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Investigating the Two-Dimensional Generalized XY Model using Tensor Networks

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The critical behavior of the two-dimensional XY model has been explored in the literature using various methods. They include the high-temperature expansion (HTE) method, Monte Carlo (MC) approach, strong coupling expansion method, and tensor network (TN) methods. This model undergoes a Berezinskii-Kosterlitz-Thouless (BKT) type of phase transition. This model can be modified by adding spin-nematic interaction terms with a period to give rise to the generalized XY model. The modified model contains excitations of integer and half-integer vortices. These vortices govern the critical behavior of the theory and produce rich physics. With the help of tensor networks, we investigate the transition behavior between the integer vortex binding and half-integer vortex binding phases of the model and how this transition line merges into two BKT transition lines.

Session

Formal Theory

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