Abstract Submitted
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Emergence of charge density wave domain walls above the superconducting dome in $TiSe_2$ Y.I. JOE, X.M. CHEN, P. GHAEMI, University of Illinois at Urbana Champaign, K.D. FINKELSTEIN, Cornell University, G.A. DE LA PEÑA, Y. GAN, University of Illinois at Urbana Champaign, J.C.T. LEE, Lawrence Berkely Nation Labaratory, S. YUAN, University of Illinois at Urbana Champaign, J. GECK, Leibniz Institute for Solid State and Materials Research Dresden, G.J. MACDOUGALL, T.C. CHIANG, S.L. COOPER, E. FRADKIN, P. ABBAMONTE, University of Illinois at Urbana Champaign — Superconductivity (SC) in so-called "unconventional superconductors" is nearly always found in the vicinity of another ordered state, such as antiferromagnetism, charge density wave (CDW), or stripe order. This suggests a fundamental connection between SC and fluctuations in some other order parameter. $1T$-$TiSe_2$ is a prototypical CDW material in the transition-metal dichalcogenide family and was previously shown to exhibit SC when the CDW is suppressed by hydrostatic pressure or intercalation of Cu atoms. Here, we present detailed high pressure x-ray scattering study on $1T$-$TiSe_2$. We found that the CDW phase of $1T$-$TiSe_2$ is completely suppressed on the application of hydrostatic pressure and established the existence of a quantum critical point (QCP). Unexpectedly, we observed a weakly first order, incommensurate CDW phase, suggesting the presence of a Lifshitz tricritical point somewhere above the superconducting dome. Our study suggests that SC in $1T$-$TiSe_2$ may not be directly connected to the QCP of the CDW order, but to the formation of CDW domain wall.

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