On the two-dimensional KPZ and Stochastic Heat Equation

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We consider the Kardar-Parisi-Zhang equation (KPZ) and the multiplicative Stochastic Heat Equation (SHE) in two space dimensions, driven by with space-time white noise. These PDEs are very singular and lack a solution theory, so it is standard to introduce a regularization - e.g. by convolving the noise with a smooth mollifier - and to investigate the behavior of the solutions when the regularization is removed. Interestingly, these regularized solutions are closely linked to a much studied model in statistical mechanics, the so-called directed polymer in random environment. Building on this link, we show that a phase transition emerges, as the noise strength is varied on a logarithmic scale. In the sub-critical regime, the solutions of the regularized KPZ and SHE (suitably centered and rescaled) converge to an explicit Gaussian field, the solution of an *additive* Stochastic Heat Equation. We finally discuss the critical regime, where many questions are open. Based on joint works with Rongfeng Sun and Nikos Zygouras

Tuesday, December 15, 2020 04:30pm - 05:15pm

Online via Zoom

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