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Amplifying the entanglement of detectors around rotating BTZ black holes

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The quantum vacuum has long been known to be characterized by field correlations between spacetime points. These correlations can be swapped with a pair of particle detectors, modelled as simple two-level quantum systems (Unruh-DeWitt detectors) via a process known as entanglement harvesting. We study this phenomenon in the presence of a rotating BTZ black hole, and find that rotation can significantly amplify the harvested vacuum entanglement. Concurrence between co-rotating detectors is amplified by as much as an order of magnitude at intermediate distances from the black hole relative to that at large distances. The effect is most pronounced for near-extremal small mass black holes, and allows for harvesting at large spacelike detector separations. We also find that the entanglement shadow – a region near the black hole from which entanglement cannot be extracted – is diminished in size as the black hole's angular momentum increases.

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