

Achim Rosch
Koeln University, Koeln, Germany

Spin and heat pumps in approximately integrable systems

We discuss how one can generate large heat and current in spin chain materials by driving the system, e.g., with a terahertz laser. We use systems which are to a good approximation described by 1d Heisenberg models. Such models are integrable and possess an infinite number of conservation laws. In the real material, however, integrability is weakly broken, e.g., by the coupling to phonons. In the limit of weak driving and weak phonon coupling, the system can be described by rate equations for the approximate conservation laws. Huge currents are generated when pumping rates can compensate decay rates arising from the phonon coupling.