



Contribution ID: 662

Type: **Talk in a parallel session**

The effects of quantum spin-connection foam in the Solar system, galaxies, and the Universe

Tuesday, 9 July 2024 18:10 (15 minutes)

We have shown earlier that quantum gravity can be described in terms of wave functions on the bundle of spin connection coefficients over spacetime. The corresponding precanonical quantization procedure introduces, for dimensional reasons, an ultra-violet parameter κ of dimension of the inverse 3-volume element. For scalar and Yang-Mills fields, the standard Schroedinger functional representation can be recovered from the equations of precanonical quantization when $1/\kappa$ is infinitesimal. In quantum YM theory, the scale of κ is related to the hadronic scale of the mass gap. In quantum gravity, we show that (i) the cosmological constant emerges from a proper ordering of the spin-connection operator in the precanonical Schroedinger equation, (ii) the Milgromian acceleration appears in the solution corresponding to the wave functions of quantum Minkowski space-time, and (iii) a modification of Newtonian dynamics by fluctuations of spin connections is derived in the non-relativistic limit. The latter modifies weak gravity on the galactic scales, that is usually attributed to dark matter, and it also modifies Newton's law in the κ -Opik-Oort cloud, that potentially can be tested.

Primary author: KANATCHIKOV, Igor (Natl Quantum Information Center)

Presenter: KANATCHIKOV, Igor (Natl Quantum Information Center)

Session Classification: Quantum gravity phenomenology