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Entanglement generation by superradiance and its impact in Hawking radiation

Tuesday, March 26, 2024 3:00 PM (1 hour)

We recently showed that superradiance generates entanglement in generic situations. On the other hand, the entanglement generated during Hawking evaporation is a crucial aspect of the Hawking effect, and is influenced by rotational superradiance induced by the black hole ergoregion. In this talk, we will leverage Gaussian quantum information techniques to describe the Hawking process for a rotating black hole in a simple yet powerful manner. This formalism allows to quantify the entanglement generated during the Hawking process in presence of an external thermal bath —CMB radiation —. We will then discuss the entanglement structure of Hawking radiation, detailing the role of superradiance and its interaction with pair creation at the horizon, which leads to a distinctive signature in the quantum correlations of Hawking radiation. We will finish by briefly discussing laboratory analogues where these findings can be tested.

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