Discriminating Quantum Correlations with Networking Quantum Teleportation

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The Bell inequality, and its substantial experimental violation, offers a seminal paradigm for showing that the world is not in fact locally realistic. Here, going beyond the concept of Bell's inequality, we show that quantum teleportation can be used to quantitatively characterize quantum correlations using a generic physical model of genuinely classical processes. The validity of the proposed formalism is demonstrated by considering the problem of teleportation through a linear three-node quantum network. A hierarchy is derived between the Bell nonlocality, nonbilocality, steering and nonlocality-steering hybrid correlations based on a process fidelity constraint. The proposed formalism can be directly extended to reveal the nonlocality structure behind teleportation through any linear many-node quantum network. The formalism provides a faithful identification of quantum teleportation and demonstrates for the first time the use of quantum-information processing as a means of quantitatively discriminating quantum correlations.

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[1] S.-H. Chen, H. Lu, Q.-C. Sun, Q. Zhang, Y.-A. Chen, and C.-M. Li, *Discriminating Quantum Correlations with Networking Quantum Teleportation*, arXiv:1805.02431 (2018).