Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Neutron Scattering Study of the Dependence of Magnetic Correlations on Se and Fe Content in the Fe(Te,Se) System ZHIJUN XU, JINSHENG WEN, GUANGYONG XU, GENDA GU, JOHN TRANQUADA, Brookhaven National Laboratory — We have performed a series of neutron scattering and magnetization measurements on $Fe_{1+y}Te_{1-x}Se_x$ with different Fe and Se compositions to study the interplay between magnetism and superconductivity.[1] FeTeSe is rather unique for possessing two different types of spin configurations: one is a "bicollinear" or "E-type" structure that corresponds to the static order near (0.5,0), and the other is a "collinear" or "C-type" spin configuration that gives rise to spin excitations near (0.5,0.5). [2] Short-range static magnetic order near the (0.5,0) in-plane wave-vector (using the two-Fe unit cell) is found in all non-superconducting samples. The static order disappears and bulk superconductivity emerges, as the spectral weight of the magnetic excitations shift to the region of reciprocal space near the in-plane wave-vector (0.5,0.5) with Se doping. Besides Se doping, Fe also plays an essential role in superconductivity and the magnetic correlations. Our results suggest that spin fluctuations associated with the collinear magnetic structure appear to be universal in all Fe-based superconductors, and there is a strong correlation between superconductivity and the character of the magnetic order/fluctuations in this system. [1] Zhijun Xu *et al.*, Phys. Rev. **B** 82, 104525 (2010) [2] Wei-Guo Yin *et al.*, Phys. Rev. Lett. 105, 107004 (2010)

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Date submitted: 23 Nov 2010 Electronic form version 1.4