



Beyond the Born rule in quantum gravity

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Abstract

We have recently developed a new understanding of probability in quantum gravity. In this talk we provide an overview of this new approach and its implications. Adopting the pilot-wave formulation of quantum physics, we argue that there is no Born rule at the fundamental level of quantum gravity with a non-normalisable Wheeler-DeWitt wave function. Instead the universe is in a perpetual state of 'quantum nonequilibrium'. Dynamical relaxation to the Born rule can occur only after the early universe has emerged into a semiclassical or Schrödinger approximation, with a time-dependent and normalisable wave function. We also show that quantum-gravitational corrections to the Schrödinger approximation can generate tiny deviations from the Born rule. The possibility of observing these effects is discussed.

Reference

A. Valentini, Beyond the Born rule in quantum gravity, *Found. Phys.* 53, 6 (2023).