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Superconductivity in $CaFe_2As_2$ under uniaxial pressure: new insights from neutron diffraction experiments K. PROKEŠ, Helmholtz-Zentrum Berlin fuer Materialien und Energie, Germany, A. KREYSSIG, Ames Laboratory, Dept of Physics and Astronomy, Iowa State University, B. OULADDIAF, Institut Laue-Langevin, Grenoble, France, D.K. PRATT, N. NI, S.L. BUD'KO, P.C. CANFIELD, R.J. MCQUEENEY, Ames Laboratory, Dept of Physics and Astronomy, Iowa State University, D.N. ARGYRIOU, Helmholtz-Zentrum Berlin fuer Materialien und Energie, Germany, A.I. GOLDMAN, Ames Laboratory, Dept of Physics and Astronomy, Iowa State University — $CaFe_2As_2$, a member of the 122 iron arsenide family, is not superconducting at ambient pressure. It undergoes structural and antiferromagnetic transitions at $T_{TO} = 172$ K that are strongly coupled [1]. In clamped cell pressure measurements using a liquid medium, superconductivity has been observed with T_C as high as 12 K [2]. However, measurements using a He-gas pressure cell, where non-hydrostatic pressure components are minimized show no evidence of superconductivity [3]. We report on neutron diffraction experiments using $CaFe_2As_2$single crystals under uniaxial pressure applied along the c axis. We find that, above 0.05 GPa, several structural phases coexist at low temperature. Simultaneous diffraction/resistivity measurements strongly suggest that a pressure-stabilized tetragonal phase is responsible for the superconductivity in $CaFe_2As_2$. – The work at Ames Laboratory was supported by US DOE (DE-AC02-07CH11358). [1] A.I. Goldman, et al., PRB **78** (2008) 100506. [2] M.S. Torikachvili, et al., PRL **101** (2008) 057006. [3] W.Yu, et al., PRB **79** (2009) 020511.

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