Berlin Leipzig Seminar
Analysis/probability theory
First Meeting Winter Term 2012/13

Organized by the DFG Research Group *Analysis and Stochastics in Complex Physical Systems*

DATE: Friday, 26 October 2012

VENUE: Felix-Klein Lecture Hall, Mathematisches Institut der Universität Leipzig, Augusteum at Augustusplatz, Leipzig

9:30–10:20: **Laurent Miclo (Université Paul Sabatier, Toulouse)**

On the hypocoercivity of two kinetic toy models

Abstract: Hypocoercivity corresponds to the exponentially fast convergence to equilibrium under hypoelliptic-type assumptions on the underlying Markovian generator. We will investigate two kinetic toy models, one consisting of the rolling up on the circle of the integral of an Ornstein-Uhlenbeck process and the other one being its Gaussian counterpart (with a quadratic confining potential). Since these models are non-reversible, their spectra are not sufficient to deduce the behavior in small and large times, and we need to use certain relations between the eigenvectors (where discrete laws curiously appear). By computing exactly the L^2 operator norms of the semi-group at any time, we will quantify how the convergence is first slower but can end up with a better asymptotical rate than the corresponding reversible models. Finally, based on some features of the results, we will discuss a perspective on finding an alternative approach to hypocoercivity, with respect to the analytical (change from L^2 to a H^1-type coercive norm) and probabilistic (Liapounov functions) methods. (collaboration with Sébastien Gadat)

10:30–11:20: **Florent Barret (MPI Leipzig)**

Transition metastable times for a class of stochastic partial differential equations

Abstract: In this talk, we study a class of scalar, parabolic, semi-linear stochastic partial differential equations, perturbed by a space-time white noise on a bounded real interval in the small noise limit. Due to the stochastic term, metastable transitions occur between different stable equilibria of the deterministic dynamical system, and different behaviors on different time scales happen. We compute the expectation of the transition times for some models (so-called Eyring-Kramers formula). The proofs use a finite difference approximation and a coupling and apply finite dimensional estimates to the approximation (using potential theory and capacities). We prove the uniformity of the estimates in the dimension, and then we take the limit to recover the infinite dimensional equation.

11:30–12:20: **Moritz Kassmann (University of Bielefeld)**

Local regularity of nonlocal operators

Abstract: In recent years several important regularity results for differential operators of second order have been extended or rather transferred to integrodifferential operators of order $\alpha/2 \in (0,1)$. We review some of these works with a special emphasis on two issues: the notion of ellipticity for nonlocal operators and robustness of the results as $\alpha \to 2-$. Under comparability assumptions on the energies we establish a parabolic Harnack inequality which is robust. The talk is based on recent joint works with Dyda, Felsinger, Mimica and Rang.

Everybody is welcome to attend.   Wolfgang König, TU Berlin and WIAS Berlin