

Quantum transport across a Bose-Hubbard chain

The problem of a chain of quantum dots coupled to two bosonic reservoirs is presented. The chain is described by a Bose-Hubbard Hamiltonian. The effect of the reservoirs is taken into account in two different ways, which lead to two approaches to solve the problem. The first possibility is to construct a Markovian Master equation in Lindblad form and solve it, the second one is to write down the scalar action of the system and extract from it all nonequilibrium Green's functions we need. In the noninteracting exactly solvable case both approaches give the same results, but they offer different ways to approximate the interparticle interaction in the chain. The approximations are applied to the particular case of a chain of three and four quantum dots. The behaviour of the steady state current through the system and the mean particle occupation of the dots is discussed.