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# Pushing Down and Out

*Characterizing hot Jupiters in detail and expanding into new regimes*

**Tuesday, 10 October • 3:30 PM**

*MSI Confernece Room • 3550 University*

We can characterize exoplanets by measuring their global, orbital, and atmospheric properties, through a variety of different observational methods. The first exoplanet discovery, the first detection of an exoplanet's atmosphere, and the vast majority of characterization measurements have all been of hot Jupiters, gas giants that orbit with about 0.1 AU of their host star. These planets are the biggest and brightest of the transiting exoplanets, making them the best targets for characterization measurements, although much work is being done to push to smaller and farther out planets. I will show that, even though we have been studying them the longest, hot Jupiters still show us mysterious properties, such as the presence of some kind of aerosol(s) in the atmospheres of some planets (but not all).

I will present three-dimensional models that include a treatment for clouds or hazes, as part of our work toward understanding aerosols in this extreme regime. I will demonstrate that we can make progress in better characterizing these worlds through cutting-edge methods such as high-resolution spectroscopy, which contains detailed information about a planet's multi-dimensional temperature and wind structure, and enables us to constrain wind speeds, rotation rates, and temperature gradients. Finally, I will also demonstrate that in the upcoming JWST era we will be able to make exquisite observations beyond the hot Jupiter population, for example using secondary eclipse mapping to resolve two-dimensional images of planets on longer orbital periods, and I will discuss some of the scientific implications of these future results.

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