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Signal Processing in the MicroBooNE LAr TPC

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The MicroBooNE experiment is a Liquid Argon Time Projection Chamber (LAr TPC) detector designed to observe interactions of neutrinos from the on-axis Booster and off-axis NuMI beams at the Fermi National Accelerator Laboratory. The detector consists of a 2.5m × 2.3m × 10.4m TPC including an array of 32 PMTs used for triggering purposes. The inner TPC is housed in an evacuable and foam insulated cryostat vessel. It has a 2.5m drift length in a uniform field of 500V/cm. There are 3 readout wire planes (U, V and Y coordinates) with 3mm pitch for a total of 8,256 signal channels. The fiducial mass of the detector is 60 metric ton of LAr.

When primary electrons from an ionizing track drift to the detection wire planes along the electric field lines, small bipolar signals are induced on the U and V induction planes, and a large unipolar signal is induced on the collection Y plane. All current signals are processed and read out by the front end readout electronics. We present the process of converting the input raw digitized waveforms which are a convolution of detector field response, electronics response and noise to the deconvoluted signal (in charge and time). These ingredients are critical for the correct event reconstruction in the TPCs.

Oral or Poster Presentation

Oral

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