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Spin Liquid Phases for Spin-1 systems on the Triangular lattice
CENKE XU, University of California Santa Barbara, FA WANG, Massachusetts Institute of Technology, YANG QI, Tsinghua University, LEON BALENTS, Kavli Institute for Theoretical Physics, University of California Santa Barbara, MATTHEW FISHER, University of California Santa Barbara — Motivated by recent experiments on material $Ba_3NiSb_2O_9$, we propose two novel spin liquid phases (A and B) for spin-1 systems on a triangular lattice. At the mean field level, both spin liquid phases have gapless fermionic spinon excitations with quadratic band touching, thus in both phases the spin susceptibility and C_v/T saturate to a constant at zero temperature, which are consistent with the experimental results on Ba3NiSb2O9. On the lattice scale, these spin liquid phases have $Sp(4) \sim SO(5)$ gauge fluctuation; while in the long wavelength limit this Sp(4) gauge symmetry is broken down to $U(1)xZ_2$ in type A spin liquid phase, and broken down to Z_4 in type B phase. We also demonstrate that the A phase is the parent state of the ferro-quadrupole state, nematic state, and the noncollinear spin density wave state.

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