

# Neural Networks for Anomaly Detection in LINACs, Injectors, and Transfer Lines

*Saturday 7 October 2023 12:30 (20 minutes)*

Maximizing up-time of accelerators relies heavily on the ability to detect and diagnose changes in the machine. The application of machine learning for anomaly detection remains a rich area of research. RadiaSoft has been developing methods for anomaly detection in collaboration with Jefferson Lab, Brookhaven National Lab, and SLAC. Here we provide a survey of recent innovations in anomaly detection for particle accelerators and present results from our recent work. Our studies are focused on the low energy injector at CEBAF, the AGS to RHIC transfer line at BNL, and industrial accelerators for radiotherapy and imaging. We focused on the use of two neural network architectures, inverse models and variational autoencoders. This talk will provide high level context for how these methods are utilized for anomaly detection and results from our studies using both simulation and measurement data.

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**Session Classification:** Project presentations/demos