

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Itinerant Spin Excitations in SrFe₂As₂ Measured by Inelastic Neutron Scattering RUSSELL EWINGS, TOBY PERRING, ISIS Pulsed Neutron and Muon Source, JACK GILLETT, SITIKANTHA DAS, SUCHITRA SEBASTIAN, University of Cambridge, ALICE TAYLOR, University of Oxford, TATIANA GUIDI, ISIS Pulsed Neutron and Muon Source, ANDREW BOOTHROYD, University of Oxford — We have performed inelastic neutron scattering (INS) measurements of the magnetic excitations in SrFe₂As₂, an iron pnictide parent compound [1]. The data extend up to energies of ~ 260 meV. We find that the spectrum calculated from a local-moment J₁-J₂ model fails to describe our data in several key respects. In particular, the data can only be fitted by using different exchange parameters at high and low energies, for which there is no obvious physical justification. In both cases the nearest-neighbor exchange parameters, J_{1a} and J_{1b}, are very different. Also, on warming above the magnetic/structural ordering transition, one would expect J_{1a} \rightarrow J_{1b} and hence a soft mode at $\mathbf{Q} = (\mathbf{0.5}, \mathbf{0.5})$, due to frustration in the local-moment model. However we find that the spectrum is largely unaltered. We find that the qualitative features of the INS spectra that cannot be described by the J₁-J₂ model are readily explained by calculations from a 5-band itinerant mean-field model. This also implies that it is not necessary to invoke additional broken symmetry, such as electronic nematic or orbital order, to explain the lack of a soft mode. [1] R. A. Ewings et al, Phys. Rev. B **83**, 214519 (2011)

Russell Ewings
Rutherford Appleton Lab

Date submitted: 11 Nov 2011

Electronic form version 1.4