Joint Workshop 7: Real-time Analysis of Synchrotron Light Source and Nanoscale Research Center Data Using AI/ML for APS-U First Experiments

Wednesday, April 19, Morning

9:00 – 9:10 Nicholas Schwarz, Subramanian Sankaranarayanan, Mathew Cherukara, and Chengjun Sun (Argonne National Laboratory)
Welcome and Introduction

Session 1: Autonomous Experiments
Chair: Nicholas Schwarz

9:10 – 9:40 Sergei Kalinin (University of Tennessee, Knoxville)
Machine Learning and Automated Experiment in Microscopy: Workflow Design, Forensics, Explainability, and Human-in-the-loop Interventions

9:40 – 10:10 Ilia Ivanov (Oak Ridge National Laboratory)
Towards Autonomous Discovery of Thin Film Functionalities

10:10 – 10:30 Break

Session 2: AI/ML for Dynamics Experiments
Chair: Subramanian Sankaranarayanan

10:30 – 11:00 Andi Barbour (Brookhaven National Laboratory)
Enabling Real-time AI-guided Photon Correlation Spectroscopy at CSX

11:00 – 11:30 James Horwath (Argonne National Laboratory)
Understanding Relaxation Dynamics Beyond Equilibrium Using AI-informed X-ray Photon Correlation Spectroscopy

11:30 – 12:00 Michael Servis (Argonne National Laboratory)
Static and Dynamic Critical Phenomena in Rare Earth Separations

12:00 Adjourn Day One

Thursday, April 20, Morning

9:00 – 9:10 Nicholas Schwarz, Subramanian Sankaranarayanan, Mathew Cherukara, and Chengjun Sun (Argonne National Laboratory)
Welcome and Introduction

Session 3: AI/ML for Diffraction Experiments
Chair: Mathew Cherukara

9:10 – 9:40 Howard Yanxon (Argonne National Laboratory)
Deploying Machine Learning-based Segmentation for X-ray Diffraction Images at Synchrotron Facilities

9:40 – 10:10 Simon Billinge (Columbia University)
AI and Machine Learning-aided Prompt Analysis of Powder Diffraction and PDF Data

10:10 – 10:30 Break

Session 4: AI/ML for Imaging and Spectroscopy Experiments
Chair: Chengjun Sun

10:30 – 11:00 Colin Ophus (Lawrence Berkeley National Laboratory)
Programmatic and Deep Learning Analysis Pipelines for 4D-STEM Materials Science Experiments

11:00 – 11:30 Aileen Luo (Cornell University)
X-ray Nano-imaging of Epitaxial Thin Film Functional Oxides via Cluster Analysis

11:30 – 12:00 Inhui Hwang (Argonne National Laboratory)
Towards Real-time Data Processing and Analysis of X-ray Emission Spectra Using AI/ML: Argonne X-ray Emission Analysis Packages

12:00 Adjourn