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Spin dynamics of the J1-J2 Model with Biquadratic Spin Interactions for the Paramagnetic Phase of the Iron Pnictides ZHENTAO WANG, RONG YU, Rice University, PALLAB GOSWAMI, Florida State University, ANDRIY NEVIDOMSKYY, QIMIAO SI, Rice University, ELIHU ABRAHAMS, UCLA — The parent compounds of the iron pnictides are bad metals, and are hence interpreted as being located at the boundary of localization and itinerancy. As such, the effective exchange interactions will naturally include more than two spin components. Here we study the $J_1 - J_2$ antiferromagnetic Heisenberg model with a biquadratic spin-spin coupling $-\kappa(\vec{S}_i \cdot \vec{S}_j)^2$ to explore the spin excitations in the paramagnetic phase of the iron pnictides which has a $(\pi, 0)$ collinear antiferromagnetic ground state. By using the modified spin wave theory and Schwinger Boson mean field theory, we determine the spin dynamics at finite temperatures. We show that a moderate biquadratic coupling κ can induce sizable anisotropy in the spin excitation spectrum. The calculated dynamical structure factor $S(\vec{q}, \omega)$ shows anisotropic elliptic features near $(\pi, 0)$, which expand with increasing frequency (ω), in a way that agrees with recent experiment on $BaFe_2As_2$ above its Neel transition temperature (L. W. Harriger *et.al*, PRB **84**, 054544, 2011).

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