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Title: Inferring the Eccentricity Distribution if Hot Jupiters Detected by Kepler in Occultation

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Abstract: Co-Authors: Eric Ford and Brice-Olivier Demory

We explore the eccentricity distribution of a sample of Hot Jupiters observed in both transit and occultation by Kepler. We use hierarchical Bayesian analysis to calculate the posterior eccentricity distribution for a sample of Hot Jupiters. We explore the sensitivity of our results to the choice of priors and demonstrate the robustness of our results by analyzing simulated observations. If we assume a Rayleigh distribution for eccentricities, then the posterior mode for the dispersion of the eccentricity distribution is $\sigma \sim 0.08$. However, we find that a Rayleigh distribution of eccentricities is inadequate to model plausible eccentricity distributions. Fortunately, we demonstrate that a broad range of realistic eccentricity distributions can be well described by a two component Gaussian mixture model with zero mean for both h=e cos omega and k=e sin omega. With this model, the posterior mode for the dispersion of the two mixture components were $\sigma_{high} \sim 0.19$ and $\sigma_{low} \sim 0.002$. Our results provide support for two populations of hot-Jupiters: one population with nearly circular orbits, and a smaller fraction that have managed to retain significant eccentricities. Next, we explore how the eccentricity distribution correlates with other planet and host star properties. Preliminary results suggest that the eccentricity distribution may be correlated with planet size, orbital period and/or host star metallicity. We will present our latest results on the significance of these trends.