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Probing the upper atmospheres of exoplanets and atmospheric escape with NLTE radiative transfer

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The helium line at 1083 nm is one of the strongest spectral features observable in transit spectroscopy of exoplanet atmospheres. As such, it is a powerful diagnostic of upper atmospheres of exoplanets, providing valuable insight into their dynamics and the process of atmospheric escape. Absorption in this line is caused by neutral helium atoms in an excited, metastable state. At low densities and strong irradiation characteristic of upper atmospheres of close-in exoplanets, the population of the helium metastable level is out of local thermodynamic equilibrium. I will discuss the NLTE approach adopted in atmospheric models designed to predict and interpret the growing number of transit observations at 1083 nm.

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