

Test of gravitation with quantum objects

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Abstract

This talk is about a test of gravitation at small distances by quantum interference deep into the theoretically interesting regime of 10000 times gravity [1]. The method allows a precise measurement of quantum mechanical phase shifts of a Schrödinger wave packet bouncing off a hard surface in the gravitational field of the earth. The experiment is sensitive to gravity-like forces at a length scale below $10\text{ }\mu\text{m}$, where we already place limits. Such forces can be mediated from gauge bosons propagating in a higher dimensional space and this experiment can therefore test speculations on large extra dimensions of sub-millimetre size of space-time or the origin of the cosmological constant in the universe, where effects are predicted in the interesting range of this experiment and might give a signal in an improved setup.

References

- [1] H. Abele, T. Jenke, H. Leeb, and J. Schmiedmayer, Phys. Rev. D **81**, 065019 (2010).