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Machine Learning for Improved SRF Operation at CEBAF

Tuesday, 25 June 2024 09:00 (30 minutes)

Over the last few years several machine learning projects at Jefferson Lab have had a common focus to optimize operation of superconducting RF (SRF) cavities in the Continuous Electron Beam Accelerator Facility (CEBAF). Recent access to information-rich data has enabled this multi-faceted approach, which aims to (1) identify and classify types of faults from cavities, (2) extend the work to provide real-time fault prediction for cavities, (3) minimize radiation levels due to field emission in the linacs, and (4) develop tools to automate cavity instability detection. We briefly describe each project including utilized data sources, summarizing progress, and sharing lessons learned. Specifically, we highlight the complications encountered working with real-world data and the challenges of deploying and maintaining models in an operationally complex system.

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