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Phase Diagram and Tricritical Behavior of a Spin-2 Transverse Ising Model in a Random Field

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Abstract: The phase diagrams of a spin-2 transverse Ising model with a random field on honeycomb, square, and simple-cubic lattices, respectively, are investigated within the framework of an effective-field theory with correlations. We find the behavior of the tricritical point and the reentrant phenomenon for the system with any coordination number z, when the applied random field is bimodal. The behavior of the tricritical point is also examined as a function of applied transverse field. The reentrant phenomenon comes from the competition between the transverse field and the random field.

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