Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Persistent Optically Induced Magnetism in Oxygen-Deficient Strontium Titanate[1] W.D. RICE, J.D. THOMPSON, S.A. CROOKER, Los Alamos National Laboratory, M. BOMBECK, TU Dortmund, P. AMBWANI, C. LEIGHTON, Dept. of Chem. Engineering and Materials Science, Univ. of Minnesota — Strontium titanate ($SrTiO_3$) is a foundational material in the emerging field of complex oxide electronics. While its electronic, optical, and lattice properties have been studied for decades, $SrTiO_3$ has recently become a renewed focus of materials research owing to the discovery of magnetism and superconductivity at interfaces between $SrTiO_3$ and other oxides. The formation and distribution of oxygen vacancies may play an essential but as-yet-incompletely understood role. Here we observe an *optically induced* and *persistent* magnetization in slightly oxygen-deficient bulk $SrTiO_{3-\delta}$ crystals using magnetic circular dichroism spectroscopy and SQUID magnetometry. The optically induced magnetization appears below $\sim$18 K, persists for hours below 10 K, and is tunable via the polarization and wavelength of sub-bandgap (400-500 nm) light. These effects, which only occur in oxygen-deficient samples, reveal a detailed interplay between defects, magnetism, and light in oxide materials.

[1]W. D. Rice *et al.* submitted. See article on arXiv.

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Date submitted: 14 Nov 2013 Electronic form version 1.4