

Einladung zur öffentlichen Defensio

Diederik van Engelenburg

Thema der Dissertation
**On spin systems, height functions and
random walks**

Abstract:

In this talk, we will focus on two specific models from statistical mechanics. In both cases, we will be interested in answering questions relating the geometry of the physical models with that of the lattice/graph on which it lives. One can view this as a step towards understanding "universality".

In the first part of the talk, we consider the uniform spanning tree (UST). Here, we will work with a relatively large class of graphs known as unimodular random rooted graphs. These spaces appear for example as the so-called local limit of random planar maps: (uniform) random tilings of the sphere. It was conjectured by Aldous and Lyons that the UST has as many ends (distinct ways to infinity) as the underlying graphs has. We will explain the history of this problem, and how the spanning tree is related to global geometric facts about the space, including potential kernels and a rooted Harnack inequality. Using this, we explain how we resolved the conjecture by Aldous and Lyon.

The second part of the talk considers the XY-model, a spin model with a continuous symmetry group. Such models famously do not have an ordered phase on planar lattices, but physicists Berezinskii, Kosterlitz and Thouless showed that a subtle transition does occur: the two-point function undergoes a transition from exponential decay to algebraic decay. We explain briefly two new proofs of this fact, and will provide a heuristic understanding of the transition.

Prüfungssenat

Univ.-Prof. Mag. Dr. Andreas Cap
(Vorsitz, Universität Wien)

Univ.-Prof. Nathanael Berestycki, PhD
(Universität Wien)

Prof. Dr. Hugo Duminil-Copin
(University of Geneva)

Prof. Dr. Christophe Garban
(University Lyon 1)

Zeit und Ort:

Zeit: 29. August 2023, 14:00 Uhr

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Wien