Metastability and coarse-graining of stochastic systems

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The study of rare events in physical, chemical and biological systems are important and challenging due to the huge span of time scales. Coarse-graining techniques, Markov state models for example, are employed to reduce the degree of freedom of the system, and hence enables simulation and understanding of the system on a long time scale. In this talk, we will introduce a novel construction of Markov state model based on milestoning. We will focus on the analysis of quality of approximation when the original system is metastable. The analysis identifies quantitative criteria which enable automatic identification of metastable sets.