Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Mesoscopic conductance fluctuations in a coupled quantum dot system KAZUTAKA TAKAHASHI, RIKEN, Japan, TOMOSUKE AONO, Ben-Gurion University of the Negev, Israel — We study electron transport properties of an Aharonov-Bohm ring containing two quantum dots. One of the dots has well-separated resonant levels and the other dot is chaotic and is treated by random matrix theory. We develop a statistical theory of the conductance through the dot using the supersymmetry method and the numerical calculation, and find that the conductance is significantly affected by mesoscopic fluctuations. The Breit-Wigner resonant peak of the conductance is changed to an antiresonance by increasing the ratio of the level broadening to mean level spacing of the random dot. The asymmetric Fano form turns into a symmetric one and the resonance peak can be controlled by magnetic flux. We also find that the conductance distribution shows rich behavior depending on the fluctuations of the chaotic dot and the position of the resonance peaks.

Kazutaka Takahashi
RIKEN, Japan

Date submitted: 27 Nov 2005 Electronic form version 1.4