## Abstract Submitted for the MAR08 Meeting of The American Physical Society

Transverse displacement modulation of the 1D metallic chains in optimally doped yttrium barium copper oxide superconductor<sup>1</sup> XUERONG LIU, University of California San Diego (UCSD), ZAHIRUL ISLAM, Argonne National Laboratory (ANL), SUNIL SINHA, UCSD, SIMON MOSS, University of Houston, JONATHAN LANG, ULRICH WELP, ANL — We report on comprehensive quantitative analyses of x-ray diffuse scattering studies of nanoscale inhomogeneities in the optimally doped YBCO superconductor. In addition to previously studied  $\mathbf{q}_0 = (\frac{1}{4}, 0, 0)$  superstructure due to oxygen vacancy ordered ORTHO-IV phase and Huang diffuse scattering due to coherent long-range strain, we present a clear x-ray scattering observation of a transverse displacement modulation of the 1D CuO metallic chains. This modulation co-exists within the well-formed ORTHO-IV patches and persists at temperatures well below  $T_c$ . Interestingly, the periodicity of this modulation is close to that of  $\frac{1}{2k_F}$  according to electronic band calculations. The significance of these modulation and their role in the formation of the electronic inhomogeneities on a nano-meter length scales will be discussed.

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