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43 º EDAÍ 8 de novembro de 2013

IMPA

Matinê: 14h00 – 15h00

Phase transitions for the slowed exclusion process

Patrícia Gonçalves (PUC Rio)

In this talk I will consider the symmetric simple exclusion process with a slow bond. This is a Markov process with state space $\{0,1\}^{\mathbb{T}_n}$, where $\mathbb{T}_n$ represents the one dimensional discrete torus. In this process, particles wait a mean one exponential time after which they jump to one of their nearest neighbors. We fix the jump rate from x to $x+1$ equal to the jump rate from $x+1$ to x and equal to 1 for all sites, except for x = -1 where it equals $\alpha n^{-\beta}$, with $\alpha > 0$ and $\beta \in [0,\infty]$. By increasing the value of β we are creating a microscopic barrier which blocks the passage of particles across the bond $\{-1,0\}$. I will present some scaling limits for this model at the level of hydrodynamics and fluctuations. In the hydrodynamics, for $\beta \in [0,1)$, the density of particles evolves according to the heat equation with periodic boundary conditions; if $\beta = 1$, it evolves according to the heat equation with some Robin's boundary conditions and if $\beta \in (1,\infty]$, it evolves according to the heat equation with Neumann's boundary conditions. A similar phase transition is also present on the fluctuations of the density, the current, the tagged particle and the occupation time.

This is a joint work with Tertuliano Franco (UB - Brazil) and Adriana Neumann (UFRGS - Brazil).

Palestra 1: 15h05 – 16h05

Coupled skinny baker's maps and the Kaplan–Yorke conjecture

Maik Gröger (Universität Bremen, Alemanha)

The Kaplan–Yorke conjecture states that for 'typical' dynamical systems with a physical measure the information dimension and the Lyapunov dimension coincide. We explore this conjecture in a neighborhood of a system for which the two dimensions do not coincide because the system consists of two uncoupled subsystems. The particular subsystems we consider are skinny baker's maps and we consider uni-directional coupling. We are interested in whether coupling 'typically' restores the equality of the dimensions. For coupling in one of the possible directions, we prove that the dimensions coincide for a prevalent (measure-theoretically typical) set of coupling functions, but for coupling in the other direction we show that the dimensions remain unequal for all coupling functions. We conjecture that this phenomenon that the two dimensions differ robustly occurs more generally for many classes of uni-directionally coupled (skew-product) systems in higher dimensions.

This is a joint work with Brian Hunt (University of Maryland, College Park).

Café: 16h05 – 16h45

Palestra 2: 16h45 – 17h45

Rigidity of critical circle maps

Pablo Guarino (USP São Paulo)

The so-called "critical circle maps" are orientation-preserving C^3 circle homeomorphisms having a non-flat critical point (they belong to the boundary of the C^3 diffeomorphisms).

The "Rigidity Conjecture"for critical circle maps with irrational rotation number was formulated in the early eighties after several works of Feigenbaum, Kadanoff, Lanford, Rand and Shenker among others, and it was proved to be true in the real-analytic category by de Faria-de Melo 2000, Yampolsky 2003 and Khanin-Teplinsky 2007.

Recently, on a joint work with Welington de Melo, we proved the rigidity conjecture for C^3 critical circle maps with irrational rotation number of bounded type (arXiv:1303.3470).

More recently, we were able to get rid of the bounded combinatorics condition, thus extending the rigidity to any irrational rotation number: inside each topological class of C^3 critical circle maps, the degree of the critical point is the unique invariant of the smooth conjugacy classes.

Work in progress with Marco Martens and Welington de Melo.

Confraternização: 19h00 – ∞

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