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The power of photons: Cavity-mediated energy transfer between quantum devices

We investigate the coherent energy transfer between two quantum systems mediated by a quantum bus. In particular, we consider the energy transfer process between two qubits, and how it can be influenced by using a resonant cavity as a mediator. Inspecting different figures of merit and considering both on and off-resonance configurations, we characterize the energy transfer performances. We show that the cavity-mediated process is progressively more and more efficient as function of the number of photons stored in the cavity that acts as a quantum bus. The speeding-up of the energy transfer time, due to a quantum mediator paves the way for new architecture designs in quantum technologies and energy based quantum logics.

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