

Anton Bovier (Berlin) and Frank den Hollander (Leiden)

METASTABILITY UNDER STOCHASTIC DYNAMICS.

Metastability is a ubiquitous phenomenon of the dynamical behaviour of complex systems.

In the first part of this lectures series (Bovier), we describe recent attempts towards a model-independent approach to metastability in the context of reversible Markov processes. We present an outline of a general theory, based on a careful use of potential theoretic ideas, and illustrate this theory by looking at metastability for diffusions.

In the second part (den Hollander), we concentrate on applications to concrete models, mainly focussing on conservative dynamics of lattice gases. We analyze the energy landscape and introduce crucial concepts such as communication heights, essential gates, dead ends and "pozzi profondi". We then show how this analysis links with the general formalism, in the context of finite volumes and low temperatures.

In the third part (Bovier and den Hollander), we discuss some major challenges, in particular, the analysis of metastability at finite temperatures and in large, possibly infinite, volumes. We point to some preliminary ideas how to deal with these.