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Optimal bounds on fidelity of quantum state transfer with respect to errors

Quantum state transfer within a quantum computer can be achieved through the use of a quantum spin chain as a "data bus" for quantum states. More generic graphs besides a chain can also be used to perform this important task. The fidelity, which measures the closeness between two quantum states, is used to determine the accuracy of the state transfer. Ideally the fidelity is 1, representing perfect state transfer. We analyse the sensitivity of the fidelity of a graph exhibiting perfect state transfer to small perturbations in readout time and edge weight in order to obtain physically relevant bounds on the fidelity.

Joint work with Whitney Gordon, Steve Kirkland, Chi-Kwong Li, and Xiaohong Zhang