

Update on DUNE FD Geometry

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[In A Git Repo](#)

- Goals of the new geometry framework
 - Stability, consistency of wire placement, object placement checks, etc...
- Where we're at with testing the geometries
- Inclusions within the new versions of geometry
- Current Process
- Physics and event displays
- Future work

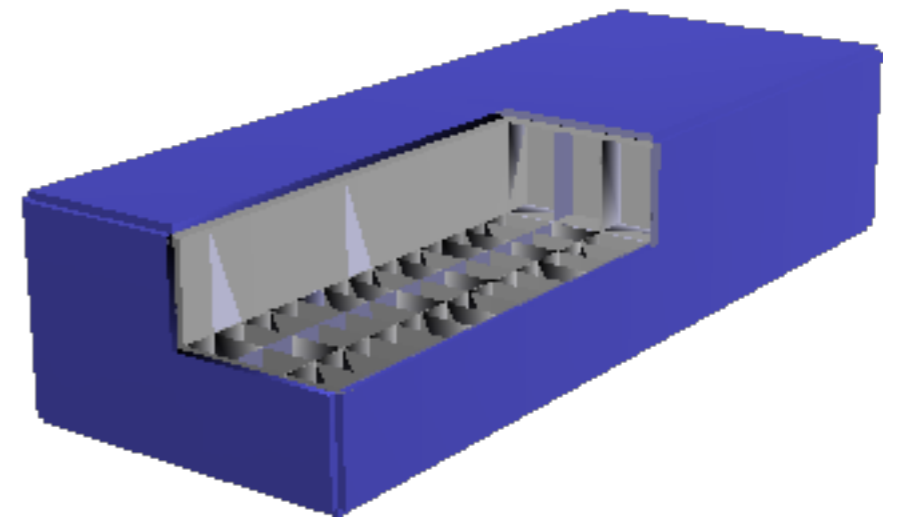
- **APAs on outside or not**
 - Already configurable in both Perl/GGD frameworks
 - Generalized to a configured number of APAs

```

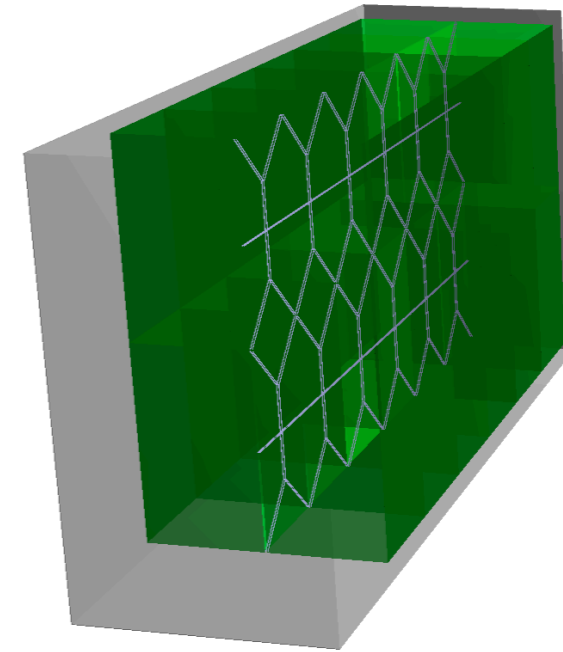
59
60 [Cryostat]
61 subbuilders = ['TPC']
62 class = duneggd.larfd.Cryostat.CryostatBuilder
63 membraneThickness = Q('0.5in')
64 cathodeThickness = Q('0.016cm')
65 nAPAs = [1, 2, 6]
66 # nAPAs = [3, 2, 25]
67 outerAPAs = False
68 #outerAPAs = True
69 sideLAr = Q('15cm')
70 APAToFloor = Q('49.2cm')
71 APAToGAR = Q('40.7cm')
72 APAToUpstreamWall = Q('301.2cm')
73 APAToDownstreamWall = Q('49.2cm')

```

- **Full Cryostat, Few APAs**
 - Study backgrounds with a manageable number of channels
 - A few APAs on the corner, sides and chunk at center
- **Water Shield**
 - For Radiological group, no internal differences

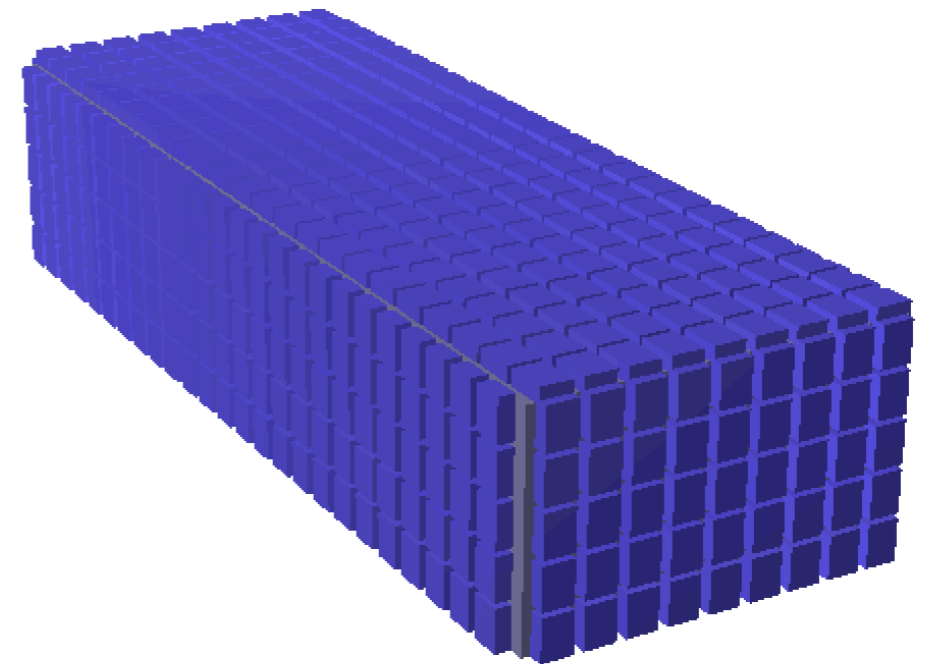


1x2x6 Workspace geometry



Segmented water shield, internals the same

- Intended to show how blocks of water between support structures would affect radiological backgrounds



- **DuneGGD in-situ Tests**

- Goal: incapable of creating a geometry that breaks LArSoft
- Wires have consistent endpoints and pitches
- Origin in intended place
- ROOT macro
 - checks overlaps, default draw options

- **LArSoft Tests**

- Existing GeoObjectSorter and ChannelMap works
- LArG4 output looks reasonable
 - IDEs where there are TPCActive, true dE/dx maps out APA Frames and other vol's
- Check DetSim with EVD scans
- Replaced GDML: Important standard FCLs still work (ci tests?)
- Go as far as checking Track/Vtx Reco?

Current progress

Testing compatibility with LArSoft

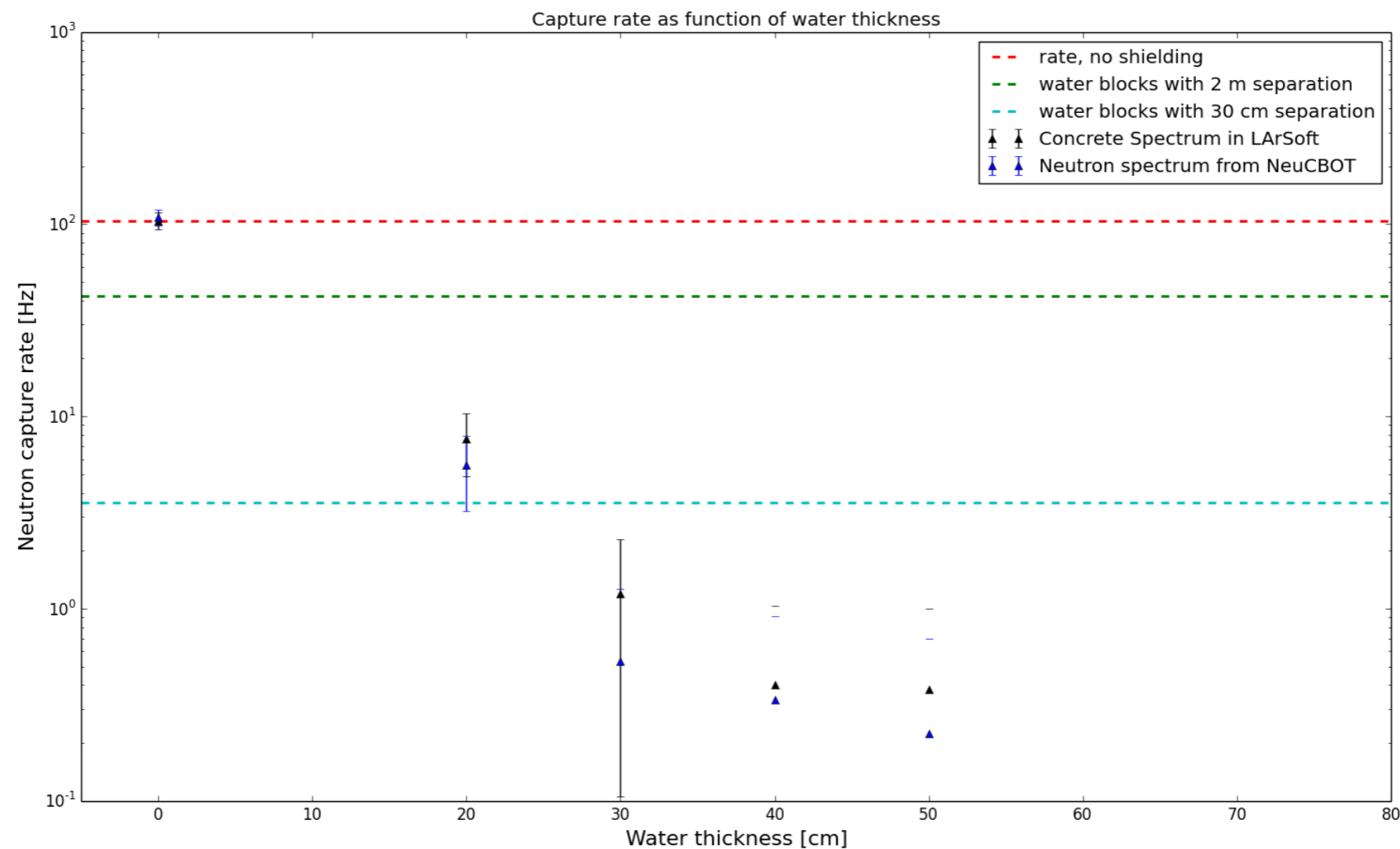
		1x2x6	Full 10kt	Water Shielded	APAs on Outside	Full Cryo, Few APA	...
G G D L A R S O F T	GGD Tests	✓	✓	✓	✓	...	
	ROOT Tests	✓	✓	✓	✓		Many other versions easily configured
	Geometry Sorting	✓	✓	✓	✓	...	
	Channel Mapping	✓	✓	✓	✓		
	G4 Overlaps	✓					Tests for the most part general to any possible config.
	G4 / IDEs	✓	—	✓	—		
	DetSim / EVD	✓					
	Passes existing FCL	✓

What else would you like to see?

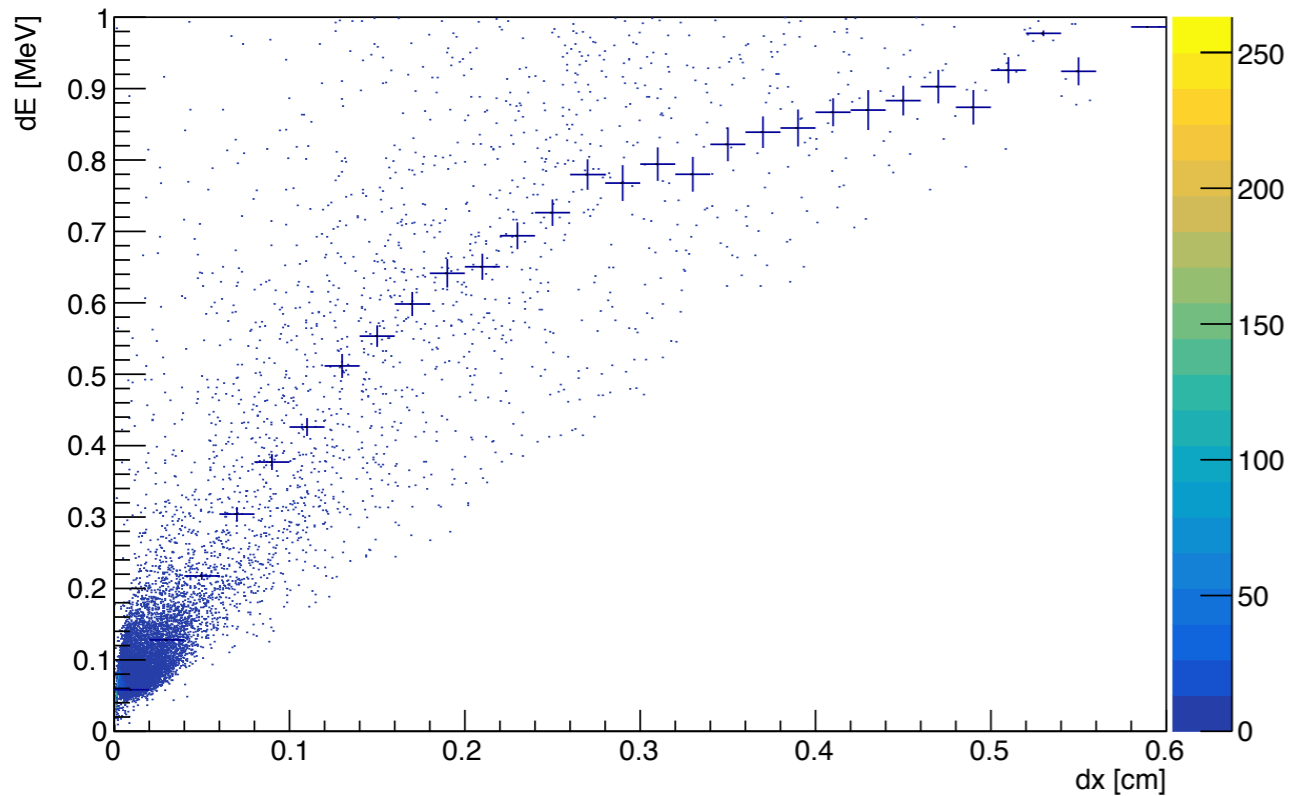
Bkgd Task Force

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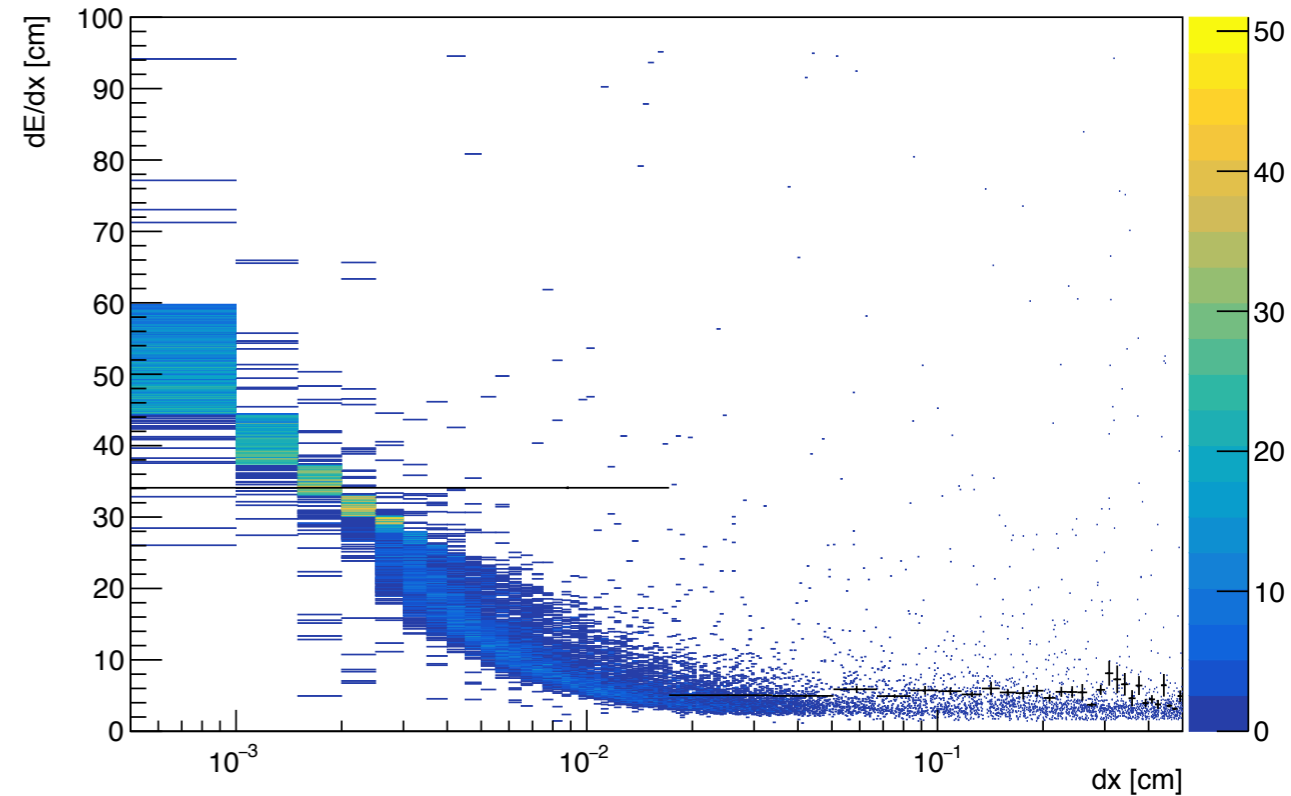
- Test for radiological background mitigation already done with new geometries.
- Results are very encouraging!



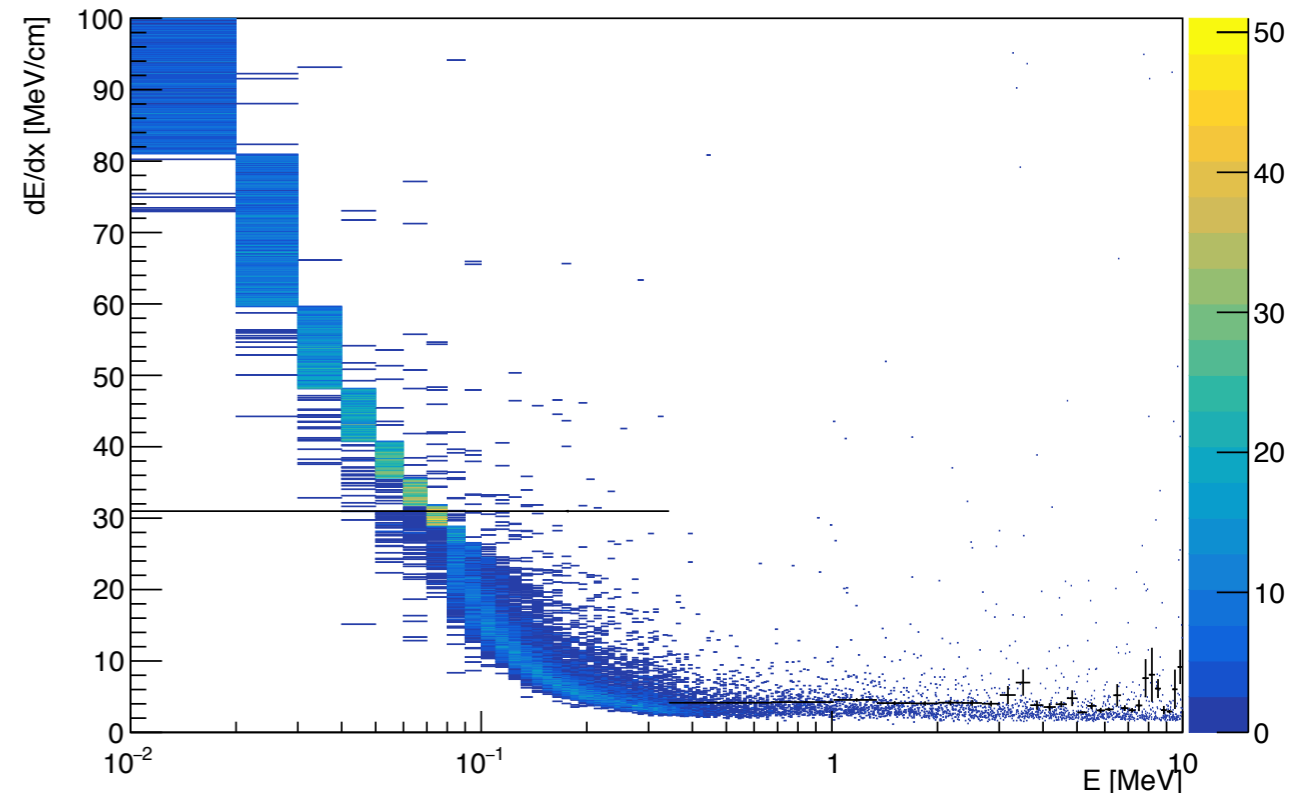
dE_dx_hist



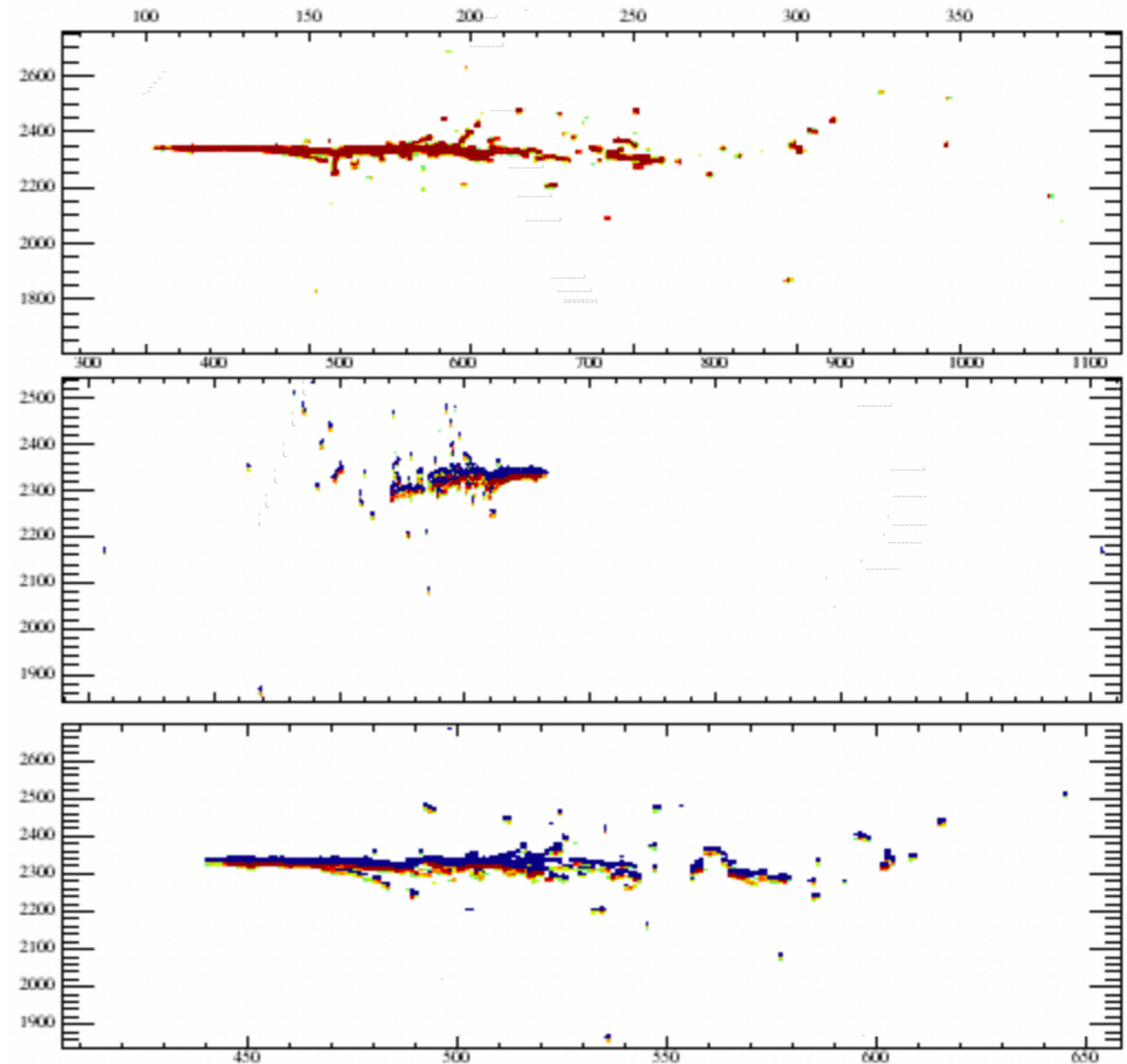
dEdx_dx_hist

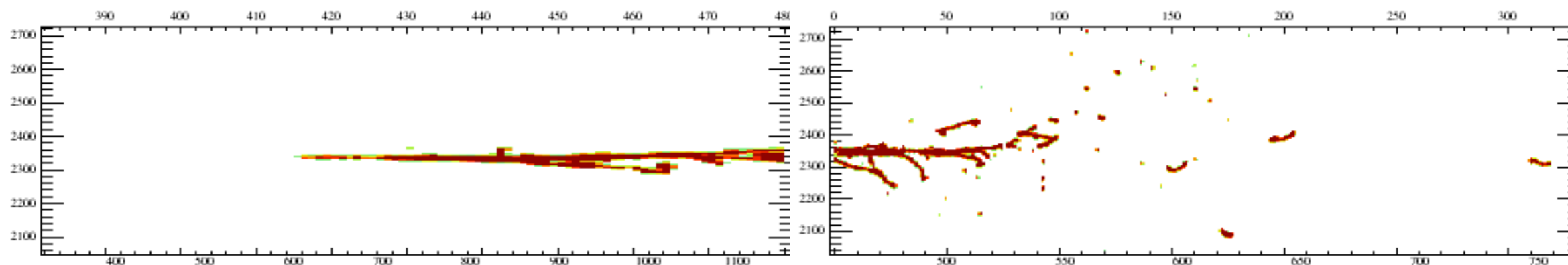


- Electron energy and travel distance relations
- Not expected to show anything different to actual case
- Very encouraging that it looks normal though!



- Electrons shot down the beam axis
- Wire placement seems to be working
 - U view is squashed
 - V view is not





Nailed it!



- **Field Cage, APA Frames**, other auxiliary volumes?
- **Photon Detector Geometry**: Ready to work with others on this.
- **Rethink APA at readout end**
 - 7cm readout board overlap, how does NearestWire use wires?
- **Streamline GGD configuration** to allow includes
 - Same source of parameters for various versions
- **DuneGGD in-situ Tests**
 - Make DuneGGD incapable of producing a geometry that breaks
 - Write some algorithms to check various parts of the build
- Nail down the **Detector Hall geometry** now that Bkgd groups interested
- Minor fixes and tweaks with current setup
- Anything else you'd like to see?