UNIVERSITY OF TORONTO
FACULTY OF ARTS & SCIENCE | Department of Mathematics

Departmental PhD Thesis Exam

Monday, May 5th, 2025 at 10:00 a.m. (sharp)
via Zoom / BA6183

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Supervisor : Jeremy Quastel

Thesis title : TASEP and the KPZ Fixed Point in the Half-space

Abstract

In this thesis, we present the multi-point probability distribution of the totally asymmetric exclusion process (TASEP) in the half-space, starting from a general deterministic initial condition. More precisely, let $h(t,x)$ denote the height function of the TASEP at position x and time t. We provide an explicit formula for

$$\mathbb{P}(h(t,x_1) \leq r_1, \ldots, h(t,x_m) \leq r_m).$$

This formula is well-suited for scaling limit analysis. By applying a 1:2:3 scaling, we derive the probability distribution for the half-space KPZ fixed point, which is conjectured to represent the universal process for KPZ universality models restricted to a half-space.

Additionally, we introduce a new formula for the full-space TASEP, starting from a general initial condition. This formula differs from the one derived by Matetski et al.

http://blog.math.toronto.edu/GraduateBlog/yourthesislink.pdf