

Would a quantum system succumb to its own gravitational attraction?

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We propose an experiment aimed at measuring extremely weak influences on the propagation of a freely falling nanosphere in a micro-gravity environment (satellite). These influences could reveal the presence of hypothetical, non-standard interactions, like e.g. self-gravitational coupling of the Rosenfeld-Moller type or spontaneous localisation mechanism a la GRW.

We show that there exists a small experimental window around the mesoscopic transition where such effects could effectively be measured, which constitutes a fundamental test of the standard quantum theory, and in particular of the standard description of the coupling to gravity of a quantum system in the mesoscopic regime.