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Magnetic phase diagram of $Ca(Co_{1-x}Fe_x)_2As_2$ ($x \leq 0.1$) single crystals W.T. JAYASEKARA, B.G. UELAND, ABHISHEK PANDEY, V.K. ANAND, N.S. SANGEETHA, Ames Laboratory U.S. DOE and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011, USA, W. TIAN, Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA, D.C. JOHNSTON, A. KREYSSIG, A.I. GOLDMAN, Ames Laboratory U.S. DOE and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011, USA — Both $CaCo_2As_2$ and $CaFe_2As_2$ possess the tetragonal $ThCr_2Si_2$ crystal structure and are paramagnetic at room temperature and ambient pressure. Upon cooling, $CaCo_2As_2$ shows A-type antiferromagnetic (AFM) order below a Néel temperature of $T_N \approx$ 50-70 K, while $CaFe_2As_2$ transitions to an orthorhombic lattice with stripe-type AFM order below $T_N \approx 170$ K. Here, we present results from neutron diffraction experiments on a series of $Ca(Co_{1-x}Fe_x)_2As_2$ single crystals ($x = 0$ to 0.1) studying the evolution of $CaCo_2As_2$'s low-temperature state upon substituting Fe for Co. We find that A-type magnetic order persists for all of the values of x studied with suppressed T_N and ordered moment for increasing Co concentration and present the magnetic phase diagram for the Co rich region.

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