

Anomalous Behavior of Spin Systems with Dipolar Interactions

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Abstract

We study the properties of spin systems realized by cold polar molecules interacting via dipole-dipole interactions in two-dimensions. Using a spin wave theory, that allows for the full treatment of the characteristic long-distance tail of the dipolar interaction, we find several anomalous features in the ground state correlations and the spin wave excitation spectrum, which are absent in their counterparts with short range interaction. The most striking consequence is the existence of true long-range order at finite temperature for a two-dimensional phase with a broken $U(1)$ symmetry.

References

[1] D. Peter, S. Müller, S. Wessel and H. P. Büchler, arXiv:1203.1624 (2012).