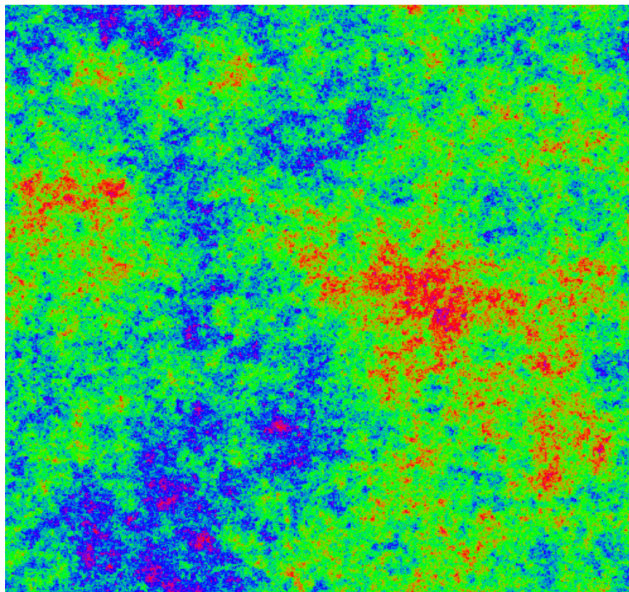


The Spin and Loop $O(N)$ Models

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The last century of statistical physics has profoundly influenced our understanding of random geometry and stochastic analysis. We will take a tour of the most studied models and seminal works with a focus on Stanislav Smirnov's proof of the conformal invariance of site percolation on the triangular lattice. A miraculous proof that won him the Fields medal, establishing the universal scaling limit for percolation: Schramm-Loewner Evolution.

This is a third of a series of three talks. In the previous talk, we demonstrated Smirnov's proof of Conformal invariance by a reduction to an interface model called the Loop $O(1)$ model, which we showed was conformally invariant. In this talk, we will introduce a broad family of statistical physics models called the Spin $O(N)$ model, and a reduction to a similar family of interface models called the Loop $O(N)$ model. We will highlight the main results, such as the Mermin-Wagner Theorem, and discuss what is conjectured.