

A Mean Field Spin Glass with Short-Range Interactions

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Abstract. We formulate and study a spin glass model on the Bethe lattice. Appropriate boundary fields replace the traditional self-consistent methods; they give our model well-defined thermodynamic properties. We establish that there is a spin glass transition temperature above which the single-site magnetizations vanish, and below which the Edwards-Anderson order parameter is strictly positive. In a neighborhood below the transition temperature, we use bifurcation theory to establish the existence of a nontrivial distribution of single-site magnetizations. Two properties of this distribution are studied: the leading perturbative correction to the Gaussian scaling form at the transition, and the (nonperturbative) behavior of the tails.

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