Seminário de sistemas dinâmicos e estocásticos

Departamento de Matemática - IMECC - UNICAMP

Macroscopic energy fluctuations: from normal diffusion to superdiffusion in the evanescent noise limit

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Resumo:

Over the last few years, anomalous behaviors have been observed for one-dimensional chains of oscillators. Recently, Bernardin, Gonalves and Jara proved the following result: when the one-dimensional system is given by an unpinned harmonic chain of oscillators perturbed by an energy-momentum conserving noise, the energy fluctuation field at equilibrium evolves according to an infinite dimensional 3/4-fractional Ornstein-Uhlenbeck process.

This talk will aim to understand the regime transition for the energy fluctuations. Let us consider the same harmonic Hamiltonian dynamics, but now perturbed by two degenerate stochastic noises S1 and S2: if S2=0, the volume is conserved, the energy transport is superdiffusive and described by a Levy process governed by a fractional Laplacian. Otherwise, the volume conservation is destroyed, and the energy normally diffuses. One natural question then arises: what happens when S2 vanishes with the size of the chain? In this case, we can show that the limit of the energy fluctuation field depends on the evanescent speed of the random perturbation, we recover the two very different regimes for the energy transport, and try to understand the regime transition. This talk is based on a collaborative work with C. Bernardin (Nice, France), P. Gonalves (PUC, Rio), M. Jara (IMPA, Rio) and M. Sasada (Tokyo).

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