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Coherent X-ray Scattering on Magnetic and Electronic Materials

Monday, 31 May 2021 16:30 (30 minutes)

With the advent of diffraction limited light sources, coherent X-rays will play an important role in understanding and characterizing nanoscale magnetic surfaces and interfaces with unique and novel spin textures. Coherent X-ray scattering give rise to speckle pattern that contain unique finger-print about the sample heterogeneity. In this talk I will show various examples to demonstrate how speckle pattern enable us to undertake studies that provide insight into spatial and temporal correlation of magnetic and electronic features in a quantum material. I will show Photon Correlation Spectroscopy (XPCS) studies performed on a 2D square magnetic lattice performed at a synchrotron, where we observed two distinct regimes of domain wall motion—a low temperature ballistic, and a high temperature diffusive type. I will also show a pulse-pair method employed at the LCLS to perform sub-nanosecond fluctuation studies on a magnetic thin film. Finally, I will also show our recent studies on generating soft X-ray orbital angular momentum beams using magnetic nanostructures that has the potential to unravel new information about quantum properties in materials.

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