

# HATANO LAB.

## [Theoretical Study of Electronic Conduction of Quantum Dots]

Department of Fundamental Engineering

<http://hatano-lab.iis.u-tokyo.ac.jp>

Many-Body Physics

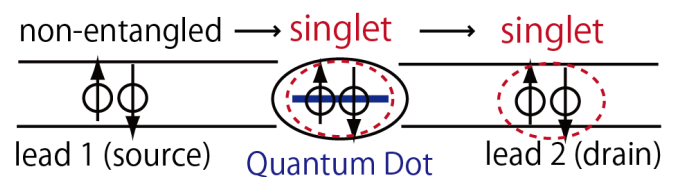
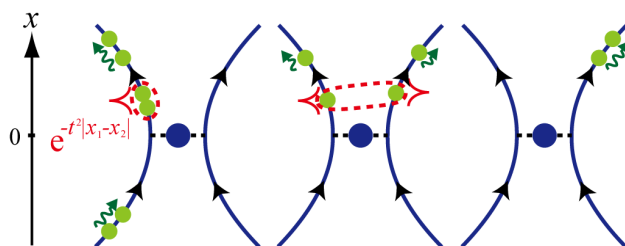
Department of Physics

## Entanglement Generation with Quantum Dots

Generating Quantum Entanglement just by Electronic Conduction through Quantum Dots

**Rigorous Calculation of Scattering State of a Quantum Dot with Interaction**  
**A Novel Two-Body Bound State of Electrons after Passing through a Dot**  
**Generation of a Singlet of Spins  $\uparrow$  and  $\downarrow$  after Passing through a Dot**

A. Nishino, T. Imamura, N. Hatano: Phys. Rev. Lett. **102**, 146803 (2009); Phys. Rev. B **83**, 035306 (2011);  
 T. Imamura, A. Nishino, N. Hatano: Phys. Rev. B **80**, 245323 (2009).

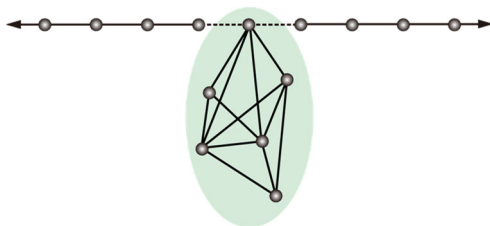


## New Conductance Formula of a Quantum Dot

Conductance Formula of a Quantum Dot based on Resonant States

**A New Expression of Conductance of Quantum Dots of a Generalized Friedrichs Type only in terms of Resonant States and Bound States**  
**Fano Asymmetry of Conductance Peaks is due to Interference between Resonant States**

K. Sasada, N. Hatano, G. Ordonez: submitted.



$$G = \frac{e^2}{h} \left[ 1 \pm \sqrt{1 - \left( \frac{\rho_{\text{eigen}}(E)}{\rho_{\text{leads}}(E)} \right)^2} \right]$$

