

Monte Carlo Study of Planar Rotator Model with Weak Dzyaloshinsky-Moriya Interaction

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Abstract: With the help of an improvement Monte Carlo method, the Berezinskii-Kosterlitz-Thouless phase transition arising in two-dimensional planar rotator model with weak Dzyaloshinsky-Moriya (DM) interaction is investigated. The effects of the DM interaction on specific heat, susceptibility, and magnetization are simulated. The critical temperature of transitions is determined by the so-called Binder cumulant and the susceptibility of finite-size scaling. We find that the chiral Z_2 symmetry reduced by the DM interactions plays an important role in a two-dimensional XY spin system, typically, the critical temperature is sensitive to weak DM spin couplings.

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Key words: Monte Carlo method, Berezinskii-Kosterlitz-Thouless phase transition, Dzyaloshinsky-Moriya interaction, XY model

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