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

PhD **Faculdade de Ciências**, Doctor's Degree in Astronomy — Universidade do Porto, 2019 – 2024
- Thesis - A new paradigm for the estimation of precise stellar radial velocities

MsC **Faculdade de Ciências**, Mestrado Integrado em Engenharia Física — Universidade do Porto, 2014 – 2019
- Thesis - An expansion to the CHEOPS mission official pipeline.

Awards

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

Instituto de Astrofísica e Ciências do Espaço, Post-doctoral researcher — CAUP, Nov 2024 – present
- Development of the observational software for the PoET solar telescope.

Faculdade Ciências da Universidade do Porto, Invited Assistant Professor — Physics department, Nov 2024 – present
- Invited assistant Professor to teach a PhD-level unit on high-resolution spectroscopy

Faculdade de Ciências da Universidade de Lisboa, Post-doctoral researcher — FCiências.ID, Aug 2024 – Nov 2024
- Development of software to measure day-time seeing, under the FIERCE ERC project

Faculdade Ciências da Universidade do Porto, Invited assistant — Physics department, Feb 2024 – Sept 2024
- Invited assistant for the practical classes of MsC-level unit on Bayesian data analysis.

Instituto de Astrofísica e Ciências do Espaço, PhD fellow — Physics department, 2019 – July 2024
- FCT funding for the PhD thesis "A new paradigm for the estimation of precise stellar radial velocities"

Talks

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

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

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 Fisica da Universidade de Coimbra**, The (radial) velocity of stars - detection and characterisation of exoplanets — Mar 2024

Supervision

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

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

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)

TOI-2322: two transiting rocky planets close to the stellar rotation period and its first harmonic 2025
Hobson et al; (Astronomy & Astrophysics, 10.48550/ARXIV.2508.18094)

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)

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)

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

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

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

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 Ciência 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

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

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)