

Name: Benjamin T Montet
Email: btm@astro.caltech.edu
Institution: California Institute of Technology
Title: LHS 6343: Precise Constraints on the Mass and Radius of a Transiting Brown Dwarf Discovered by Kepler
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Abstract: Despite the discovery of more than 1200 brown dwarfs, only a dozen have both a measured mass and radius. Such systems are fundamental for our understanding of brown dwarf evolution. To this end, we report an updated analysis of the mass and radius of LHS 6343C, a brown dwarf orbiting one member of an M+M binary system in the Kepler field. With visible light adaptive optics data from Robo-AO, we are able to determine the third light contribution in the Kepler bandpass from the B component directly from observations in visible wavelengths. We combine 16 quarters of transit photometry from Kepler with 33 Keck HIRES radial velocity observations to measure the brown dwarf's mass and radius with 2 percent precision. Tight constraints such as these will be critical for future brown dwarf atmospheric studies as the next generation of theoretical evolutionary models are developed.