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Precision measurements in gravitational physics with cold atom interferometry

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I will describe experiments we are conducting for precision tests of gravitational physics using cold atom interferometry. In particular, I will report on the measurement of the Newtonian gravitational constant [1] and of the gravity-field curvature [2] with a Rb Raman interferometer, and on experiments based on Bloch oscillations of Sr atoms in optical lattices for gravity measurements at small spatial scales [3] and for testing the Einstein equivalence principle [4]. Future prospects for experiments in space will be also discussed [5].

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[3] F. Sorrentino, A. Alberti, G. Ferrari, V. V. Ivanov, N. Poli, M. Schioppo, G. M. Tino, *Quantum sensor for atom-surface interactions below 10 μm*, Phys. Rev. A 79, 013409 (2009).
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[5] G. M. Tino et al., *Precision Gravity Tests with Atom Interferometry in Space*, Nuclear Physics B (Proc. Suppl.) 243–244, 203 (2013).