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Phonon Spectroscopy by Electrical Measurement in Coupled Quantum Dots AKIKO UEDA, Deparment of Physics, Keio University, MIKIO ETO, Faculty of Science and Technology, Keio University — We propose a phonon spectroscopy by electrical measurement in coupled quantum dots. We consider T-shaped double quantum dots, in which one of the dots is connected to external leads (dot 1) and the other is disconnected (dot 2). The differential conductance shows a dip at the midpoint of the two peaks by resonant tunneling through bonding or antibonding orbitals between the two dots, when the energy levels are tuned in the dots. The dip is caused by the destructive interference between the electron waves passing by the molecular orbitals. We calculate differential conductance under finite bias $V_{\rm bias}$ using Keldysh Green function method.[1] The conductance dip is diminished by electron-phonon interaction since phonon emission from dot 2 destroys the interference between electron waves passing through only dot 1 and waves passing through both dots. The dip as a function of $V_{\rm bias}$ reflects a product of the density of states for phonons at $eV_{\rm bias}$ and strength of electron-phonon coupling in dot 2. This implies a new method of electrically detected phonon spectroscopy.

[1]A. Ueda and M. Eto, Phys. Rev. B **73**, 235353 (2006); New J. Phys. **9**, 119 (2007).

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