Reconstruction updates
and
plan for measurements

D. Stefan (CERN/NCBJ), R. Sulej (FNAL/NCBJ)

Reco-updates

- Next MCC is forseen in August (from Tingjun's talk on yesterday FD meeting).

- Disambiguation cheater was not working properly with SCE in MCC6. It is now fixed by Tyler. For now the code is in larreco feature branch *talion_dbig_cheat,* soon will be pushed.

- First test of 3D reconstruction (real disambiguation→GausHitFinder→LineCluster-→PMA) of proton sample with spatial SCE implemented.

- Some fixes of event display in LArSoft to identify easier cosmics muons MC with reconstruction.

- Several tests of reconstruction performance in protoDUNE.

In preparation for MCC7

Some tests should be performed before we start next production:

- muons: do we reconstruct dE/dx for 1 mip?

- Electrons: do we reconstruct dE/dx for 1 mip in the first part of a cascade?

- Photons: do we reconstruct dE/dx for 2mip in the first part of a cascade?

- do we reconstruct kinetic energy of stopping particles which has been simulated?

Test of tracks reconstruction with spatial SCE

Example of tracks deforamtion due to space charge effect:
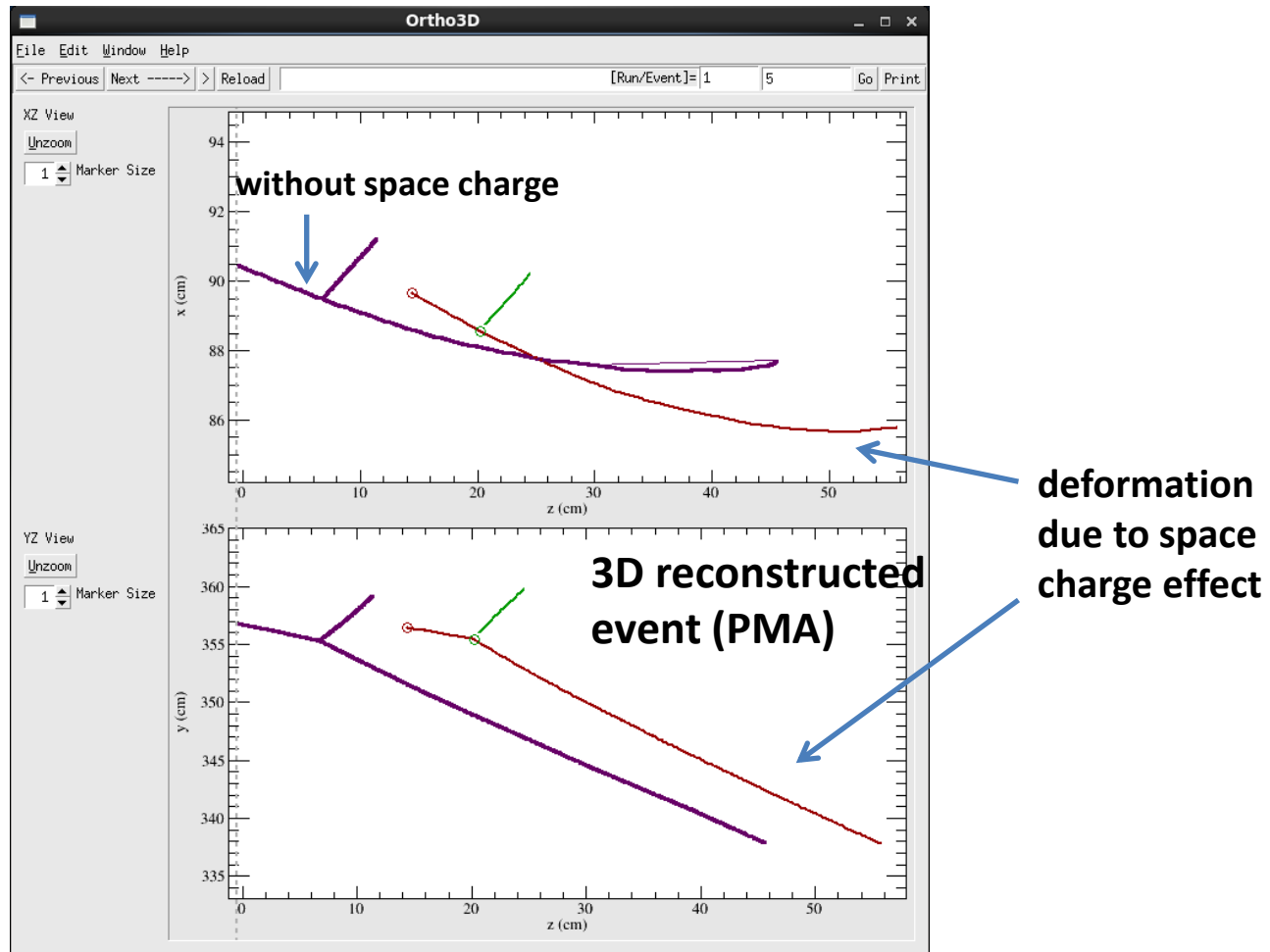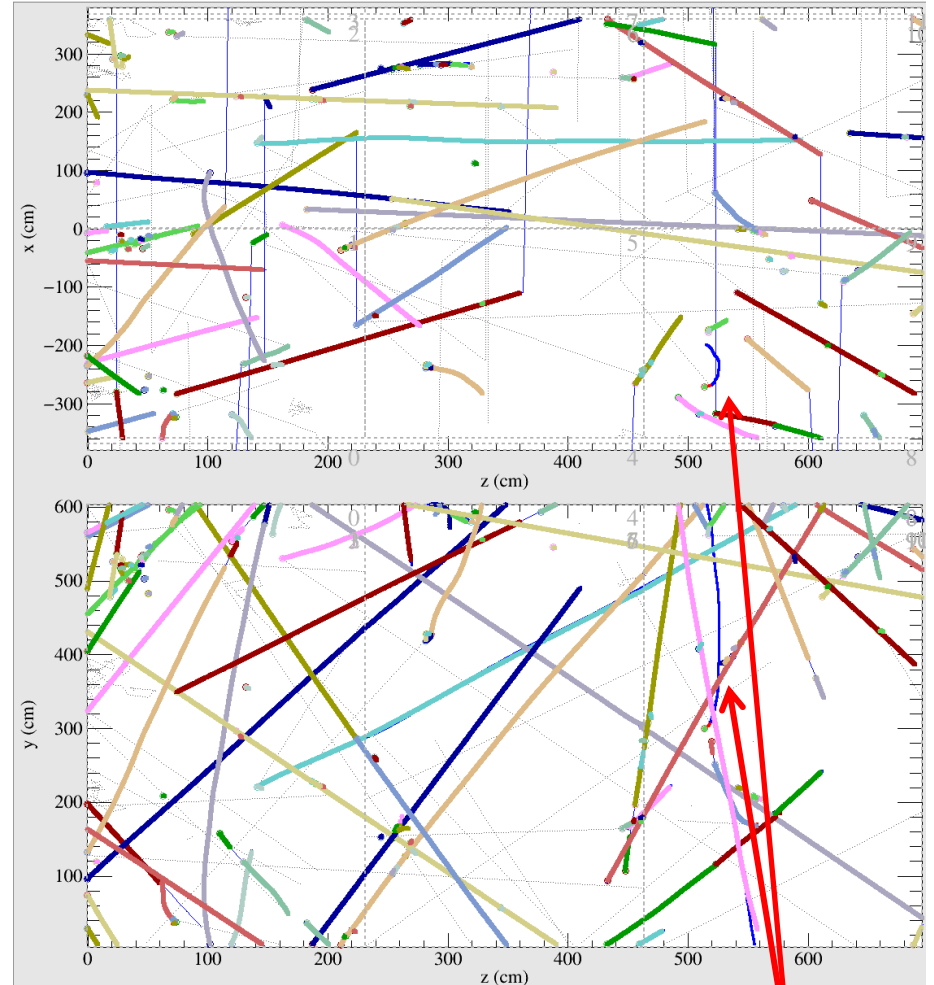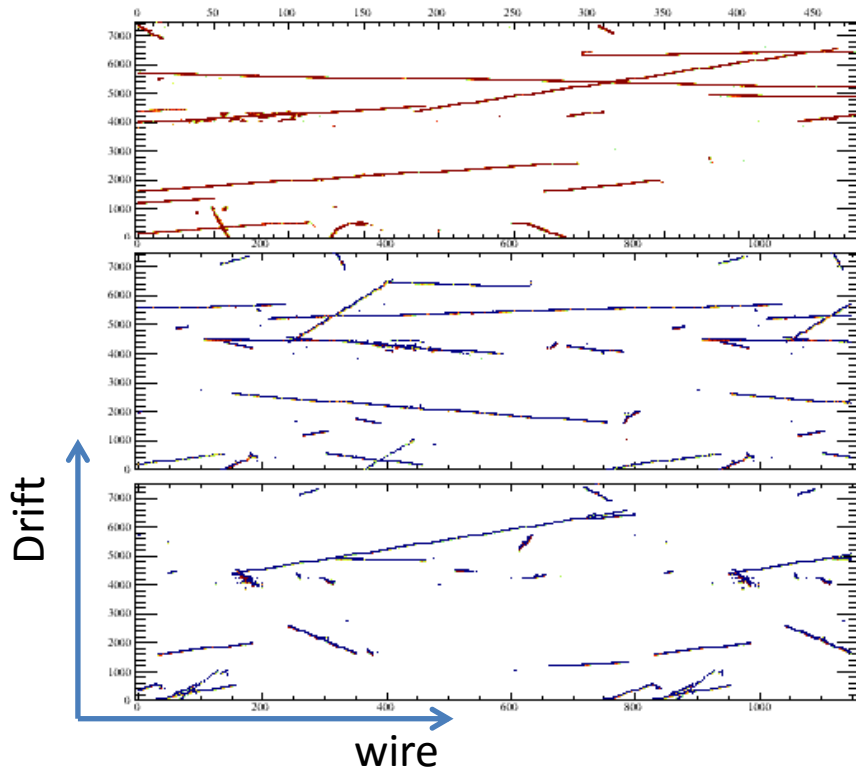
Stopping protons with SCE
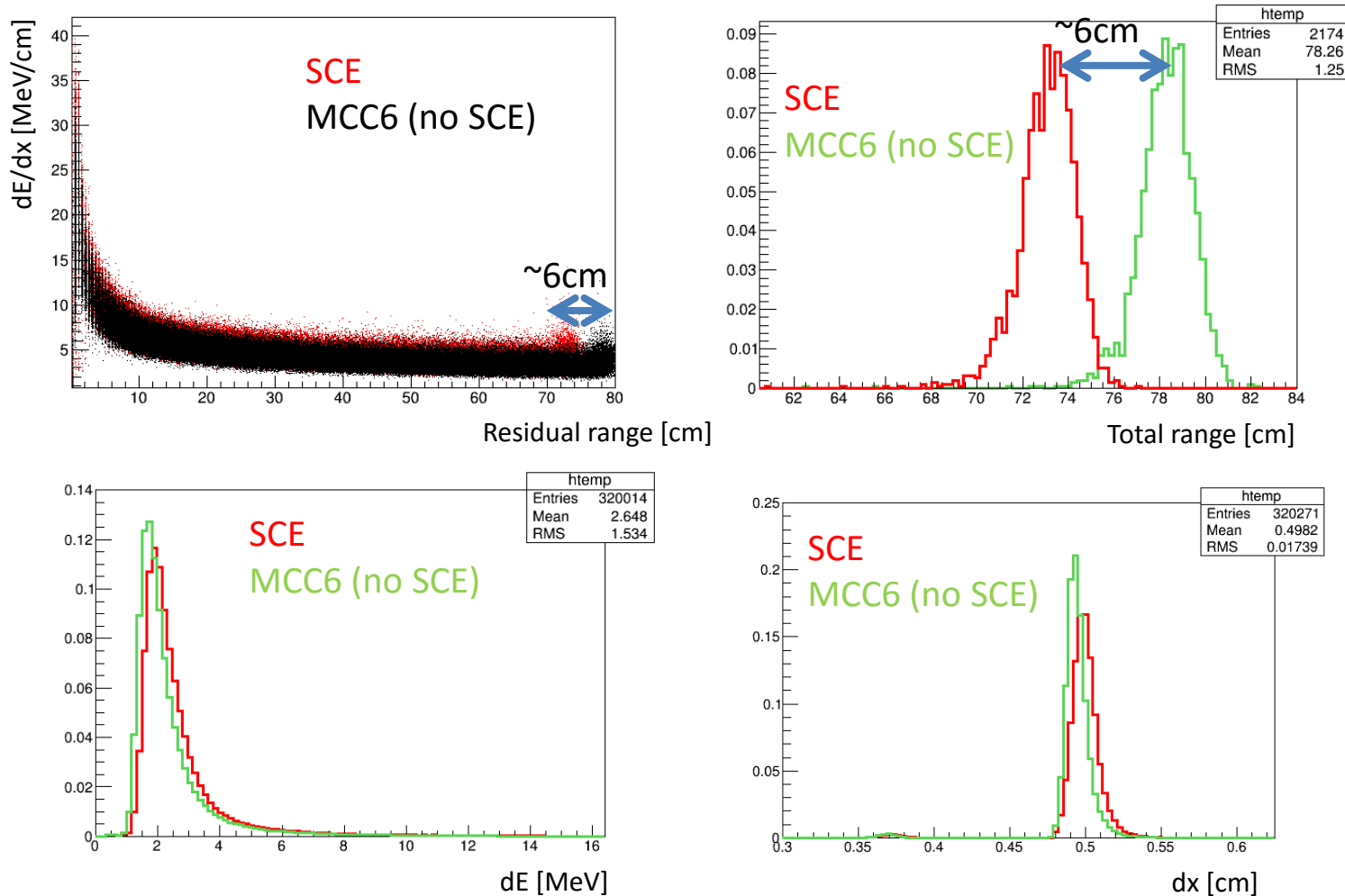
→ Proton/kaon/μ−π identification via dE/dx can be still possible.

→ We will have to learn how energy reconstruction is affected (recombination correction).

Test of spatial reconstruction of cosmics

2 drift windows

Drift

wire

Event display has been fixed:
- Correcting offset for MC particle trajectories in multple TPCs.
- Set readout window size in evd for protoDUNE.

Only 1 not reconstructed muon
(but cannot find ADC signal of this mu…)

Planned work

„Muon" work

Muon reconstruction efficiency plots.*

Selection of through going muons.

> Identification of „Both ends crossing wire planes": pure TPC reconstruction

> Other configurations useful for calibration: need work with muon tagging and t0 reconstruction – collaboration welcome

Identification of stopping muons and detailed reconstruction/analysis

> Fraction of clean and useful for calibrations, efficiency of selection of such tracks

> Michel electrons

> dE/dx vs residual range evolution

> should be combined with t0 matching, we'd like to collaborate with someone else on this.

Required reco algorithm developments (in the order of planned work):

> **Precise identification of a point where muon decays or stops.***
> Identification and reconstruction muons with bremsstrahlung.
> Association of EM activity with muons

e-gamma work

Selection of π^+ interaction points with π^0 production.*