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Project QVADIS: Testing the existence of the gravitational anomalies by the study of trans-Neptunian binaries

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The unrivalled advantage of tiny trans-Neptunian binaries is that they are the best available realisation of an isolated two body system with very weak external and internal Newtonian gravitational field. As a consequence, in many cases (as for instance in the case of the binary (55637) 2002 UX25), the known Newtonian precession of orbit of the satellite is so small that cannot be detected by the existing telescopes; hence an astronomer must observe the zero Newtonian perihelion precession. Fortunately, an observable precession of the orbit can be caused by an anomalous gravitational field as weak as 10-11m/s2 (with the next generation of telescopes the anomalous gravitational field of the order of 10-12m/s might be revealed). In brief, the measurement of a non-zero precession would be sign of new physics, while the measurement of zero-precession would impose strong limits on the size of the eventual gravitational anomalies. The goal of the emerging project QVADIS is to measure the perihelion precession of tiny satellites in some trans-Neptunian binaries. While these measurements are significant independent of any theory they were initially proposed as a crucial test of a new model of the Universe based on the hypothesis that quantum vacuum fluctuations are virtual gravitational dipoles. According to the new model, the only content of the Universe is the known Standard Model matter (i.e. matter made from quarks and leptons interacting through the exchange of gauge bosons) immersed in the quantum vacuum "enriched"with virtual gravitational dipoles. Apparently, what we call dark matter and dark energy, can be explained as the local and global effects of the gravitational polarization of the quantum vacuum by the immersed baryonic matter

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