Berlin Mathematical School

BMS Friday Colloquium

Friday 29 January 2016 at 14:15
Tea & Cookies starting at 13:00

BMS Loft, Urania, An der Urania 17, 10787 Berlin

Christof Schütte
(ZIB/FU)

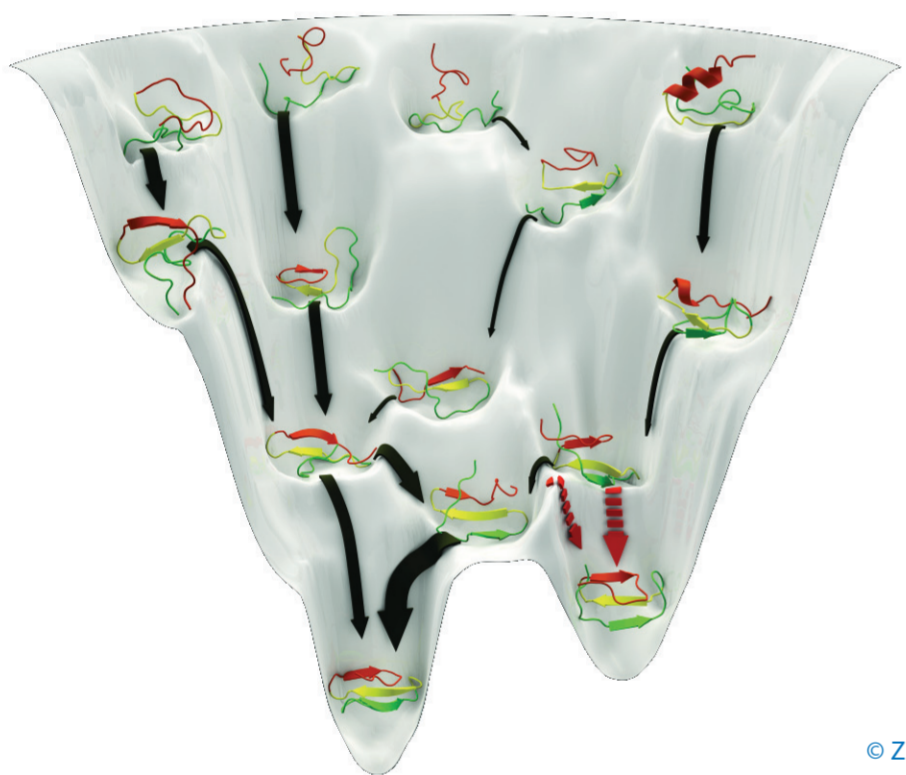© ZIB

Model reduction for stochastic processes exhibiting multiple scales

We consider stochastic processes as they appear in modelling molecular and cellular dynamics. Such processes exhibit a rich hierarchy of scales that easily span 15 orders of magnitude in time and several more in space. However, understanding biological function typically requires information about the dynamical behavior on the longest timescales and often also on large spatial scales.

Simulation of the processes on such scales is not feasible today, not even on the fastest and largest supercomputers. Therefore mathematical strategies are required that allow for a massive reduction of complexity but still lead to good approximation of the dynamical behavior on the largest scales. The talk will review the progress that has been made in this direction in recent years along the lines of metastable process and transfer operator analysis but will also discuss open problems and main challenges for future research. It will start with a detailed introduction into the biological background.

Christof Schütte is a professor in the Mathematics and Computer Science Department at Freie Universität Berlin (FU). He holds a diploma in physics and a PhD in mathematics. His research is on modelling, simulation and data analysis in the life sciences with a special focus on stochastic multiscale problems in molecular and systems biology and on information-based medicine. Since 2008, he is the co-chair of the Research Center MATHEON, and currently the president of the Zuse Institute Berlin (ZIB).

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