

Título/Title:

Asymmetric radial velocities for the detection of exoplanets

Area:

Exoplanets

Orientador/Supervisor:

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Local do Estágio/Host Place:

IA-Porto (Faculdade de Ciências da Universidade do Porto).

Descrição/Description:

On the quest for an Earth-like exoplanet, one big obstacle is the host star itself: active regions on the stellar surface can produce similar effects to those of planets, making it harder to observationally disentangle the two signals. With the radial-velocity technique, we measure the stellar spectrum and how it changes due to the presence of the planet. The only clear difference between signals coming from stellar activity and planets is that stellar activity *deforms* the spectral lines while a planet only *shifts* them in wavelength.

This project aims at finding new ways to measure those deformations of the spectral lines, with the ultimate goal of discovering new diagnostics for stellar activity. To do this, the student will focus on the cross-correlation function (CCF), which represents an average spectral line, and will test different asymmetric functions to fit observed CCFs of active stars. Using data from the HARPS and ESPRESSO spectrographs, this analysis will help develop new corrections for stellar activity, which can open the door for the detection of low-mass planets.

Some bibliography:

Measuring precise radial velocities and cross-correlation function line-profile variations using a Skew Normal density, Simola et al. 2018, <https://arxiv.org/abs/1811.12718>

Requisitos/Requirements:

The project does not require prior knowledge of astronomy and/or exoplanets. The candidate is expected to have basic knowledge of numerical methods and computer programming (with preference for the Python language).