

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Charge dynamics in an incommensurate layered cuprate
Sr₁₄Cu₂₄O₄₁ : **A momentum-resolved study** LEWIS WRAY, DONG QIAN,
DAVID HSIEH, MATTHEW XIA, Princeton University, HIROSHI EISAKI, Na-
noelectronics Research Institute (NeRI), ZAHID HASAN, Princeton University
— We report the first *momentum resolved* charge mode spectrum of insulating
Sr₁₄Cu₂₄O₄₁ using inelastic resonant x-ray scattering. Our results show that the
intense excitation modes at the charge gap edge predominantly originate from the
ladder-containing two-dimensional planes. The observed modes (E vs. Q) are found
to be dispersive for momentum transfers along the “legs” ($\vec{Q} \parallel \hat{c}$) but nearly localized
along the “rungs” ($\vec{Q} \parallel \hat{a}$). Dispersion and peakwidth characteristics are strongly
similar to the low energy charge spectrum of quasi-one dimensional *SrCuO₂*, and
we suggest a qualitative explanation in terms of a model in the strongly correlated
limit ($U \gg t$). This behavior is in marked contrast to the charge spectrum ob-
served in most two dimensional cuprates. Quite generally, our results also show that
momentum-tunability of inelastic scattering can be used to resolve mode contribu-
tions in multi-component correlated systems.

Lewis Wray
Princeton University

Date submitted: 01 Dec 2006

Electronic form version 1.4