Berlin Leipzig Seminar
Analysis/probability theory
Fourth Meeting Winter Term 2005/06

Jointly organized by the University of Leipzig, the Max-Planck Institute Leipzig, and the Technical University Berlin

Date:

Friday, 13 January 2006

Venue:

University of Leipzig, Mathematical Institute, Augustusplatz 10/11, 04109 Leipzig

Room 4-24 (Felix Klein Lecture Hall)

Program:

10:30–11:30: **Patrik Ferrari (Technical University Munich)**

GUE eigenvalue distribution and the space-time correlation function for the asymmetric exclusion process (TASEP)

11:40–12:40: **Jean-Dominique Deuschel (Technical University Berlin)**

Large deviations and concentration properties for $\nabla\phi$ *interface models*

13:40–14:40: **Konrad Schmüdgen (University of Leipzig)**

The multidimensional moment problem

Everybody is welcome to attend.

Wolfgang König, University of Leipzig

Abstracts:

Ferrari: *GUE eigenvalue distribution and the space-time correlation function for the asymmetric exclusion process (TASEP)*

We consider the stationary totally asymmetric simple exclusion process (TASEP), with a translation-invariant measure as initial condition, and analyze the two-point function using a non-intersecting line representation. We determine the two-point function in the large time limit, and show that it is given in terms of a generalization of the GUE Tracy-Widom distribution of random matrices.

(Joint work with H. Spohn)

Deuschel: *Large deviations and concentration properties for $\nabla\phi$ interface models*

We consider an anharmonic crystal with gradient interaction and zero boundary condition outside a large box. The interaction is assumed to be strictly convex with bounded second derivative. We derive a large deviation principle for the rescaled profile and show that the corresponding rate function is given by the integrated surface tension. This allows us to construct the Wulff droplet under volume constraint. The basic tools are both analytic (elliptic equations, Young measures) and probabilistic (random representation, entropy estimates).

(joint work with G. Giacomin and D. Ioffe)

Schmüdgen: *The multidimensional moment problem*

Let μ be a nonnegative Borel measure on $\mathbb{R}^d$. For $\alpha \in \mathbb{N}_0^d$, $s(\alpha) = \int x^\alpha \, \mathrm{d}\,\mu(x)$ is called the $\alpha-th$ *moment* of μ (if it exists). The *moment problem* asks when a given multisequence $\{s(\alpha); \alpha \in \mathbb{N}_0^d\}$ is a moment sequence for a nonnegative measure μ. Given a closed subset K of $\mathbb{R}^d$, the K-*moment problem* is the moment problem with the requirement that μ is supported by K. A moment problem is called *determinate* if the corresponding measure μ is unique.

In the first half of the talk parts of the general theory of the K-moment problem (relations between existence and positive semidefiniteness and positive polynomials, determinacy and selfadjointness etc.) are sketched. In the second half some new results from the last decade on the interplay between real algebraic geometry (structure of positive polynomials on K) and the solution of the K-moment problem for semialgebraic sets K are presented.