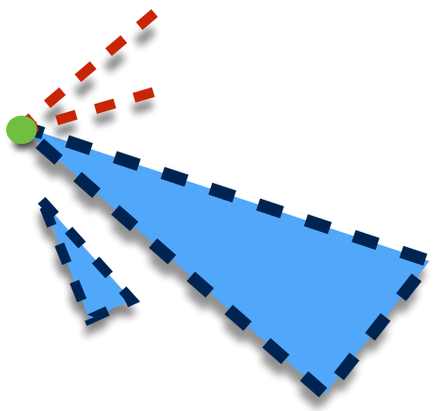
Electron-neutrino reconstruction and selection in the μBooNE LArTPC using the Pandora pattern recognition

MicroBooNE (the Micro Booster Neutrino Experiment) is a liquid argon time-projection chamber experiment designed for short-baseline neutrino physics, currently running at Fermilab.

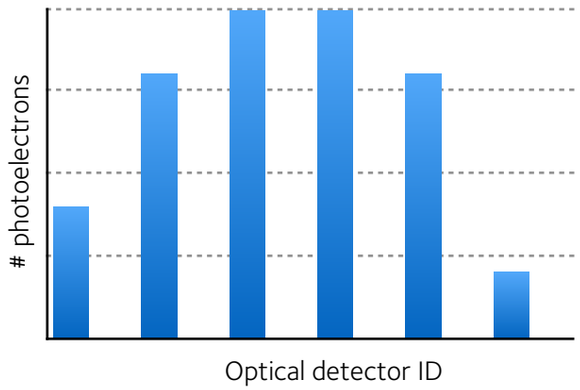
In this poster we present a fully automated event selection algorithm that aims to identify charged-current electron neutrino event candidates with no pions and at least one proton in the final state.

Optical Selection



Deposited charge in the TPC

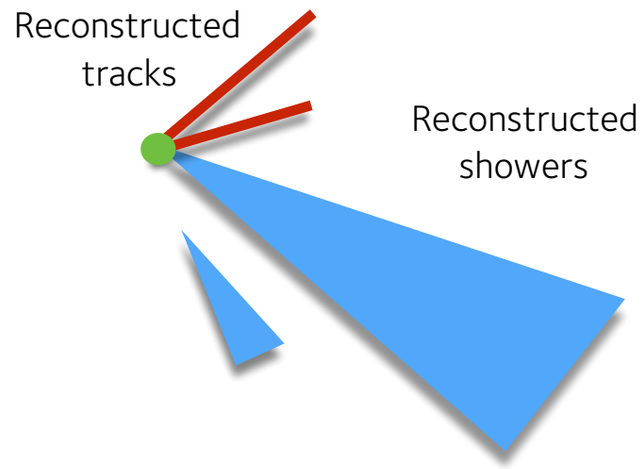
Propagation of the light to the PMTs



Flash hypothesis in the optical systems (schematic)

A flash-matching algorithm compares the reconstructed flash object as seen by the PMT's with the hypothetical flash for all possible neutrino candidates and picks the best matching candidate

Topology Requirement



Reconstructed objects in the TPC

Select events with particle topologies consistent with 1+ proton(s) and 1 electron in the final state (ν_e CC0π-Np event).

Stefano Roberto Soleti on behalf of the MicroBooNE collaboration

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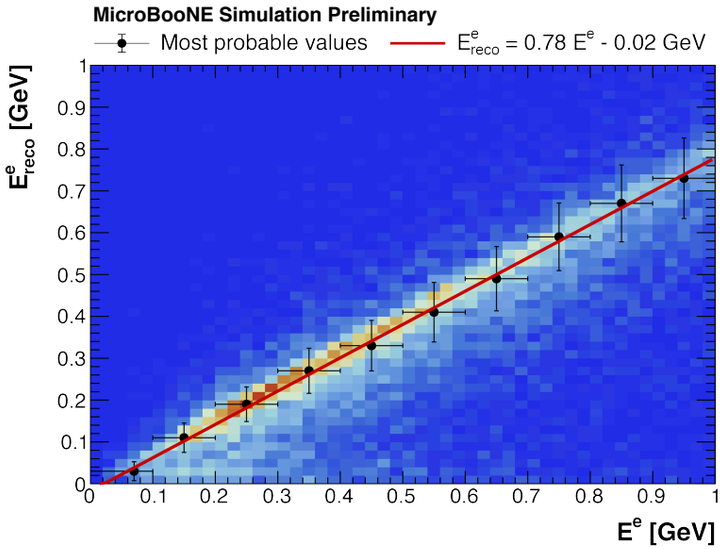
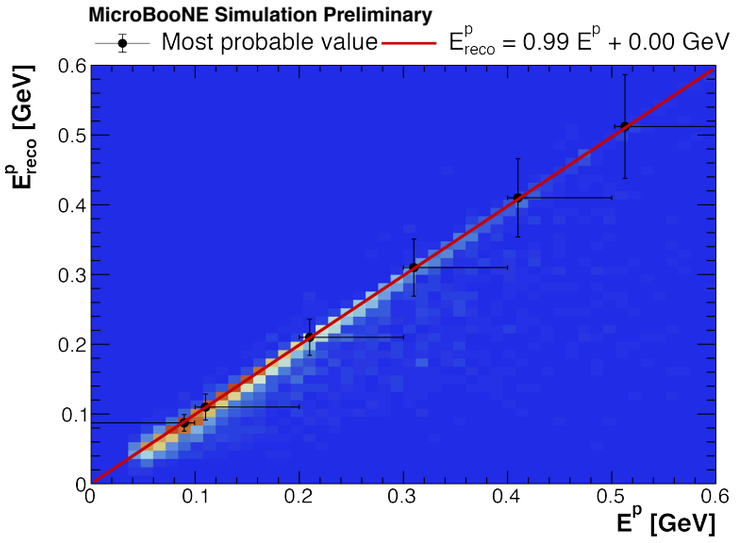
Electron energy



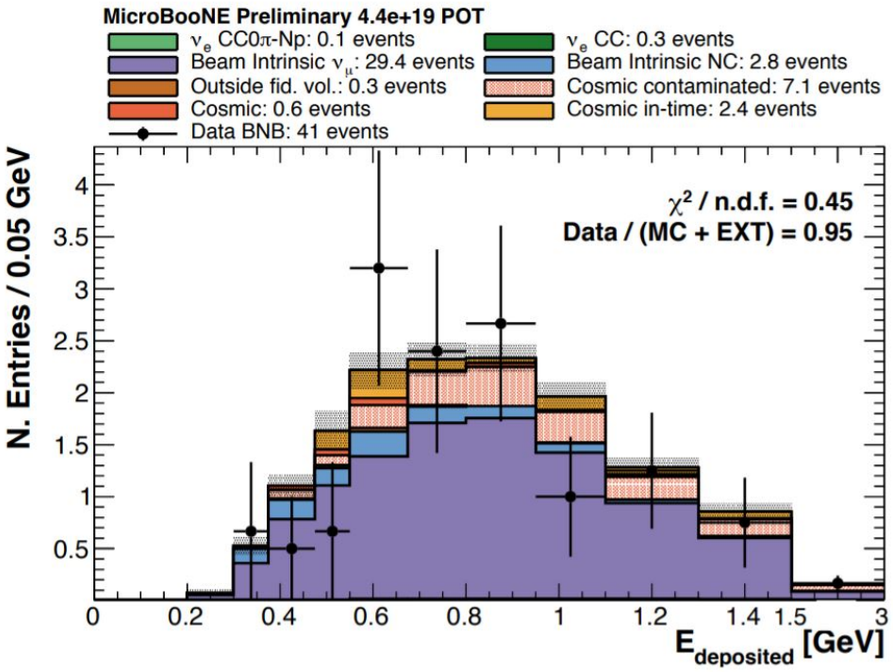
The electron energy is measured converting the collected charge into deposited energy.

Proton energy

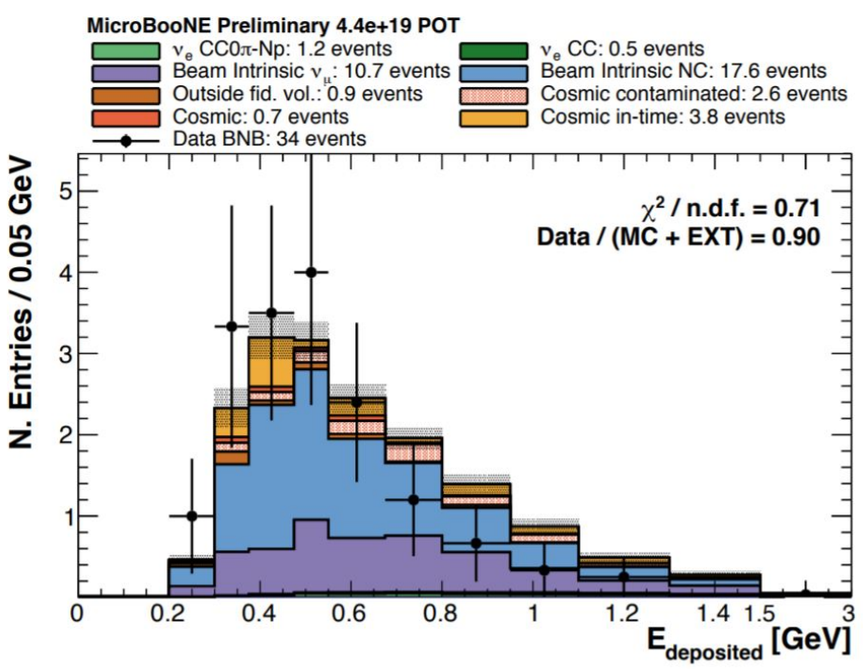


The proton energy is calculated converting the reconstructed track length into deposited energy using the stopping power in liquid argon.

ν_μ-enhanced spectrum



NC-enhanced spectrum



We inverted selected cuts from the final event selection to demonstrate good data/MC agreement in ν_e CC0π-Np orthogonal sidebands, enhanced with specific remaining background distribution.

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