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Fluctuation theorem for a double quantum dot coupled to a point-contact electrometer YASUHIRO UTSUMI, Department of Physics Engineering, Faculty of Engineering, Mie University, DMITRI GOLUBEV, MICHAEL MARTHALER, GERD SCHOEN, Karlsruhe Institute of Technology, MIE UNIVERSITY, JAPAN COLLABORATION, KARLSRUHE INSTITUTE OF TECHNOLOGY, GERMANY COLLABORATION — We study the fluctuation theorem in single-electron sequential tunneling regime. We consider single-electron transport through a double quantum dot (DQD) monitored by a capacitively coupled quantum point-contact (QPC) electrometer. In this setup it is possible to perform a direction resolved real-time electron counting experiment. We derive the full counting statistics for the coupled DQD - QPC system and obtain the joint probability distribution of the charges transferred through the DQD and the QPC. We show that the joint probability distribution satisfies the fluctuation theorem for 4-terminal system. For two-terminal DQD, the effective temperature should be introduced to recover the fluctuation theorem. The system can be described by a master equation with tunneling rates depending of the counting fields and satisfying a generalized local detailed-balance relation. Furthermore, we derive universal relations between the non-linear corrections to the current and noise, which can be verified in experiment.

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