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The algebraic properties of the 2d lattice models

Two recent Fields medals have brought the field of two-dimensional statistical physics to the attention of the mathematical community. Werner, together with Lawler and Schramm, showed how many physical observables can be studied rigorously using the stochastic Loewner evolution, and Smirnov that percolation and the Ising model are conformally invariant. There remain many mathematical problems intimately related to physical conjectures describing these models. I will present recent efforts to describe how the algebraic structure of conformal transformations might appear from discrete probabilistic lattice models.