

High precision astrometry mission for the detection and characterization of nearby habitable planetary systems with the Nearby Earth Astrometric Telescope (NEAT)

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(abridged) A complete census of planetary systems around a volume-limited sample of solar-type stars (FGK dwarfs) in the Solar neighborhood with uniform sensitivity down to Earth-mass planets within their Habitable Zones out to several AUs would be a major milestone in extrasolar planets astrophysics. This fundamental goal can be achieved with a mission concept such as NEAT - the Nearby Earth Astrometric Telescope. NEAT is designed to carry out space-borne extremely-high-precision astrometric measurements sufficient to detect dynamical effects due to orbiting planets of mass even lower than Earth's around the nearest stars. Such a survey mission would provide the actual planetary masses and the full orbital geometry for all the components of the detected planetary systems down to the Earth-mass limit. The NEAT performance limits can be achieved by carrying out differential astrometry between the targets and a set of suitable reference stars in the field. The NEAT instrument design consists of an off-axis parabola single-mirror telescope, a detector with a large field of view made of small movable CCDs located around a fixed central CCD, and an interferometric calibration system originating from metrology fibers located at the primary mirror. The proposed mission architecture relies on the use of two satellites operating at L2 for 5 years, flying in formation and offering a capability of more than 20,000 reconfigurations (alternative option uses deployable boom). The NEAT primary science program will encompass an astrometric survey of our 200 closest F-, G- and K-type stellar neighbors, with an average of 50 visits. The remaining time might be allocated to improve the characterization of the architecture of selected planetary systems around nearby targets of specific interest (low-mass stars, young stars, etc.) discovered by Gaia, ground-based high-precision radial-velocity surveys.

Comments: Accepted for publication in Experimental Astronomy. The full member list of the NEAT proposal and the news about the project are available at [this http URL](#) The final publication is available at [this http URL](#)

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