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

Wednesday, May 5, Morning

8:50 – 9:00  Welcome Day 1

**Session 1**

9:00 – 9:30  Prasanna Balaprakash (Argonne National Laboratory)

*Neuromodulated Neural Architectures with Local Error Signals for Memory-constrained Online Continual Learning*

9:30 – 10:00  Maria Chan (Argonne National Laboratory)

*Integrating Machine Learning and Theoretical Modeling for X-ray and Electron Data Inversion*

10:00 – 10:30  Stephan Hruszkewycz (Materials Science Division, Argonne National Laboratory)

*Opportunities for AI/ML to Enable New Materials Science with Coherent X-ray Diffraction*

10:30 – 11:00  Break

**Session 2**

11:00 – 11:30  Wendy Di (Mathematics and Computer Science Division and X-ray Science Division, Argonne National Laboratory)

*Multimodal Inverse Problem in Data Science*

11:30 – 12:00  Inhui Hwang (Advanced Photon Source, Argonne National Laboratory)

*X-ray Emission Data Analysis Software Package Using Unsupervised Machine Learning*

12:00 – 12:15  Closeout Discussion for Day 1

Thursday, May 6, Morning

8:50 – 9:00  Welcome Day 2

**Session 3**

9:00 – 9:30  Bobby Sumpter (Oak Ridge National Laboratory)

*Understanding and Controlling the Materials and Chemical World, Atom-by-Atom*

9:30 – 10:00  Stephen Whitelam (Molecular Foundry, Lawrence Berkeley National Laboratory)

*Learning to Grow: Control of Material Self-assembly Using Evolutionary Reinforcement Learning*
10:00 – 10:30  Remi Dingreville (Center for Integrated Nanotechnologies, Sandia National Laboratories)
Decoding Microstructure Statistics from Diffractograms Via Atomistic Simulations and Machine Learning

10:30 – 11:00 Break

Session 4
11:00 – 11:30  Petrus Zwart (Lawrence Berkeley National Laboratory)
Towards High-throughput Autonomous Infrared Spectromicroscopy

11:30 – 12:00  Hemant Sharma (Advanced Photon Source, Argonne National Laboratory)
AI Accelerated Reconstructions for Real-time Analysis of High-energy Diffraction Microscopy Data at APS

12:00 – 12:15 Closeout Discussion for Day 2