

Non-Arrhenius barrier-crossing dynamics of non-equilibrium non-Markovian systems

Motivated by in-vivo protein folding, we merge systems far from equilibrium and non-Markovian barrier-crossing dynamics and use a generic one-dimensional model that can be turned off equilibrium by choosing different friction and random relaxation times. We analytically derive a formula for the barrier-crossing time and favorably compare it with extensive non-equilibrium simulations. Non-equilibrium effects modify the basic law of reaction kinetics, the Arrhenius law, by changing the exponential dependence of the barrier-crossing time on the barrier energy, which is a very unexpected and fundamental result.