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Towards GFF convergence for the six-vertex model

Thursday, July 31, 2025 11:00 AM (1 hour)

The six-vertex model is a height function model that serves as a unifying framework for several two-dimensional statistical mechanics systems. In this talk, I will present a proof of a long-standing conjecture asserting that the height function converges, in a certain parameter regime, to the Gaussian Free Field (GFF). The proof combines techniques from different areas of mathematics: at its core is a soft analysis of the transfer matrix, which notably avoids reliance on the Bethe Ansatz. This analysis is made rigorous through probabilistic tools, including the Fortuin-Kasteleyn-Ginibre (FKG) inequality and Russo-Seymour-Welsh (RSW) theory. This is joint work with Hugo Duminil-Copin, Karol Kozlowski, and Ioan Manolescu. I will also discuss a closely related conjecture – that the Fortuin-Kasteleyn percolation associated with the six-vertex model converges in the scaling limit to a Conformal Loop Ensemble, $CLE(\kappa)$.

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