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# Improvements to Cosmic Muon Identification Using Machine Learning

*Wednesday, 14 July 2021 14:30 (15 minutes)*

The Mu2e Experiment at Fermilab is looking for neutrino-less conversion of a muon to an electron. The experiment requires an extremely efficient Cosmic Ray Veto (CRV) to detect cosmic muons and ignore them so they cannot be confused with a successful direct conversion. Similarly, noise generated by neutrons and gamma rays from muon beam production/transportation can challenge the operation of the CRV, and creates difficulties in looking at actual events involving muons by creating experimental dead time. To try to help maintain adequate efficiency levels and minimize dead time, machine learning is being used in an attempt to improve the rejection efficiency and noise event classification. The model being used is a neural net, using Monte Carlo dropout for error analysis and better prediction, built by the Keras library in Python, and is trained on a simulated dataset of noise and cosmic muon events generated using Geant4.

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