# Long-range correlated processes: confinement, heterogeneity, & tempering

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Stochastic processes driven by Gaussian yet power-law correlated noise, such as Mandelbrot's fractional Brownian motion (FBM) are ubiquitous in a range of complex systems, e.g., for the motion of tracers in viscoelastic environments, in "rough" financial data, or for the persistent motion of animals. FBM is an ergodic yet strongly non-Markovian process, with often surprising behaviour. In this talk I will briefly introduce these processes and demonstrate that in strong confinement their probability density may assume multimodal shapes, while in soft external potentials no steady state exists. An application to brain fibre growth is discussed. In heterogeneous environments the dynamics of a diffusing test particle may become a (random or deterministic) function of time. For these cases I will introduce novel extensions of FBM such as memory-multimodal FBM and FBM with a "diffusing diffusivity". Finally, I will discuss tempering of the power-law correlations, to emulate systems with a finite correlation time. This description is a good description for observed dynamics of lipid molecules in model membranes.