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The ILRS campaign for the GREAT experiment

Clocks on-board GNSS satellites can be used to perform an improved test of the gravitational redshift if they are placed on an elliptical orbit around Earth. As proposed in Delva et al. (Classical and Quantum Gravity 32.23 (2015) p 232003), we use signals from Galileo satellites 5 and 6 (GAL-201 and GAL-202) to perform such a test. ESA is funding two parallel studies, named Galileo gravitational Redshift test with Eccentric sATellites (GREAT), led by SYRTE/Observatoire de Paris and ZARM.

An elliptical orbit induces a periodic modulation of the gravitational redshift at the orbital frequency. Since these spacecraft have atomic clocks with good stability, a test of the variation of the redshift can be performed and an accumulated relativistic effect can be determined over the long term. SLR data are required to characterize the orbital radial errors, which are highly correlated to clock errors in IGS orbit solutions.

The ILRS support the GREAT experiment by initiating a one-year campaign of SLR with Galileo satellites 5 and 6. We present the current status of this campaign, and a first analysis of the SLR data in order to estimate the systematic effects coming from the orbital errors on the GR violation parameter.