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### Metastable Fokker-Planck Equations

Singular perturbations of Fokker-Planck equations with multistable drift lead to the phenomenon of metastability: the solution remains trapped for long stretches of time around a stable state with occasional, relatively quick transitions between different stable states. The relevant time scales at which the transitions among stable states occur are governed at first order (in the perturbation parameter) by the so-called Eyring-Kramers formula.

The aim of this lecture is to

- review heuristics and some rigorous analytical approaches to the metastability problem in the simplest setting. The focus will be in particular on some explicit and basic one-dimensional computations and on general ideas on how to derive the Eyring-Kramers formula.
- make connections to topics which in a way or another enter the analysis of metastability (as the semiclassical spectral theory of Schrödinger operators, Large deviation estimates for stochastic differential equations, potential theory) or where metastability plays an important role (molecular dynamics simulations, statistical physics).
- discuss infinite-dimensional models (arising for example by considering small stochastic perturbations of PDEs as the Allen-Cahn equation) and point to open problems.