Black Holes, Causal Order, and Quantum Entanglement

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Abstract

Entanglement harvesting is an operational way to transfer correlations from the quantum vacuum to (idealized) detectors. As such, it provides a new probe of the structure of spacetime via quantum correlations. This becomes particularly interesting when the spacetime has curvature, and even more so if a black hole or a moving mirror is present. A variety of new phenomena occur, including asymmetric time-shift effects, separability islands in parameter space, entanglement inhibition, and sensitivity to topology. Particularly interesting effects take place if the detectors are in a superposition of indefinite causal order. I shall provide an overview of an ongoing research program in this area along with a description of these and other novel results.