

Wire-Cell Event Reconstruction

Part 1: Sim-NP-SigProc

Part 2: Img-Clus-QLMatching-nu-select

Part 3: 3D PatRec



TPC simulation

noise filtering

signal processing

3D imaging

clustering

charge-light matching

3D trajectory &

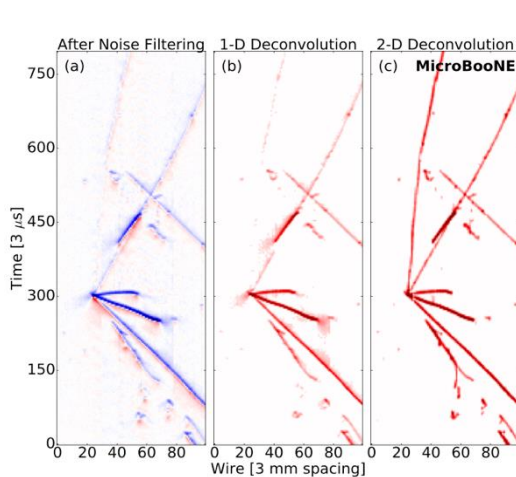
dQ/dx fitting

cosmic muon tagger

multi-track fitting

DL-3D vertexing

particle identification

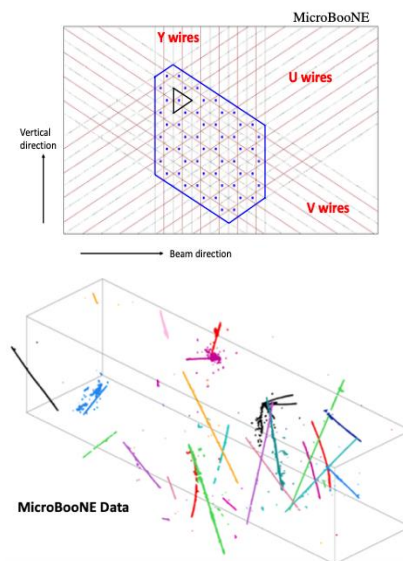


[JINST 12 P08003 \(2017\)](#)

[JINST 13 P07006 \(2018\)](#)

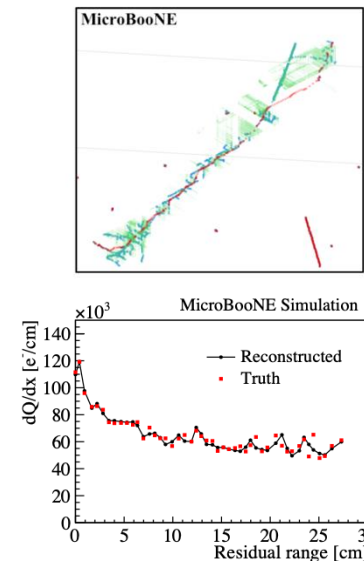
[JINST 13 P07007 \(2018\)](#)

[JINST 16 P01036 \(2020\)](#)

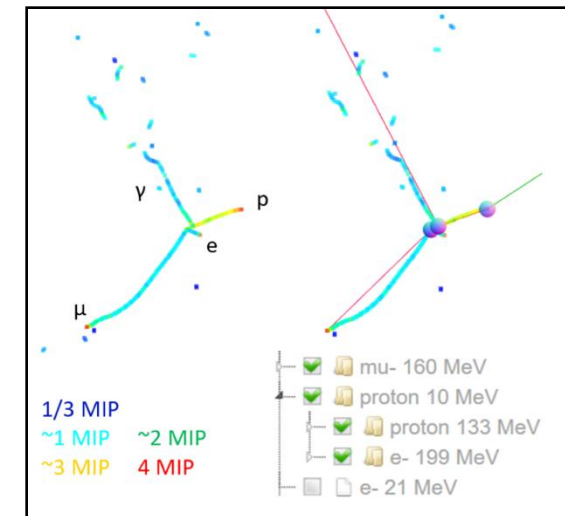


[JINST 13 P05032 \(2018\)](#)

[JINST 16 P06043 \(2021\)](#)



[Phys. Rev. Applied 15, 064071 \(2021\)](#)



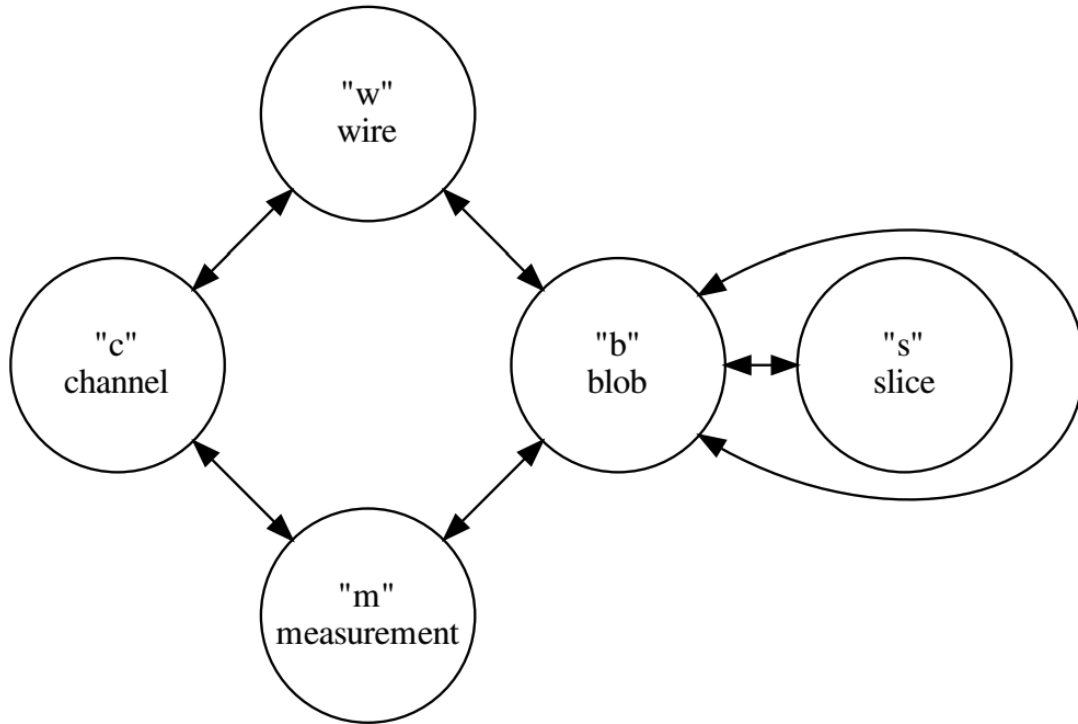
[JINST 17 P01037 \(2022\)](#)

Imaging

- Input
 - IFrame: WCT memory/file or LArSoft (CookedFrameSource)
- Output
 - ICluster: WCT memory/file
 - sampled points in BEE json: wire-cell-python
- Algorithms:
 - Slicing (live + dead + dummy)
 - Tiling (always three-plane)
 - Solving
 - Deghosting: Projective or In-Slice
- Updates in 0.30.0
 - Recent bug fix for multi-face clustering
 - **CookedFrameSource RMS scaling bug fix**
- Application:
 - BEE event disp. – visual debugging/showcasing
 - BlobDepoFill
 - Eval tool from Ewerton and Hanyu
 - based on BEE points and CellTree
 - **Wenqiang, Jay: imaging -> signal filter/noise removal**

ICluster

ICluster



Example usage Projection2D:

<https://github.com/WireCell/wire-cell-toolkit/blob/master/img/src/Projection2D.cxx#L136>

Clustering

- Input
 - ICluster: WCT memory/file
 - WCP ROOT: UbooneBlobSource, UbooneClusterSource
- Output
 - ITensorSet (PointCloudTree): WCT memory/file
 - debug output:
 - internal sampled points: BEE json
 - internal sampled points, pp-edges, blobs: .npz (not finished in 0.30.0)
- Algorithms:
 - Point Sampling and other information extraction: PointTreeBuilding, clus/Facade_*
 - Clustering: MultiAlgBlobClustering

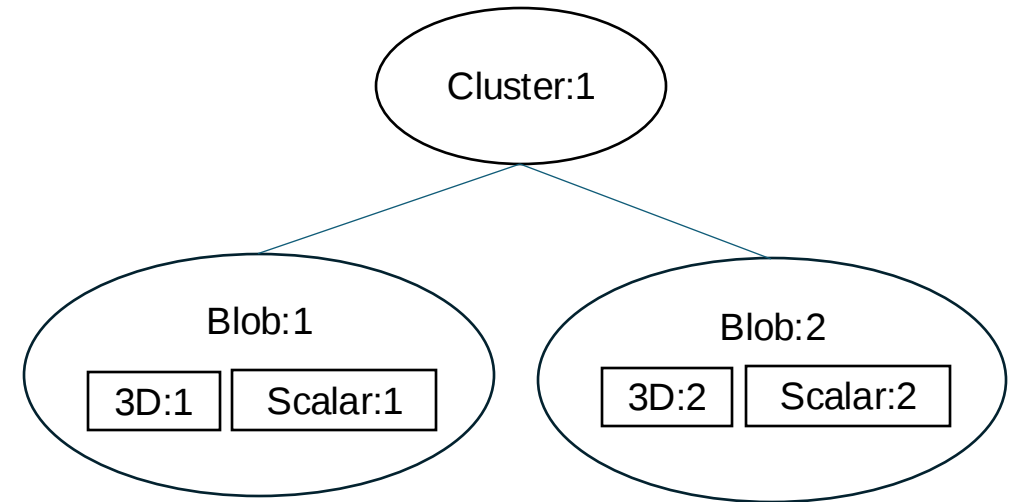
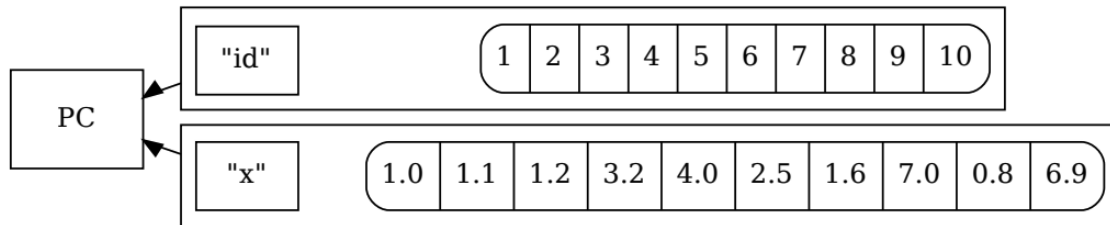
Clustering

- Updates in 0.30.0
 - compared to 0.29.5: Functional clustering (configured for SBND and DUNE-FD-VD)
 - compared to my local build on SBND:
 - bug fixes from Xin
 - fixed some crashing cases
 - 0 blob
 - 0 unc
 - quickhull crashing/imaging solving won't finish
- Application:
 - ITensorSet: input to following WCT reco.
 - debug out:
 - BEE event disp. – visual debugging/showcasing
 - QL-Matching (for SBND) by Lynn T.
 - <https://github.com/lynnt20/larwirecell/tree/qlmatch-ls993>
 - Eval tool from Ewerton and Hanyu
 - based on CellTree
 - DL-Clustering for neutrino interactions, Moon, Avinay

PointCloudTree

- PointCloud is based on WireCell::ITensor for persistency and can utilize KDTree for spacial information.

PointCloud



Example usage, Lynn's ql-matching:

<https://github.com/lynnt20/larwirecell/blob/qlmatch-Is993/larwirecell/qlmatch/QLMatching.cxx>