

# A New Link Between Bernoulli Percolation and the Gaussian Free Field

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Percolation is a probabilistic model defined on infinite graphs that describes the inside of a porous material. The model emerged timidly in the middle of the twentieth century before becoming one of the major examples of a statistical physics model undergoing a phase transition. In this talk, we will explore some of the techniques enabling one to prove the existence of such a phase transition. In particular, we will discuss the connection between the existence of a phase transition and the geometry of the graph (for instance the isoperimetric dimension). To illustrate this last claim, we will explain how one can prove that Bernoulli percolation on super-linear growth Cayley graphs undergoes a non-trivial phase transition by exhibiting a new link between Bernoulli percolation and another classical model of statistical physics called the Gaussian Free Field (GFF). The talk requires no prior knowledge of probability theory.