

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

X-ray Studies of Quantum Fluctuations in SrTiO₃ across its Quantum Paraelectric Phase Transition SHIH-CHANG WENG, University of Illinois at Urbana-Champaign, RUQING XU, AYMAN SAID, HAWOONG HONG, Argonne National Laboratory, TAI-CHANG CHIANG, Univ. of Illinois at Urbana-Champaign — Strontium titanate (SrTiO₃), with a simple cubic perovskite structure at room temperature, displays a number of interesting phase transitions as a function of temperature and pressure. It exhibits an antiferrodistortive transition at $T_c = 105$ K, resulting in a cubic-to-tetragonal structural distortion. This transition has been studied in detail by M. Holt and H. Hong using thermal diffuse scattering and inelastic x-ray scattering methods. Another phase transition takes place at 37 K, below which the system assumes a quantum paraelectric phase. It is generally believed that the classical free energy of the system favors a ferroelectric phase, but this transition never fully develops because of quantum fluctuation. Despite a large number of prior investigations, this quantum phenomenon is still not well understood in terms of the underlying lattice dynamics. Using inelastic x-ray scattering, we have obtained new information about this classic system, including mode softening as a function of temperature.

Shih-Chang Weng
Univ. of Illinois at Urbana-Champaign

Date submitted: 10 Nov 2011

Electronic form version 1.4