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Tomographic Reconstruction of LArTPC Events using Wire-cell

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The Liquid Argon Time Projection Chamber (LArTPC) is an exciting detector technology that is undergoing rapid development. Due to its high density, low diffusion, and excellent time and spatial resolutions, the LArTPC is particularly attractive for applications in neutrino physics and nucleon decay, and is chosen as the detector technology for the future Deep Underground Neutrino Experiment (DUNE). However, the event reconstruction in LArTPC is challenging due to the intrinsic degeneracy introduced by the wire-readout scheme, typically enforced to satisfy the power dissipation constraint presented by implementing electronics inside liquid argon. In this talk, we present a new 3D reconstruction method “Well-cell” based on the physics principle of charge conservation among wire planes. It then transfers the problem into a set of linear equations closely resembling the concept of tomography. We will further discuss the technique of compressed sensing with L1 regularization to efficiently reconstructing the sparse images. Finally, we will show a web-based event display developed with the WebGL and modern Javascript technologies for interactive 3D visualization.

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Session Classification: Track 2: Data Analysis - Algorithms and Tools

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