

# Berlin Leipzig Seminar

## Analysis/probability theory

### First Meeting Summer Term 2008

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

DATE: **Friday, 18 April 2008**

VENUE: **Max Planck Institute, Inselstr. 22, 04103 Leipzig, Room A01**

PROGRAMME:

9:30 – 10:20: **Martin Hairer (Warwick University)**

*Slow energy dissipation in anharmonic chains*

*Abstract:* We study the dynamic of a very simple chain of three anharmonic oscillators with linear nearest-neighbour couplings. The first and the last oscillator furthermore interact with heat baths through friction and noise terms. If all oscillators in such a system are coupled to heat baths, it is well-known that under relatively weak coercivity assumptions, the system has a spectral gap (even compact resolvent) and returns to equilibrium exponentially fast. It turns out that while it is still possible to show the existence and uniqueness of an invariant measure for our system, it returns to equilibrium much slower than one would at first expect. In particular, it no longer has compact resolvent when the pinning potential of the oscillators is quartic and the spectral gap is destroyed when the potential grows faster than that.

10:30–11:20: **Sabine Jansen (University of Leipzig)**

*Thermodynamic limit for jellium on a cylinder*

*Abstract:* We consider the classical statistical mechanics of charged particles moving in a neutralizing background on a cylinder. For even-integer values of the so-called plasma parameter and sufficiently small cylinder radius, one can show that not only the free energy but also the correlation functions have a limit when the number of particles goes to infinity, at fixed cylinder radius and fixed background density. The limiting state is periodic with respect to translations along the cylinder axis. The proof makes crucial use of a discrete renewal equality, which is reminiscent of earlier apparitions of renewal (in)equalities in the context of Coulomb systems (Lieb-Lebowitz 1969, Lenard 1961). The talk is based on joint work with with E.H. Lieb and R. Seiler.

11:30–12:20: **Stefan Großkinsky (Warwick University)**

*Equivalence of ensembles and condensation in zero-range processes*

*Abstract:* The zero-range process (ZRP) is an interacting particle system that exhibits a condensation transition, which has been studied recently in nonequilibrium statistical mechanics. Besides various direct applications, ZRPs are of particular importance as effective models for domain wall dynamics of more general particle systems. From a mathematical viewpoint, ZRPs are generic models leading to product Gibbs measures, which could also be interpreted as distributions of random permutations. For these measures we establish the equivalence of ensembles via convergence in specific relative entropy, providing a rigorous characterization of the condensation transition. This is not related to spatial correlations, but to a bounded domain of the Gibbs free energy as the result of an unbounded Hamiltonian. Depending on the choice of the jump rates in the ZRP, the transition can be continuous or discontinuous.

Everybody is welcome to attend.

Wolfgang König, University of Leipzig