

# ND-LAr

Quick Update

DUNE ND Sim/Reco Physics Meeting

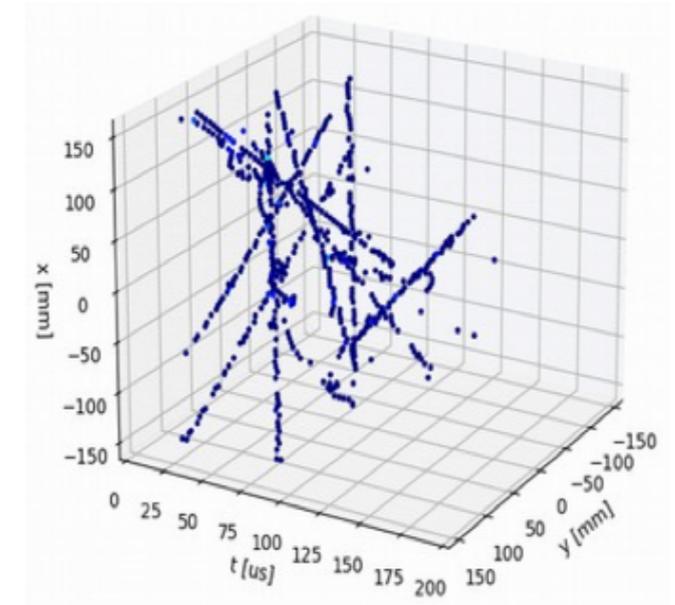
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Andy Mastbaum

Rutgers University

mastbaum@physics.rutgers.edu



# Production

## Planning

- **Samples and Statistics**

- Chris's list provides a good starting point for beam events
- Also consider a variety of single-particle samples?

- **File sizes**

- Charge data and detector-simulated samples are in the LArPix raw data format; due to thresholding, file sizes are much smaller than full WFD
- $\leq$  MB per ND event for charge readout

- **Run times**

- Charge simulation (GPU)
  - Initially few hundred  $\mu\text{s}$ /segment  $\sim$  100 ms/interaction  $\sim$  O(s/spill)
  - Further optimization possible
- Light simulation: Negligible given LUT, one-time cost to build LUT
- Reconstruction: Small contribution after initial training
- Note: Depending on where jobs are run (e.g. NERSC), file transfer may dominate. This will need further testing.

# Discussion

## Status/Questions

- **Geometry**

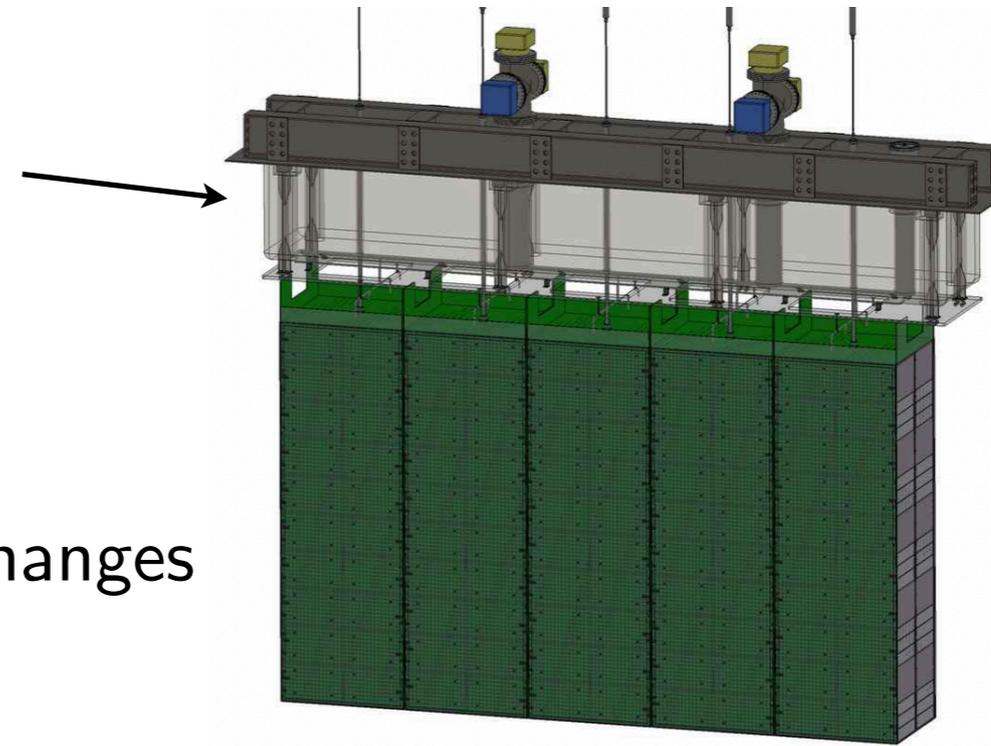
- Updating ND-LAr geometry to reflect design changes
- Anticipated timeline for freezing?

- **edep-sim**

- Tracking of step energy loss fluctuations to distribute charge on pixels
  - `ClarkMcGrew/edep-sim@testbed/AddSegmentFluctField`
  - Needs validation, testing with `larndsim`
- Trajectory pruning
  - Feature caused issues in reconstruction training (incomplete information, grouping of particles with ancestors)
  - Disabling thresholds gives +60% in file size and +20% in run time
- Would prefer output to HDF5, avoiding a conversion step for Q sim

- **Reconstruction**

- Seeing reasonable performance in voxel classification, point of interest ID
- Moving on in the ML reco chain to clustering of tracks/showers



# Summary & Plans

## Near-term Plans:

### ● January – February 2021

- *Updated ND-LAr geometry (required for ND production)*
- Export of photons from larnd-sim to optical simulation
- Addition of truth information to larnd-sim output

### ● February – March 2021

- Integration of optical simulation into larnd-sim
- Data-like photon simulation output
- Reconstruction interface to larnd-sim output
- Finalize Module-0 geometry

### ● March — April 2021

- Module-0 operation at Bern
- Analysis Workshop — Module-0 analysis
- Reconstruction of Module-0 data, ND-LAr neutrinos (towards reconstruction with pile-up)



I. Kreslo, Bern

Biweekly analysis meetings: Thursdays 9:30 AM CT

lar-nd-analysis@fnal.gov, Slack #lar\_nd\_analysis

# ND-LAr Overview

