Non-Markovian Brownian dynamics in nonequilibrium baths

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The Brownian motion of a dense particle in a liquid at thermal equilibrium is the historical paradigm of non-Markovian dynamics—in which the slow decay of the velocity correlation function was first measured, questioned, and finally theoretically understood. The same dynamics taking place in a nonequilibrium solvent is arguably the simplest system to understand the interplay between long-time tails and energy dissipation. In my talk I will begin by considering a solvent under a thermal gradient. This case allows us to analytically work out the breaking of the equipartition and fluctuation-dissipation theorem starting from the fluctuating hydrodynamics of the liquid [2]. Then I will focus on a stirred (or active) solvent. To this aim I will introduce an approach based on nonequilibrium response theory able to unveil *inter alia* the breaking of the action-reaction law for suspended Brownian particles [3].

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