

Connecting the interior and the atmosphere of gaseous exoplanets through vertical mixing

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Abstract

Recent studies suggest a strong connection between the atmosphere and the interior of exoplanets to explain:

- the radius inflation of hot Jupiters, which could be due to advection of potential temperature or ohmic dissipation, both related to the atmospheric circulation [Tremblin et al. 2017, Thorngren et al. 2019]

- the strong chemical disequilibrium with an apparent methane depletion on warm Neptunes, potentially related to tidal heating [Fortney et al. 2020].

Such a connection opens up the possibility to probe the interior of exoplanets by measuring their chemical composition with future instruments (i.e. JWST, ELTs, Ariel). During this talk, I will discuss how to consistently simulate the impact of the vertical mixing on the thermal structure and the chemical composition of exoplanets in 1D atmospheric models for exoplanets. I will discuss after the implications for the radius inflation and the chemical disequilibrium observed on exoplanets.