**Title: Characterisation of the atmosphere of WASP-76b using SPIRou**

**Auteurs: Thea Hood, Florian Debras, Baptiste Klein, Claire Moutou**

With every new instrument that allows us to observe exoplanetary atmospheres, our knowledge about exoplanets both grows and deepens. At last in orbit, the James Webb Space Telescope (JWST) has great potential to revolutionise research into atmospheric structures, and coupling it with ground-based observations would optimise this opportunity. The near-infrared spectropolarimeter SPIRou located at the Canada-France-Hawaii Telescope (CFHT) is one of if not the best for atmospheric characterisation from the ground, due to its properties and location. It observed the exoplanet WASP-76b as part of the ATMOSPHERIX project, dedicated to the characterisation of exoplanetary atmospheres and uniting a consortium of french specialists in related fields. The motivation behind these observations is a reported and confirmed asymmetry in the limbs of the atmosphere of this ultra hot Jupiter, detected through observations in the visible (Ehrenreich et al. 2020, Kesseli et Snellen 2021). This has led to extensive theoretical and observational work around this planet to understand its peculiarity. In acquiring infrared data of this atmosphere, different pressure layers are expected to be probed, which could reveal a different temperature and dynamical profile of the atmosphere. In this talk, I will detail my study of the characterisation of the atmosphere of WASP-76b from SPIRou infrared data. I used a combination of simulated atmospheric models and statistical methods to analyse the data acquired by SPIRou for WASP-76b, reduced so as to maximise the atmospheric signal. This led to the first detection of $H_2O$ and CO at the expected theoretical Doppler shift due to the planet orbital motion, opening a new window into the understanding of the circulation and composition of WASP-76b. Coupling visible and infrared observation, at high and low spectral resolution with the complementarity between ground-based instruments and JWST, is an exciting possibility to better understand the physics and chemistry of ultra-hot planetary atmospheres.