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Fluctuation Relations for Current Components in Mesoscopic Electric Circuits NIKOLAI SINITSYN, Los Alamos National Lab, SRIRAM GANESHAN, University of Maryland, College park — Discovery of Fluctuation Theorems (FTs) for non-equilibrium systems led to optimism that they might serve as universal laws that had long been missing from the study of nonequilibrium systems. Surprisingly, recent experimental work has shown that the FTs can fail in an electric circuit, but could be salvaged under the experimental conditions if the affinity parameter is suitably renormalized by a factor of 0.1. Motivated by this new experimental result we present a new class of fluctuation relations, to which we will refer as "Fluctuation Relations for Current Components" (FRCCs). Unlike standard fluctuation theorems, FRCCs follow from the seemingly trivial fact that to know statistics of particle currents, it is sufficient to know only statistics of single particle geometric trajectories while the information about time moments, at which particles make transitions along such trajectories, is irrelevant. We also show that FRCCs are robust in the sense that they do not depend on some basic types of electron interactions and some quantum coherence effects.

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