curve extraction of CHEOPS background stars | 2020 |
| André M. Silva et al, Online, Europlanet Science Congress 2020 | |
| A Bayesian approach to precise Radial Velocities | 2020 |
| André M. Silva et al, Online, 30th Encontro Nacional de Astronomia e Astrofísica | |

Grants

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| Post-doctoral fellowship | Aug-Nov 2024 |
| Software development for the PoET telescope, funded by the FIERCE ERC project, grant number 101052347, Faculdade de Ciências da Universidade de Lisboa | |
| PhD fellowship, Fundação para a Ciéncia e Tecnologia (FCT) | 2021-2024 |
| "A new paradigm for the estimation of precise stellar radial velocities - towards the development of an innovative data analysis software", Ref. 2020.05387.BD | |
| FLAD grant | 2023 |
| Fund travel to the EPRV V conference in Santa Bárbara, California, PAPERS 4 USA, Ref. 2023/052 | |
| Research fellowship | Nov-Dec 2019 |
| field of Planetary Systems at Instituto de Astrofísica e Ciências do Espaço, Ref. IA2019-17-BIM | |
| Scientific Initiation Studenship | Apr-Sep 2019 |
| field of Computacional Astrophysics at Instituto de Astrofísica e Ciências do Espaço, Ref. IA2019-04-BIC | |

Skills

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| Programming: Proficient with Python and Git; Familiar with code optimization to large datasets through numpy operations and Cython development |
| Data manipulation: Proficient with numpy and pandas for the manipulation of large datasets, coupled with matplotlib for data visualization |
| Data Analysis: Analysis of complex datasets using classical statistics (scipy) and Bayesian models (emcee, tinyGP) |
| Languages: English (fluent), Portuguese (native) |

Organization

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| Coordinator of internal working group focused on modelling time-series for exo-planet detection and characterisation | 2025 - now |
| Organizer of the scientific seminars of CAUP | September 2025 - now |
| Co-organizer of PoET's Working Group 1 - Radial velocities | 2025 - now |
| Coordinator and lecturer of advanced course "Python for astronomers" | 2021 - now |
| SoC of Dias da Física 2025 | 2025 |
| Part of the Local Organization committee of EPRV6 | 2025 |

Refereed

Main referee of the MsC thesis of Telmo Monteiro, in FCUP

2025

Refereed 1 manuscript for A&A

Outreach

Ignite sessions; ‘Torres Vedras ↗ Ílhavo ↗ Armamar’

2023-2024

Outreach talks to highschool students: Espaço vai à Escola - Descoberta de outra Terra - deteção de planetas fora do sistema solar

2022-2025

2022 (3 talks); 2023 (5 online; 5 in-person); 2024 (6 online; 4 in-person); 2025 (6 in-person; 17 online)