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Gravitation astrometric tests in the internal Solar System: the Astrometric Gravitation Probe mission goals

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High precision astrometry at the microarcsecond level is a promising tool for Fundamental Physics tests in the Solar system, reaching a sensitivity adequate to set stringent constraints on the competing theories of gravitation, including General Relativity, and on effects induced by quantum mechanics related phenomena.

In the weak field limit of gravitation applicable to the Sun neighborhood, General Relativity and competing gravity models can be expressed in a common framework, in particular the Parametrised Post-Newtonian (PPN) and Parametrised Post-Post-Newtonian (PPPN) formulations.
Micro-arcsec astronomy is able to verify the predictions of theoretical models of gravitation by a modern rendition of two Einstein's classical tests: deflection of the light around the Sun, and perihelion precession of Mercury and other orbiting bodies.
Local constraints on gravitation have also implications on fundamental principles like the Equivalence Principle and the Local Lorentz invariance and, through extrapolation at cosmological level, on the distribution of Dark Matter and Dark Energy.
Astrometric Gravitation Probe (AGP) is the concept of a space mission for gravitation tests in the Solar system through
coronagraphy and Fizeau interferometry for differential astrometry.
The equivalent precision goal on the "γ" and "β" PPN parameters is respectively in the 10^{-8} and 10^{-6} range.
The design is focused on systematic error control through multiple field simultaneous observation and calibration.
The main science goals of AGP are presented, as well as the measurement approach and a sketch of the implementation concept.

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