

Abstract Submitted
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Bidirectional Single-Electron Counting and the Fluctuation Theorem¹ YASUHIRO UTSUMI, Institute for Solid State Physics, University of Tokyo, DIMITRI GOLUBEV, Forschungszentrum Karlsruhe, MICHAEL MARThALER, Universitaet Karlsruhe, KEIJI SAITO, Graduate School of Science, University of Tokyo, TOSHIMASA FUJISAWA², NTT Basic Research Laboratories, GERD SCHOEN³, Universitaet Karlsruhe — We investigate the direction-resolved full counting statistics of single-electron tunneling through a double quantum dot system and compare with predictions of the fluctuation theorem (FT) for Markovian stochastic processes. Experimental data obtained for GaAs/GaAlAs heterostructures appear to violate the FT. After analyzing various potential sources for the discrepancy we conclude that the nonequilibrium shot noise of the quantum point contact electrometer, which is used to study the transport, induces strong dot-level fluctuations which significantly influence the tunneling statistics. Taking these modifications into account we find consistency with the FT once we introduce the “effective temperature.” Y. Utsumi, D. S. Golubev, M. Marthaler, K. Saito, T. Fujisawa, Gerd Schoen, arXiv:0908.0229

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