

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Low-Energy Charge Excitation in Single Crystal MgB₂ Y.Q. CAI, P. CHOW, H. ISHII, C.C. CHEN, K.S. LIANG, C.T. CHEN, NSRRC, Taiwan, S. TSUDA, S. SHIN, U. Tokyo, Japan, Y. TAKANO, K. TOGANO, NIMS, Japan, H. KITO, AIST, Japan, C.C. KAO, NSLS — The charge dynamics of MgB₂ has been studied at 300K along the *c*-axis using inelastic X-ray scattering (IXS) with 65 and 250 meV resolution at 9.886 keV on the Taiwan IXS beamline at SPring-8. [1] An unusual charge excitation has been observed which shows periodic dispersion with momentum transfer *q* that follows: $\omega = \omega_0 - 2\gamma\cos(qc)$, with $\omega_0 = 3.55$ eV, $\gamma = 0.49$ eV, and $c = 3.52$ Å the lattice constant along the *c*-axis. This charge excitation persists even at momentum transfers greater than q_c , where the conventional bulk plasmon excitation has decayed into the single-particle continuum. This feature may be linked with the predicted sharp collective mode at $q < 0.6$ Å⁻¹ [2], but the behavior at higher *q* is not accounted for. Possible origins and implications of this feature are discussed. This work was supported by the National Science Council of Taiwan. [1] Y.Q. Cai, et al., AIP Conf. Proc. 705, 340 (2004). [2] W. Ku, et al., Phys. Rev. Lett. 88, 057001 (2002).

Yong Cai
National Synchrotron Radiation Research Center

Date submitted: 01 Dec 2004

Electronic form version 1.4