THURSDAY

10.00-11.00: Eric Carlen

Spectral gaps for jump processes with chaotic invariant measures and degenerate jump rates

We present a method for estimating spectral gaps for jump processes representing the stochastic dynamics of many particle systems with pair transitions. The motivating example is the Kac process for the spatially homogenous Boltzmann equation with hard sphere collisions. The object is to show the existence of a spectral gap that is independent of the number of particles when the jumps occur at a rate such that the expected waiting time for any one particle to make a jump is also independent of number of particles. The case in which the jump rate for all pairs of particles is bounded from below is relatively easy. Otherwise, the rates are degenerate. A method for obtaining results in this case, which solve the problem for the Kac model is presented. This is joint work with Michael Loss and Maria Carvalho.

11.30-12.10: Domokos Szász

Fourier law from Hamiltonian dynamics

For deriving Fourier law from Hamiltonian dynamics in 2008 Gaspard and Gilbert came up with a billiard model and suggested a two-step approach for it: 1. for the energies of the particles derive – in the rare interaction limit – a Markov jump process (dynamical part); 2. take the hydrodynamic limit of the obtained jump process; this is expected to indeed lead to the Laplace equation (stochastic part). Since their model was still unsuitable for mathematics, P. Bálint, Th. Gilbert, P. Nándori, IP. Tóth and myself introduced its tractable variant: the disk-piston model. For it, we can show that its rare interaction limit is, indeed, a Markov jump process. But the stochastic part is open.

14.00-15.00: Imre Péter Tóth

Spectral gap in interacting particle systems obtained from Gaspard-Gilbert heat conduction models - proof plan proposal

In her paper [1] Makiko Sasada proves a lower bound for the size-dependence of the spectral gap in a family of interacting particle systems, including the systems arising from the Gaspard-Gilbert models in e.g. [2]. However, the proof has an error, a simple miscalculation which leads to the collapse of the proof, at least for the case which is really interesting for the Gaspard-Gilbert models.

In this talk I present a few key points of Sasada's argument, point out exactly where the error is, and propose an idea of how it could possibly be corrected. This includes a convincing argument (containing numerical calculations) that the final result claimed by Sasada is indeed true.

The talk is meant to be technical, focusing on details of the argument, with little or no time spent on motivation and context, probably not even presenting the precise statement of Sasada's theorem.

[1] Sasada M.: Spectral gap for stochastic energy exchange model with nonuniformly positive rate function, Annals of Probability 2015, Vol. 43, No. 4, 1663-1711. arXiv:1305.4066

[2] Gaspard P., Gilbert T.: On the derivation of Fourier's law in stochastic energy exchange systems, Journal of Statistical Mechanics P11021, 2008. arXiv:0809.3967

FRIDAY

10.00-11.00: Pietro Caputo

Spectral gap and entropy inequalities in random permutation dynamics.

We discuss functional inequalities associated with the uniform distribution over permutation. We start with the Spectral Gap of the interchange process on
arbitrary weighted graphs and its hypergraph version. We then discuss the entropic version of these inequalities and its consequences for entropy production estimates.
We highlight recent advancements as well as several open questions.

14.00-15.00: Justin Salez

Entropy and curvature of Markov chains on metric spaces

This talk is devoted to the celebrated Peres-Tetali conjecture, which asserts that any Markov chain exhibiting contraction in the Wasserstein distance should also exhibit contraction in relative entropy, by the same amount. I will give a brief historical overview of this question, describe our main result, and illustrate it with several applications. This is based on joint works with Pietro Caputo and Florentin Münch.