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Improved mapping of planetary gravitational field with an electrostatic accelerometer/gradiometer

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ONERA has a proven record spanning several years in developing the most accurate accelerometers for geodesy missions. They are still operational in the GRACE mission and their successors for the GRACE-FO mission will fly in 2017. Finally, the GOCE mission has shown the benefit of using a gradiometer for the direct measurement of the gravity field.
Now, ONERA proposes a new accelerometer design, MicroSTAR, for interplanetary missions. This design based on the same technology as for the GRACE and GOCE space missions, with the notable addition of a bias rejection system, has a reduced mass and consumption. The accelerometer is embarked on Uranus Pathfinder (mission proposal for Cosmic M4) as up-scope instrument to achieve two scientific objectives: 1) to determine the gravity fields of Uranus and the satellites, allowing for a better understanding of the planet interior composition, 2) to test gravity at the largest possible length scales to search for deviations from General Relativity. The success of using accelerometer for geodesy mission could be imported in the planetary science field.
The poster details the accuracy which can be achieved on the gravity potential field according to different accelerometer configurations. It describes the instrument and its integration inside an interplanetary probe. Finally, it explains the benefit of using this electrostatic accelerometer complementary to radio science technology for improved planetary gravitational field measurements.