Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spin waves and magnetic exchange interactions in the spin-ladder compounds $BaFe_2S_3$ and $RbFe_2Se_3$.[1] MENG WANG, S. J. JIN, DAO-XIN YAO, Sun Yat-Sen University, MING YI, D. H. LEE, R. BIRGENEAU, University of California, Berkeley, H. C. JIANG, SLAC National Accelerator Laboratory, YU SONG, Rice University, W. L. ZHANG, H. Q. LUO, Institute of Physics, CAS, H. L. SUN, Institute of High Energy Physics, CAS, A. D. CHRISTIANSON, C. DE LA CRUZE, Oak Ridge National Laboratory, E. BOURRET-COURCHESNE, Lawrence Berkeley National Laboratory — We report inelastic neutron scattering studies on the spin waves of $BaFe_2S_3$ and $RbFe_2Se_3$. Both of them exhibit similar stripe antiferromagnetic (AF) orders as that of $BaFe_2As_2$. At ambient pressure $BaFe_2S_3$ can be viewed as the parent state of the superconductivity discovered under pressure. Fitting the spin wave spectra to a Heisenberg Hamiltonian reveals a strong ferromagnetic (FM) exchange interaction (SJ_R~71 meV) along the rung direction, an AF SJ_L~49 meV along the leg direction, and a FM SJ_2~15 meV along the diagonal direction. The results are in clear contrast to the exchange interactions of the parent compounds of the other iron-based superconductors, suggesting that specific relative values for the exchange interactions do not appear to be unique for the parent states of the superconducting materials. However, identical measurements for insulating $RbFe_2Se_3$ reveal comparable exchange interactions as that of $BaFe_2As_2$, indicating the irrelevance of the fermiology for the existence of the stripe AF order among various Fe-based materials. arXiv:1609.00465, PRB 94,041111(R)(2016).

[1]U.S. DOE under Contract No. DE-AC02-05-CH11231 and DE-AC03- 76SF008.

Meng Wang
Sun Yat-Sen University

Date submitted: 14 Nov 2016 Electronic form version 1.4