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A search for argon-bound neutron-antineutron oscillation with the MicroBooNE LArTPC

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Massive and deep underground detectors such as the future Deep Underground Neutrino Experiment (DUNE) will offer a unique opportunity to search for rare, beyond-Standard Model (BSM) physics signals. One such BSM process is nucleus-bound neutron-antineutron oscillation—a baryon number violating process that produces a unique, star-like topological signature that should be easily recognizable within a fully active liquid argon time projection chamber (LArTPC) detector. While the future DUNE LArTPC can search for this signature with high sensitivity, existing MicroBooNE data can be used to demonstrate and validate the methodologies that are used as part of the DUNE search. This talk presents a deep learning (DL)-based analysis of MicroBooNE off-beam data, making use of a sparse convolutional neural network (CNN) to search for neutron-antineutron oscillation-like signals in MicroBooNE. This search represents the first-ever search for neutron-antineutron oscillation in a LArTPC.

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