

Space astrometry with the *Milli-Arcsecond Pathfinder Survey*: mission overview and science possibilities

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Abstract. We present a mission overview and science possibilities of space astrometry with the *Milli-Arcsecond Pathfinder Survey (MAPS)*.

Keywords. astrometry, surveys, reference systems, stars: kinematics, instrumentation

The *Milli-Arcsecond Pathfinder Survey (MAPS)* mission is a space-based, all-sky astrometric and photometric survey from 2nd through 15th magnitude with a 2010 launch date goal. The primary mission goal for MAPS is the generation of a 1 mas all-sky astrometric catalog for the 2010 epoch.

The instrument consists of a 15 cm telescope and large (64 megapixel) active pixel sensor focal plane with associated processing electronics carried aboard a microsatellite bus in a 900 km sun-synchronous low Earth orbit.

MAPS technology, including the very large format detector, the onboard processing electronics, and next generation space-based GPS-receiver, will serve as a pathfinder in support of future space missions.

A 1 mas (or better) all-sky survey through 15th magnitude will have a tremendous impact on our current understanding of the galaxy and stellar astrophysics. *MAPS* science topics include:

- (i) a kinematic and photometric exploration of the nearest star forming regions and associations; an understanding of the dynamics and membership of nearby open clusters;
- (ii) a survey of nearby stars that addresses the 130 missing systems within 10 pc;
- (iii) recalibration of the cosmic distance scale via distances to nearby clusters, and the period-luminosity relationship using high accuracy proper motion (*Hipparcos* and *MAPS* positions and a twenty year baseline) and parallax measurements;
- (iv) discovery of giant planets and brown dwarfs orbiting nearby stars; kinematic detection of galactic cannibalism and mergers in the Milky Way; and
- (v) discovery of low-mass black holes and neutron stars in astrometric binaries.