

Spin liquid phases in $SU(N)$ antiferromagnets

We will review some simple microscopic models that give rise to unconventional phases of matter for $SU(N)$ antiferromagnets.

In one dimension, we will present different lattice models on chains or two-leg ladders that can stabilize symmetry protected topological (SPT) phases [1,2]. We will also discuss quantum phase transition between a trivial phase and a chiral SPT one that goes beyond Landau-Ginzburg paradigm [2].

In two dimensions, guided by the recent discovery of chiral spin liquids on the square lattice for $SU(2)$ and $SU(3)$ models, we propose a family of generic time-reversal symmetry breaking $SU(N)$ models (in the fundamental representation). By using a combination of state-of-the-art numerical methods (exact diagonalization, DMRG and PEPS), we provide strong evidence for the existence of a chiral spin liquid ground-state [3].

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[2] S. Capponi, L. Devos, Ph. Lecheminant, K. Totsuka, L. Vanderstraeten, Phys. Rev. B 111, L020404 (2025)

[3] J.-Y. Chen, J.-W. Li, P. Nataf, S. Capponi, M. Mambrini, K. Totsuka, H.-H. Tu, A. Weichselbaum, J. von Delft and D. Poilblanc, Phys. Rev. B **104**, 235104 (2021)

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