

Testing general relativistic clock effects in the vicinity of the Earth

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Due to a malfunction of the Fregat upper stage of the Soyuz rocket the Galileo satellites 5 and 6 were released in an elliptical orbit instead in the targeted circular orbit. This gave the unique opportunity to perform a test of the gravitational redshift resulting in an improvement of about a factor 5 compared with the previously best tests from Gravity Probe A test of more than 40 years ago. We report on our data analysis [1] and also propose new clock tests of further general relativistic effects like the gravitomagnetic clock effect [2] or the gravitational time delay.

References

- [1] Sven Herrmann, Felix Finke, Martin Lülf, Olga Kichakova, Dirk Puetzfeld, Daniela Knickmann, Meike List, Benny Rievers, Gabriele Giorgi, Christoph Günther, Hansjörg Dittus, Roberto Prieto-Cerdeira, Florian Dilssner, Francisco Gonzalez, Erik Schönemann, Javier Ventura-Traveset, and Claus Lämmerzahl: Test of the Gravitational Redshift with Galileo Satellites in an Eccentric Orbit, *Physical Review Letters* **121**, 231102 (2018).
- [2] Eva Hackmann and Claus Lämmerzahl: Generalized gravitomagnetic clock effect, *Physical Review* **D 90**, 044059 (2014).