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S E M I N A I R E

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« Effect of crowding and hydrodynamic interactions on the dynamics of fluctuating systems »

Describing the interactions of a fluctuating object with its environment is an ubiquitous problem of statistical physics, with applications in the understanding of biological self-organisation. I will first focus on the dynamics of a driven particle in a host medium which hinders its motion through crowding interactions. Going beyond the usual effective descriptions of the environment of the active tracer, we propose a model which takes explicitly into account the correlations between the dynamics of the tracer and the response of the bath and for which we determine analytically exact and approximate solutions, that reveal intrinsically nonlinear and nonequilibrium properties. I will then present recent experimental results that reveal how the diffusivity of exothermic and fast enzymes can be enhanced when they are catalytically active. In order to identify the physical mechanisms at stake in this phenomenon, we perform measurements on the endothermic and relatively slow enzyme aldolase, which also shows substrate-induced enhanced diffusion. We propose a new physical paradigm, which reveals that the diffusion coefficient of a model enzyme hydrodynamically coupled to its environment increases significantly when undergoing changes in conformational fluctuations in a substrate concentration dependent manner, and is independent of the overall turnover rate of the underlying enzymatic reaction.

Mercredi 15 novembre 2017
15h00

SALLE DE CONFERENCE