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**Dissipated work and fluctuation relations for non-equilibrium single-electron transitions** AKI KUTVONEN, JUKKA PEKOLA, TAPIO ALANISSILÄ, Aalto University — We discuss a simple but experimentally realistic model system, a single-electron box (SEB), where common fluctuation relations can be tested for driven electronic transitions. We show analytically that when the electron system on the SEB island is driven to a non-equilibrium state by the control parameter (gate voltage), the common fluctuation relation (Jarzynski equality) is not valid due to dissipated heat even when the system starts at thermal equilibrium and returns to it after the drive has been stopped. We perform no feedback on the system. However, an integral fluctuation relation based on total entropy production works also in this situation. We perform extensive Monte Carlo simulations of single-electron transitions in the SEB setup and find good agreement with the theoretical predictions.

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