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Characterizing Extrasolar Planets with the SIM Lite Astrometric Observatory

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SIM Lite is an observatory mission dedicated to precision astrometry. With an accuracy of 1 microarcsecond (μas) in a single measurement and a noise floor below 0.035 μas it will have the capability to do an extensive search for Earth-mass planets in the 'habitable zone' around several dozen of the nearest stars. Recently demonstrated in double-blind tests was the capability to characterize multiple-planet systems, yielding masses, and orbit parameters including mutual inclinations which are essential for studies of formation, evolution and dynamical stability.

As a flexibly pointed instrument, SIM Lite is a natural complement to sky surveys such as JMAPS and Gaia, and is well suited to experiments that do not need a large number of targets. It will have a wide-angle accuracy of 4 μas for targets as faint as V = 19, opening up a wide range of problems in stellar and Galactic astrophysics. These include direct mass measurements of exotic objects such as neutron stars and black holes, and dynamically probing the nature of dark matter. SIM Lite will have an open General Observer (GO) program, for all categories of astrometric observations. The project successfully completed a series of technology milestones in 2005, and is currently under study by NASA as a flight mission.

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