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Finite temperature spin dynamics of a square lattice $J_1 - J_2$ antiferromagnet and its implications for iron arsenides[1] ELIHU ABRAHAMS, University of California Los Angeles, PALLAB GOSWAMI, RONG YU, QIMIAO SI, Rice University — Motivated by recent inelastic neutron scattering measurements in the paramagnetic phase of iron arsenides, we have studied the finite temperature spin dynamics of a square lattice $J_1 - J_2$ antiferromagnet in the parameter regime that gives rise to a collinear $(\pi, 0)$ ground state at zero temperature. We have calculated the dynamical structure factor $S(\mathbf{q}, \omega)$ in the paramagnetic state at finite temperatures using a modified spin wave theory. We have shown that short range antiferromagnetic correlations below the mean-field Ising transition temperature give rise to elliptic features for $S(\mathbf{q}, \omega)$ in momentum space. Employing an effective nonlinear sigma model analysis for the low energy and wave vector limit, we also account for fermion damping and circumvent the shortcoming of modified spin wave theory. Finally, considering a matrix $J_1 - J_2$ model, we point out the connection between the Ising transition and the putative orbital ordering in iron arsenides.

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