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Paramagnetic Spin Correlations in CaFe2As2 Single Crystals SOULEYMANE DIALLO, D. PRATT, R. FERNANDES, W. TIAN, J. ZARESTKY, Ames Laboratory, M. LUMSDEN, Oak Ridge National Laboratory, T. PERRING, ISIS Spallation Neutron Source, C. BROHOLM, Johns Hopkins, N. NI, S. BUDKO, P. CANFIELD, Iowa State University, H. LI, D. VAKNIN, A. KREYSSIG, A. GOLDMAN, J. SCHMALIAN, R. MCQUEENEY, Iowa State University — Magnetic correlations in the high temperature paramagnetic phase of $CaFe_2As_2$ ($T_N = 172$ K) have been examined by means of inelastic neutron scattering from 180 K up to 300 K. Despite the first-order nature of the magnetic ordering, strong but short-ranged anti-ferromagnetic (AFM) correlations are clearly observed. These correlations, which consist of quasielastic scattering centered at the wavevector $\mathbf{Q_{AFM}}$ of the low-temperature AFM structure, are observed up to the highest measured temperature of 300 K and at high energy transfer (above 60 meV). The weak L dependence of the scattering implies rather weak interlayer coupling corresponding to nearly two-dimensional fluctuations above T_N. The spin correlation lengths within the Fe layer are found to be anisotropic, consistent with underlying fluctuations of the AFM stripe structure. These experimental features can be adequately reproduced by a scattering model $S(\mathbf{Q}, \hbar\omega)$ that describes short-ranged aniostropic spin correlations with overdamped spin dynamics.

Souleymane Diallo
Ames Laboratory

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