

QUANTUM TRANSPORT THROUGH NANO-DEVICES: A SCATTERING-STATES NUMERICAL RENORMALIZATION GROUP APPROACH TO OPEN QUANTUM SYSTEMS

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We propose a numerical renormalization group (NRG) approach to steady-state currents through nano-devices. A discretization of the scattering-states continuum ensures the correct boundary condition for an open quantum system. We introduce two degenerate Wilson chains for current carrying left and right-moving electrons reflecting time-reversal symmetry in the absence of a finite bias. We employ the time-dependent NRG to evolve the known steady-state density operator for a non-interacting junction into the density operator of the fully interacting nano-device at finite bias. We present calculations of the temperature dependent current as function of an applied external magnetic field using a recently developed algorithm for non-equilibrium spectral functions.