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Nonequilibrium noise and current fluctuations at the superconducting phase transition[1] DMITRY BAGRETS, University of Cologne, ALEX LEVCHENKO, Michigan State University — We study non-Gaussian out-of-equilibrium current fluctuations in a mesoscopic NSN circuit at the point of a superconducting phase transition. The setup consists of a voltage-biased thin film nanobridge superconductor (S) connected to two normal-metal (N) leads by tunnel junctions. We find that above a critical temperature fluctuations of the superconducting order parameter associated with the preformed Cooper pairs mediate inelastic electron scattering that promotes strong current fluctuations. Though the conductance is suppressed due to the depletion of the quasiparticle density of states, higher cumulants of current fluctuations are parametrically enhanced. We identify experimentally relevant transport regime where excess current noise may reach or even exceed the level of the thermal noise.

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