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Presentation Abstract

Title **Polarization of Directly Imaged Young Giant Planets as a Probe of Mass, Rotation, and Clouds**

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Abstract Young, hot gas giant planets at large separations from their primaries have been directly imaged around several nearby stars. More such planets will likely be detected by ongoing and new imaging surveys with instruments such as the Gemini Planet Imager (GPI). Efforts continue to model the spectra of these planets in order to constrain their masses, effective temperatures, composition, and cloud structure. One potential tool for analyzing these objects, which has received relatively less attention, is polarization. Linear polarization of gas giant exoplanets can arise from the combined influences of light scattering by atmospheric dust and a rotationally distorted shape. The oblateness of gas giant planet increases of course with rotation rate and for fixed rotation also rises with decreasing gravity. Thus young, lower mass gas giant planets with youthful inflated radii could easily have oblateness greater than that of Saturn's 10%. We find that polarizations of over 1% may easily be produced in the near-infrared in such cases. This magnitude of polarization may be measurable by GPI and other instruments. Thus if detected, polarization of a young Jupiter places constraints on the combination of its gravity, rotation rate, and degree of cloudiness. We will present results of our multiple scattering analysis coupled with a self-consistent dusty atmospheric models to demonstrate the range of polarizations that might be expected from resolved exoplanets and the range of parameter space that such observations may inform.