Probabilistic Constraints on the Mass and Composition of Proxima Centauri b A. Bixel[1] and D. Apai[1], [1]University of Arizona (abixel@email.arizona.edu)

Abstract: Recent studies regarding the habitability, observability, and possible orbital evolution of the indirectly detected exoplanet Proxima Centauri b [1] have mostly assumed a planet with M ~ 1.3 $M_\oplus$, a rocky composition, and an Earth-like atmosphere or none at all. In order to assess these assumptions, we use previous studies of the radii, masses, and compositions of super-Earth exoplanets to probabilistically constrain the mass and radius of Proxima Centauri b, assuming an isotropic inclination probability distribution. We find it is ~ 90% likely that the planet's density is consistent with a rocky composition; conversely, it is at least 10% likely that the planet has a significant amount of ice or an H/He envelope which could impact its habitability. If the planet does have a rocky composition, then we find expectation values and 95% confidence intervals of $\langle M \rangle = 1.63^{+1.66}_{-0.72}$ $M_\oplus$ for its mass and $\langle R \rangle = 1.07^{+0.38}_{-0.31}$ $R_\oplus$ for its radius. Finally, we discuss the implications of our results with regards to future studies of potentially habitable exoplanets.

References: [1] Anglada-Escudé, G. et al. (2016) *Nature*, *536*, 437.