

Anomaly Detection for Diode Failures

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The Collider-Accelerator Department's (C-AD) Controls Group at Brookhaven National Laboratory produces and implements tools to analyze data after magnet quench events. Diodes are used in the circuitry to protect quenching magnets from damage. Intermittently failing diodes can be difficult to identify as they may not always impact beam. Accelerator physicists have studied the voltage tap shutoff curves at various times after a failure, identifying specific time zones over which a derivative may be calculated to detect an anomaly. Anomaly detection and clustering models show promise by detecting negative events and outliers in datasets. Using machine learning modeling algorithms, an automated analysis for each power supply based on the voltage tap data can be applied which will help to efficiently identify faulty diodes and limit the number of false positives reported. This could potentially lead to faster recovery times as well as help avoid equipment damage.

Primary Keyword

anomaly detection

Secondary Keyword

failure prediction

Tertiary Keyword

AI-based controls

Primary authors: MALDONADO, Jennefer (Brookhaven National Laboratory); LASTER, Jonathan (Brookhaven National Laboratory)

Co-authors: BRUNO, Donald (Brookhaven National Laboratory); NEMESURE, Seth (Brookhaven National Laboratory)

Presenter: MALDONADO, Jennefer (Brookhaven National Laboratory)

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