Mathematical Physics

Asymptotics of the mean-field Heisenberg model

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We consider the mean-field classical Heisenberg model and obtain detailed information about the magnetization by studying the model on a complete graph and sending the number of vertices to infinity. In particular, we obtain Cram\`er- and Sanov-type large deviations principles for the magnetization and the empirical spin distribution and demonstrate a second-order phase transition in the Gibbs measures. We also study the asymptotics of the magnetization throughout the phase transition using Stein's method, proving central limit theorems in the sub- and supercritical phases and a nonnormal limit theorem at the critical temperature.

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