Cutoff thermalization for Ornstein-Uhlenbeck systems with small Lévy noise in the Wasserstein distance

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This talk presents recent results on cutoff thermalization (also known as the cutoff phenomenon) for a general class of general Ornstein-Uhlenbeck systems under ϵ-small additive Lévy noise. The driving noise processes include Brownian motion, α-stable Lévy flights, finite intensity compound Poisson processes and red noises and may be highly degenerate. Window cutoff thermalization is shown under generic mild assumptions, that is, we see an asymptotically sharp $\frac{\infty}{0}$-collapse of the renormalized Wasserstein distance from the current state to the equilibrium measure μ^ϵ along a time window centered in a precise ϵ-dependent time scale t_ϵ. In many interesting situations such as reversible (Lévy) diffusions it is possible to prove the existence of an explicit, universal, deterministic cutoff thermalization profile. The existence of this limit is characterized by the absence of non-normal growth patterns in terms of an orthogonality condition on a computable family of generalized eigenvectors of the matrix Q. With this piece of theory at hand this article provides a complete discussion of the cutoff phenomenon for the classical linear oscillator with friction subject to ϵ-small Brownian motion or α-stable Lévy flights. Furthermore, we cover the highly degenerate case of a linear chain of oscillators in a generalized heat bath at low temperature.