

Joint APS/CNM WK #4: Autonomous Control of Experiments in the Microscopes and Light Sources of the Future

Time: Full-day

Date: Tuesday, April 21

Workshop location: Building 440, Room A105/106

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

Description: The APS and CNM are positioned 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 and the enabling of 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. Human-in-the-loop experiments become infeasible in the face of such large and varied data streams. As experiments progress to speeds where humans are too slow to make control decisions, adaptive control becomes imperative. This workshop is organized to discuss the state-of-the-art and potential of autonomous control of experiments. It provides an opportunity for academics, laboratory and facility staff, researchers, and students from both x-ray and electron characterization communities to exchange ideas and think creatively about new avenues for collaborations and advance autonomous characterization and experimentation.