Surprises in the O(N) models: nonperturbative fixed points, large N limit and multi-criticality

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Abstract

We find that the multicritical fixed point structure of the O(N) models is much more complicated than widely believed. In particular, we find new nonperturbative fixed points in three dimensions (d=3) as well as at N=∞. These fixed points come together with an intricate double-valued structure when they are considered as functions of d and N. Many features found for the O(N) models are shared by the O(N)$\otimes$O(2) models relevant to frustrated magnetic systems.

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