Anomalous fluctuation relations

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We study Fluctuation Relations (FRs) for dynamics that are anomalous, in the sense that the diffusive properties strongly deviate from the ones of standard Brownian motion. We first briefly review the concept of transient work FRs for stochastic dynamics modeled by a simple Langevin equation [1]. We then introduce three generic types of dynamics generating anomalous diffusion: Lévy flights, long-time correlated Gaussian stochastic processes and time-fractional kinetics. By combining Langevin and kinetic approaches we calculate the work probability distributions for a particle subject to a constant force [2]. This allows us to check the transient work FR for anomalous dynamics. We find novel forms of FRs, which are intimately related to the validity of fluctuation-dissipation relations [2,3]. We provide evidence that these findings are important for understanding fluctuations in experimentally accessible glassy systems.

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[2] A.V.Chechkin, F.Lenz, R.Klages, J.Stat.Mech. L11001 (2012)

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