

Quantum observers from Poisson-Lie geometry

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In this talk I will discuss a general framework, recently introduced in [1], to describe quantum observers in Minkowski spacetime. This framework involves two main ingredients: on the one hand we need to give a geometrical interpretation of the space of inertial observers, which we identify with the space of time-like oriented geodesics in Minkowski spacetime. We use the fact that Minkowski spacetime is a simply connected Lorentzian space of constant curvature. On the other hand a quantum deformation, in the sense of quantum groups, is used to describe quantum gravitational effects on this space of observers.

The general procedure above will be illustrated with a concrete example, the so-called κ -deformation. For this well-known quantum group deformation, the associated Poisson G -space will be explicitly constructed. Its quantization [1] gives the first explicit instance of the above-mentioned construction. Time-permitting we will comment on ongoing research concerning the description of the fuzzy nature of these quantum observers [2], that should be related to quantum gravity effects.

References

- [1] A. Ballesteros, I. Gutierrez-Sagredo, and F. J. Herranz. Noncommutative spaces of world-lines. *Phys. Lett. B*, 792:175–181, 2019. [arXiv:1902.09132](https://arxiv.org/abs/1902.09132), [doi:10.1016/j.physletb.2019.03.029](https://doi.org/10.1016/j.physletb.2019.03.029).
- [2] A. Ballesteros, G. Gubitosi, I. Gutierrez-Sagredo, F. J. Herranz and F. Mercati. In preparation.