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Quantum correlations in a gravitational classical-channel model

In models where gravity is mediated by a quantum field, gravitational interaction between two masses is accompanied by generation of entanglement. Gravitational interaction can yet be reproduced also by gravitational decoherence models where interaction is treated as a classical channel with no entanglement generation [1,2]. Here, we show that, despite the absence of entanglement, such a classical model entails creation of quantum correlations in the form of discord. Starting from a (fully classical) two-mode coherent state of two masses, we show that discord is generated reaching a universal asymptotic value, which can be worked out in a simple analytic form.

[1] D. Kafri, J. M. Taylor, and G. J. Milburn, New J. Phys. 16, 065020 (2014)
[2] J.L. Gaona-Reyes, M. Carlesso and A. Bassi, arXiv:2007.11980

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