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Anomaly detection of slow-moving variables at LANSCE for improved beam quality

Monday 11 August 2025 16:00 (2 hours)

Modern accelerator facilities operate with a large number of variables, many of which can influence beam quality. While most of these variables are constrained within predefined boundary conditions, slow fluctuations over extended periods—from tens of minutes to a full day—can still significantly degrade beam performance. Due to their gradual nature and the difficulty in distinguishing meaningful trends from background noise, such variables often go unnoticed and remain unoptimized by operators for days.
This study investigates the use of machine learning algorithms to identify and analyze these slow-moving variables. By applying advanced time-series analysis and feature importance ranking, the proposed approach reveals hidden correlations between slow variable drifts and a key beam quality metric: the ring loss at the Los Alamos Neutron Science Center (LANSCE). The results demonstrate the potential of machine learning to detect subtle anomalies and offer actionable insights to mitigate persistent beam quality issues that can disrupt operations for weeks at a time.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

LANL-LDRD

I have read and accept the Privacy Policy Statement

Yes

Authors: HUANG, En-Chuan (Los Alamos National Laboratory); YAMPOLSKY, Nikolai (Los Alamos National Laboratory)

Presenter: HUANG, En-Chuan (Los Alamos National Laboratory)

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