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Performance of Port-based teleportation

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Quantum teleportation is one of the fundamental building blocks of quantum Shannon theory. While ordinary teleportation is simple and efficient, port-based teleportation (PBT) enables applications such as universal programmable quantum processors, instantaneous non-local quantum computation and attacks on position-based quantum cryptography. In this work, we determine the fundamental limit on the performance of PBT: for arbitrary fixed input dimension and a large number N of ports, the error of the optimal protocol is proportional to the inverse square of N. We also give an improved converse bound of matching order in the number of ports. In addition, we determine the leading-order asymptotics of PBT variants defined in terms of maximally entangled resource states.

This is joint work with Felix Leditzky, Christian Majenz, Graeme Smith, Florian Speelman, Michael Walter, available here: https://arxiv.org/abs/1809.10751

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