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# On the Ground State of Spin Systems with Orbital Degeneracy

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Abstract: In order to understand the properties of the spin system with orbital degeneracy, we first study the ground state of the SU(4) spin-orbital model on a square lattice. The mean-field results suggest that for a small Hund's interaction, the flavor liquid state is stable against the solid state, but with sufficient deviation from the SU(4) limit the long-range order may be attained in 2D system. Furthermore, we employ a variational approach to calculate the phase diagram of the ground state and the temperature-dependent susceptibility by taking into account the Hund's interaction and the anisotropy in orbital wavefunctions. Finally, the implications for the experimental observations on the material, $LiNiO_2$, are discussed.

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Key words: SU(4) symmetry, spin liquid, spin order, orbital order

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