



Gravity Advanced Package to probe Solar System gravitation

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The Gravity Advanced Package (GAP) is composed of an electrostatic accelerometer, as the ones developed by ONERA for geodetic missions CHAMP, GRACE and GOCE, and radio science instruments for Doppler and range tracking. The measurement of the non gravitational acceleration associated to the radio-science will allow to perform a very accurate navigation of the trajectory.

The aim of the package is to test the gravitation in the Solar System, by checking the deviation of the probe trajectory from a geodetic one during the cruise phase of the interplanetary journey, with two primary scientific objectives:

- Verify the Einstein gravitation law at the scale of the solar system, to see any dependency of the law with the distance to the gravitation source : any modification of the gravitation law can have consequence in the models of Solar System origin or planet formation;
- Verify the anomaly detected on several fly-by of past interplanetary missions: the explanation of such anomaly can have consequence in the knowledge of the planet and moon gravity field which are often determined by such flyby around these bodies.

After arrival to destination, such package can also be used to improve the gravity measurement of the visited planet and its moons, without any need of hypotheses on the non gravitational forces which will be measured (atmospheric drag, pressure radiation ...). This measurement scenario is the one used for the CHAMP mission around the Earth, with a great improvement in the gravity field knowledge.

The Gravity Advanced Package is presently proposed as an instrument for the Jupiter Ganymede Orbiter mission, according to the ESA Fundamental Physic Advisory Group (FPAG) recommendation following the ESA Cosmic Vision process.