Öresund seminar

Wednesday, May 3, 2017

Hörmander auditorium, Centre for Mathematical Sciences, Sölvegatan 18A, Lund

13.15–14.05

Ai-Hua Fan, Université de Picardie Jules Verne

Topological Polynomial Wiener-Wintner Theorem

Wiener-Wintner theorem (1941) concerns with the almost everywhere convergence of ergodic averages weighted by trigonometric polynomials of degree 1. The case of polynomials of arbitrary degree was studied by E. Lesigne (1993). By topological Wiener-Wintner theorem, we mean the everywhere convergence in the case of topological dynamical systems. A first result was obtained by Robinson (1994). We will present a positive result for arbitrary polynomial weights and for the class of totally strictly ergodic dynamical systems for which generalized eigenfunction in the sense of Abramov are all continuous. As an application, we find fully oscillating sequences among nilsequences. Recall that no fully oscillating sequences can be realized by zero entropy affine maps on compact abelian groups. Fully oscillating sequences are recently introduced in the study of problems related to Sarnak's conjecture.

14.15–15.05

Jens Wittsten, Lund University

Random perturbations of partially expanding maps on the torus

I will discuss random perturbations of skew products of rotations on the unit circle over uniformly expanding maps on the unit circle. If the skew product satisfies a certain generic condition then the transfer operator of the skew product has a spectral gap. This spectral gap is preserved under small random perturbations, which implies exponential decay of random correlation functions for smooth observables at small noise levels.

Coffee break

15.45–16.35

Jesper Lykke Jacobsen, ENS and Université Pierre et Marie Curie, Paris

Finite-size corrections for universal boundary entropy in bond percolation

We compute the boundary entropy for bond percolation on the square lattice in the presence of a boundary loop weight, and prove explicit and exact expressions on a strip and on a cylinder of size L. For the cylinder we provide a rigorous asymptotic analysis which allows for the computation of finite-size corrections to arbitrary order. For the strip we provide exact expressions that have been verified using high-precision numerical analysis. Our rigorous and exact results corroborate an argument based on conformal field theory, in particular concerning universal logarithmic corrections for the case of the strip due to the presence of corners in the geometry. We furthermore observe a crossover at a special value of the boundary loop weight.

16.45–17.35

Wojciech De Roeck, KU Leuven

Quasi-Localization, very slow heating, glassiness... in many-body physics

I will present some rigorous results in classical and quantum many-body physics with the following common theme: Some many body systems like the bosonic Hubbard model at high density, a classical rotor chain at high energy, periodically driven spin systems at high frequency, have parametrically small transport coefficients and/or thermalization times. From the mathematical point of view, this is a form of many-body Nekoroshev estimates. For long times, these systems appear to be completely stuck, more or less like a jammed system of hard spheres at high density. However, unlike for the case of hard spheres, the 'jamming' is due to a lack of resonances and therefore less stable. For example, the phenomenon is not robust enough to survive coupling to a bath. Some of these systems are often mentioned in one breath with 'many-body localization', but that is, according to me, not fully justified: there are good reasons to believe that these systems do eventually thermalize, just very slowly and due to rare event ('bubbles'). However, this question is presently outside the grasp of mathematics.

18.15: Social dinner

The social dinner takes place at Mat & Destillat, Kyrkogatan 17, Lund. If you wish to participate, please sign up at `https://goo.gl/forms/WoIfHnbX8a4GW7c43` by April 21.