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**Inelastic Neutron Scattering Studies of High-Energy Spin Excitations in Superconducting $BaFe_{1.9}Ni_{0.1}As_2$** MENGSHU LIU, University of Tennessee, DOUGLAS ABERNATHY, Oak Ridge National Laboratory, JUN ZHAO, University of Tennessee, MENG WANG, Institute of Physics, China, CHENGLIN ZHANG, MIAOYIN WANG, PENGCHENG DAI, University of Tennessee — Understanding how the spin fluctuations evolve with doping in iron pnictide superconductors is important because spin fluctuations may mediate electron pairing for superconductivity in these materials. Upon doping, the spin fluctuation persists long after the long-range antiferromagnetism is destroyed. More importantly, spin excitations are coupled to superconductivity in the appearance of a neutron magnetic resonance and a superconductivity-induced spin gap. However, all current neutron scattering results in iron based superconductors are confined to low energy excitations except for the "11" $FeTe_{1-x}Se_x$ system, which shows incommensurate excitations that are not found in other iron pnictide systems. Therefore, how the spin waves in parent compounds of the "122" ($AFe_2As_2$, A = Ca, Sr, Ba) system will evolve when the system becomes an optimal superconductor is still an open question. We use time-of-flight spectroscopy to determine S (Q,$\omega$) at energy regions not accessed before. We compare spin fluctuations of iron arsenide superconductors with those of high-Tc copper oxides and discuss their role in the superconductivity of these materials.

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