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Quantum Discord Bounds the Amount of Distributed Entanglement[1] MARCO PIANI, Institute for Quantum Computing, University of Waterloo, TAN KOK CHUAN, Centre for Quantum Technologies, National University of Singapore, JEAN MAILLARD, Blackett Laboratory, Imperial College London, KAVAN MODI, Department of Physics, University of Oxford, TOMASZ PATEREK, Nanyang Technological University, Singapore, MAURO PATERNOSTRO, Queen's University, Belfast — The ability to distribute quantum entanglement is a prerequisite for many fundamental tests of quantum theory and numerous quantum information protocols. Two distant parties can increase the amount of entanglement between them by means of quantum communication encoded in a carrier that is sent from one party to the other. Intriguingly, entanglement can be increased even when the exchanged carrier is not entangled with the parties. However, in light of the defining property of entanglement stating that it cannot increase under classical communication, the carrier must be quantum. Here we show that, in general, the increase of relative entropy of entanglement between two remote parties is bounded by the amount of nonclassical correlations of the carrier with the parties as quantified by the relative entropy of discord. We study implications of this bound, provide new examples of entanglement distribution via unentangled states, and put further limits on this phenomenon.

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