TESTING KEPLER ASTROMETRY WITH OUR NEAREST NEIGHBORS

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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 capable of collecting milli-arcsecond precision astrometric data for each of the target stars. This single measurement precision when combined with the large number of observations collected by the mission each quarter (~1600) and over its 3.5 year lifetime (>22k), means Kepler should be sensitive to Jupiter-mass planets and brown dwarfs around some of the nearest stars in the input catalog. Astrometry can also be used to derive the trigonometric parallax and proper motions of Kepler stars resulting in a direct measurement of the radius of the star. Finally, astrometric measurements can rule out false positives due to blends with eclipsing binaries. With this in mind, I propose to assist the Kepler team in extracting precise astrometric information from the Kepler data sets with the final science goal of measuring proper motions, parallaxes and companion perturbations. I will use my expertise with ground and space-based precision data analysis to determine robust astrometric solutions for the Kepler data. The statistics on the frequency of stars with massive planets at separations of > 1 AU, when eventually combined with results from the WFIRST micro-lensing mission, will aid future NASA missions including JWST in determining how to efficiently directly image planets around nearby stars. Both astrometry and the detection of habitable planets were emphasized as priority goals in the 2010 Decadal Survey.