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Breaking the fluctuation-dissipation relation by universal transport processes ASIER PIÑEIRO ORIOLI, JILA, NIST and University of Colorado, 440 UCB, Boulder, CO 80309, USA, JÜRGEN BERGES, Institute for Theoretical Physics, Heidelberg University, Philosophenweg 16, 69120 Heidelberg, Germany — Universal phenomena far from equilibrium exhibit additional independent scaling exponents and functions as compared to thermal universal behavior. For the example of an ultracold Bose gas we simulate nonequilibrium transport processes in a universal scaling regime and show how they lead to the breaking of the fluctuation-dissipation relation. As a consequence, the scaling of spectral functions (commutators) and statistical correlations (anti-commutators) between different points in time and space become linearly independent with distinct dynamic scaling exponents. As a macroscopic signature of this phenomenon we identify a transport peak in the statistical two-point correlator, which is absent in the spectral function showing the quasi-particle peaks of the Bose gas.

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