

Abstract Submitted
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Violations of UGR in atomic clocks and atom interferometers¹

FABIO DI PUMPO, CHRISTIAN UFRECHT, ALEXANDER FRIEDRICH, Ulm University, ALBERT ROURA, Institute of Quantum Technologies, German Aerospace Center (DLR), WOLFGANG P. SCHLEICH, Ulm University; Institute of Quantum Technologies, German Aerospace Center (DLR), ENNO GIESE, Ulm University, QUANTUS COLLABORATION — The question of which atom-interferometer geometries can be used to test the universality of the gravitational redshift (UGR) is at the center of a long-standing debate. We compare in this contribution classical UGR tests based on the synchronization of two atomic clocks with atom interferometers relying on i) quantum clock interference [1] or ii) internal state transitions during the interferometer [2,3]. For this purpose, we introduce a dilaton model which consistently parametrizes violations of the Einstein equivalence principle. Based on this model, we derive the corresponding phase shifts for atomic clocks and atom interferometers and study their differences. Consequently, we identify a large class of atom-interferometer geometries which measure violations of UGR.

[1] Nat. Commun. **2**, 505 (2011) [2] arXiv:1810.06744 (2018)
[3] arXiv:2001.09754 (2020)

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