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Evaluating and comparing the performances of the first units of Absolute Quantum Gravimeter in the time domain

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We report on the performances of the first three units of the Absolute Quantum Gravimeter that have been integrated so far and discuss their stationary measurement capability. The Absolute Quantum Gravimeter (AQG) is an industry-grade commercial gravimeter measuring g with laser-cooled atoms [1] that has been developed in close collaboration with RESIF (the French Seismologic and Geodetic Network, [2]). This new type of gravimeter is presently the only technology that allows for continuous drift-free monitoring of gravity over timescales from a few minutes to several months.
We will discuss the performances of the AQG in terms of sensitivity, stability and repeatability of the measurements provided by the three units. In particular, we report on a reproducible sensitivity to gravity at a level of 1 μGal in various types of environment.
We will also present the status of the development of the field version of the AQG designed to be compatible with field operation. This work demonstrates the feasibility to operate a free-falling atom gravimeter as a transportable turn-key device and paves the way to practical investigation of both spatial and temporal gravity variations at the μGal level in both laboratory and field conditions [3].

[1] V. Ménoret et al., "Gravity measurements below 10−9 g with a transportable absolute quantum gravimeter", Nature Scientific Reports, vol. 8, 12300 (2018)
[2] http://www.resif.fr/
[3] M. Van Camp, O. de Viron, A. Watlet, B. Meurers, O. Francis, C. Caudron, "Geophysics from terrestrial time-variable gravity measurements", Rev. Geophys. (2017).