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Magnetic phases of two-component lattice bosons at nonzero temperature STEPHEN POWELL, University of Oxford — The realization of magnetically-ordered phases in optical lattices is set to be one of the next major experimental advances in the field of ultracold atoms. In the limit of strong repulsion and weak tunneling between lattice sites, perturbation theory predicts that two-component fermions form a Néel state with a two-sublattice structure, while bosons will tend to form a ferromagnetic insulator. This perturbative approach is, however, ill-suited for describing the physics above zero temperature and away from the strong-coupling limit. Here we address the phase diagram of two-component bosons at nonzero temperature using an approach that takes as its basis the standard mean-field theory for spinless bosons. This allows spin and charge excitations to be treated on an equal footing, and elucidates the competition between the possible magnetic and superfluid orders in the lattice.

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