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## Quantum mechanics and the principle of equivalence

PAUL DAVIES, Beyond: Center for Fundamental Concepts in Science, Arizona State University

Einstein's principle of equivalence is based on the notion of classical trajectories in spacetime, and the question arises of how this principle applies to quantum particles, especially those in delocalized, highly-non-classical states. I shall describe a quantum version of Galileo's classic experiment, using a model quantum clock to measure the time of flight of a quantum particle in a background gravitational field. Because the particle's mass does not scale out of Schrodinger's equation, unlike in the Newtonian case, conformity with the principle of equivalence is far from obvious and involves some interesting subtleties. It also suggests some new experiments.