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The hydrodynamic atmospheric escape of 5 gas giant exoplanets with He absorption signal

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Abstract

Many detected planets experience hydrodynamic atmospheric escape during some stage of their life. Most of those exoplanets are hot Jupiters and sub-Neptunes orbiting close to their stars. Traditionally, the escape in these evaporating planets has been studied by Lyman-α line absorption measurements taken by instruments from space. Very recently, a new window into atmospheric escape has been opened by using high-spectral resolution measurements of the He I triplet line at 10830 Å from the ground. In our Group we are carrying out a systematic study of the escape in the gas giant evaporating planet by analyzing their observed He triplet absorptions, having been studied so far seven exoplanets. Here, we expand that sample with the He triplet analysis in the planets TOI 1268 b, TOI 2018 b, HAT-P-11 b, HAT-P-67 b and HD 235088 b for which this absorption has been recently detected. We analyze these observations using a 1D hydrodynamic model with spherical symmetry of the atmosphere together with a non-local thermodynamic model of the He population in the triplet state. In addition, we perform high-resolution radiative transfer calculations of synthetic spectra for helium triplet lines and compare them with the measured absorption spectrum to recover information about the mass loss rate, temperature, and hydrogen-helium ratio of these planets. In this poster we will present our results and contextualize them in the general study carried out to date.

My poster in zenodo.org can be found here