

"Polynomial Chaos and Scaling Limits of Disordered Systems"

Francesco Caravenna, University of Milano-Bicocca

Outline of the lectures (5 x 1.5 hour).

1. Introduction. Overview on disorder systems and disorder relevance/irrelevance. Motivating examples (Directed Polymers, Stochastic Heat Equation, Pinning Models, Ising Model). The key role of partition functions.
2. Polynomial chaos and Wiener chaos. A Lindeberg principle and a multi-linear Central Limit Theorem.
3. Disorder relevant systems. Scaling limit of partition functions and the construction of a continuum disordered model.
4. Weak-disorder asymptotics. Sharp estimates on free energy and critical curve from continuum partition functions. Introduction to marginally relevant systems.
5. Marginally relevant systems. Universal scaling limit of partition functions and multi-scale correlations. Results for the 2d Stochastic Heat Equation.