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Multipartite Superposition of Spacetime from an Operational Perspective

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It is widely anticipated that a quantized theory of gravity will admit quantum spacetime configurations that are described by a superposition of semiclassical spacetimes. However, in the absence of such a complete theory of quantum gravity, can we learn anything about how such states might behave?
In this talk, I will present a recent operational approach to this problem using a first-quantized two-level quantum detector coupled to a quantum-controlled superposition of spacetimes. While this framework has been used to describe bipartite superpositions of black hole masses and accelerated detectors, I will here expand the framework to consider multipartite superpositions and comment on the connection between these set-ups and entanglement harvesting protocols.

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