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Pressure dependence of the inelastic neutron scattering response of $CaFe_2As_2$. S. ROSENKRANZ, R. OSBORN, E. GOREMYCHKIN, I.S. TODOROV, D.Y. CHUNG, H. CLAUS, J.A. SCHLUETER, Argonne Nat. Lab., C.D. MALLIAKAS, M.G. KANATZIDIS, Northwestern Univ., A.D. CHRISTIANSON, Oak Ridge Nat. Lab., R.I. BEWLEY, T. GUIDI, ISIS, Rutherford Lab. — Application of ∼2.5 kbar pressure induces superconductivity in $CaFe_2As_2$ with a T_C ∼12K that remains constant up to ∼ 7kbar, where superconductivity is again suppressed. This modest pressure enables the use of neutron scattering to study in detail changes of the spin and lattice correlations between normal to the superconducting state as a function of pressure. The elastic part of the scattering measured on the MERLIN spectrometer utilizing a He gas pressure cells shows that at 4kbar pressure and 2K only ∼ 50% of the sample has transformed to the collapsed tetragonal phase. The inelastic spectra show a suppression of spectral weight at low energies and small momentum transfer on going from ambient pressure to the superconducting state at 4kbar and 2K. The spectral weight is transferred to higher energies and wavevectors, leading to a V-shaped excitation branch in the collapsed tetragonal phase.

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