Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Decoding Spatial Complexity of Local Charge Modulations in Superconducting Pb-Bi-2201 ERICA CARLSON, Purdue University, CAN-LI SONG, ELIZABETH MAIN, Harvard University, SHUO LIU, BENJAMIN PHILLABAUM, Purdue University, KARIN DAHMEN, University of Illinois, Urbana-Champaign, ERIC HUDSON, Pennsylvania State University, JENNIFER HOFFMAN, Harvard University — In unconventional superconductors, real-space orders such as charge density modulations can coexist with superconductivity. In the cuprate superconductors, it has recently been recognized that local charge modulations are a ubiquitous feature and likely important for understanding the superconductivity in these materials. However, there are still open issues surrounding the dimensional profile of these charge modulations, including whether the modulation wavevector is unidirectional or bidirectional, and also whether the charge modulations extend beyond the surface of the material into the bulk. In bismuth-based cuprates, material disorder is a severe enough effect so as to preclude understanding the charge modulations through bulk scattering techniques. In order to resolve these issues, we use a local technique, scanning tunneling microscopy, to image the static charge modulations in Pb-Bi-2201. We find that the charge modulations are more consistent with an underlying tendency to a unidirectional charge density wave than a bidirectional charge density wave. Using recently developed cluster analysis technques, we show that these locally 1D structures are more than surface deep, extending into the bulk of the material throughout the doping range.

Erica Carlson
Purdue University

Date submitted: 14 Nov 2014 Electronic form version 1.4