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Percolation transition and dissipation in quantum Ising magnets[1]

JOSE HOYOS, THOMAS VOJTA, University of Missouri-Rolla — We study the effects of dissipation on a randomly diluted transverse-field Ising magnet close to the percolation threshold. For weak transverse fields, a novel percolation quantum phase transition separates a superparamagnetic cluster phase from an inhomogeneously ordered ferromagnetic phase. The properties of this transition are dominated by large frozen and slowly fluctuating percolation clusters. This leads to a discontinuous magnetization-field curve and exotic hysteresis phenomena as well as highly singular behavior of magnetic susceptibility and specific heat. We compare our results to the smeared transition in generic dissipative random quantum Ising magnets. We also discuss the relation to metallic quantum magnets and other experimental realizations.

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