

Abstract Submitted
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Breakdown of the Weak Equivalence between Passive Gravitational Mass and Energy of a Composite Quantum Body¹ ANDREI LEBED, Department of Physics, University of Arizona — It is shown that passive gravitational mass operator of a composite quantum body in the post-Newtonian approximation of the General Relativity does not commute with energy operator. For the simplest composite quantum body - a hydrogen atom - a breakdown of the weak equivalence between passive gravitational mass and energy at a microscopic level can be experimentally detected by studying unusual electromagnetic radiation, emitted by the atoms, supported and moved in the Earth gravitational field. On the other hand, the weak equivalence between the expectation value of passive gravitational mass and energy is shown to survive at a macroscopic level for stationary quantum states. For mixed quantum states, a breakdown of the above mentioned equivalence at macroscopic level leads to time dependent oscillations of the expectation values of passive gravitational mass.

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Andrei Lebed
Department of Physics, University of Arizona

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