THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON PROBABILITY

Hard wall repulsion for the supercritical discrete Gaussian free field in random environment

By

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Abstract

We study the effect of disorder, introduced through random edge conductances on the underlying graph, on the discrete Gaussian free field.

We analyse the maximal fluctuation of the field and its behaviour in the presence of a macroscopic hard wall constraint. We focus on the supercritical dimension $d \geq 3$.

First, we derive sharp quenched large deviation asymptotics for the hard wall event. The rate is governed by two key quantities: the homogenized capacity of the associated random conductance model, and the essential supremum of the on-site (random) variances of the field. Secondly, we investigate the law of the field conditioned on the hard wall. We prove that the conditioned field exhibits an entropic push away from the zero height, and identify its expected asymptotic profile. Lastly, we characterize the pathwise behaviour of the conditioned field. This is based on the preprint https://arxiv.org/abs/2510.24562, a joint work with Alberto Chiarini (University of Padua).

Date : **5 March 2026 (Thursday)**
Time : **2:00p.m. – 3:00p.m.**
Venue : **Room 1104 (near lift 19)**

All are Welcome!