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Existence of an unbounded vacant set for subcritical continuum percolation. (English)

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Summary: We consider the Poisson Boolean percolation model in $\mathbb{R}^2$, where the radius of each ball is independently chosen according to some probability measure with finite second moment. For this model, we show that the two thresholds, for the existence of an unbounded occupied and an unbounded vacant component, coincide. This complements a recent study of the sharpness of the phase transition in Poisson Boolean percolation by the same authors. As a corollary it follows that for Poisson Boolean percolation in $\mathbb{R}^d$, for any $d \geq 2$, finite moment of order d is both necessary and sufficient for the existence of a nontrivial phase transition for the vacant set.

MSC:

60K35 Interacting random processes; statistical mechanics type models; percolation theory
82B43 Percolation
60G55 Point processes (e.g., Poisson, Cox, Hawkes processes)

Keywords:

percolation; phase transition; dependent environments

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