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Discovery of a pressure-induced "collapsed" phase in $CaFe_2As_2$ A. KREYSSIG^{1,2}, ¹Ames Laboratory; ²Dep. of Physics and Astronomy, Iowa State University, Ames, M.A. GREEN^{3,4}, ³NIST Center for Neutron Research, Gaithersburg; ⁴Dep. of Materials Science and Engineering, University of Maryland, College Park, Y. LEE^{1,2}, G.D. SAMOLYUK^{1,2}, P. ZAJDEL^{3,5}, ⁵Dep. of Chemistry, University College of London, UK, J.W. LYNN³, S.L. BUD'KO^{1,2}, M.S. TORIKACHVILI⁶, ⁶Dep. of Physics, San Diego State University, San Diego, N. NI^{1,2}, S. NANDI^{1,2}, J.B. LEÃO³, S.J. POULTON^{3,4}, D.N. ARGYRIOU⁷, ⁷Helmholtz-Zentrum Berlin fuer Materialien und Energie, Germany, B.N. HARMON^{1,2}, R.J. MCQUEENEY^{1,2}, P.C. CANFIELD^{1,2}, A.I. GOLDMAN^{1,2} — Recent investigations of the superconducting iron-arsenide families have highlighted the role of pressure, be it chemical or mechanical, in fostering superconductivity. Here we report that CaFe₂As₂ undergoes a pressure-induced transition to a non-magnetic, volume "collapsed" tetragonal phase, which becomes superconducting at lower temperature. Spin-polarized totalenergy calculations on the collapsed structure reveal that the magnetic Fe moment itself collapses, consistent with the absence of magnetic order in neutron diffraction. - The support by U.S. DOE (DE-AC02-07CH11358) and NSF (DMR-0306165 and DMR-0805335) is acknowledged.

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