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Non-equilibrium transport in the quantum dot: quench dynamics and non-equilibrium steady state[1] ADRIAN CULVER, NATAN ANDREI, Rutgers Univ — We present an exact method of calculating the non-equilibrium current driven by a voltage drop across a quantum dot. The system is described by the two lead Anderson model at zero temperature with on-site Coulomb repulsion and non-interacting, linearized leads. We prepare the system in an initial state consisting of a free Fermi sea in each lead with the voltage drop given as the difference between the two Fermi levels. We quench the system by coupling the dot to the leads at $t = 0$ and following the time evolution of the wavefunction. In the long time limit a new type of Bethe Ansatz wavefunction emerges, which satisfies the Lippmann-Schwinger equation with the two Fermi seas serving as the boundary conditions. This exact, non-perturbative solution describes the non-equilibrium steady state of the system. We describe how to use this solution to compute the infinite time limit of the expectation value of the current operator at a given voltage, which would yield the I-V characteristic of the dot.

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