

**Título/Title:**

Exploring new wavelength domains: abundances from new spectral regions covered by the ESPRESSO spectrograph

**Orientador/Supervisor:**

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**Descrição/Description:**

The Institute of Astrophysics and Space Sciences is deeply involved in the scientific exploitation of a new high resolution spectrograph for the ESO VLT telescopes. This spectrograph, named ESPRESSO, was specifically designed to allow for the detection and characterization of rocky planets orbiting other stars. ESPRESSO will start science operations in 2018 (first light 27 November 2017), providing high resolution spectra of solar-type stars.

In order to precisely characterize the planets, one fundamental step is our capacity to characterize the stars. In particular, the high quality spectra obtained with ESPRESSO will allow to derive precise atmospheric parameters (such as temperature, surface gravity) for the stellar hosts, as well as chemical abundances for a large range of chemical elements. In this context, ESPRESSO has, when compared to his predecessors, the ability to observe in a wider spectral range. However, this spectral range is not yet characterized in detail. The proposed project has the goal of approaching that problem.

The student is expected to work on the following tasks:

- 1) Use atomic line list databases (e.g. VALD) to compile lines from all metals (FeI, FeII, Mg, Si, Ni, ...) in the spectral region between ~6800 and 7800 Angstrom, the spectral region where ESPRESSO adds with respect to previous spectrographs;
- 2) Visually select the best spectral lines for stellar parameter and chemical abundance studies;
- 3) Calibrate the lines using a solar spectrum;
- 4) If time allows, the student will then use newly obtained ESPRESSO spectra to evaluate how stellar parameters and chemical abundances are improved when these new lines are used.

This work will allow the student to understand the basic concepts and methods of high resolution spectroscopy and stellar characterization. Furthermore, it will give the student the possibility to have contact with extreme quality spectra from the brand new ESPRESSO spectrograph, and be involved in the exploration of a new wavelength domain for stellar characterization.

Depending on the outcome of the project, the student may be involved (as co-author) in one scientific paper.