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Fano-Kondo effect in a two-level system with triple quantum dots

TETSUFUMI TANAMOTO, YOSHIFUMI NISHI, SHINOBU FUJITA, Advanced LSI Technology Laboratory, Toshiba Corporation — Quantum dot (QD) systems have been providing opportunities to probe a wide variety of many-body effects in microelectronic structures. Recently, the Fano effect, which appears as a result of quantum interference between a discrete single energy level and a major electronic system, has attracted the interests of many researches [1]. Here, we theoretically study the Fano-Kondo effect and Fano effect in a triple QD system, where two QDs constitute a two-level system and the other QD works in a detector with electrodes. When two QDs are coupled, bonding and anti-bonding states are formed. It is expected that the detector current reflects these electronic states. Indeed, we found that the Fano dip is modulated by strongly coupled QDs with a slow detector. We also compare noise properties of Fano-Kondo effect with those of Fano effect, and we found that, depending on the coupling strength among the QDs, noise and the Fano factor are greatly modulated for a slow detector. These suggest a new method of reading out qubit states [2].— [1] A. W. Rushforth et al., Phys. Rev. B 73, 081305 (2006). [2] T. Tanamoto et al., Phys. Rev. B 76, 155319 (2007); arXiv:0710.0912.

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