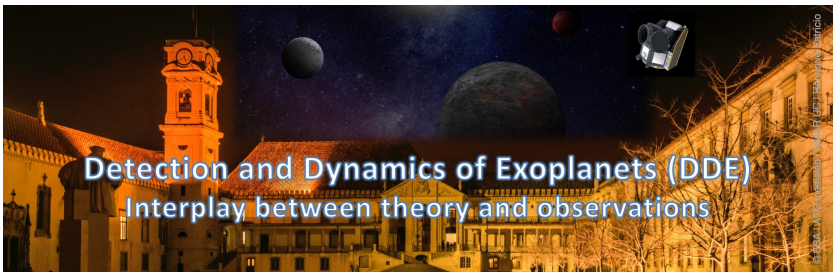

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Exoplanets: Transits and Habitability

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The search for life outside the Earth is one of the most ancient ambitions in humanity. Scientific and technological advances conduct the possibility to expect habitable environments even outside the Solar System, on exoplanets. The Habitable Zone (HZ) is a function of stellar parameters and represents the area surrounding a star where the surface temperature at a planet with an atmosphere is favourable to the existence of liquid water (H2O). This classic, planetary or radiative HZ contemplates inner and outer borders with temperatures of 100 and 0 ℃, respectively. The definition of habitability in the Universe is biased towards terrestrial life, for which is paramount the presence of H2O as a solvent in chemical reactions between organic molecules, formed predominantly by carbon. In spite of that, the real limits for cosmic life are unknown; factors including geological phenomena, presence of an atmosphere and magnetic field on the planet and characteristics of the central star must influence it, besides the orbital dynamics of the planetary system. Particularly, the observation of transits is a significant method for exoplanet analysis, consisting in the passage of the planet in front of the stellar disk, diminishing the total flux observed from the star. These events estimate parameters such as the ratio of radius of the planet and its host star as well as the transit mid-time. We observed some transits in continuous photometry with SPARC4 (Simultaneous Polarimeter and Rapid Camera in 4 bands) in g, r, i and z bands of SDSS (Sloan Digital Sky Survey) at the 1.6m telescope in Pico dos Dias Observatory, Brazil. The priority objects were rocky planets in systems of red dwarf stars, of spectral types K and M, in order to investigate their potential habitability, along with gas giants to complete the granted nights. Therefore, differential photometry in Python scripts is applied to analyze the transits and the depth variation related with distinct wavelengths due to chemical species in the planetary atmosphere.

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