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Quantum Gravity as Gravitized Quantum Theory

Abstract

Starting from a new understanding of the vacuum energy problem based on the combination of the phase space regularization and the holographic bound, we argue that quantum gravity should be understood as gravitized quantum theory, that is, quantum theory wherein the geometry and topology of the state-space is fully dynamical, in analogy with the dynamical nature of spacetime in Einstein's general relativity. Apart from the vacuum energy problem viewed as a quantum gravity problem, we discuss the "smoking gun" experiments involving higher order quantum interference, as well as experimental probes of the statistics of spacetime quanta. Finally, we address the conundrum of the intricately patterned spectrum of masses of elementary particles as well as their mixing angles, as another telltale problem of quantum gravity viewed as gravitized quantum theory.