

## New Perspectives 2016



Contribution ID: 43

Type: **not specified**

# Deep Learning MicroBooNE

*Tuesday, 14 June 2016 17:15 (15 minutes)*

Liquid Argon Time Projection Chamber (LArTPC) technology offers a high resolution image of ionizing particle trajectories in liquid argon providing unique features for pattern recognition. Traditional methods used to reconstruct the data in order to extract physics results involve writing a bottom-up chain of algorithms, which involves a complex sequence of signal waveform processing, 2D and/or 3D pattern recognition, geometrical reconstruction, particle identification, and energy reconstruction. Writing dozens of algorithms, modeling and optimizing the whole chain in an iterative manner, and dealing with the complexity of real data with detector effects, makes such an approach increasingly hard and difficult to accomplish. In this talk we present a possible alternative approach using a machine learning algorithm called Deep Learning which uses convolutional neural networks to learn features from images. Convolutional neural networks have experienced a meteoric rise in computer vision applications, especially in object classification, where computers have gained super-human ability. We present our preliminary result that shows Deep Learning can detect and identify particles from LArTPC images from MicroBooNE.

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**Session Classification:** Session 8