



The gravimeter “B-grave” for the in-situ surface gravity measurements of an asteroid

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In the context of the preliminary study phase for the CubeSats supporting ESA’s Asteroid Impact Mission (AIM) to the Didymos, we investigate a miniaturized gravimeter as part of the geophysical instrument package for the Asteroid Geophysical Explorer (AGEX). AGEX intends to land a CubeSat on the secondary object in the Didymos system, Didymoon in order to characterize the asteroid surface and internal structure

A 3D compact gravimeter is developed at the Royal Observatory of Belgium. Its design allows to meter a weak $50 \mu\text{m}/\text{sec}^2$ gravity field corresponding to 5 ppm of Earth gravity in a harsh environment. A system with three components mounted in an orthogonal geometry allows obtaining the gravity field in amplitude and in angular position without any requirement of levelling. B-GRAVES will use a in-situ calibration and multi-parameter approach for validation of the measurements.

A laboratory simulation is induced with centrifugal forces applied to the pendulum set-up in a vertical position to reject the Earth gravity field.

Signal treatment and uncertainties are discussed keeping in mind questions of thermal and vibration influence. The B-GRAVES can serve as a novel and robust instrument for future lander and rover missions .