

Interplay between Quantum Theory and Gravity

The conciliation of relativity and quantum theories has always been problematic. The reasons are mainly two. On the one side, quantum nonlocality (exemplified by the violation of Bell inequalities) creates a direct conflict with special relativistic requirements. On the other side, the unification of quantum and gravitational phenomena has not yet reached the desired goal. On top of this, one should not forget that existing relativistic quantum field theories are plagued by infinities. Crucial questions are still open: how can our world be nonlocal but at the same time be relativistic? Does gravity really need to be quantized? How is the gravitational field generated by a quantum superposition shaped? In recent years, several scientists have been proposing ideas which differ from the dominant view. The group is engaged in understanding the source of friction between quantum theory and relativity/gravity [1].

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References:

[11] A. Bassi, Nat. Phys. 11, 626 (2015); G. Gasbarri *et al.*, Phys. Rev. D 96, 104013 (2017).