Contribution ID: **179** Type: **Talk**

Quantization consequences on the metric tensors

Wednesday, 9 September 2020 13:37 (7 minutes)

When minimal length uncertainty emerging from generalized uncertainty principle (GUP) is thoughtfully implemented, it is of great interest to consider its impacts on Einstein's gravitational field equations (EFE) and to find out whether the corresponding modification in the metric manifests properties of quantum geometry due to quantum gravity. GUP takes into account the gravitational impacts on the noncommutation relations of the distance and momentum operators and of the time and energy operators, etc. On the other hand, the EFE relates classical geometry or gravity to the energy-momentum tensors, i.e. quantum equations of state. Despite the technical difficulties, we confront GUP to the metric tensors so that the line metric, geodesic equation, Christoffel connection, etc. are accordingly modified. We illustrate our idea on approaching quantum gravity by focusing the discussion on the corresponding modified geodesic equation, which apparently encompasses acceleration, jerk, and snap (jounce) of a particle in the quasi-quantized gravitational field.

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Session Classification: COMPACT STARS, DM, DE, GWs, ϒ RAYS, QGP, QCD, HIC, SNOVAE, BHs, PARTICLES, GALAXIES