MAR14-2013-020072

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Unraveling electronic and magnetic structure at cuprate-manganite interfaces

JOHN FREELAND, Argonne National Laboratory

Oxide interfaces offer a rich variety of physics and a pathway to create new classes of functional oxide materials. The interface between the cuprate high-temperature superconductors and ferromagnetic manganites is of particular interest due to the strongly antagonistic nature of the superconducting and ferromagnetic phases. Advancements in the synthesis of oxide heterostructure offers the opportunity to merge these two dissimilar oxides with atomic precision to understand the fundamental limits of bringing such states into close proximity. However, the main challenge is to understand the physical framework that describes the behavior of strongly correlated electrons near oxide interfaces. One aspect that will be addressed here is the use of advanced tools to gain detailed electronic and magnetic information from the boundary region[1-3]. In this talk, recent work will be addressed both in connection to visualizing the interface with spatially resolved tools [3] as well as harnessing layer-by-layer growth to explore the limits in ultrathin superlattices. These insights allow us to better understand the physics behind the interfacial spin and orbital reconstruction observed in this system [1,2]. Work at Argonne is supported by the U.S. Department of Energy, Office of Science, under Contract No. DE-AC02-06CH11357.

[1] J. Chakhalian et. al. Nature Physics 2, 244 (2006).
[2] J. Chakhalian et. al. Science 318, 1114 (2007).
[3] Te-Yu Chien et al. Nature Communications 4 2236 (2013).