

How curved backgrounds affect communication between quantum systems

Wireless communication between quantum systems can be modeled using a pair of Unruh-deWitt detectors interacting with a field in the background. Leveraging quantum properties, this approach could enhance the ability to send classical messages over distances and pave the way for transmitting quantum information. Motivated by these possibilities, we develop a quantum communication protocol using harmonic oscillator detectors coupled to a field and generalize it for any background spacetime. The communication capacities of the resulting channel are sensitive to the gravitational field of the background, suggesting that a curved spacetime could improve communication performance. Furthermore, this setup offers a novel means to probe the quantum characteristics of gravitational fields by analyzing the channel's behavior.

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