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Dynamics of Large Fluctuations: from Chaotic Attractors to Ion Channels

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D202 Seminar room, School of Engineering, 2nd Floor

Abstract: Large fluctuations play a fundamental role in a wide range of important processes -- from earthquakes to nucleation at phase transitions, also for mutations in DNA sequences, for thermal instability of quantum dot and for magnetic reversal in nano-magnets. Such large fluctuations can be considered in the framework of the concept of optimal paths – deterministic patterns of stochastic motion. The main advantage of this concept is that it can be applied to non-equilibrium multi-dimensional systems and, thus, the concept enables the investigation of a wide range of problems that are important in engineering, physics and biology. I will consider the application of this concept for understanding and controlling large fluctuations in systems with chaotic attractors. Properties of two different types of chaotic attractors: quasi-hyperbolic and non-hyperbolic, will be briefly discussed and the problem of noise-induced escape from these attractors will be analysed. Then molecular dynamics modelling of transport of an ion via a protein will be considered. Existing approaches for describing ion motion will be briefly discussed and ion's transport in KcsA Potassium Channel will be analysed.

More info: http://www2.warwick.ac.uk/fac/sci/wcpm/seminars

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