FWS21-2021-000060

Abstract for an Invited Paper
for the FWS21 Meeting of
the American Physical Society

Coherent X-ray Scattering of domain dynamics in quantum materials

ROOPALI KUKREJA, UC Davis

Mesoscale phenomena play an important role in the dynamics of phase transitions in quantum materials. In order to fully understand and tailor nanoscale functionalities of quantum material such as strongly correlated oxides, detailed access to the nanoscale regime, correlation length scales and their temporal evolution is required. Coherent x-ray scattering at synchrotron sources have emerged as a unique technique to access both nanoscale lengthscales and fundamental timescales. Higher brightness, and coherence enabled by upcoming new sources such as NSLS-II, APS upgrade and ALS upgrade, provide a novel way to investigate material dynamics and fluctuations at fundamental limits of lengthscales and timescales. In this talk, I will discuss coherent x-ray scattering techniques with a focus on x-ray photon correlation spectroscopy (XPCS) which provides a unique way to characterize nanoscale heterogeneities and their correlations across the phase transition. It allows us to study domain dynamics and fluctuations by capturing high resolution coherent speckle patterns in reciprocal space which can be considered as a fingerprint of the sample in real space. I will discuss the details of XPCS technique and present our recent XPCS studies across the metal-insulator transition in magnetite.