
Role of amplitude fluctuations in the BKT transition

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Abstract

The study of the Berezinskii-Kosterlitz-Thouless (BKT) transition in two-dimensional $-\phi-4$ models can be performed in several representations, and the amplitude-phase (AP) Madelung parametrization is a natural way to study the contribution of density fluctuations to non-universal quantities. We show how one can obtain a consistent phase diagram in the AP representation using the functional renormalization group scheme. Constructing the mapping between $-\phi-4$ and the XY models allows us to treat these models on equal footing. We estimate universal and non-universal quantities of the two models and find good agreement with available Monte Carlo results. The presented approach is flexible enough to treat parameter ranges of experimental relevance.

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