Title:	Entanglement Generation via Locally Mediated Interactions
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Abstract:	Two similar proposals have been made for witnessing quantum signatures of gravity by Bose et al.[Bose 17] and by Marletto and Vederal [Marletto 17]; these two proposals are based on the claim:A classical system mediating interaction between two quantum systems can not entangle the two quantum systems. Our work is motivated by the above assertion. This work studies the entanglement generation between two quantum systems by interac- tions locally mediated by a third physical system. We aim to test their claim in a simple analytical model, with interaction mediated by a classical system. We then look at the entanglement dynamically created between the quantum systems by a quantum mediator and study the dependence of entanglement on the mediator's various quantum states and state parameters, we look at Gaussian and Fock states configurations of the mediator. We try to identify quantum states which might behave classically in the sense of producing no entanglement. We further study the conditions for a quantum state to behave classically, as proposed in [Morikawa 90] for Gaussian states, and look at the entanglement mediated when the interaction mediating oscillator is initially put in a "classically" behaving Gaus- sian quantum state.
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