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Deep Neural Networks for Rare Event Searches in DUNE

The Deep Underground Neutrino Experiment (DUNE) uses a large liquid argon time projection chamber detector, well shielded from cosmogenic radiation, and sensitive to physics signals down to a few MeV. As such, it is well positioned for rare event searches, e.g. searches for neutrinos from a nearby supernova burst, and various modes of nucleon decay. The detector is read out in the form of high-resolution 2D-projected views of particle interactions within it, streamed continually at a rate of a few TB/s. The high data rate necessitates a data acquisition system (DAQ) that is highly efficient at detecting infrequent physics-related activity above radiological backgrounds and detector noise, and capable of processing the data in real time with zero deadtime. This poster reviews the range of astroparticle physics enabled by such a DAQ, and presents exploratory work for a DAQ architecture that employs deep neural networks for real-time image analysis of data for triggering purposes.

Authorship annotation

for the DUNE Collaboration

Session and Location

Wednesday Session, Poster Wall #202 (Ballroom)

Poster included in proceedings:

yes

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