
12th Iberian Meeting on Asteroseismology
23–26 November 2025 · Luso · Portugal
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ia instituto de astrofísica e ciências do espaço
Centro de Astrofísica da Universidade do Porto
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COFINANCING
FCT Fundação para a Ciência e a Tecnologia

	23 Nov. (Sunday)	24 November (Monday)	25 November (Tuesday)	26 November (Wednesday)
9:00 - 9:15		Ângela Santos: Welcome	Hands-on	Hands-on
9:15 - 9:32		Anthony Noll: ICE		
9:32 - 9:49		Andy Moya: UV		
9:49 - 10:06		Javier Pascual: IAA		
10:06 - 10:23		Diego Godoy-Rivera: IAC		
10:23 - 10:40		Tiago Campante: IA		
10:40 - 11:00		Coffee Break	Juan Carlos Suaréz: UG	
11:00 - 11:30		Pedro Días	Coffee Break	Coffee Break
11:30 - 11:50		Juliana Henriques Amaral	Hands-on	Hands-on
11:50 - 12:10		Carlos C. Camino Mesa		
12:10 - 12:30		XIAOYA SUN		
12:30 - 12:50		Inês Martins Rolo		
13:00 - 14:30		Lunch	Lunch	Lunch
14:30 - 16:15		HO1: Rúben Costa	Hands-on	Antonio García Hernández: Funding
				Ângela Santos: Concluding remarks
				Hands-on
16:15 - 16:45		Coffee Break	Coffee Break	Coffee Break
16:45 - 18:30		HO2: Ricardo Vaca	Hands-on	Hands-on
19:30 - 21:00	Dinner	Dinner	Dinner	Dinner

Early-Career Talks

Title: Seismic Masses, Radii, Surface Gravities and Ages of Oscillating Solar-Type Stars

Author: Pedro Diaz
Affiliation: Institute of Space Sciences

Co-authors: Aldo Serenelli (1, 2)
Co-authors' affiliation: (1) Institute of Space Sciences (ICE-CSIC); (2) Institut d'Estudis Espacials de Catalunya (IEEC)

Abstract: In this work, we present a catalog of seismic masses, radii, surface gravities, and ages of 765 Kepler main sequence and subgiant stars derived using seismic data included in the homogeneous catalog of oscillating solar-type stars, produced by Sayeed et al. (2025) by re–analyzing all available Kepler DR25 short–cadence data using pySYD. We started by completing the missing asteroseismic data in the homogeneous catalog through empirical relations between $\nu_{{max}}$ and $\Delta \nu$. The seismic parameters were then complemented with spectroscopic measurements of effective temperature, metallicity ([Fe/H]), and the abundance ratios of the main alpha-elements, i.e. O, Mg, Si, S, Ca, and Ti. To fully account for the effects of chemical composition on stellar properties, we determined the best-fit [alpha/Fe] for each star. Determinations of masses, radii, surface gravities, and ages have been carried by means of stellar grid-based modeling and Bayesian inference. We provide stellar properties determined using seismic data in combination to spectroscopic data. We present comparisons with stellar quantities in the asteroseismic catalog with measurements computed in previous works.

Title: Shedding Light on the Complexities of Stellar Rotation

Author: Juliana Henriques Amaral
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Abstract: Magnetic activity, driven by differential rotation, plays a key role in stellar evolution and exoplanetary environments. Average stellar rotation periods are typically inferred from light curves modulated by starspots, but disentangling contributions from spots at different latitudes remains challenging. This work refines the use of peak-height ratios to constrain differential rotation, enhancing our understanding of stellar magnetism. Using numerical simulations, we model starspot evolution to generate synthetic light curves and periodograms, starting with simple one-spot cases and progressively adding complexity before applying the method to real stellar data. The peak-height ratios technique, compares the amplitudes of the first and second rotation harmonics to infer both the sign and strength of differential rotation. Our results show that while spot area variations have minimal impact on peak-height ratios in one-spot simulations, their influence becomes more pronounced in two-spot configurations. The method remains robust in recovering spot latitudes and differential rotation profiles under controlled conditions, but its accuracy decreases in more complex scenarios due to signal blending and visibility effects. Despite these limitations, the peak-height ratios method successfully recovers meaningful differential rotation parameters from both synthetic and real Kepler light curves, demonstrating its potential as a valuable tool for probing stellar rotation.

Title: A-F Type Stars Catalogue in PLATO first field of view: LOPS2

Author: Carlos C. Camino Mesa
Affiliation: Universidad de Granada

Co-authors: García Hernández, A. (1), Suárez Yanes, J.C. (1) and Mirouh, G. M. (1)
Co-authors' affiliation: (1) Universidad de Granada

Abstract: In this presentation, I will introduce the first catalogue of intermediate-mass (A–F type) stars that will be observable by the PLATO mission during its first long pointing, located in the LOPS2 region. The catalogue currently contains more than 250,000 objects, for which TESS light curves are available for download and analysis. This work aims to provide a comprehensive database that compiles stellar parameters derived from both TESS Input Catalogue (TIC) and Gaia DR3, offering a homogeneous and updated view of the stellar content in the field. Additionally, the catalogue includes a census of known open clusters within LOPS2, together with their corresponding member stars, enabling population studies and comparisons across stellar environments. A key feature of this catalogue is the incorporation of pulsation frequencies extracted from the available TESS light curves, allowing users to classify targets according to their variability type and to perform large-scale asteroseismic analyses. This resource will therefore serve as a preparatory step for the upcoming PLATO observations, facilitating target selection and early scientific exploitation of the mission's data. Although still under active development, the catalogue already represents a major step forward in the characterisation of PLATO's first observation field and provides the community with an essential tool for advancing the study of intermediate-mass pulsators and their stellar populations.

Title: Unveiling Rotational Effects in the Pulsations of the δ Scuti Star V1790 Ori: The Roles of Resolution, Rotational correction and Non-adiabatic Effects

Author: XIAOYA SUN
Affiliation: Xi'an Jiaotong University & University of Granada

Co-authors: Antonio García Hernández (1) Zhaoyu Zuo (2)
Co-authors' affiliation: (1) Universidad de Granada; (2) Xi'an Jiaotong University

Abstract: This work aims to investigate the effects of rotation on the pulsation modes of the δ Scuti star V1790 Ori by calculating stellar evolution models and theoretical pulsation frequencies, focusing on spatial resolution, rotational correction, and non-nadiabatic effect. We analyzed the pulsation behavior of V1790 Ori using MultiModes. Based on these pulsation information, we applied different techniques (the Fourier transform, the autocorrelation function, and the histogram of frequency differences) to determine its large frequency separation Δν, which will be used to select models in subsequent analysis. We computed rotating MESA (Modules for Experiments in Stellar Astrophysics) models at different spatial resolutions and used GYRE to calculate both adiabatic and nonadiabatic pulsation frequencies. Since GYRE applies first-order rotational correction, we also used FILOU—which includes up to second-order rotational correction—to further investigate the impact of rotation on the pulsation modes.

Title: A comparative magnetic field analysis of pulsating and non-pulsating Ap stars

Author: Inês Martins Rolo
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Abstract: Chemically peculiar A-type (Ap) stars are known for their strong magnetic fields, but only a small fraction (~5.5%) exhibit pulsations. To date, the reason for this is poorly understood. In this work we construct, for the first time, consistent samples of non-pulsating Ap (noAp) and pulsating Ap (roAp) stars. We homogeneously derive several seismic and non-seismic parameters for both samples to investigate whether there are systematic physical differences between them. Among the parameters we investigate for both samples is the magnetic field, which is known to play a key role in the excitation of pulsations in Ap stars. We then numerically constrain the dipolar magnetic field strength (Bd) using two observable magnetic quantities: the mean longitudinal field and the mean magnetic field modulus. Our method improves upon existing techniques by providing tighter constraints on Bd even with limited data. Our results indicate that roAp stars showing high radial orders and pulsation frequencies above the acoustic cut-off frequency tend to possess lower dipolar field strengths. This supports theoretical predictions suggesting that such high-frequency oscillations may be excited by turbulent pressure rather than the classical opacity mechanism. This finding puts us one step closer to understanding the physical conditions that govern pulsation excitation in Ap stars.

Hands-on Projects

Title: Studying the impact of modifying the opacity profile on the modelling of main-sequence stars

Author: Rúben António Ribeiro Costa
Affiliation: Instituto de Astrofísica e Ciências do Espaço

Co-authors: Tiago Campante (1); Mário João Monteiro (1); Morgan Deal (2)
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Abstract: Stellar evolution models must take into account all of the different processes and interactions that are present in stars, in order to properly model them. In this hands-on project we will focus on one of these components, opacity, and the impact that it has on stellar structure and global parameters. Concentrating on the effect of increasing the opacity in low-mass stars. We will provide files for stellar models with normal and modified opacity profiles, along with a notebook containing the code to read them. The goal of the project will be for people to analyse the models and understand what are the differences between the ones with normal and increased opacity. The models that we will provide are examples of best fitting models for real K-type stars, such as Epsilon Indi and Alpha Centauri B. This project is related to an upcoming article we intend to release on the subject of the radius discrepancy in K dwarfs between models and interferometry, where we are studying the hypothesis of an increase in opacity being able to mitigate this discrepancy.

Title: Parsing Galactic Populations Using Advanced Machine Learning Techniques

Author: Ricardo Vaca
Affiliation: FCUP & CAUP

Co-authors: Tiago Campante (1); Andreas W. Neitzel (1)
Co-authors' affiliation: (1) Instituto de Astrofísica e Ciências do Espaço, Universidade do Porto, CAUP

Abstract: Understanding the Milky Way's formation requires disentangling its overlapping stellar populations, a task that becomes increasingly complex with the vast multidimensional data from Gaia and cosmological simulations. In this hands-on session, we will explore how manifold learning, such as UMAP, and clustering algorithms, like HDBSCAN, can reveal the structure of stellar populations in synthetic Gaia DR3-like datasets derived from the FIRE-2 simulations. Participants will interact with precomputed HDBSCAN embeddings through an intuitive visualization interface, examining how different regions correspond to physical Galactic components such as the thin disk, thick disk, or accreted halo. By comparing embeddings generated with varying hyperparameters, attendees will assess which configurations yield the most physically meaningful separations. The goal is to collect expert input on the interpretation of these representations, identify potential pitfalls, and discuss how such AI-driven tools can be integrated into future analyses of large stellar surveys.