Contributed Session:
Statistical Mechanics and Stochastic PDEs

Organizer:

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Speakers:

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Description:

Statistical Mechanics and Stochastic Partial Differential Equations are two major areas of research in probability theory, both of which have witnessed fundamental breakthroughs in recent years. The connection between these areas emerges through scaling limits: Stochastic Partial Differential Equations often arise as the continuum limit of stochastic fluctuations of discrete models in Statistical Mechanics.

A famous example is the model of Directed Polymer in Random Environment, whose partition function provides a discretisation for the solution of the Stochastic Heat Equation and, via the Cole-Hopf transformation, of the Kardar-Parisi-Zhang (KPZ) equation. In this context, spectacular results were proved in one space dimension.

The situation is more delicate in dimensions two and higher, which are the critical and super-critical dimensions: only recently important progress was obtained and many intriguing questions are open. The purpose of this session is to present some recent key advancements in the fluctuation properties of the Directed Polymer partition functions and their connections with the Stochastic Heat Equation, both for light-tailed and heavy-tailed disorder.