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Pressure-induced CDW suppression in 1T-TiSe₂¹

YOUNG IL JOE, University of Illinois, K. FINKELSTEIN, CHESS, S. YUAN, S.L. COOPER, PETER ABBAMONTE, University of Illinois — 1T-TiSe₂ is a prototypical transition-metal dichalcogenide showing a commensurate CDW phase transition. It has been shown that hydrostatic pressure suppresses the CDW order and induces superconductivity. Here we present a high-pressure x-ray scattering study of the CDW order parameter and its fluctuations in TiSe₂. The integrated intensity at the base temperature as a function of pressure shows a positive curvature, indicating deviation from mean-field behavior. The ratio between the lattice distortion and the critical temperature is pressure-dependent, indicating a cross-over from strong to weak coupling limits. Using a Monte Carlo simulation of the three-component Potts model, we argue that the amount of anisotropy and the effective dimension must be taken into account to explain the properties of the phase transition.

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