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projective construction of spin nematic states in S=1/2 frustrated ferromagnets RYUICHI SHINDOU, TSUTOMU MOMOI, RIKEN — An $SU(2)$ slave-boson formulation of bond-type spin nematic orders is developed in the context of quantum frustrated ferromagnets, where the spin nematic states are described as the resonating spin-triplet valence bond (RVB) states. Namely, the d-vector of the spin-triplet pairing ansatz plays the role of the so-called 'director' in the spin nematic states. The low-energy excitations around such bond-type spin quadrupolar orders generally comprise the gauge boson, massless goldstone bosons, spinon individual excitations and their composites. Using the projective symmetry-group arguments, we will argue how to identify the number of massless gauge bosons. Applying this formulation, we will next enumerate possible 'mixed' RVB ansatzes in the $S = \frac{1}{2}$ J_1-J_2 Heisenberg model on the square lattice (J_1 ferromagnetic nearest neighbor and J_2 antiferromagnetic next nearest neighbor), and argue their stability against gauge fluctuations. As a result, we found two stable ansatzes in the intermediate coupling region, $J_1 : J_2 = 1 : 0.4$. One is the Z_2 'Balian-Werthamer (BW)' state stabilized by the Higgs mechanism. The other is the $SU(2)$ 'chiral p-wave' state, where the massless gauge fluctuations are controlled by the Chern-Simon mechanism. Especially, the former Z_2 state exhibits the same spatial configuration of the spin quadrupolar moment as found in the previous exact diagonalization studies.

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