

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

0.7 anomaly due to the Rashba interaction in a nonuniform electric field J.H. HSIAO, K.M. LIU, S.Y. HSU, T.M. HONG — We demonstrate that three conductance features, 0.5 and 0.7 G_0 plateaus and a dip at 0.5 G_0 , observed in quantum point contacts (QPCs) can be consistently explained by the Rashba interaction in the nonuniform electric field created by the side gates along the transport direction. A quantity is defined which depends on the extent of this nonuniformity and the electron density. A short QPC tends to have a small . Only when is large will the Rashba interaction produce a potential well deep enough to localize the electron. This provides the bound state that forms the Kondo resonance with the tunneling electrons. We propose to compare the medium/long QPC to small/large quantum dots, which are governed by the Kondo physics and the Coulomb blockade, respectively. The relation between 0.7 anomaly and the side-gate voltage, length of QPC, and temperature can all be determined to agree qualitatively with the experiments.

Jen Hao Hsiao

Date submitted: 13 Nov 2009

Electronic form version 1.4