Abstract Submitted
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An Inelastic X-ray Study of the Ferroelectric Phase Transition in SnTe[1] CHRISTOPHER O'NEILL, DMITRY SOKOLOV, ANDREAS HERMANN, School Of Physics University of Edinburgh, ALEXEI BOSSAK, ID28, ESRF, 71 Avenue des Martyrs, Grenoble, France, CHRISTOPHER STOCK, ANDREW HUXLEY, School Of Physics University of Edinburgh — SnTe was originally studied in the context of lattice vibrations in diatomic lattices [1]. There has been a recent renewal of interest due to its identification as a crystalline topological insulator, which is related to its room temperature *fcc* rocksalt structure [2]. However, the material undergoes a phase transition to a rhombohedral structure upon cooling, strongly affecting its topological states. While the transition is predicted to be a displacive ferroelectric transition, no ferroelectric response has previously been seen due to free carrier screening. We report inelastic x-ray measurements showing the low energy transverse-optic phonon soften to near zero energy at the structural transition [3]. Importantly, the energy of this mode increases again at temperatures below the transition temperature, proving SnTe undergoes a ferroelectric displacement. Density functional calculations that account for the ferroelectric transition and phonon linewidth changes consistent with anharmonic coupling will also be discussed. [1] G. S. Pawley, W. Cochran, R. A. Cowley, and G. Dolling, Phys. Rev. Lett. 17, 753 (1966). [2] T. Hsieh, H. Lin, et al. Nat Comm 3, 982 (2012). [3] C.D. O'Neill, D. Sokolov, A. Hermann, A. Bossak, C. Stock and A.D. Huxley. (submitted)

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