Contribution ID: **545** Type: **Oral (Student, In Competition) / Orale (Étudiant(e), inscrit à la compétition)**

Modifications of Heisenberg's Uncertainty Principle Motivated by Quantum Gravity

Thursday, 18 June 2015 10:00 (15 minutes)

As it is currently not possible to access the natural energy scale of quantum gravity (the Planck scale), it is important to look for low-energy effects, e.g. the quantum gravity induced perturbative corrections to non-relativistic quantum mechanics. One such avenue of approach is studying the corrections to the Schrödinger equation via the Generalized Uncertainty Principle (GUP) proposed in various candidate theories of quantum gravity.

GUP corrections to the simple harmonic oscillator in phase space will be shown by way of the Wigner function. This GUP-corrected Wigner function will then be compared to the simple harmonic oscillator Wigner function (with no GUP corrections). The changes in the resultant marginal probabilities indicate that there may be observational consequences.

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Session Classification: R1-5 Quantum Gravity and Quantum Cosmology (DTP) / Gravité quantique et cosmologie quantique (DPT)

Track Classification: Theoretical Physics / Physique théorique (DTP-DPT)