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Experimental Observation of Chiral Order in $TiSe_2^1$ RAYMOND OSBORN, JOHN-PAUL CASTELLAN, STEPHAN ROSENKRANZ, JASPER VAN WEZEL, JACOB RUFF, UTPAL CHATTERJEE, Argonne National Laboratory, GORAN KARA-PETROV, Drexel University — Recent STM measurements on TiSe₂ were interpreted as evidence of chirality in the charge-density-wave order parameter, *i.e.*, a rotation in the phase of the three in-plane components of the CDW order from one layer to the next. Recently, J. van Wezel has shown theoretically how a chiral state can arise from the onset of orbital order of the Ti 3d and Se 4p states in conjunction with the charge order at a temperature at or below the CDW transition temperature [arXiv:1106.1930v1 (2011)]. This theory predicts a lowering of the symmetry of the ordered phase from $P\bar{3}c1$ to P2. We present the results of synchrotron x-ray diffraction measurements on a single crystal of TiSe2 that provide evidence of a second structural phase transition 15K below the CDW transition, consistent with the proposed space group.

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