

# The 22nd international workshop on Next Generation Nucleon Decay and Neutrino Detectors (NNN23)



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## Deep Learning techniques to search for rare processes in LArTPC-based neutrino experiments

*Friday, 13 October 2023 16:10 (20 minutes)*

The current and next-generation liquid argon time projection chamber (LArTPC) detectors offer a great opportunity to search for rare, beyond-Standard Model (BSM) physics such as baryon number violation. During operation, these detectors generate high-resolution images of particle interactions, making them well-suited for applying and leveraging deep learning techniques to search for rare signals within their data. This talk will discuss ongoing research and development (R&D) aimed at developing data-driven data selection for LArTPC detectors—a major challenge particularly for large-scale detectors such as the future Deep Underground Neutrino Experiment due to its exorbitant data rate—with the objective of developing real-time data selection schemes as well as offline data analysis for rare signals with very high accuracy and computational performance. As part of the latter, the talk will focus on recent results from a deep learning-based analysis of MicroBooNE data, making use of a sparse convolutional neural network (CNN) and event topology information to search for argon-bound neutron-antineutron transition-like signals, which demonstrates the capability of LArTPCs in achieving high signal efficiency and strong background rejection when leveraging advances in image analysis techniques.

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**Session Classification:** Third Day - Contributed Talks