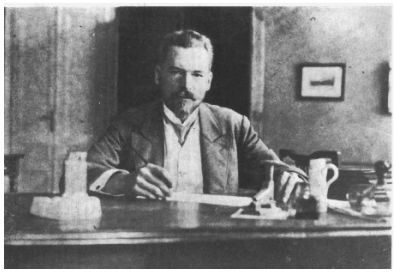

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Stochastic resetting: When does it accelerate diffusive transport?

Monday, 27 September 2021 09:00 (30 minutes)

Stochastic resetting [1] can either accelerate or delay a dynamical process that takes a random time to complete (i.e., a first-passage process). Tuning system parameters can invert the effect of resetting on the mean completion time of the process, leading to a *resetting transition.* In this talk, I shall first explore the exact conditions where stochastic resetting accelerates diffusive transport for a couple of analytically tractable systems, viz.,

(i) diffusion in a linear potential, where the resetting transition is found to be governed by the Péclet number [2],

(ii) diffusion in a logarithmic potential, that exhibits a series of dynamical transitions when the constant strength of the potential in the units of thermal energy, is tuned [3].

Based on the common trends that these model systems show, a general framework can be proposed that reveals that the resetting transition is governed by an interplay between thermal and potential energy; when thermal energy dominates the dynamics, resetting can expedite the process [4]. Finally, considering a toy model for space-dependent diffusion, I shall show that whenever a dynamical process is diffusion-controlled, resetting can, in principle, accelerate it [5]. We believe that our analysis will be useful in a variety of natural as well as man-made systems where resetting plays a crucial role in diffusive transport.

References:

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[5] S. Ray, J. Chem. Phys. 153, 234904, (2020).

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