

Space Interferometry Mission: Measuring the Universe

For: Special Session on "Astrophysical Telescopes and their Instrumentation"

SIM will be NASA's first space based long-baseline optical interferometer. SIM will revolutionize precision astrometry, with a wealth of new astronomical data and serve as a technology pathfinder for future astrophysics missions. The SIM architecture uses a 10-m Michaelson stellar interferometer in Earth-trailing solar orbit to provide 4 microarcsecond (μas) precision absolute position measurements of stars down to 20th magnitude. This precision will allow parallax measurements to 10% accuracy at 25 kpc and proper motion measurement accuracy of about $2 \mu\text{as/yr}$ over it's 5 year mission (equivalent to 10 m/s at 1 kpc). In addition, SIM will produce images with a resolution of about 10 milliarsecond (equivalent to a 10-m diffraction-limited optical aperture). It will also demonstrate interferometric nulling with suppression of the on-axis starlight to a level of 10^{-4} .

In this paper we describe: the SIM science objectives and requirements, the operational scenario and science data processing center envisioned for the instrument's five year minimum on-orbit life, the several configurations presently under consideration, and the extensive technology development program underway to demonstrate the enabling technologies.