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Fe moments in the pressure-induced collapsed tetragonal phase of $(Ca_{0.67}Sr_{0.33})Fe_2As_2$[1] JASON JEFFRIES, NICHOLAS BUTCH, JOSEPH BRADLEY, Lawrence Livermore National Laboratory, YUMING XIAO, PAUL CHOW, Carnegie Institute of Washington, SHANTA SAHA, KEVIN KIRSHENBAUM, JOHNPIERRE PAGLIONE, University of Maryland — The tetragonal $AEFe_2As_2$ (AE=alkaline earth element) family of iron-based superconductors exhibits magnetic order at ambient pressure and low temperature. Under pressure, the magnetic order is suppressed, and an isostructural volume collapse is induced due to increased As-As bonding across the mirror plane of the structure. This collapsed tetragonal phase has been shown to support superconductivity under some conditions, and theoretical calculations suggest an unconventional origin. Theoretical calculations also reveal that enhanced As-As bonding and the magnitude of the Fe moments are correlated, suggesting that the Fe moments can be quenched in the collapsed tetragonal phase. Whether the Fe moments persist in the collapsed tetragonal phase has implications for the pairing mechanism of the observed, pressure-induced superconductivity in these compounds. We will present pressure-dependent x-ray emission spectroscopy (XES) measurements that probe the Fe moments through the volume collapse transition of $(Ca_{0.67}Sr_{0.33})Fe_2As_2$, and compare these measurements with the occurrence of superconductivity.

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