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Enhancing Neutrino Event Reconstruction with Pixel-Based 3D Readout for Liquid Argon Time Projection Chambers

Wednesday, 22 July 2020 11:30 (25 minutes)

In this talk we will show the potential improvements in neutrino event reconstruction that a 3D pixelated readout could offer over a 2D projective wire readout for liquid argon time projection chambers. We simulated and studied events in two generic, idealized detector configurations for these two designs, classifying events in each sample with deep convolutional neural networks to compare the best 2D results to the best 3D results. In almost all cases we found that the 3D readout provides better reconstruction efficiency and purity than the 2D projective wire readout, with the advantages of 3D being particularly evident in more complex topologies, such as electron neutrino charged current events. We conclude that the use of a 3D pixelated detector could significantly enhance the reach and impact of future liquid argon TPC experiments physics program, such as DUNE.

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