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Automated Anomaly Detection on European XFEL Klystrons

Thursday, 23 May 2024 16:00 (2 hours)

High-power multi-beam klystrons represent a key component to amplify RF to generate the accelerating field of the radio frequency superconducting (SRF) cavities at European XFEL. Exchanging these high-power components takes time and effort, thus it is necessary to minimize maintenance and downtime and at the same time maximize the device's operation. In an attempt to explore the behavior of klystrons using machine learning, we completed a series of experiments on our klystrons to determine various operational modes and conduct feature extraction and dimensionality reduction to extract the most valuable information about a normal operation. To analyze recorded data we used state-of-the-art data-driven learning techniques and recognized the most promising components that might help us better understand klystron operational states and identify early on possible faults or anomalies.

Footnotes

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Primary author: SULC, Antonin (Deutsches Elektronen-Synchrotron)

Co-authors: EICHLER, Annika (Deutsches Elektronen-Synchrotron); WILKSEN, Tim (Deutsches Elektronen-Synchrotron)

Presenter: SULC, Antonin (Deutsches Elektronen-Synchrotron)

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