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Two-dimensional magnetic interactions in LaFeAsO MEHMET RAMAZANOGLU, JAGAT LAMSAL, Ames Lab. DoE, GREGORY S. TUCKER, Iowa State Univ. and Ames Lab. DoE, STUART CALDER, Oak Ridge National Lab., JIAQIANG YAN, Univeristy of Tenessee, Knoxville, TATIANA GUIDI, TOBY PERRING, ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 OQX, United Kingdom, THOMAS A. LOGRASSO, ANDREAS KREYSSIG, ALAN GOLDMAN, ROBERT J. MCQUEENEY, Ames Lab. DoE —
The magnetic excitations in antiferromagnetic (AFM) ordered LaFeAsO (La1111) are mapped out by inelastic neutron scattering (INS) technique using both time-of-flight and triple-axis spectroscopies. The energy dependence of the observed intensity at the AFM ordering wavevector, Q_{AFM}, yields a spin gap of $\sim$11 meV. The independence of the spin gap along the c-direction suggests nearly two-dimensional magnetic interactions. A steep magnetic excitation spectrum is observed for in-plane wavevectors for energy transfers up to 100 meV. The constant energy cuts of these steep excitations are elliptically shaped for the low energy transfers below 50 meV. As energy transfer increases, the elliptical anisotropy develops into a splitting above 50 meV. A phenomenological model based on highly damped diffuse spin dynamics is used to analyze the data. The calculated parameters of anisotropic spin wave velocities, spin gap and the damping values are similar to the previous results in $BaFe_2As_2$ and $CaFe_2As_2$ based materials but La111 has a more two-dimensional character.

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