Effects of decoherence and Rashba-type spin-orbit interaction on quantum transport in mesoscopic structure

Stusent: Ching-Hang Chien Advisors: Dr. Chon-Saar Chu
Institute of Electro-physics
National Chiao Tung University

Abstract

In many researches, the scale of system is much smaller then coherent length. So it neglect the de-phase process due to electron scattering. We use custom method to induce numerical de-phase process in 1-D case to solve 2-D problem through considering sub-band mixing. Observe de-coherent strength how to influence the conductance of double quantum point contacts (QPCs) in series.

Next, we consider an open quantum dot connected via two narrow constriction (NC) to the source and drain electrode. The NC has both Dresselhaus and Rashba spin-orbit interaction while the open quantum dot has only Rashba (SOI). Effects of the dot configuration and the SOI coupling constants on the spin-dependent characteristics will be studied.

非同調效應和 Rashba-type 自旋軌道交互作用對介觀下量子傳輸的影響

研究生: 簡靖航　　指導教授: 朱仲夏 博士

國立交通大學電子物理研究所

摘要

在大多數研究中，系統的尺度常小於同調長度。因此這假設忽略了由電子散射產生的非同調效應。我們用一維中系統中處理非同調效應的做法處理二維系統並考慮二維系統中的次能帶干涉。觀察非同調效應如何影響串聯量子接點的電導。

接下來，我們考慮一個開放式量子點兩端接有通道至 source 端和 drain 端。通道中有 Rashba-type 和 Dresselhaus-type 自旋軌道交互作用，而量子點只考慮較強的 Rashba-type 自旋軌道交互作用。而我們將會觀察到和自旋有關的傳輸特性。