Abstract Submitted
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Phase Transitions on Random Lattices: How Random is Topological Disorder?[1] HATEM BARGHATHI, THOMAS VOJTA, Missouri Univ of Sci & Tech — We study the effects of topological (connectivity) disorder on phase transitions. We identify a broad class of random lattices whose disorder fluctuations decay much faster with increasing length scale than those of generic random systems, yielding a wandering exponent of $\omega = (d-1)/(2d)$ in d dimensions. The stability of clean critical points is thus governed by the criterion $(d+1)\nu > 2$ rather than the usual Harris criterion $d\nu > 2$, making topological disorder less relevant than generic randomness. The Imry-Ma criterion is also modified, allowing first-order transitions to survive in all dimensions $d > 1$. These results explain a host of puzzling violations of the original criteria for equilibrium and nonequilibrium phase transitions on random lattices. We discuss applications, and we illustrate our theory by computer simulations of random Voronoi and other lattices.

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