

Nonlinear Current Response of an Isolated System of Interacting Fermions

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Nonlinear real-time response of interacting particles is studied on the example of a one-dimensional tight-binding model of spinless fermions driven by electric field. We show that for a nonintegrable case at finite temperatures the major effect of nonlinearity can be taken into account within the linear response formalism extended by a renormalization of the kinetic energy due to the Joule heating. On the other hand, integrable systems show on constant driving a different universality with a damped oscillating current whereby the frequency is related but not equal to the Bloch oscillations. Results for a single carrier moving in a two-dimensional t-J system under a constant electric field will be discussed as well.

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