

# Extracting Geometry from Quantum Spacetime: Obstacles down the road.

*Thursday, 28 September 2017 17:45 (0:30)*

## Content

Any acceptable version of a quantum theory of gravity must include, in the appropriate limit, the recovery of the classical spacetime. Moreover, the spacetime notion itself should be intrinsically tied to the behavior of the matter that probes it. We consider some of difficulties that would be confronted in attempting this enterprise. The problems we uncover seem to go beyond the technical level to the point of questioning the overall feasibility of the project. The main issue is related to the fact that, in the quantum theory, it is not possible to assign a trajectory to a physical object, and, on the other hand, according to the basic tenants of the geometrization of gravity, it is precisely the trajectories of free localized objects that must somehow define the spacetime geometry. This indicates the need to revise the standard geometrical concepts, and to explore the corresponding notions that could have operational meaning. The insights gained in this analysis should be relevant to those interested in the quest for a quantum theory of gravity and might help refocus some of its goals.

## Summary

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**Session Classification :** WG Principios Fundamentales (Luis Urrutia)