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Title: Atmospheric characterization of the hot Jupiter Kepler-13b
Type: Poster
Session: Characterizing Transiting Planets
Abstract:
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Kepler-13b (= KOI-13.01) is a unique transiting hot Jupiter. It is one of very few known short-period (1.76 day) planets orbiting a bright (V~10 mag) A-type star. Therefore, it is among the hottest and brightest planets currently known, motivating the study of its atmosphere. The availability of Kepler data allows us to measure the planet's occultation (secondary eclipse) and phase curve, in the optical, with very high precision, which we combine with occultations observed by the Warm Spitzer Mission at 3.6 micron and 4.5 micron, and a ground-based occultation observation by the Wide-field Infra-Red Camera (WIRC), mounted on the Palomar 200 inch telescope, at the Ks band (~2.1 micron). Since the host star is the primary component of a visual binary system with ~1 arcsec separation, the two similar stars are fully blended in all our photometry. To correct the observed occultation depths for this dilution we modeled the stellar spectra, from the optical to the infrared, based on Keck/HIRES spectra that resolved the two stars. Our preliminary results indicate that the planetary atmosphere has a relatively high geometric albedo (Ag ~0.3) and a highly efficient heat distribution from the day side to the night side (epsilon ~0.9). This represents a deviation from previous studies in which the most highly irradiated hot Jupiters were found to have inefficient recirculation of energy from the day to the night sides. We also present revised atmospheric parameters for the planet-hosting star in this triple stellar system, and a revised planetary mass estimate based on the beaming effect and the tidal ellipsoidal distortion observed in the Kepler phase curve.