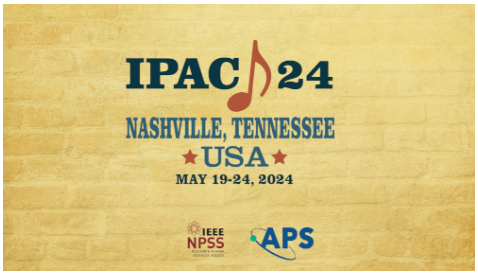

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Machine Learning for Data Analysis and Control of an MeV Ultrafast Electron Diffraction Sysytem and a Photo-Cathode Laser and Gun System: Updates

Tuesday, 21 May 2024 16:00 (2 hours)

An MeV ultrafast electron diffraction (MUED) in-strument system is a unique characterization technique used to study ultrafast processes in a variety of mate-rials by a pump-probe method. Combining this tech-nology with rapid data science and artificial intelli-gence/machine learning (AI/ML) technologies in con-junction with high-performance computing can create a turnkey, automated instrument. AI-based system controls can also provide real-time electron beam optimization or provide virtual diagnostics of the beamline operational parameters. Deep learning can be applied to the MUED diffraction patterns to recover valuable information on subtle lattice variations Such a data-science-enabled MUED facility will open this technique to a wider user base with a wider variation of experience, providing an automated or semi-automated state-of-the-art instrument, with a beamline scientist orchestrating the overall data collection pro-cess. Updates on research and development efforts pri-marily in the realm of initial studies of network con-nection between the ALCF and the Accelerator Test Facility (ATF) at Brookhaven National Laboratory are presented.

Footnotes

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