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Title: Kepler Astrometry: An Attempt
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Abstract: While the primary science goal for the Kepler mission is the detection and characterization of terrestrial and giant exoplanets through ultra-precision photometry, the telescope is theoretically capable of collecting ~2 milli-arcsecond precision relative astrometric data. This single measurement precision when combined with the few thousand epochs collected by the mission each quarter over its lifetime (> 40000 observations to date), means Kepler should be sensitive to Jupiter-mass planets and brown dwarfs around some of the nearest stars in the input catalog in addition to parallax and proper motions for the closest KOIs.

Unfortunately, the Kepler PSF is out of focus and painfully undersampled. This combined with additional instrumental and potential astrophysical effects have made it difficult to reach the predicted milli-arcsecond astrometric stability across multiple, continuous Kepler quarters. Even for some of the assumed

astrometrically stable red giant stars, the positional systematics are ~80 mas and above and repeat annually. I will review my progress as a Kepler Participating Scientist in characterizing and mitigating these astrometric variations. This includes investigations into the potential cause of the positional systematics including stellar crowding, intrapixel variations, CCD cross talk and instrumental changes. Mitigation tactics include stellar background models, Kepler PRFs and Bayseian PSF fitting to extract robust stellar positions. Finally, I will invite the Kepler community to join a newly formed Kepler astrometry working group to help facilitate the sharing of new ideas on how to tackle this confounding issue.