ASTROMETRY OF STARS & GALAXIES IN THE KEPLER FIELD

Robert Olling
University of Maryland
GO20058

We propose to observe three distinct sets of objects: 1) ninety-one (91) stars that are likely to be within 100 parsec from the Sun, and which have not previously been identified as such [the SN sample], 2) nine (9) K Giant Stars in Kepler's field of view that are part of the SIM-Lite Grid-star Catalog [SGC], and 3) four hundred and sixty three (463) small, nucleated galaxies that we will use to define an Absolute Astrometric Reference system [AAR] and to determine astrometric accuracy. Our science and technical goals for these target groups are as follows. The SN sample will improve the census of stars in the solar neighborhood. Because of their relative proximity, these systems are well-suited for a Kepler-based astrometric search for stellar and sub-stellar companions. Through a study of their positions and motions, we expect to be able to find Brown Dwarfs and long period planets that can be added to the target lists for future missions in NASA's Exoplanet Exploration Program. The SN sample is unique in that it allows both astrometric and RV studies so that masses can be determined unambiguously. The SGC K-giant stars were selected by the SIM program on the presumption that they would not have measurable astrometric wobble. We will evaluate the astrometric and photometric stability of these systems for suitability as astrometric standards for the SIM-Lite mission. This study will be particularly relevant for NASA if the Astro2010 Decadal Committee gives SIM-Lite the go-ahead in NASA's Exoplanet Exploration Program. The AAR sample comprises galaxies as identified in the 2MASS extended source catalog with diameters not exceeding 10 arcsec. We select about ten such small galaxies for each of our stellar targets. As was done for the Lick Proper Motion programs, we will use these slightly extended sources as absolute astrometric standards. We will use methods developed by the VLBA astrometry community to assess the absolute astrometric errors. We will also monitor these galaxies for variability as might occur from low-level AGN activity. We will use the state-of-the art ePSF astrometric methodology as developed by Anderson and collaborators for undersampled point-sources as well as for slightly extended sources.