

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

Sorting Category: 06.4 (T)

**Probing orbitons in YTiO<sub>3</sub> with Resonant Inelastic X-ray Scattering** LUCAS AMENT, Lorentz Institute, Leiden, GINIYAT KHALIULLIN, Max Planck Institute, Stuttgart, JEROEN VAN DEN BRINK, Lorentz Institute, Leiden — In YTiO<sub>3</sub>, a strongly correlated electron system with degenerate orbitals, orbitons are predicted to exist [1]. The hallmark of collective excitations is dispersion. To observe the orbiton dispersion, the rapidly developing technique of Resonant Inelastic X-ray Scattering (RIXS) is especially well suited. We analyze recent experimental RIXS data on YTiO<sub>3</sub> in the Ultrashort Core hole Lifetime framework [2]. The Ti ions in this material have a  $3d^1$  configuration, and the electron occupies one of the three degenerate  $t_{2g}$  orbitals. Many of this compound's ground state properties are explained by assuming that the orbitals on these Ti ions talk to each other through a superexchange mechanism [1]. RIXS could couple to the orbital excitations (orbitons) in these kind of materials in two ways: via modulation of the superexchange interactions [3] and via a shakeup process. We compare our theoretical RIXS spectra to experimental ones, giving strong evidence for the existence of orbitons. // [1] G. Khaliullin and S. Okamoto, Phys. Rev. B 68, 205109 (2003) // [2] J. van den Brink and M. van Veenendaal, Europhys. Lett. 73, 121 (2006); L. J. P. Ament, F. Forte and J. van den Brink, Phys. Rev. B 75, 115118 (2007) // [3] compare F. Forte, L. J. P. Ament and J. van den Brink, PRL (2008)

Prefer Oral Session  
 Prefer Poster Session

Lucas Ament  
ament@lorentz.leidenuniv.nl  
Lorentz Institute

Date submitted: 21 Nov 2008

Electronic form version 1.4