Small Updates to the LArSoft Event Display

Waveform and SpacePoint Displays

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Proposed Changes

- Waveform Drawing part of the 2D Event Display

  - Modify to use art tools to handle the drawing of the Raw waveform, the "Wire" data and the reconstructed hits

  - Allows interchangeability - Gaussian vs Skew Gaussian hits

  - Allows multiple types of same waveform to be overlaid

  - Configurable via FHICL

- 3D Display of SpacePoints

  - Use art tools to handle the 3D drawing of SpacePoints

  - Allows variations of the parameters to draw the SpacePoints

  - Configurable via FHICL

- In each case believe I have preserved the ability to modify input parameters from the viewer

- Available for trial on the LArEventDisplay branch feature/usher_wiredatadrawer

2D Event Display
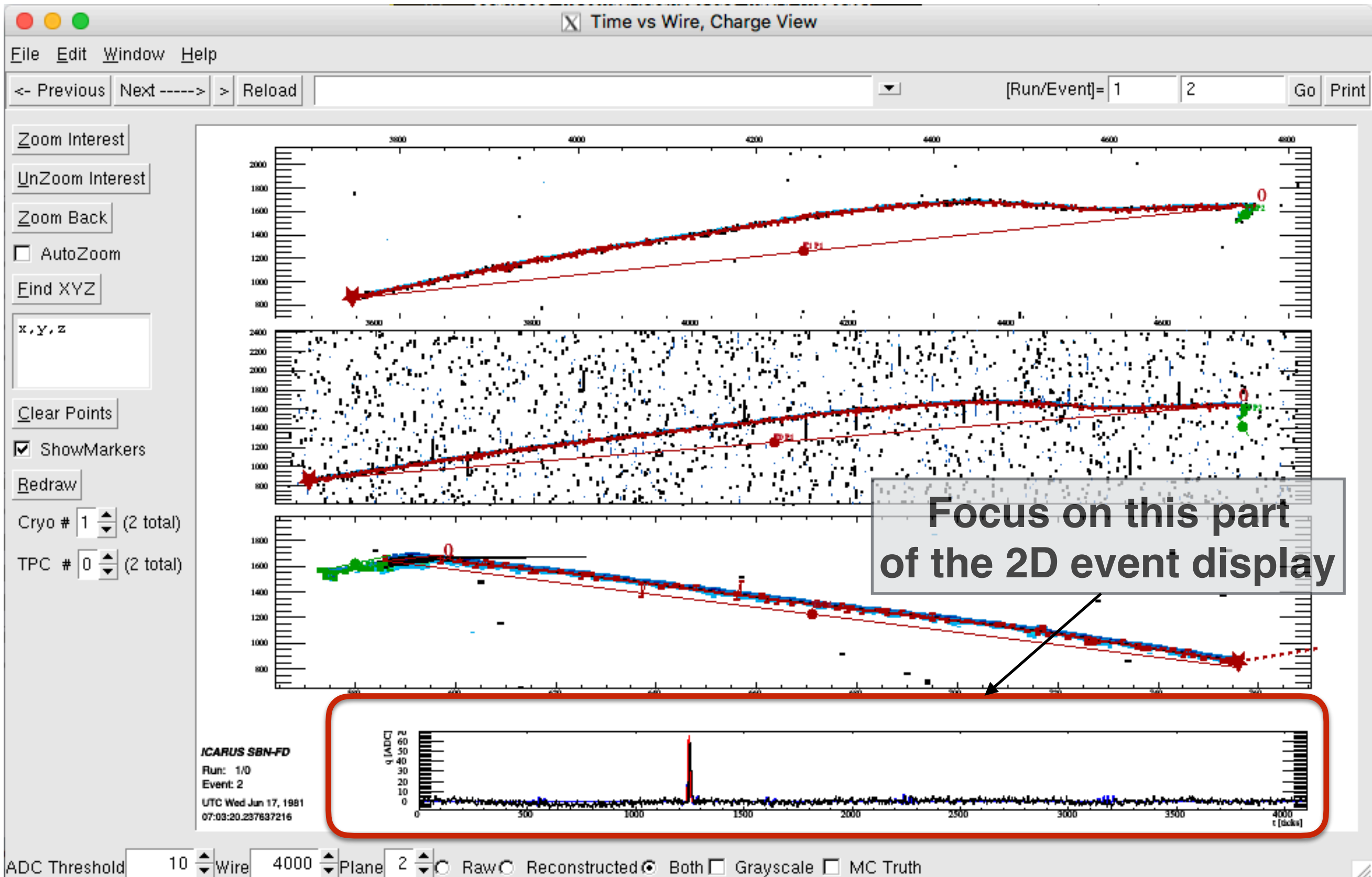
Current Situation

- The module TQPad is responsible for drawing the waveforms

  - It will output one "raw" waveform (as histogram), it outputs one "wire" waveform (as histogram).

  - A relatively recent modification allows for art tool drawing of hits which will allow multiple hit producers to be drawn

    - But only for gaussian shaped hits

- A complication is that the DP wants to display a skew gaussian hit

  - The block in TQPad that draws the raw, wire and hits has been copied into an if-else block and then the hit part of the drawing is modified to accommodate skew gaussian hits

- Would like to:

  - Simplify TQPad

  - Allow ability to display multiple raw or wire waveforms as well as multiple hits (and skew or gaussian as ICARUS also has skew gaussian hits)

  - Fix the current hit display (there was a reported problem)

  - Preserve the ability to modify producer list interactively

Proposal

- Move all the actual display code out of TQPad

    - Ownership of histograms in the actual drawing tools

    - Remove the artificial if-else block to differentiate SP and DP

- Drawing tools in subfolder "wfHitDrawers"

    - Raw and Wire data histogram tools can handle multiple producers

    - Gaussian and Skew Gaussian tools to draw the hits

    - fhicl definitions included here as well
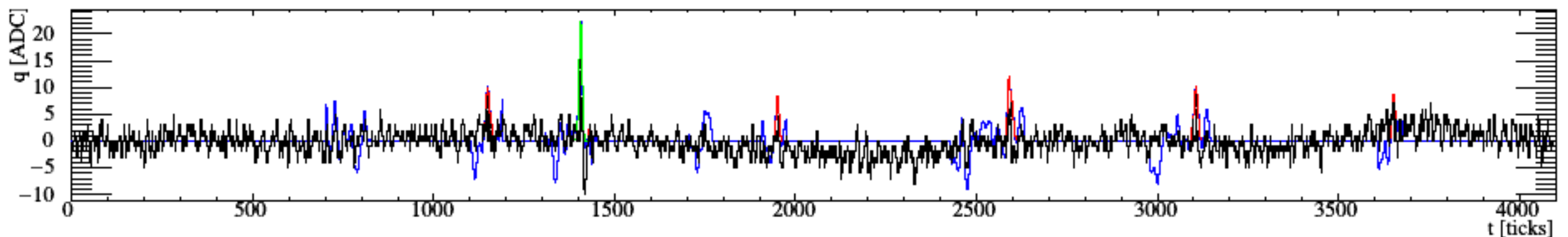
3D SpacePoint Drawing

- Would like to provide some flexibility in how SpacePoints are drawn in the 3D display
  - Color coding options:
    - Plain white to preserve the current boring state
    - "Heat map" coloring by SpacePoint "Chi-square"
      - See how "good" the SpacePoint is
    - "Heat map" coloring by SpacePoint "charge"
      - Technically, the common charge in the region the three 2D points overlap
      - Similar measure to what SpacePointSolver keys on (I think)
  - Configurable
    - Can draw a full SpacePoint collection with one scheme (e.g. boring white)
    - Can also draw SpacePoints associated to objects (e.g. Tracks) with another scheme
  - Implemented with art tools
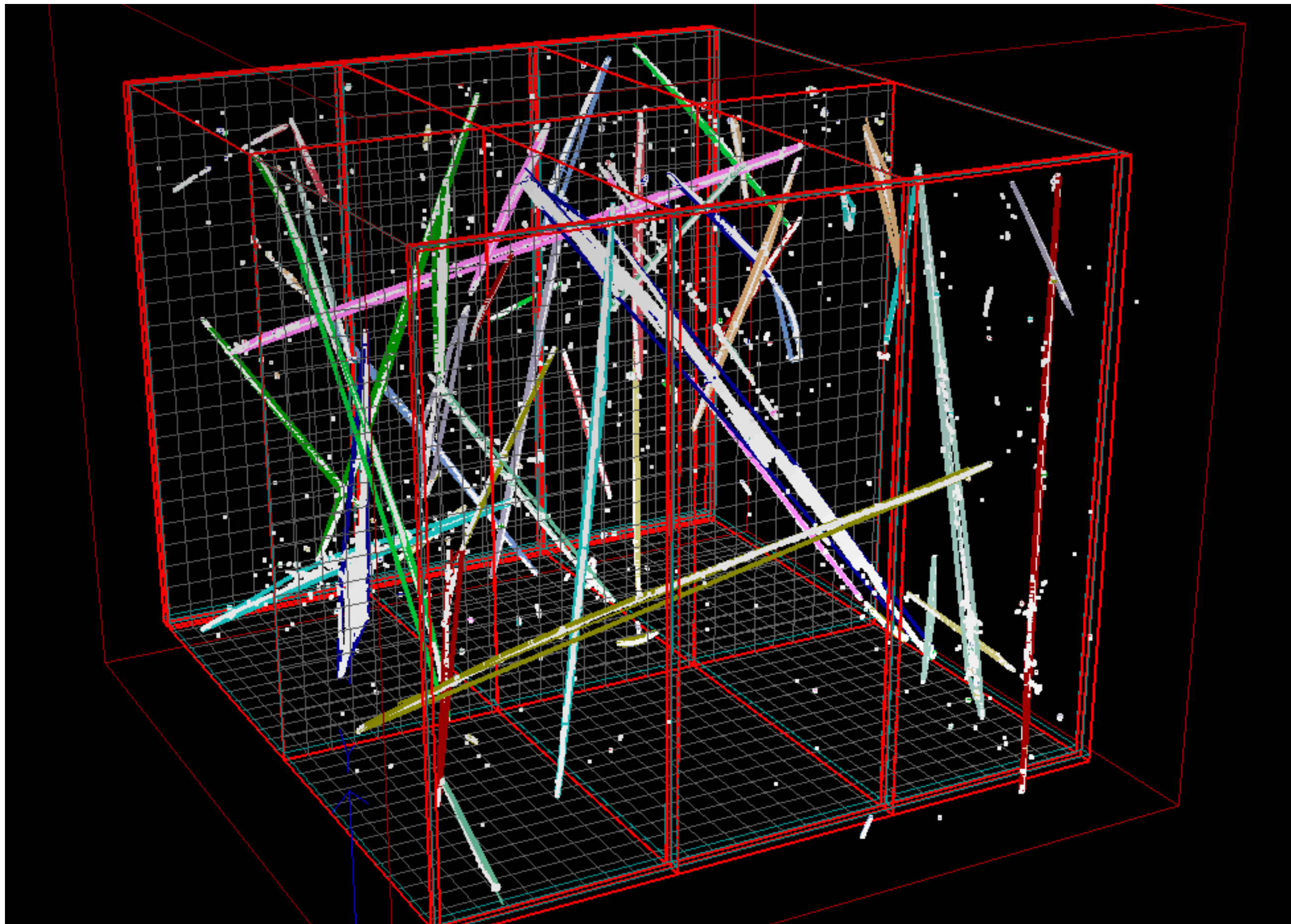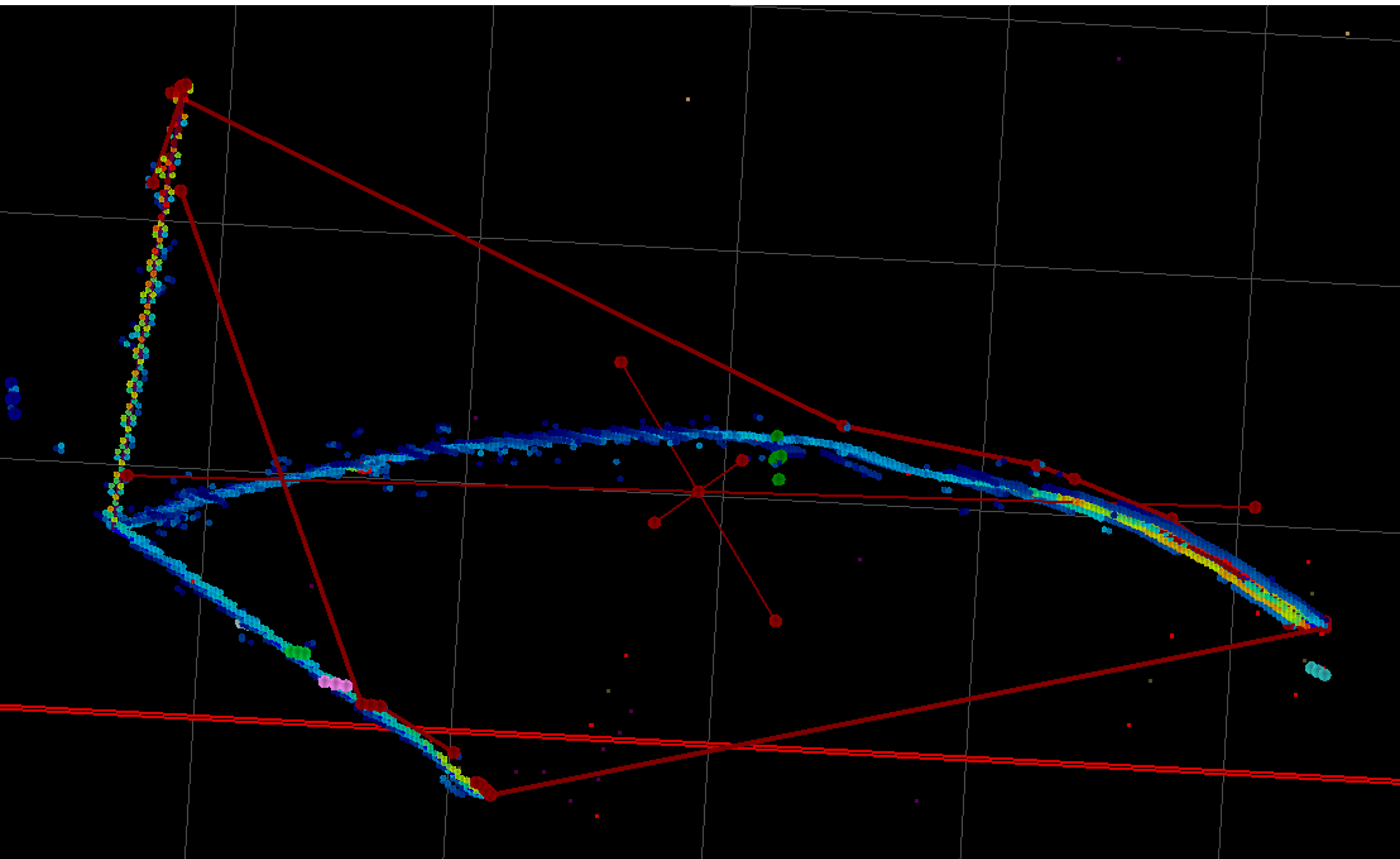
Status

- Everything in LArEventDisplay feature branch feature/usher_wiredatadrawer

  - Latest is current with LArSoft v08_13_02

- This has been tested for SP detectors

  - ICARUS

  - ProtoDUNE

- I have not had the chance to test DP display…

  - I'm not really set up to do this

  - Need to coordinate with a DP person

- It should be non-breaking in that the fhicl file modifications are all low level…

  - Hopefully people are not making personal copies of the base fhicl files!