

Physics Colloquium

UNIVERSITY OF MISSOURI-KANSAS CITY
DEPARTMENT OF PHYSICS

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Checking up on the Harris Criterion: A Monte Carlo study of strongly disordered magnets

We discuss a direct Monte Carlo calculation testing the validity of the Harris Criterion in strongly disordered Heisenberg models (e.g., as might be used to model diluted magnetic semiconductors). We find self-averaging (uniformity of thermodynamic properties in the bulk limit) to be intact. However, we find that the critical exponents are altered even for very weak disorder, implying a universality class distinct from that of the pure model. We also examine the Harris Criterion in the context of a direct antiferromagnetic superexchange coupling, finding that self averaging IS violated in this case; we explore via numerical simulation the possibility of significant transition temperature fluctuations even for very large samples, a phenomenon with significant technological ramifications.

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Coffee at 3:10, Colloquium at 3:30 in Room 310