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SEMINAR

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304 Whitehead Hall
Refreshments: 3:30 p.m.
Seminar: 4:00 p.m.

"UNIVERSAL" APPROXIMATION FORMULAS FOR ESTIMATING PERCOLATION THRESHOLDS

Abstract

Bond percolation models are infinite random graph models, in which each edge is retained with probability p, $0 \leq p \leq 1$, independently of all other edges. The percolation threshold p_c is the value of p such that for $p > p_c$ there exists an infinite component with positive probability and for $p < p_c$ all components are finite almost surely. (Site percolation models and their percolation thresholds are defined similarly, with the randomness associated with the vertices of the graph.) Percolation models are widely studied and applied in the physical sciences and engineering, with the percolation threshold representing a phase-transition point.

The exact value of the percolation threshold is known for very few infinite graphs. A number of approximation formulas, called "universal formulas", have been proposed in the physics literature. Recently, joint research with Dora Naor has introduced an evaluation framework for universal formulas. The talk reviews this framework, and introduces new site and bond threshold formulas which improve upon the best previous formulas.