

Available PhD position on solar and stellar variability at LPC2E et the University of Orléans, France. Deadline for application : 24 April 2015.

Solar and stellar variability: analysis of photospheric and chromospheric activities

Many stars, including the Sun, are characterized by a strong magnetic activity that generates different types of phenomenon –from eruptions to the variation of their total and ultraviolet radiative output in particular- and can influence the conditions for life emergence and stability as well as impact the technology infrastructures on Earth. Stellar activity can also hide or biases the detection and characterization of exoplanets.

Stellar activity manifests itself by the apparition and evolution of magnetic structures (called fluxtube) that have different brightness than their surrounding and cause the variations the stellar radiative flux. The contrast of the magnetic structures varies with the considered layer of the stellar atmosphere (and therefore with wavelengths), the intensity of the magnetic field, and the position of the structure on the stellar disk. These structures are usually identified as spots (dark), faculae (bright), and plages or active regions in the chromosphere. The later in particular radiate ultraviolet light that is important for the chemistry of planetary atmosphere.

The research project consists first in investigating the link between the solar photospheric and chromospheric variabilities by analyzing the data from the NASA SDO mission. These data provide information on the magnetic field in the photosphere as well as the brightness of the magnetic structure in the photosphere and the chromosphere. The student will investigate the contrast of different features and their dependence on several parameters (position, solar activity, wavelengths, ...); the contributions of these various structures to the changes of the solar irradiance will be investigated as well. The student will benefit from the work that has already been done in our group with these data and our expertise on solar irradiance variability. In a second part of the thesis, the student will focus on stellar activity. Different approach can be considered. A first possibility is to rely on the results previously obtained to study to what extent the relationships found in the solar case can -or not- be extrapolated to other stars, taking into account different physical parameters. Another possibility consists in studying the correlations of different indices of stellar activity using SOPHIE and HARPS data.

The thesis will take place at Laboratory of Physics and Chemistry of the Environment and Space (LPC2E) within the "space plasmas" team that studies the solar-terrestrial relationships, and will be in collaboration with the FOST team of the Institute of Planetology and Astrophysics of Grenoble (IPAG), which works on stellar activity and the detection of exoplanets. The student will be required to travel to Grenoble and abroad to go to workshops and present his findings at conferences. Orléans is a medium size city located one hour south of Paris in the Loire Valley. The starting date is October 2015. The net monthly salary, including health insurance, is about 1400 euros monthly net without teaching and 1650 euros with teaching (nb: teaching must be done in french).

Candidates are required to have a Master's degree in Physics or an equivalent degree. A

specialization in astrophysics would help but is not strictly required. Previous experience with data analysis and programming in IDL/MATLAB is a plus. Good communication skills in written and spoken English are necessary.

Interested applicants must send a detailed CV and a letter summarizing their background and motivation for the subject to matthieu.kretzschmar_at_cnrs-orleans.fr no later than April 24, 2015. Successful applicants will be interviewed by the graduate school of Orléans on May 19, 2015.