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Unexpected (π, π) order in $Fe_{1.1}Te$[1] DAVID FOBES, IGOR ZALIZNYAK, ZHIJUN XU, GENDA GU, JOHN M. TRANQUADA, CMPMSD, Brookhaven National Lab, Upton, NY 11973 USA, DEEPAK SINGH, NCNR, National Institute of Standards and Technology, Gaithersburg, MD 20899 USA — We have studied the evolution of the magnetic and crystal structure in single crystalline $Fe_{1.1}Te$, an iron-rich parent of the chalcogenide superconductor family. While a structural transition to a monoclinic symmetry occurs at ~ 60 K, magnetic peaks at $2\pi \cdot (0.48, 0)$ only arise below $T_N \approx 58$ K, and can be understood as bicollinear magnetism with discommensuration defects. [2] Unexpectedly, we have also observed resolution limited peaks at approximately (π, π), arising at the same temperature T_N, and exhibiting temperature hysteresis similar to that seen in magnetic susceptibility, perhaps indicating that these peaks are of magnetic origin. Additionally, the position of these peaks is nearly the same as in the parent compounds of the iron pnictide family of superconductors, where magnetic order is simple collinear commensurate antiferromagnetism. The origin of these new peaks near (π, π) and their relationship to the dominant bicollinear magnetic order observed in $Fe_{1.1}Te$ presents a puzzle.

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[2]I. Zaliznyak *et al.*, Phys. Rev. B **85**, 085105 (2012)

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