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Spin Excitations in Superconducting $BaFe_{2-x}Co_xAs_2$ A.D. CHRISTIANSON, M.D. LUMSDEN, Oak Ridge National Laboratory, D. PARSHALL, University of Tennessee, S.E. NAGLER, G.J. MACDOUGALL, H.A. MOOK, Oak Ridge National Laboratory, K. LOKSHIN, T. EGAMI, University of Tennessee, M.B. STONE, D.L. ABERNATHY, Oak Ridge National Laboratory, E.A. GOREMYCHKIN, R. OSBORN, Argonne National Laboratory, M.A. MCGUIRE, A.S. SEFAT, R. JIN, B.C. SALES, D. MANDRUS, Oak Ridge National Laboratory — We present neutron scattering measurements on singe crystals of superconducting $BaFe_{2-x}Co_xAs_2$. For optimally doped samples (x=0.16, T_C=21 K) the spin waves are gapless above T_C, while a gap opens below T_C with the appearance of a spin resonance at an energy of 8.6 meV. The dispersion of the spin excitations is weak along the c-axis, but the in-plane dispersion is still very steep indicating a reduction in dimensionality of the spin excitations when compared to those found in the parent compound. On the other hand, in underdoped samples (x=0.08, T_C=11 K) the spin waves display a gap above T_C with anisotropic three-dimensional interactions. Below T_C no additional gap is observed for energies greater than 2 meV. However, below T_C a spin resonance at 4.5 meV appears simultaneously with a reduction in the magnetic Bragg peak intensity suggesting that the spectral weight required for the spin resonance arises due to competition between superconductivity and magnetism.

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