NORTHWESTERN UNIVERSITY'S DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING AND MATERIALS RESEARCH SCIENCE AND ENGINEERING CENTER PRESENT:

2022 MSE FUTURE LEADERS SEMINAR SERIES

Shua Sanchez

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Shua Sanchez is a Postdoctoral Fellow at MIT working with Prof. Riccardo Comin. He earned his B.S. in Physics from the University of Wisconsin-Madison and his PhD in physics at the University of Washington working with Prof. Jiun-Haw Chu. His current primary research focus is on combining in-situ strain methodologies to strongly correlated electron materials to tune various quantum phases, and using x-ray techniques to characterize the structural, magnetic and electronic changes that result from strain and other applied fields. He is currently supported by the NSF MPS Ascend postdoctoral fellowship, and was previously supported by the DOE SCGSR award during a one year stay at Argonne National Laboratory to develop the strain+x-ray technique.

Probing nematicity and magnetism with combined tunable strain and x-ray scattering/fluorescence techniques

In this talk I will review our recent progress at the Advanced Photon Source in combining in-situ tunable uniaxial stress with simultaneous transport measurements and several synchrotron x-ray techniques to perform unique characterizations of several iron-based superconductors. In Co-doped $BaFe_2As_2$ we use x-ray diffraction (XRD) to carefully monitor the strain detwinning of the orthorhombic structural domains and make a precise determination of the spontaneous resistivity anisotropy across temperature within the nematic phase. In $EuFe_2As_2$ we use x-ray magnetic circular dichroism (XMCD) to make the first observation of a magnetic field-induced spin flip transition of antiferromagnetic Eu moments in a strain-detwinned sample. Finally, in FeSe we combine XRD and x-ray linear dichroism (XLD) to observe the nematic orbital polarization anisotropy within the nematic phase across a range of strain and detwinning values. This unique combination of tuning and probing techniques has so far given new insight into these interesting materials and presents a new approach to answering unresolved questions in iron-based superconductors and beyond.

Thursday, May 5 • 10 AM CDT • Zoom Link

Meeting ID: 958 6172 3631 • Password: mse_FLS

Questions? Contact Elena.Lindstrom@northwestern.edu

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