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Benchmarks for quantum communication via gravity

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We establish limitations and bounds on the transmission of quantum states between gravitationally interacting mechanical oscillators under different models of gravity. This provides benchmarks that can enable tests for quantum features of gravity. Our proposal does not require the measurement of gravitationally induced entanglement and only requires final measurements of a single subsystem. We discuss bounds for classical models based on local operations and classical communication when considering coherent-state alphabets, and we discuss the transfer of quantum squeezing for falsifying the Schrödinger-Newton model.

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