Pandora on Real Data

Steve Green & Leigh Whitehead
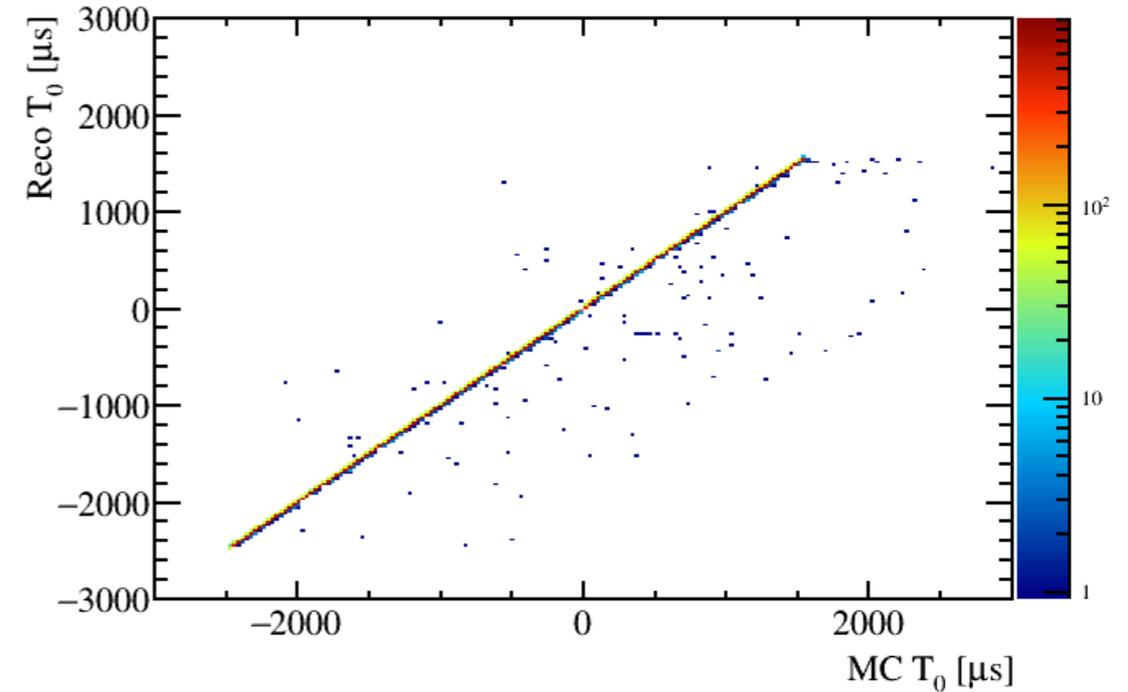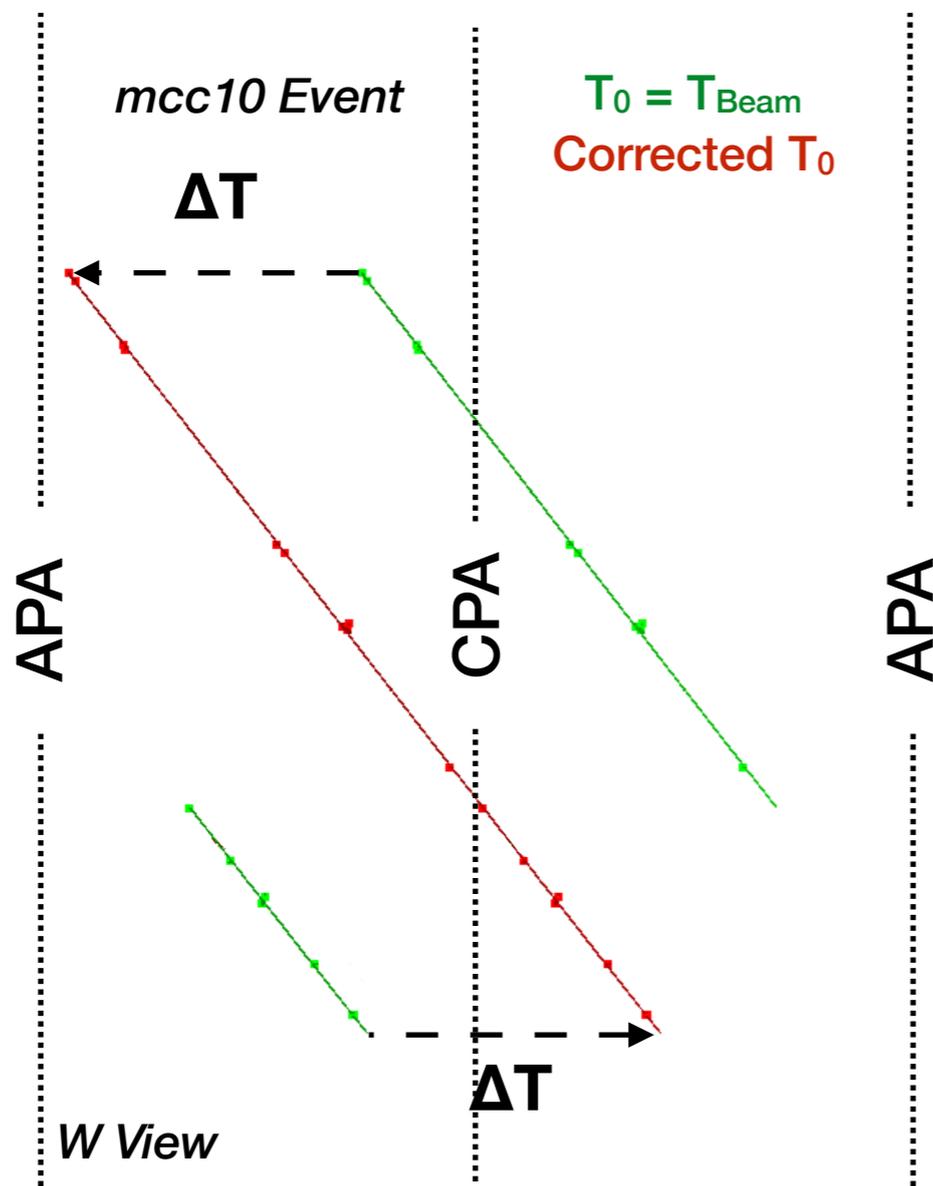
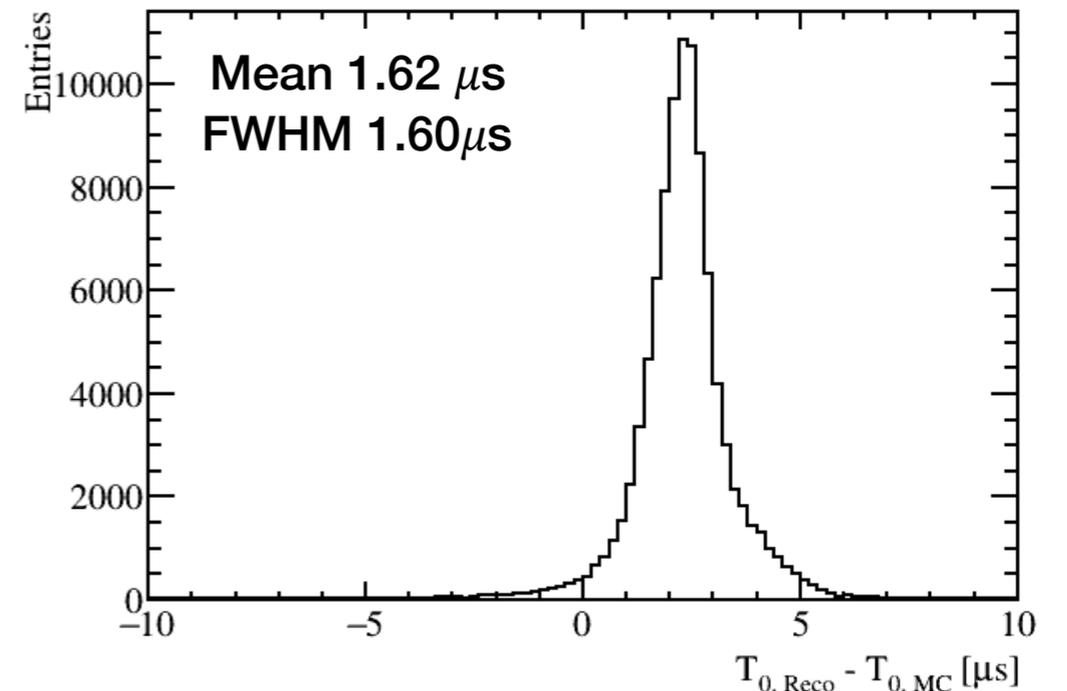**10th October 2018**

○ Pandora accurately "stitches" cosmic rays that pass through the cathode to determine the cosmic T_0.
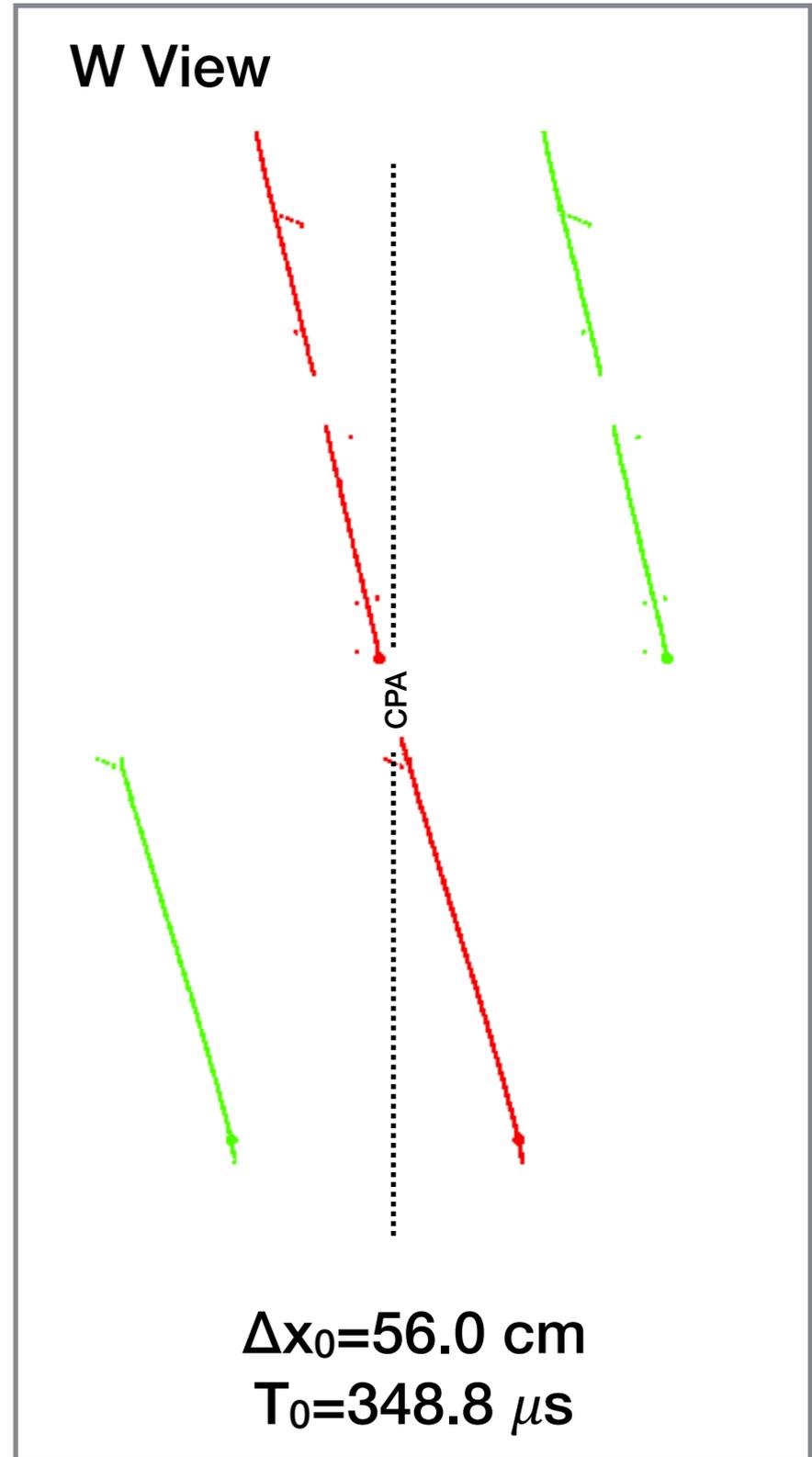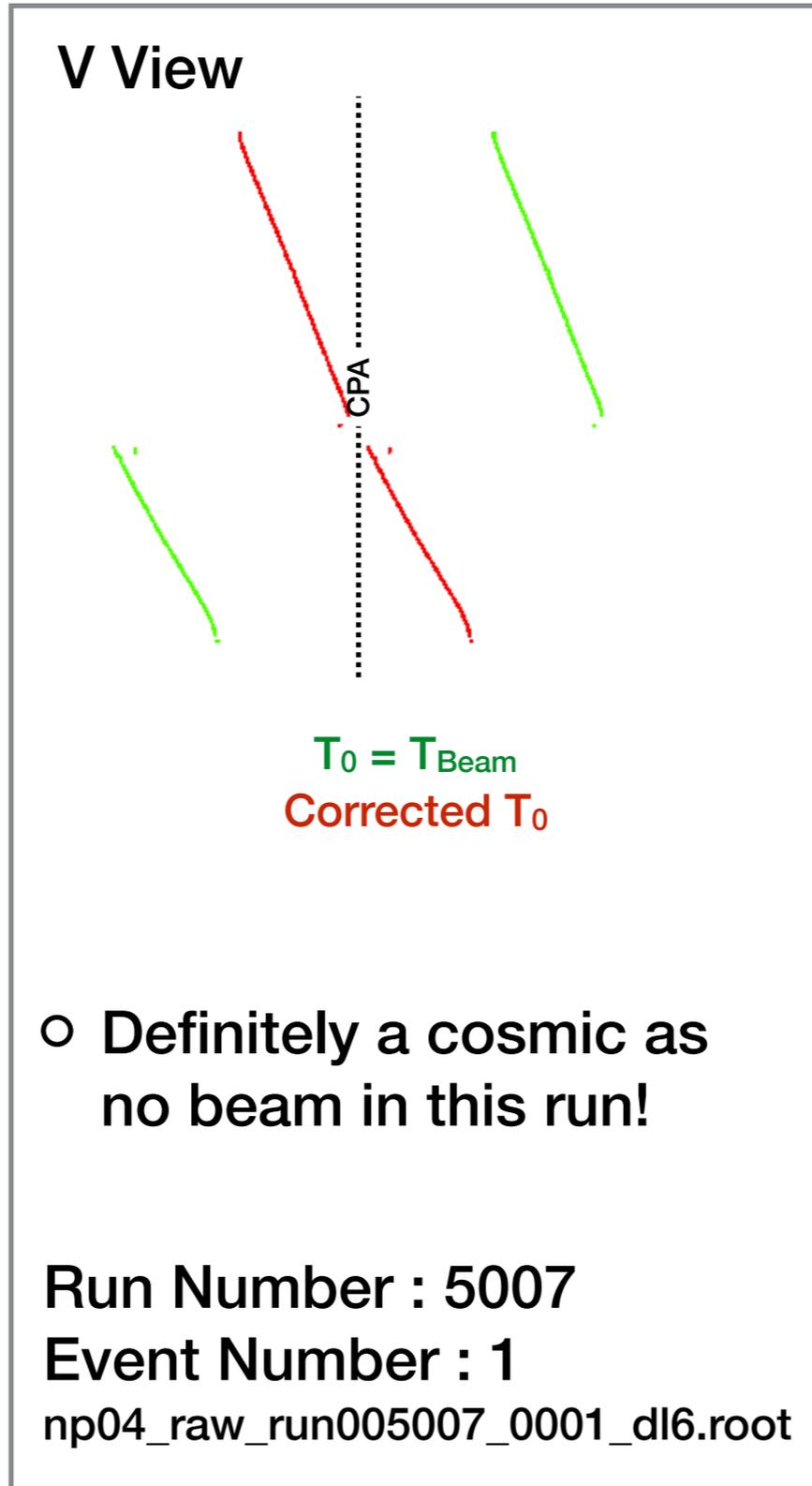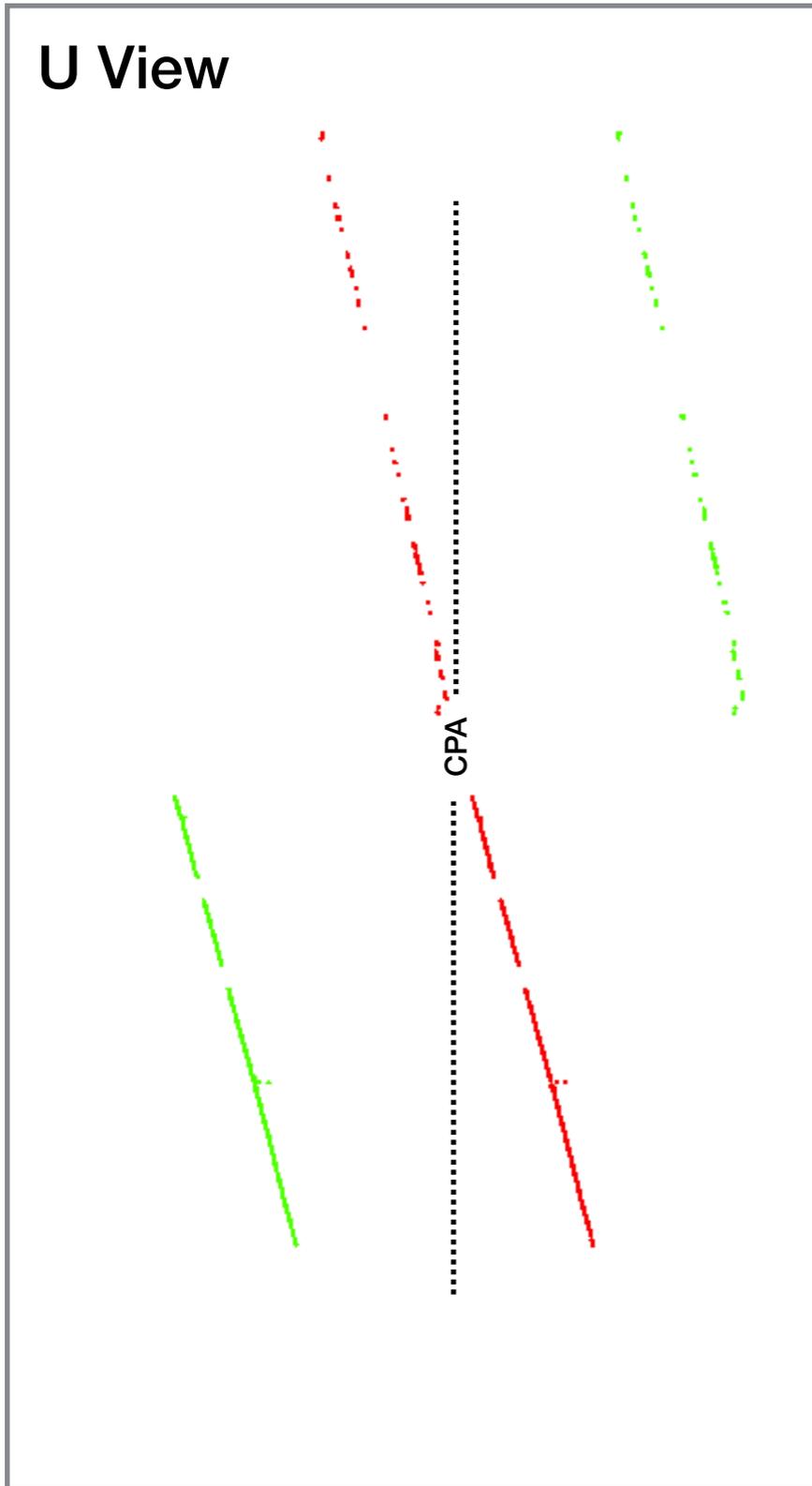
○ T_0 accuracy is of the order of a few μs.

mcc10 Event

$T_0 = T_{Beam}$
Corrected T_0

ΔT

APA

CPA

APA

ΔT

W View

mcc10 Samples
With Space Charge

Mean 1.62 μs
FWHM 1.60μs

Stitching on Real Cosmic Data

U View

V View

CPA

$T_0 = T_{Beam}$
Corrected T_0

○ Definitely a cosmic as no beam in this run!

Run Number : 5007
Event Number : 1
np04_raw_run005007_0001_dl6.root

W View

CPA

Δx_0=56.0 cm
T_0=348.8 μs

V View

$T_0 = T_{Beam}$
Corrected T_0

θ

CPA

θ

Run Number : 5007
Event Number : 1
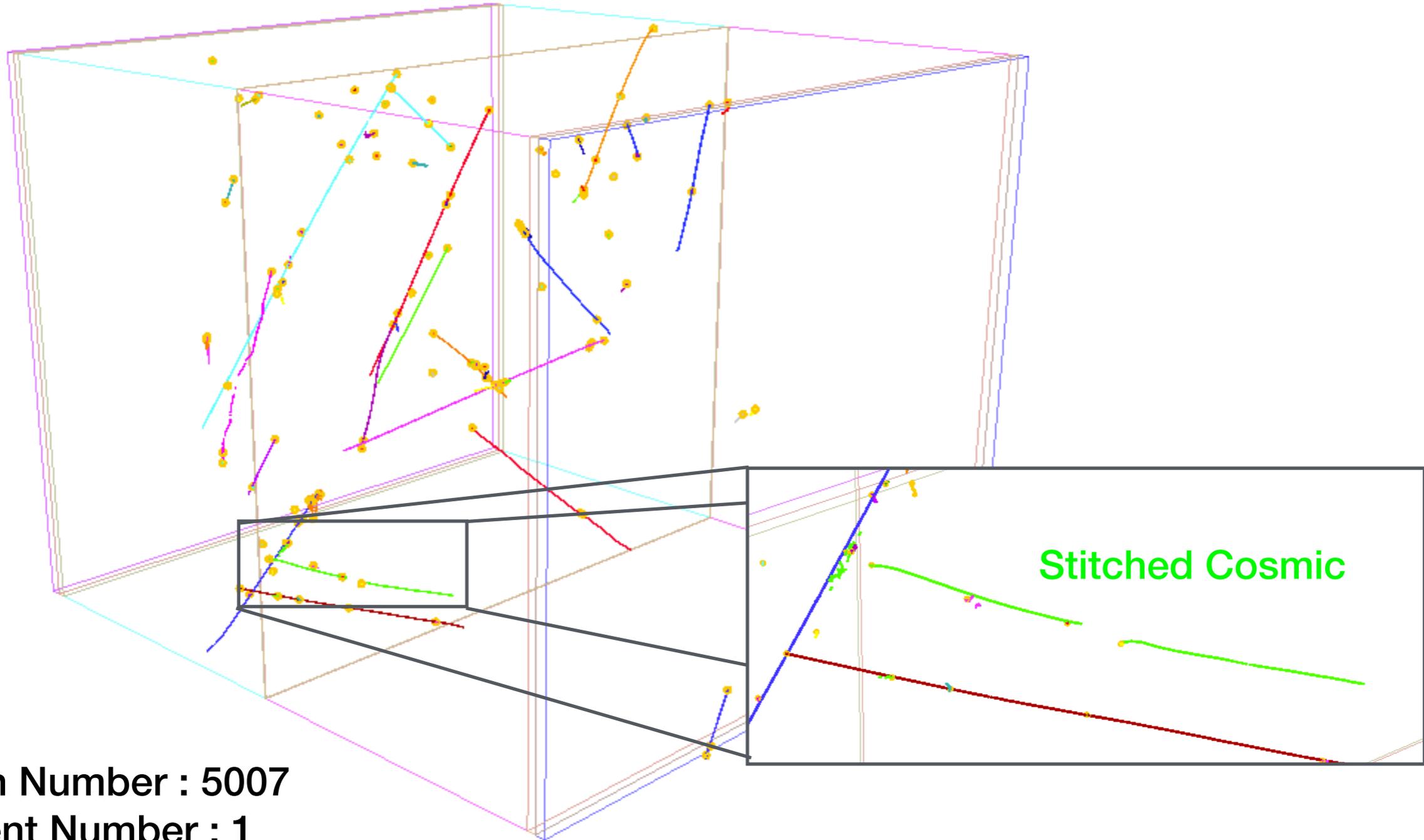np04_raw_run005007_0001_dl6.root

V View

Z

X

CPA
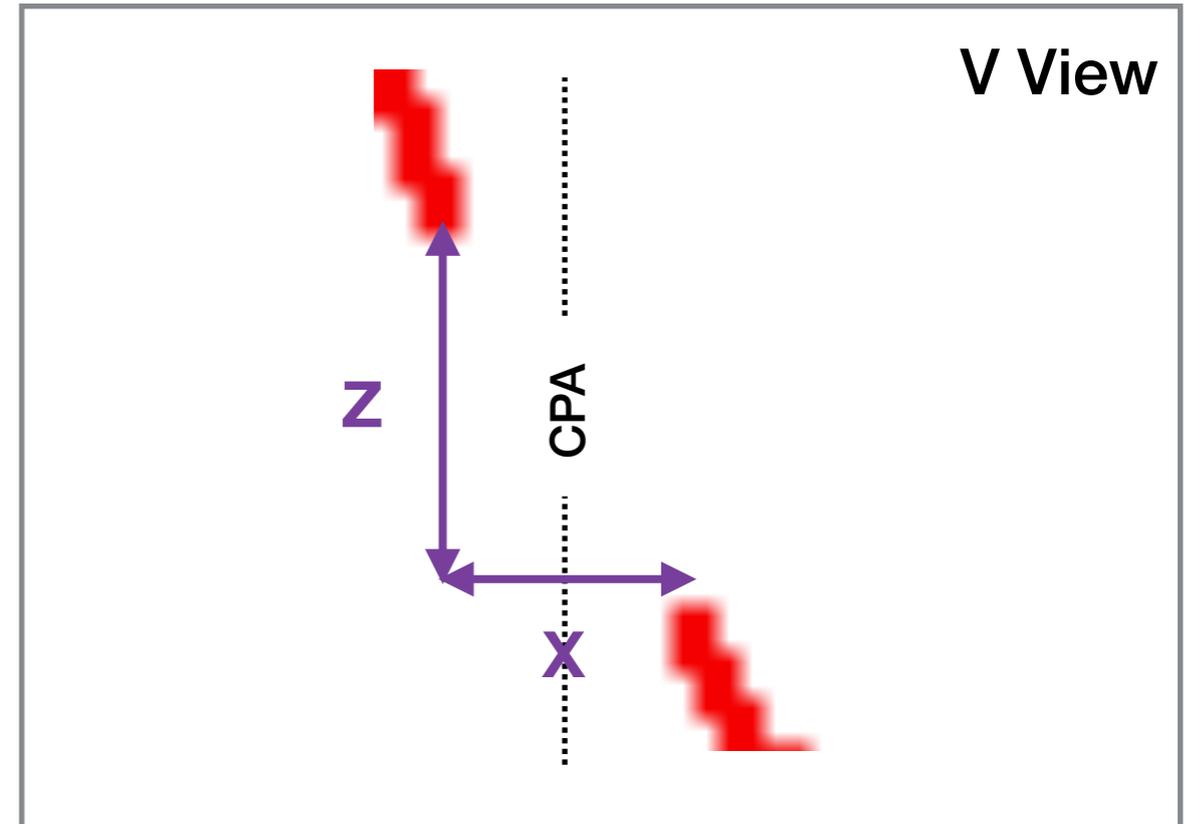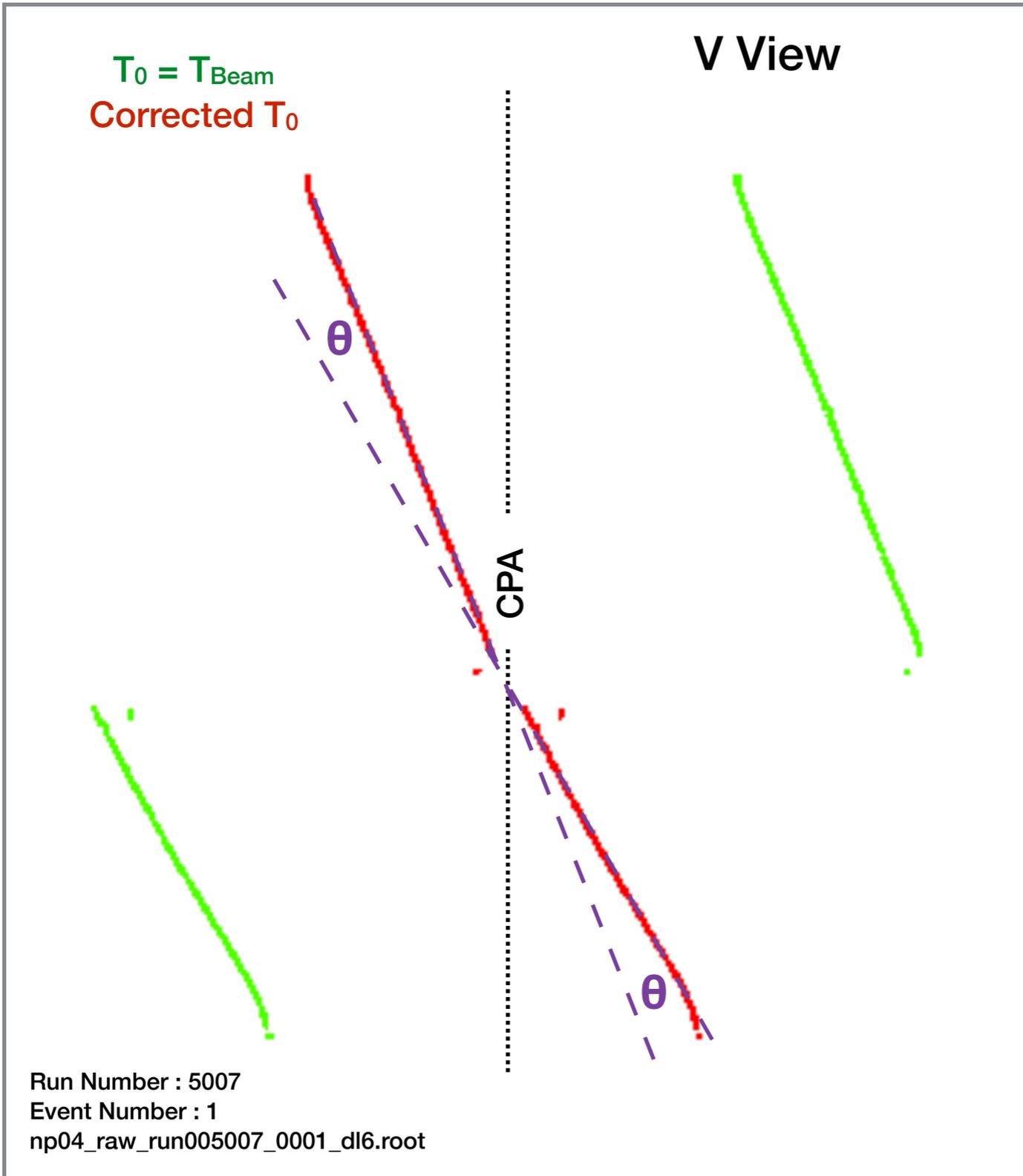
o The stitching process considered the longitudinal (X) and transverse (Z) separation of the clusters at their endpoints to determine if stitching should take place, as well as the relative angle (θ) of the clusters near their endpoint.
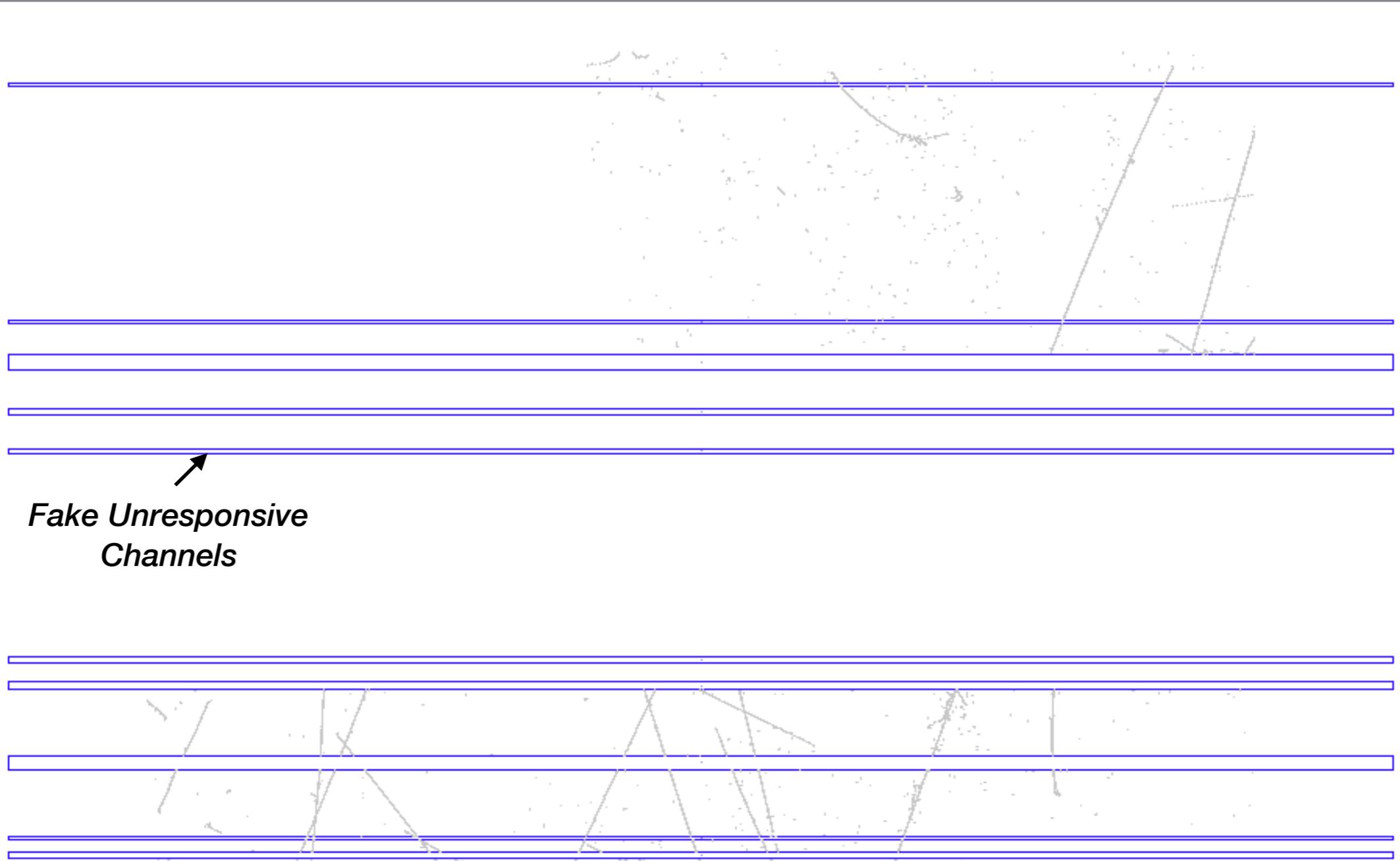
Stitched Cosmic

Run Number : 5007
Event Number : 1
np04_raw_run005007_0001_dl6.root

W View
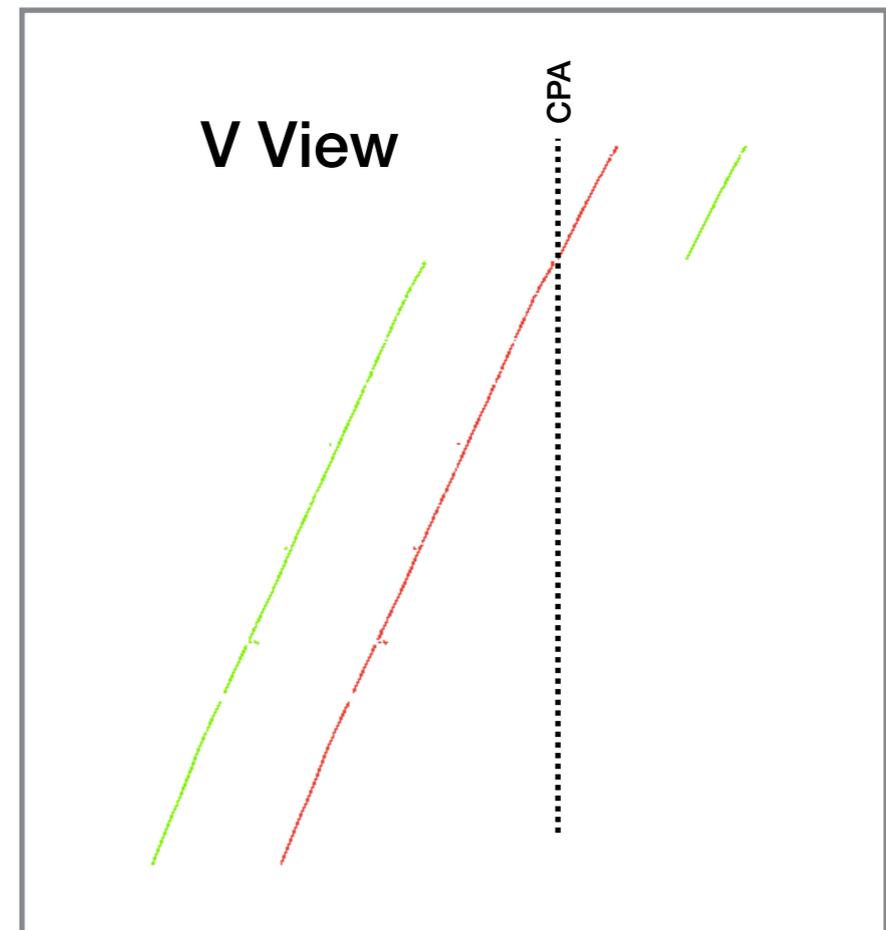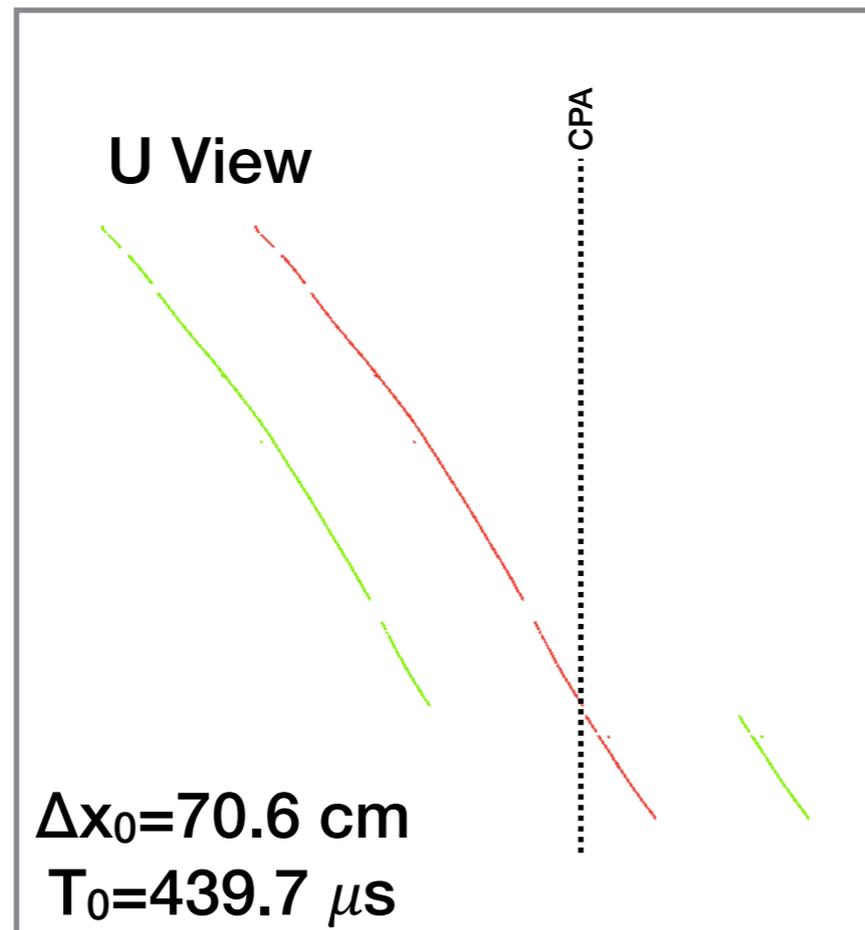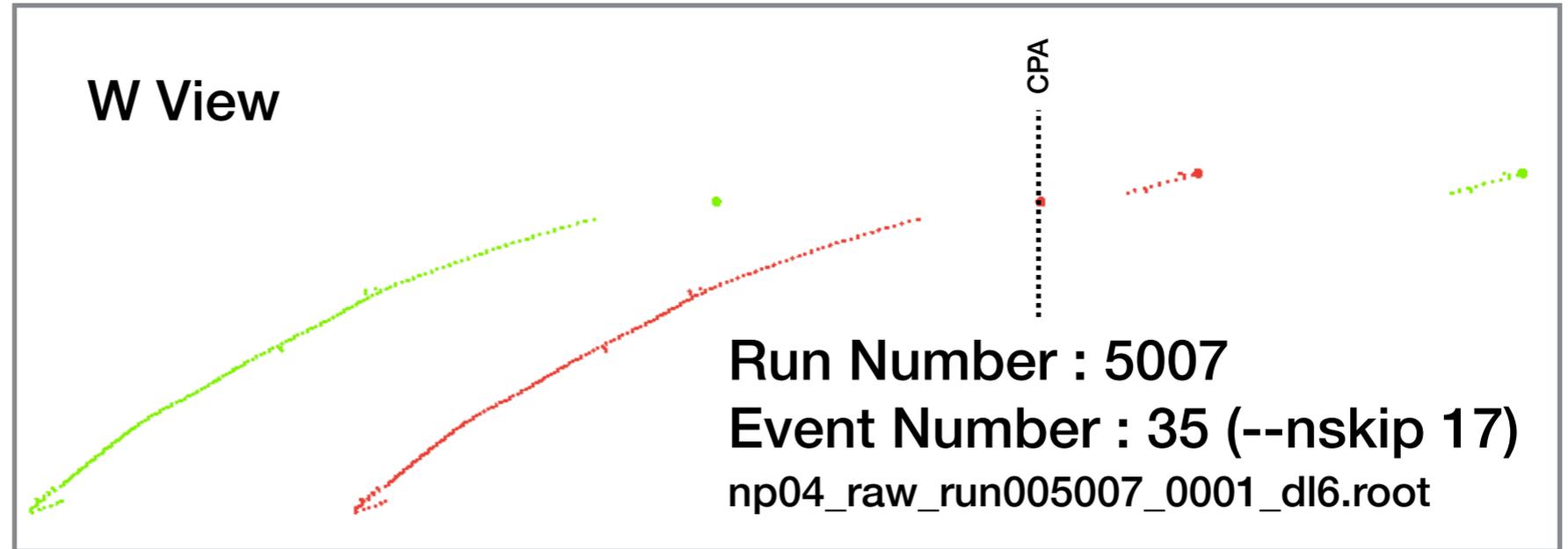
Fake Unresponsive
Channels

Run Number : 5007
Event Number : 1
np04_raw_run005007_0001_dl6.root

- Nice example of a track affected by space charge (curvature of track, particularly visible in W view) that is still stitched.

- Of course more detailed studies are needed to determine how robust this process is, but first steps are very encouraging.

W View

CPA

Run Number : 5007
Event Number : 35 (--nskip 17)
np04_raw_run005007_0001_dl6.root

U View

CPA

Δx_0=70.6 cm
T_0=439.7 μs

V View

CPA

Stitched Cosmic

Run Number : 5007
Event Number : 35 (--nskip 17)
np04_raw_run005007_0001_dl6.root

Thanks to L.Whitehead
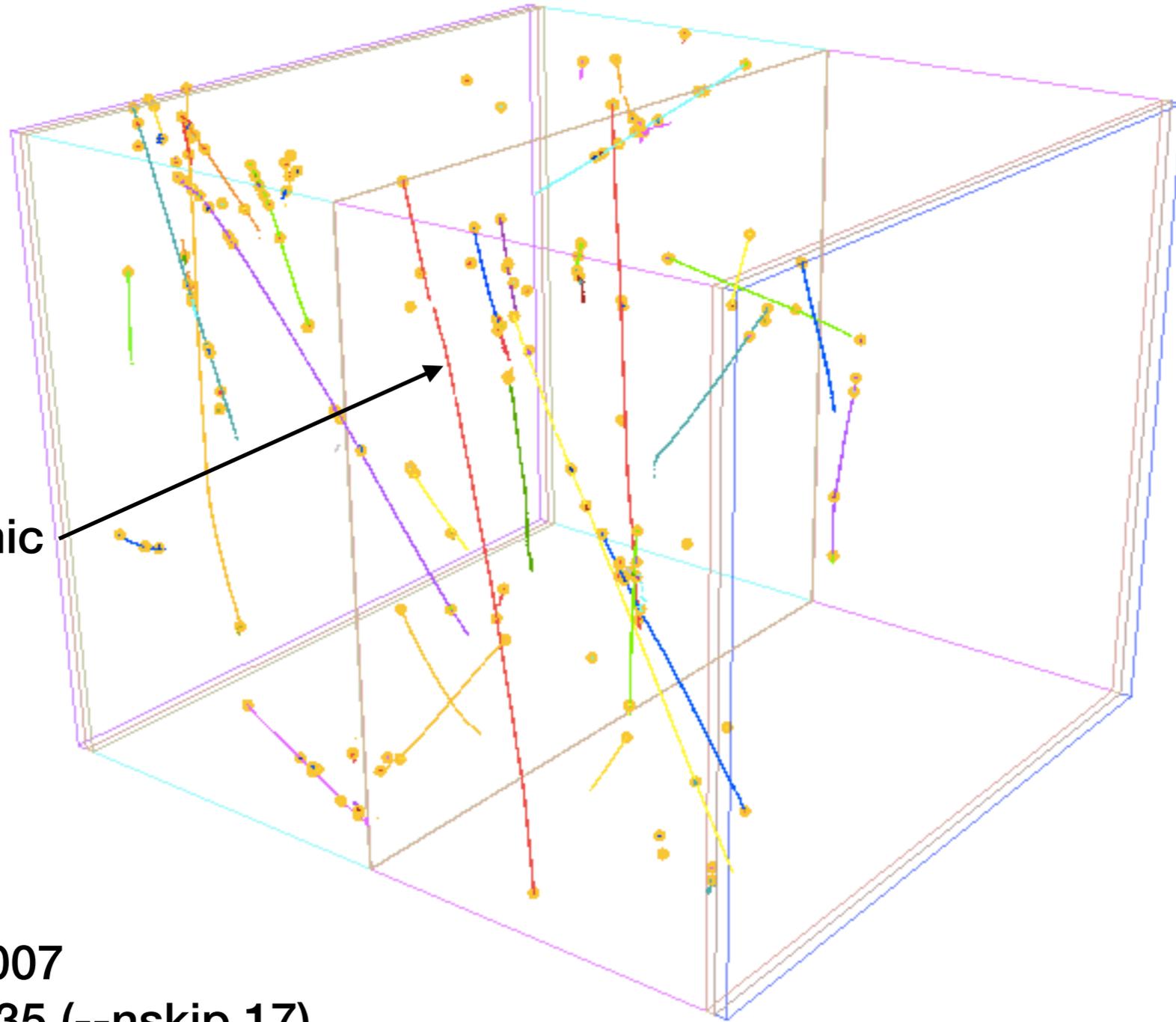
Run Number : 5007

np04_raw_run005007_0001_dl6.root

○ The purity of the ProtoDUNE-SP detector is good now that we can reconstruct cosmic rays passing through the cathode.

○ Stitching in Pandora seems to be working well on data.

○ Results look good (by eye) so far for the events that have been examined.

○ anab::T0 objects are being produced using the default setup.

Thanks to everyone working on ProtoDUNE-SP who have
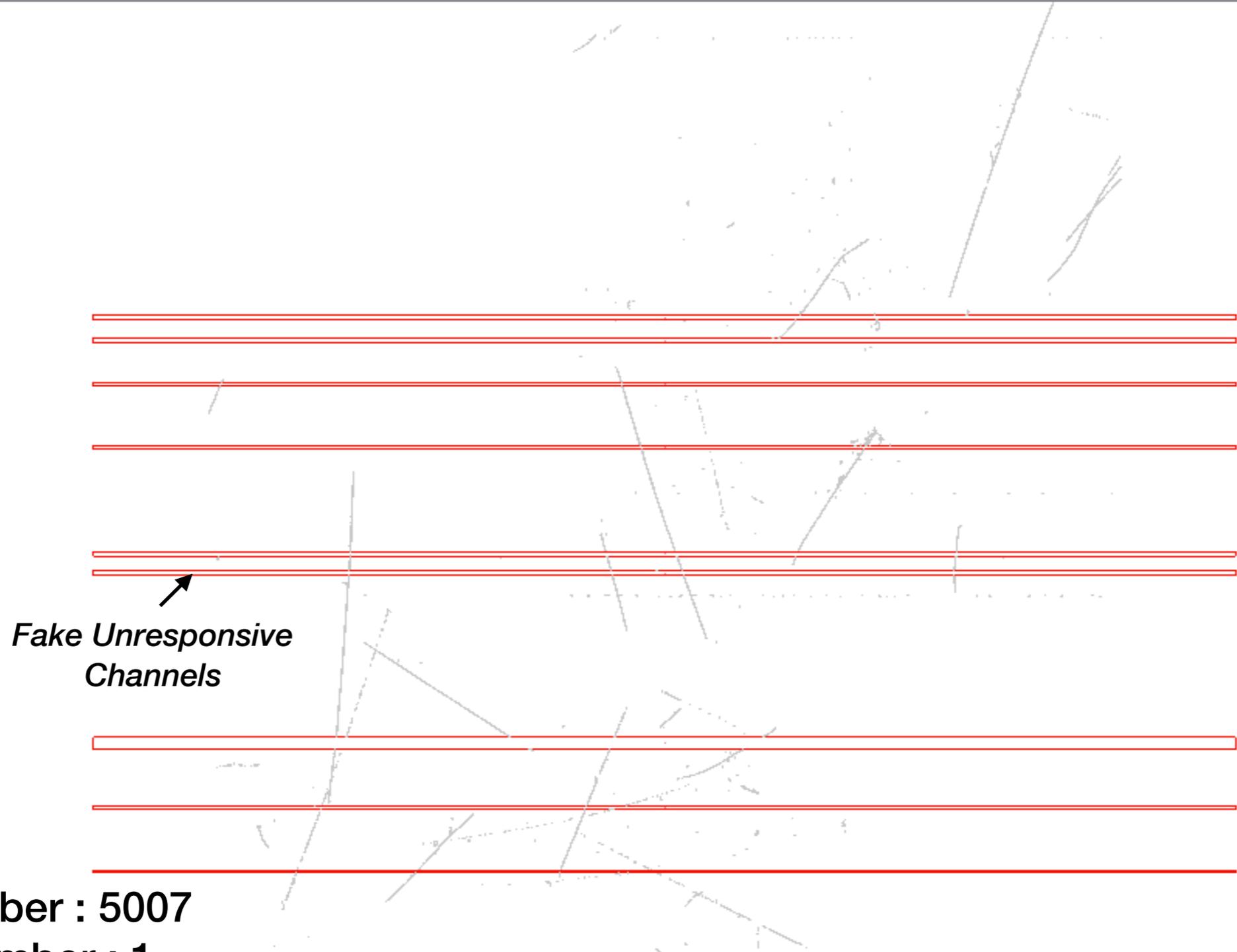helped to get such high quality data so quickly!

Thank you for your attention. Questions?

Backup

U View

Fake Unresponsive
Channels

Run Number : 5007
Event Number : 1
np04_raw_run005007_0001_dl6.root

V View
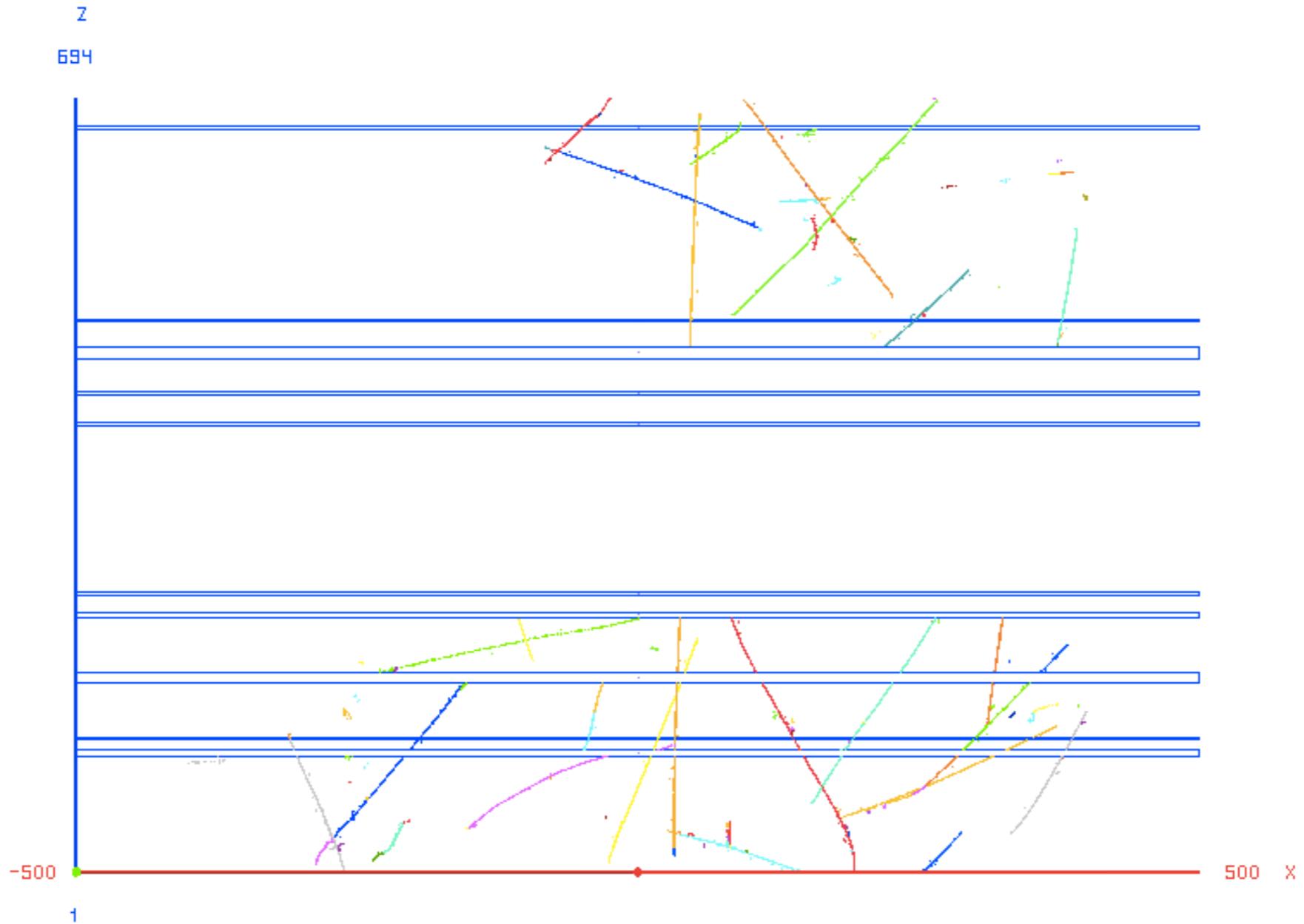
Fake Unresponsive
Channels

Run Number : 5007
Event Number : 1
np04_raw_run005007_0001_dl6.root

W View

Run Number : 5007
Event Number : 35 (--nskip 17)
np04_raw_run005007_0001_dl6.root

○ There was a second stitched event in the curved track example.

Run Number : 5007
Event Number : 35 (--nskip 17)
np04_raw_run005007_0001_dl6.root

Δx_0=5.8 cm
T_0=36.1 μs