Contribution ID: **77**   Type: **Poster**

Multi-channel, multi-template reconstruction for SuperCDMS SNOLAB using machine learning

Thursday 18 July 2024 20:40 (20 minutes)

SuperCDMS SNOLAB is a 4th generation direct detection experiment that will employ Si and Ge crystals equipped with Transition Edge Sensors (TESs) to search for low mass dark matter particles ($<10\,\mathrm{GeV}/c^2$). These detectors use larger crystals compared to their predecessors and feature 12 phonon readout channels each. The position dependence of the detector response broadens the energy resolution in addition to a broadening from correlated noise between channels. The NxM filter is an advanced event reconstruction algorithm meant to address these issues by fitting digitized waveforms from N channels with M signal shapes simultaneously. This algorithm allows us to mathematically account for correlated noise. Position information is encoded in the shapes and amplitudes of the pulses. We present results from combining machine learning methods with NxM filter to capture position information in the output amplitudes, correct for position dependence of the energy estimators and more.

Alternate track

1. Computing, AI and Data Handling

I read the instructions above

Yes

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Session Classification: Poster Session 1

Track Classification: 09. Dark Matter Detection