Berlin Leipzig Seminar
Analysis/probability theory
First Meeting Summer Term 2012

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

DATE: Friday, 13 April 2012

VENUE: Weierstrass Institute, Mohrenstr. 39, 10117 Berlin, Erhard-Schmidt Lecture Hall (ground floor)

PROGRAMME:

9:40–10:30: **Jiří Cerný (University of Vienna)**

Chemical distance on random interlacements

Abstract: We investigate the chemical (or graph) distance on the infinite occupied cluster of random interlacements. We will explain that large balls in this distance obeys a full shape theorem. The main tool in proving this is a 'large deviation estimate', similar to the result of Antal and Pisztora in the case of Bernoulli percolation. This is joint work with Serguei Popov.

Coffee break

11:00–11:50: **Alexander Mielke (WIAS)**

Entropy gradient flows for Markov chains and reaction-diffusion systems

Abstract: First, we discuss a new gradient flow formulation for time-continuous reversible Markov chains that was also introduced by Jan Maas [2011]. The driving functional is the relative entropy while the Riemannian metric as an analog of the Wasserstein metric in diffusion system. We show that for all finite Markov chains the entropy is geodesically lambda-convex and discuss special cases of nearest-neighbor interactions where true convexity can be established under certain monotonicity assumptions.

Second, we highlight that this gradient structure can be generalized to cover large classes of reaction-diffusion systems, possibly including electrostatic interaction or coupling to a heat equation. We present recent result with Matthias Liero on the geodesic lambda-convexity for special cases.

J. MAAS. Gradient flows of the entropy for finite Markov chains. *J. Funct. Anal.* **261**, 2250-2292 (2011).

A. MIELKE. A gradient structure for reaction-diffusion systems and for energy-drift-diffusion systems. *Nonlinearity* **24**, 1329-1346 (2011).

A. MIELKE. Geodesic convexity of the relative entropy in reversible Markov chains. *WIAS preprint 1650.*

12:00–12:50: **Matthias Röger (University of Dortmund)**

Confined structures of least bending energy

Abstract: We analyze a constrained minimization problem for the Willmore energy. For a given parameter $a > 0$ we consider smooth embeddings of the sphere into the unit ball with surface area a. In this class we minimize the Willmore energy and investigate the dependence of the minimal energy value on the parameter a. (This is joint work with Stefan Müller, Bonn.)

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