

Reassessing Quantum Einstein Equivalence Principle

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The Einstein Equivalence Principle (EEP) underlies general relativity, asserting, from operational viewpoint, that a freely falling laboratory can locally eliminate gravitational effects. But does EEP still hold when the lab is a quantum system—delocalized, entangled, or in a nonclassical spacetime? In such cases, no single classical coordinate choice may exist to render spacetime Minkowskian. This talk explores how to generalize EEP to the specific quantum regime by introducing local quantum coordinates through suitable quantum-controlled diffeomorphisms. I will show that this framework allows one to transform to the lab's quantum frame and locally cancel gravitational effects, preserving the spirit of EEP in quantum settings. Implications for quantum gravity and foundational questions will also be discussed.

Working Group

WG3 - Low-energy gravitational effects in quantum systems

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