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Title: Eccentricity Distribution of Kepler Planets Transiting Stars with Astroseismology
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Abstract: Coauthors: Thomas Barclay (NASA Ames) and the SAMSI Bayesian Characterization of Exoplanet Populations Working Group

We present recent results characterizing the eccentricity distribution of Kepler planet candidates transiting stars that have been precisely characterized via astroseismology. This is a particularly valuable population of planets, since astroseismology robustly and precisely constrains the mean stellar density, a key parameter for detailed transit light curve fitting. Thus, studying this population circumvents the typical challenges associated with uncertainties and potential biases in stellar characterization via other methods. These planet candidates typically have high signal-to-noise light curves that allow for precise measurements of the transit duration and ingress timescale.
We report results from analyzing this data set using Bayesian hierarchical models that allow for characterizing the properties of the underlying eccentricity distribution, while accounting for measurement uncertainties, finite sample sizes and even detection biases. Finally, we outline how these methods can be applied to other questions about the underlying distribution of planets, such as the frequency of small planets in the habitable zone of solar-type stars.
This research builds on collaborations between astronomers and statisticians forged during a three week workshop on "Modern Statistical and Computational Methods for Analysis of Kepler Data" at SAMSI in June 2013.