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Abstract

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Sharpness of the phase transition for continuum percolation

Joint with H. Duminil-Copin and A. Raoufi

In this talk we consider some percolation processes in dimension $d \geq 2$ constructed from Poisson processes (e.g. Boolean percolation, Voronoi percolation). In the case of Boolean percolation, we begin with a Poisson process of intensity λ in $\mathbb{R}^d$, and around each point of the process we draw a ball of random radius. We are interested in the connectivity properties of the *occupied* set, i.e. the set of points covered by at least one ball. Such process undergoes a phase transition at a critical intensity λ_c: for $\lambda < \lambda_c$, all the connected component of the occupied set are bounded a.s., and for $\lambda > \lambda_c$, there exists an unbounded connected component of occupied points. Using a new method based on the theory of randomized algorithms, we prove that the phase transition is *sharp* for a large class of continuum percolation processes, in the sense that the connection probabilities in the regime $\lambda < \lambda_c$ decay very fast.