Reconstruction in the DUNE far detector

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MUSUN

- ✤ Cosmic muon simulation for deep underground muons - Matt has presented a lot about this.

- ✤ So far apart from an initial pass at reconstruction have been using truth information.

  - ✤ Would be nice to use reconstructed events when performing background studies.

- ✤ Simulated 100 events with no filter and looked at event displays to draw some simple conclusions about the state of reconstruction in the far detector

 - ✤ /dune/data2/users/warburton/MUSUN/100RawEvents on dunegpvm nodes if anyone wants to look for themselves…

Helpful hints about LArSoft event display

✤ RHS of screenshot shows the Ortho3D view:

  ✤ The primary muon has a thin blue line

  ✤ The reconstructed tracks have coloured thick lines and are numbered.

  ✤ Grey numbers represent TPC numbers.

✤ The LHS of the screenshot shows the raw display.

  ✤ Top is collection plane, then U and V planes.

  ✤ Hits are shown on a colour scale. Black squares are the reconstructed hits

✤ At the bottom of the LHS a tick vs ADC plot is shown for a single wire:

  ✤ Black is raw signal (from detsim)

  ✤ Blue is reconstructed signal (from cal data)

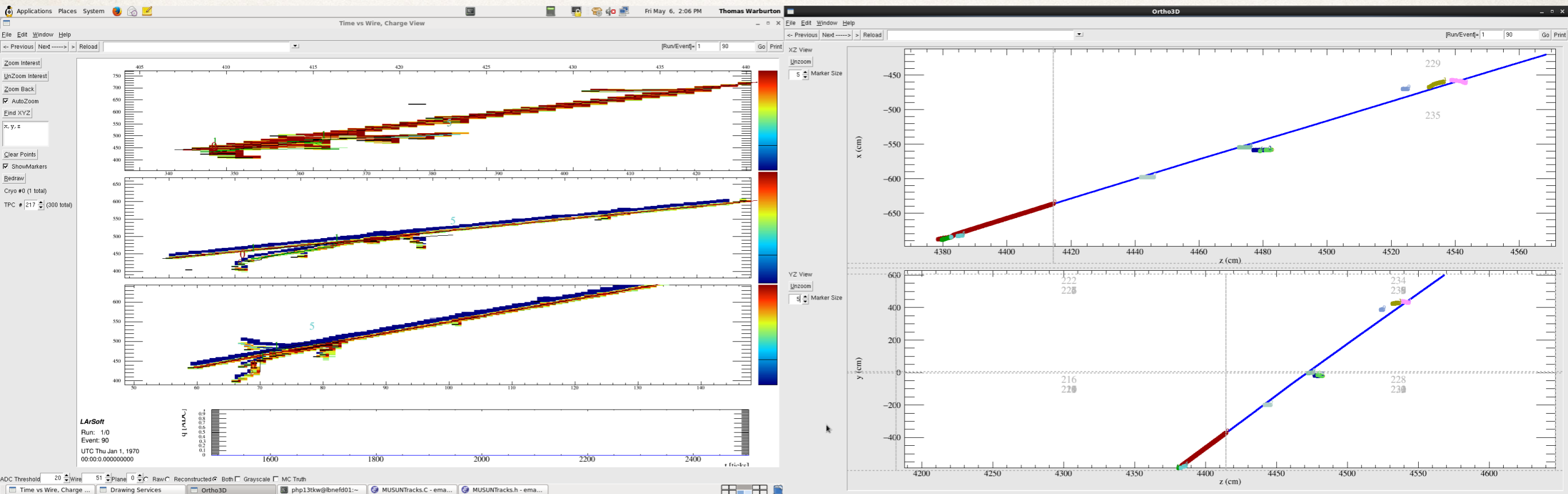 ✤ Orange is the reconstructed hit (from hitfd)

Some event displays - showers and delta rays
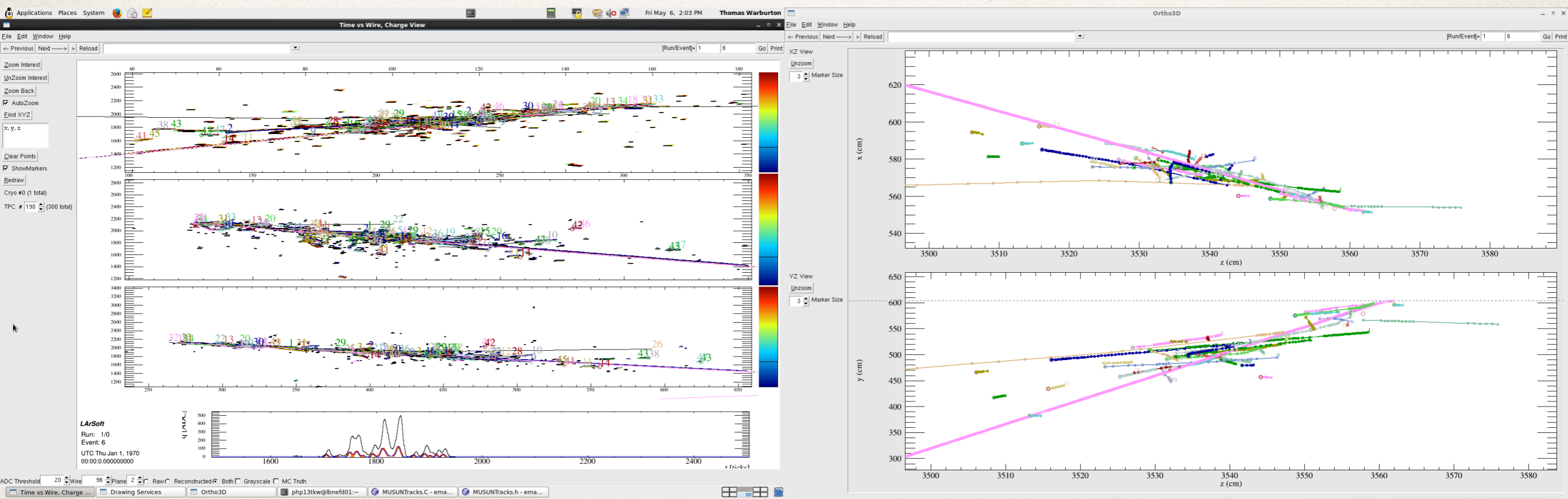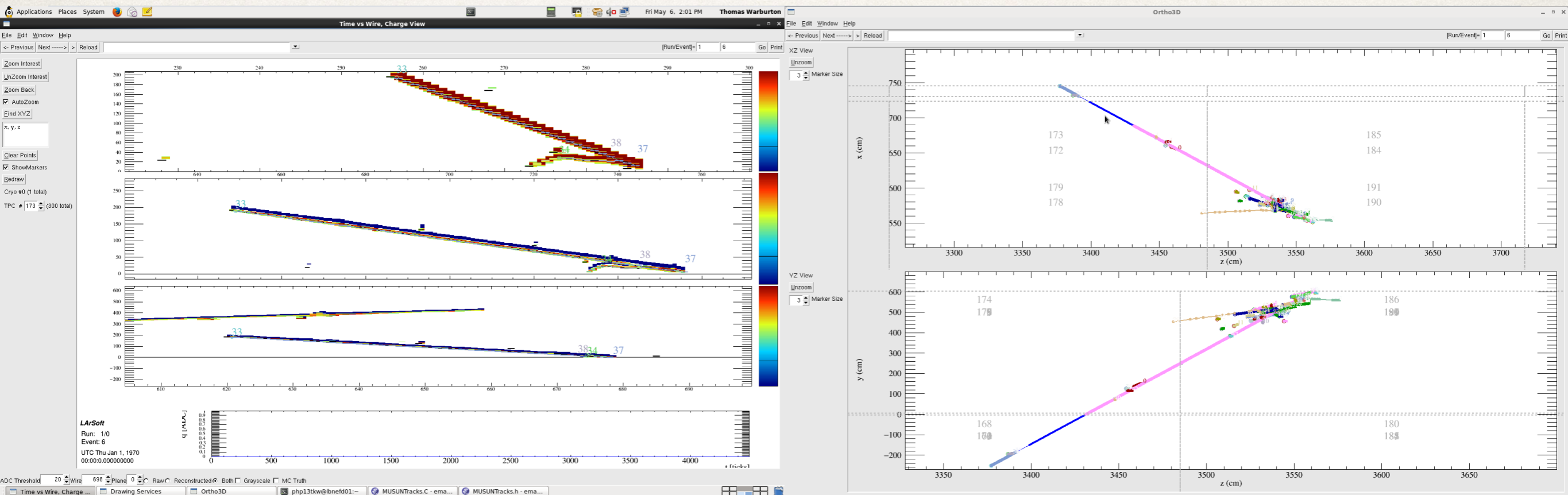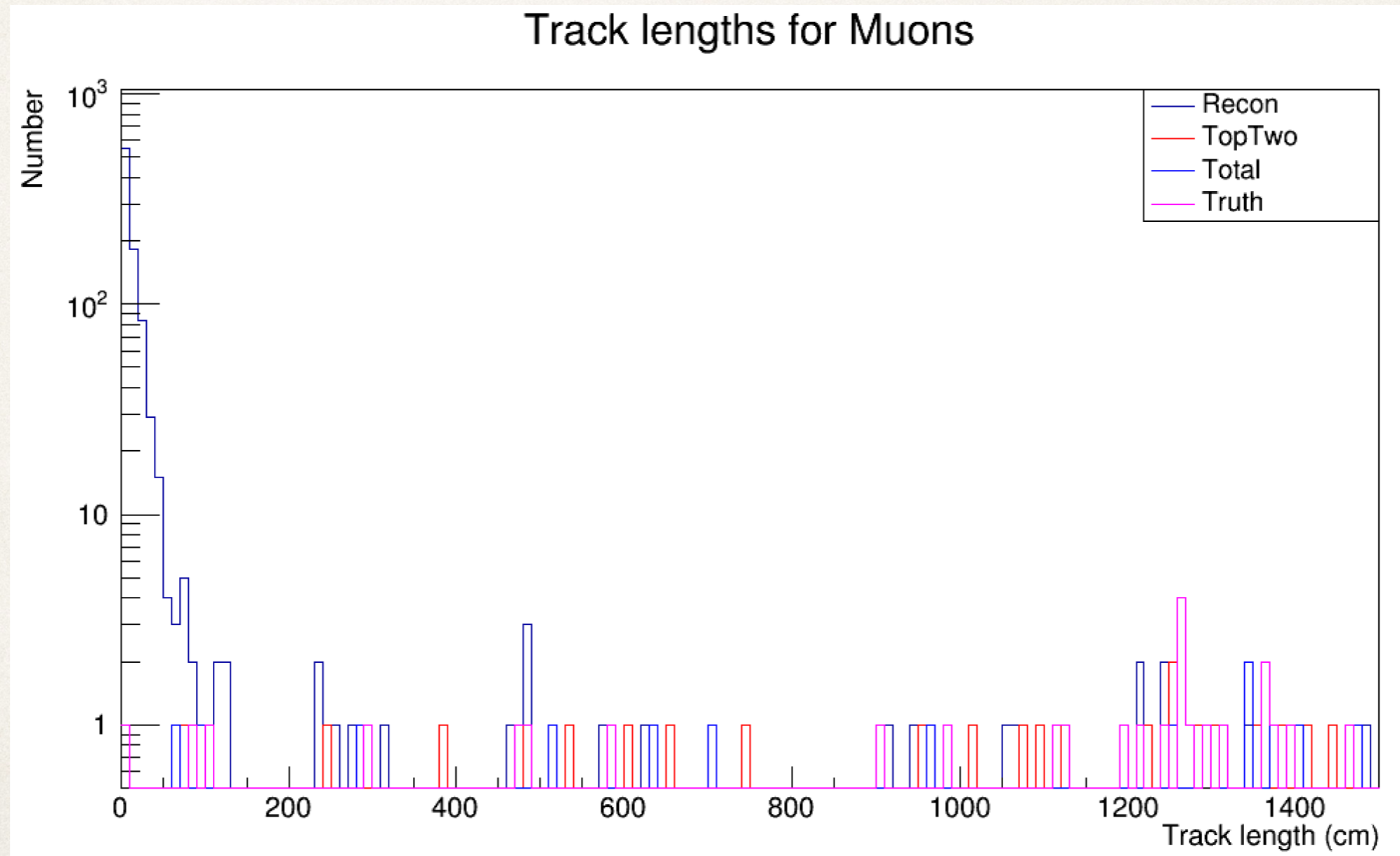
Some event displays - missing tracks
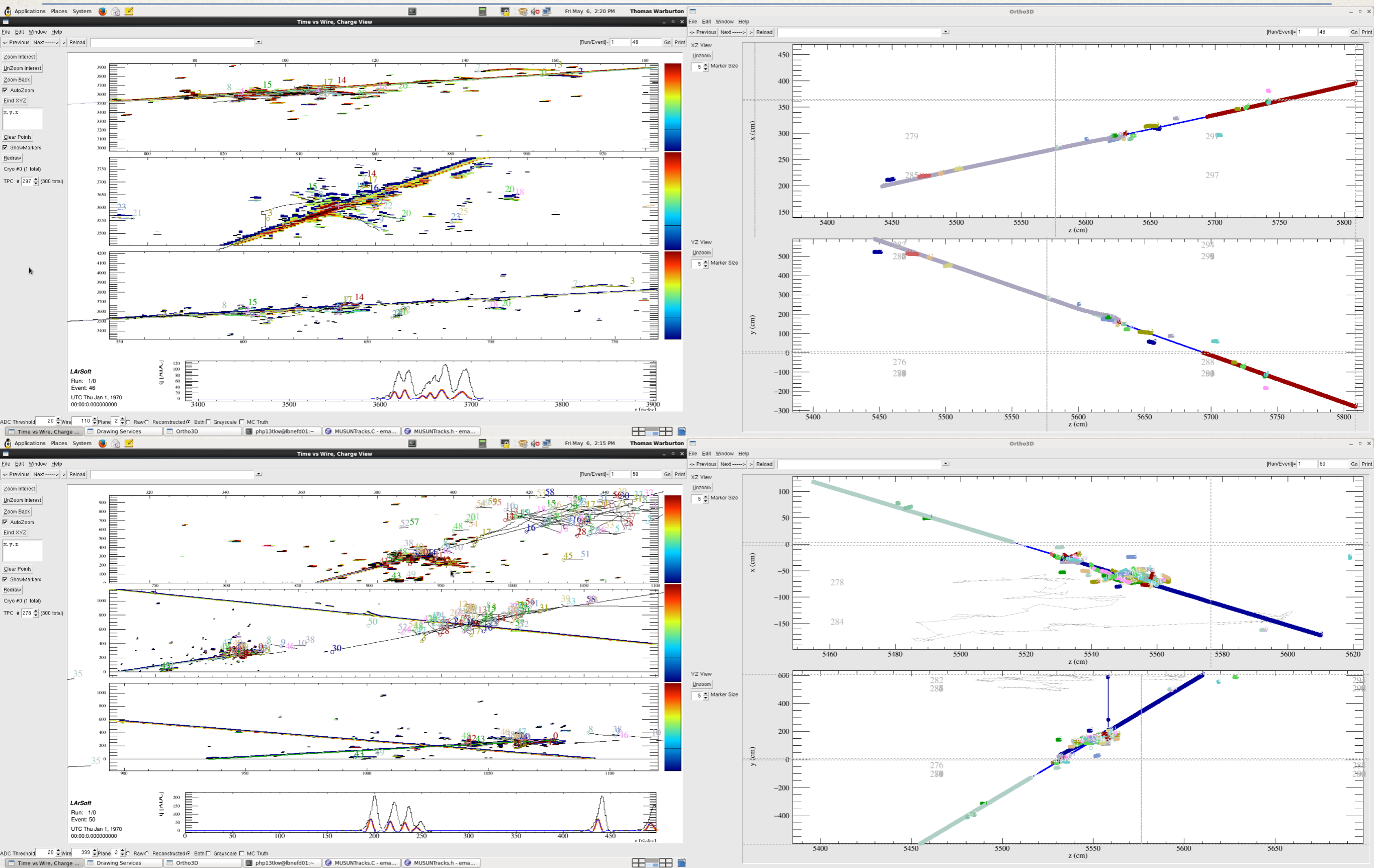
Some event displays - A lost track

Reconstructed tracks lengths

✤ Apologies for sparseness, will run a sample of 10k muons.

✤ Lots of very short tracks ~ 20 cm as Matt has seen previously - these are due to showering see slide 4.

Conclusions

✤ Stitching across TPC gaps occasionally fails:

  ✤ A small section of TPC which is separated from the rest by 6 cm seems to cause problems (slide 4)

  ✤ Tracks crossing APAs sometimes are not stitched

  ✤ Delta rays can cause a track to be separated.

✤ Showering is causing lots of small tracks to be made. Will investigate further.

✤ Also sent an email to Robert and Dorota, they suggested looking at how pandora reconstructs events, to try using a different clustering algorithm and to vary some track track stitching algorithms. I will do this by the next Tuesday.