Universal statistics of entropy production in Langevin processes

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Fluctuations of the stochastic entropy production of nonequilibrium processes obey universal relations - these universal relations govern the fluctuations of active molecular processes. Here, we discuss stochastic entropy production of Langevin processes. We show that a stochastic time transformation renders fluctuations of the stochastic entropy production universal. The recently derived infimum laws, first-passage-time fluctuation theorems, and the martingale property of the exponentiated negative entropy production [1], follow from the stochastic time transformation. Additionally, we derive universal relations for entropy-production suprema and level crossings. In summary, we derive a simple equation for stochastic entropy production of Langevin processes that reveals its universal features.

[1] I. Neri, E. Roldán and F. Jülicher, Phys. Rev. X 7 (2017) 011019