Adiabatic charge pumping in open quantum systems

G. M. Graf
Institute of Theoretical Physics
ETH - Honggerberg
Zurich, CH-8093, Switzerland

Abstract

We introduce a mathematical setup for charge transport in quantum pumps connected to a number of external leads. Under rather general assumption on the Hamiltonian describing the system, in the adiabatic limit, the current through the pump is given by a formula of Büttiker, Pretre, and Thomas, relating it to the frozen S-matrix and its time derivative. The result entails an adiabatic theorem for a gapless quantum mechanical system.

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