Pasquale Bosso (University of Lethbridge)

Quantum Gravity Phenomenology from the Generalized Uncertainty Principle

Abstract

One of the cornerstones of Quantum Mechanics (QM), Heisenberg's Uncertainty Principle (HUP), establishes that it is not possible to simultaneously measure with arbitrary precision both the position and the momentum of a quantum system. This principle, however, does not prevent one from measuring with infinite precision the particle's position. However, theories of Quantum Gravity, aiming to bridge between General Relativity and QM, predict the existence of a minimal observable length - a minimal uncertainty on the position generally of the order of the Planck length P l $\sim$ 10−35 m. This prediction results therefore in a contradiction with HUP, requiring a modification of the principle. This need gave rise to the Generalized Uncertainty Principle (GUP). In this talk, after introducing the basics of the Uncertainty Principle, I will show how the GUP can change known aspects of standard QM, leading to ways to test Quantum Gravity.