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Probing orbitons in YTiO3 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 $YTiO_3$, 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 $YTiO_3$ 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)

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