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Shortcuts to adiabaticity for accelerated quantum state transfer
ALEXANDRE BAKSIC, HUGO RIBEIRO, AASHISH A. CLERK, Department of physics, McGill University — Adiabatic transfer protocols are among the most powerful and interesting approaches to move quantum states between two different systems. While having many advantages, those schemes are necessarily slow, and hence can suffer from dissipation and noise in the target and/or source system.
In this talk, we present an approach that allows to operate a state transfer much faster, without suffering from non-adiabatic errors. The key idea is to work with a basis of dressed states whose very definition incorporates the matrix elements which give rise to non-adiabatic transitions [1]. By introducing additional control fields, we can ensure that the system "rides" these new dressed states during the protocol, thus allowing for a fast high fidelity state transfer. We discuss a recent experimental implementation of these ideas in an NV-center Λ-system [2], as well as extensions to state transfer problems involving propagating states.
[1] A. Baksic, H. Ribeiro, and A. A. Clerk, Phys. Rev. Lett. **116**, 230503 (2016).
[2] B. B. Zhou, A. Baksic, H. Ribeiro, C. G. Yale, F. J. Heremans, P. C. Jerger, A. Auer, G. Burkard, A. A. Clerk, and D. D. Awschalom, arXiv:1607.06503 (to appear in Nature Physics).

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