

Workshop in Stochastic Analysis and Applications

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Tracy - Widom type formulas for the KPZ and periodic KPZ fixed points

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Abstract

The KPZ universality conjecture is the belief that growth models in $1+1$ dimensions exhibiting a $1:2:3$ nontrivial scaling for its height, spatial location and temporal fluctuations should be described, in the large time limit, by an universal fluctuation field. The universal object itself is the KPZ fixed point, introduced for the first time by Matetski, Quastel and Remenik as a Markov process starting from a given initial condition. In this talk, we discuss an alternative description of the KPZ fixed point and its periodic version in terms of nonlinear integrable systems such as the NLS and mKdV equations, generalizing the celebrated Tracy - Widom formula that relates the limiting eigenvalue distribution of Gaussian matrices with the second Painlevé equation. We also discuss how tools inspired from integrable systems then lead to asymptotic estimates for the tails and nontrivial scaling limits for some of these distributions.

The talk is based on joint works with Zhipeng Liu (University of Kansas), Jinho Baik (University of Michigan) and Andrei Prokhorov (University of Michigan).