## Joint APS/CNM WK#5: Applications of AI/ML to Real-time Multi-modal Analysis at Synchrotron Light Sources and Electron Microscopes

**Organizers**: Mathew Cherukara (APS), Subramanian Sankaranarayanan (CNM), Nicholas Schwarz (APS), and Chengjun Sun (APS)

The APS and CNM are in the position to help solve some of the most challenging and novel scientific questions facing the energy needs of the nation. The design of new materials to manipulate classical and quantum information with high fidelity and ultralow power consumption, enabling systems for efficient energy storage, transportation, and conversion that will drive the emerging economy based on renewable energy are just a few examples. Addressing these scientific opportunities will be aided by the intrinsic capabilities of APS-U era facilities along with new measurement techniques and technological advances in detectors.

These advances in sources and detectors (x-ray and electron) will result in orders of magnitude higher data rates and increased complexity from multi-modal data streams. Conventional data processing and analysis methodologies become infeasible in the face of such large and varied data streams. The use of AI/ML methods is becoming indispensable for real-time multi-modal analysis at advanced synchrotron light sources and in electron microscopes. This workshop is organized to discuss the state-of-the art and potential of AI/ML for real-time multi-modal data processing and analysis. It provides an opportunity for academics, laboratory and facility staff, researchers, and students from x-ray and electron characterization communities to exchange ideas and think creatively about new methods for multi-modal characterization and experimentation.