Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Orbiton features in $YTiO_3$ and $LaTiO_3$ probed by Raman light scattering C. ULRICH, Max-Planck-Institut FKF, Stuttgart, Germany, A. GOESSLING, M. GRUENINGER, H. ROTH, T. LORENZ, Universitaet zu Koeln, Germany, G. KHALIULLIN, M. GUENNOU, Max-Planck-Institut FKF, Stuttgart, Germany, C. FROST, ISIS, Rutherford Appleton Laboratory, United Kingdom, Y. TAGUCHI, Y. TOKURA, University of Tokyo, Japan, B. KEIMER, Max-Planck-Institut FKF, Stuttgart, Germany — The existence of collective orbital excitations, termed orbitons, in $YTiO_3$ has been proposed by G. Khaliullin et al. [1] and S. Ishihara [2]. We have performed Raman and inelastic neutron scattering experiments on $LaTiO_3$ and $YTiO_3$ single crystals in order to determine the excitation spectrum for energies above the range of optical phonons. There are two unexpected features in the high energy Raman spectrum of both materials. A sharp structure at 165 meV and a broad continuum like feature around 230 meV. Our theoretical calculations of the phonon dispersion relation have revealed, that the peak at 165 meV is right at the high energy cutoff of the two-phonon density of states, but it's unexpected large intensity cannot be explained with two-phonon processes alone. The temperature dependence, polarization dependence and the resonance behavior probed with different laser lines for excitation, yields that the feature at 230 meV can possibly be assigned to orbital excitations. [1] G. Khaliullin and S. Okamoto, PRB **68**, 205109 (2003). [2] S. Ishihara. PRB **69**, 075118 (2004).

Clemens Ulrich
Max-Planck-Institut FKF, Stuttgart, Germany

Date submitted: 01 Dec 2004 Electronic form version 1.4