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Towards a machine learning trigger for high-purity germanium spectrometers

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High-purity germanium spectrometers are widely used in fundamental physics and beyond. Their excellent energy resolution enables the detection of electromagnetic signals and recoils down to below 1keV ionization energy and even lower. However, the detectors are also very sensitive to all types of noise that will overwhelm the trigger routines of the data acquisition system and significantly increase the file sizes. This ultimately limits the set trigger threshold to not be able to fully leverage the full potential of the detectors.
I will present in my talk time series cluster algorithms to identify this noise and show a concept of how to use anomaly detection algorithms for triggering to overcome the short comings of traditional trigger algorithms and lower the energy threshold. I will also illustrate the gains for fundamental physics detections using coherent elastic neutrino nucleus scattering as an example.

Focus areas

HEP

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