

Quantum transport in mesoscopic systems: interference and correlation effects in quantum dots

Abstract

A few concepts and physical effects defintory for mesoscopics are presented in introduction with emphasis on the interference and interaction processes.

The Meir-Wingreen formalism of the quantum transport and the main tool consisting of the nonequilibrium Green functions are described. The way this technique works is shown for the single impurity Anderson model, which is a model for the small quantum dots exhibiting the mesoscopic Kondo effect. Two extensions will be discussed referring to : i) specific aspects coming up in multiply-connected mesoscopic systems, and ii) behaviour of the differential conduction of quantum dots in the nonequilibrium case.