Cathode Crossing Muons vs Cosmic Muon SCE Validation

Initial question: Is Lane's data under a different name/am I using samweb incorrectly?

From Lane's tech note:

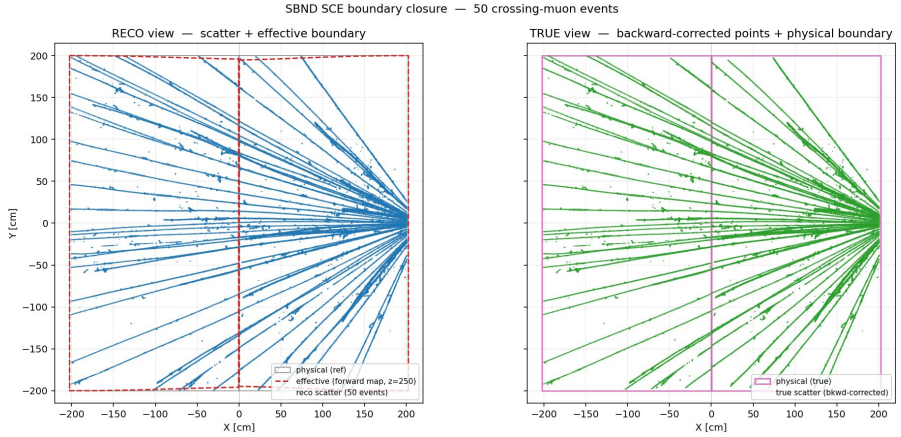
2.2 Sample

This study looks at data collected from February 2025 -July 2025 (Run 1 of SBND), specifically using a crossing muon stream where the light trigger is established. Data was processed with `sbndcode` v10_06_03 through the calibration ntuple stage. Files can be found using the following SAMweb definition: data_MCP2025B_CrossingMuon_FullRun1_AfterLight_crossingmuon_v10_06_03.

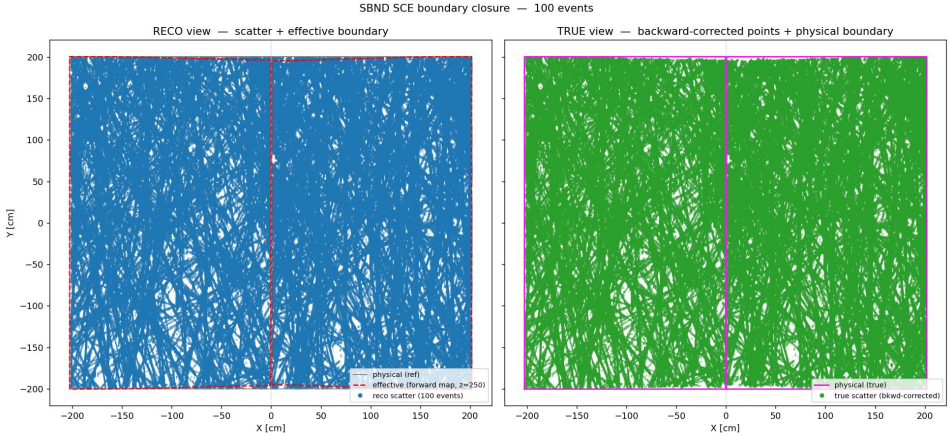
```
SL7> [sbndgpvm01 11:15:55 AM] ~ > setup sam_web_client
SL7> [sbndgpvm01 11:16:05 AM] ~ > samweb     list-definitions --defname crossingmuon_v10_06_03
SL7> [sbndgpvm01 11:16:23 AM] ~ >
```

Cathode Crossing Muons (n=50)

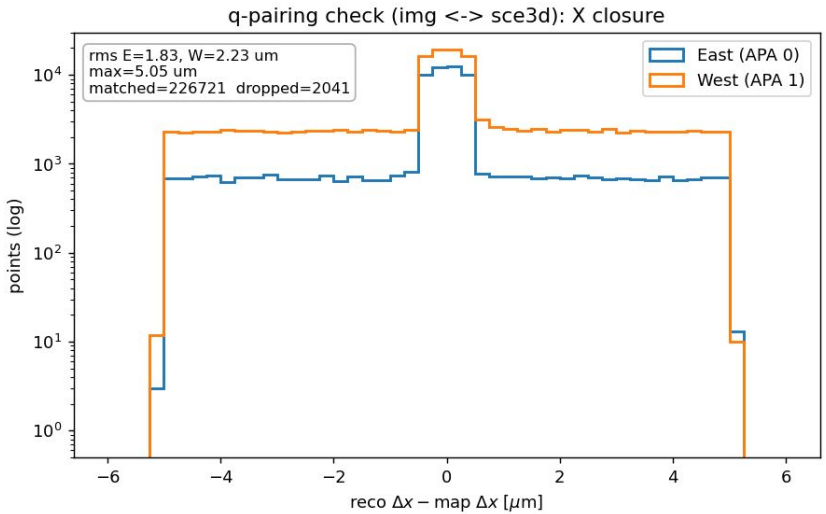
Blue: raw reco positions, where the SCE makes the charge appear to be
Green: same points after backwards SCE correction
Effective boundary: where detectors walls appear to be, as distorted by SCE



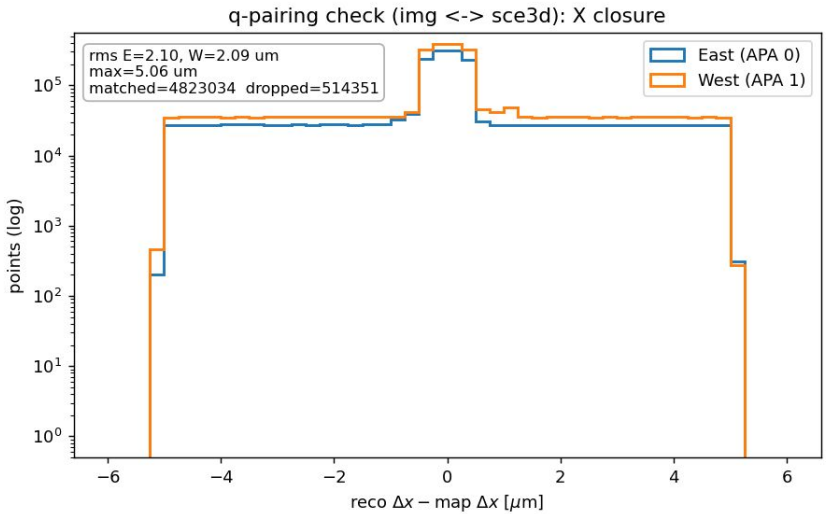
CORSIKA Cosmic Muons (n=50)



Cathode Crossing Muons (n=50)



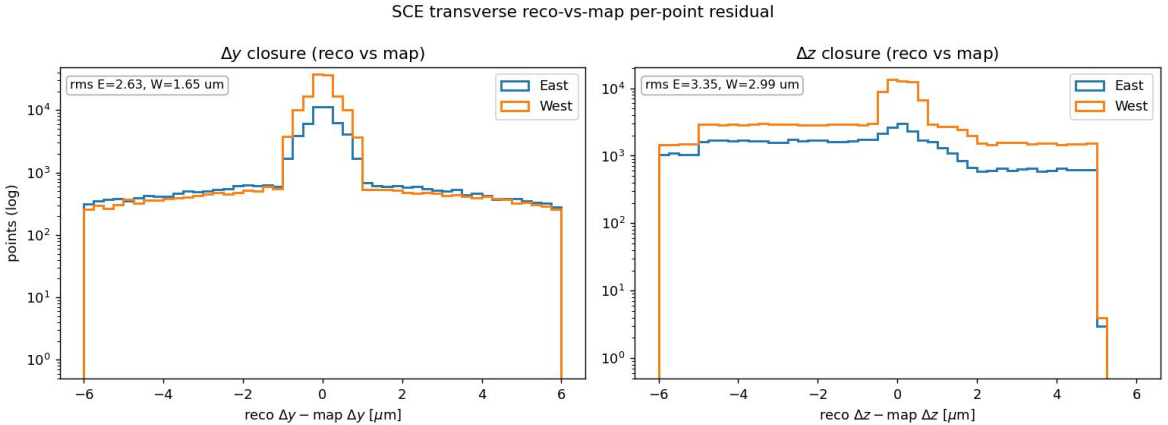
CORSIKA Cosmic Muons (n=100)



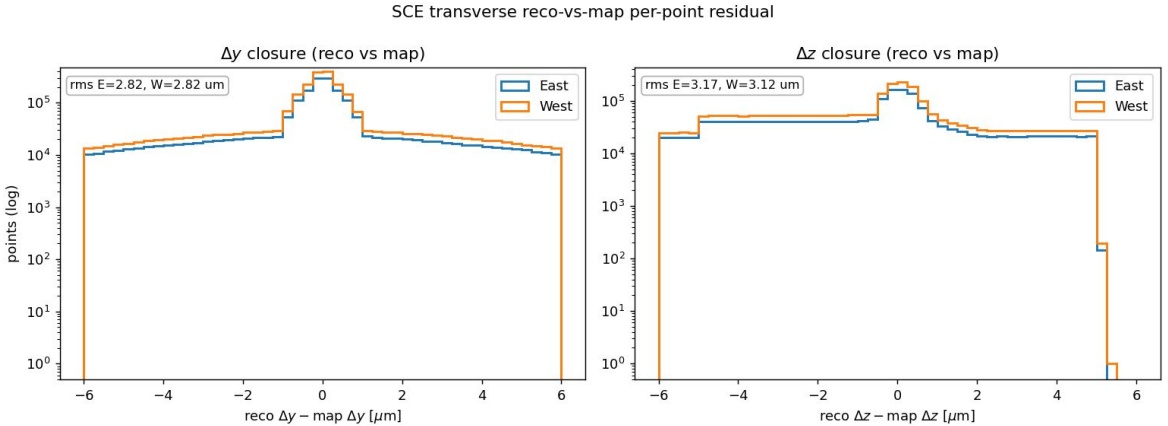
Only 2x events but but 227k vs 4.8m matched since cosmics deposit more charge, so fewer fluctuations in cosmic sample

Cathode Crossing Muons (n=50)

Less east-west asymmetry in counts with cosmics as cosmics fill east-west evenly

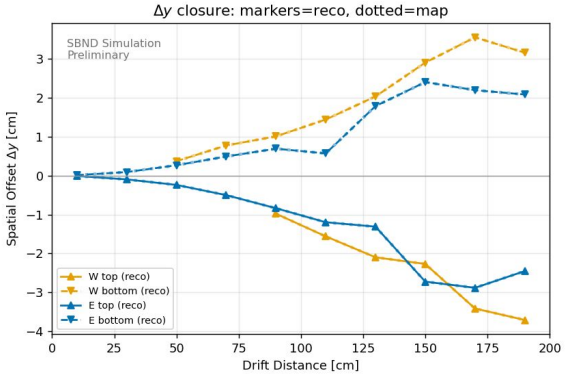


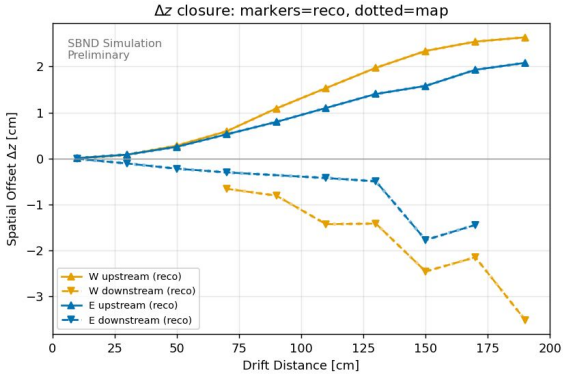
CORSIKA Cosmic Muons (n=100)



Cathode Crossing Muons (n=50)

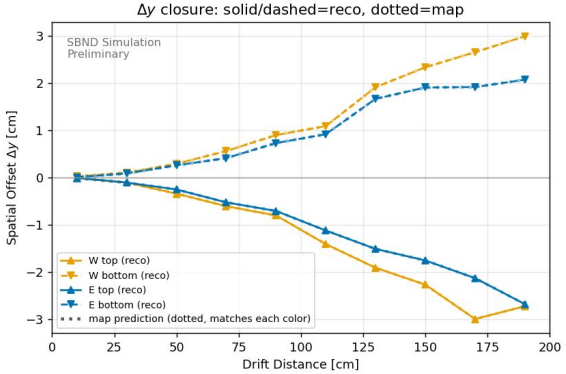
SBND SCE transverse closure -- reco (markers) vs map (dotted) vs drift

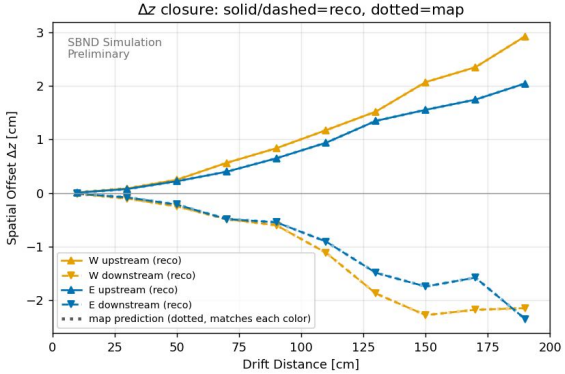




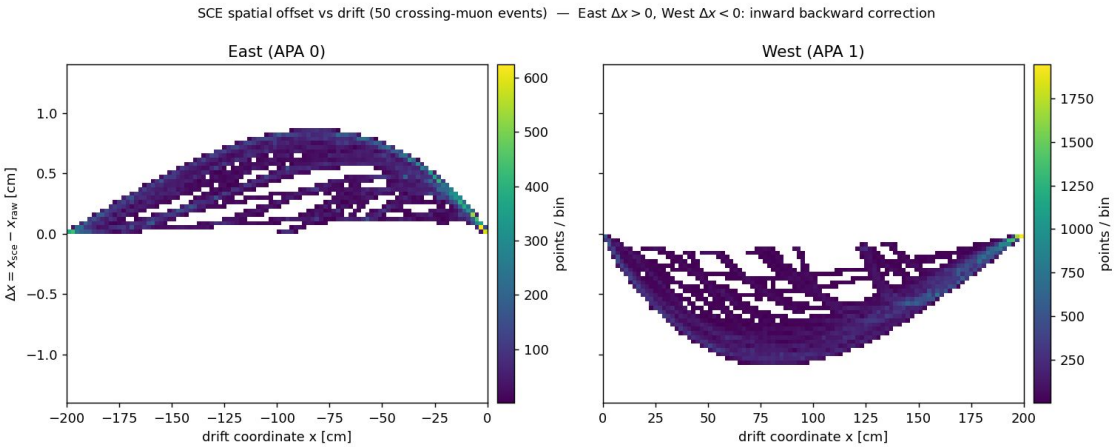
CORSIKA Cosmic Muons (n=100)

SBND SCE transverse closure -- reco (markers) vs map (dotted) vs drift

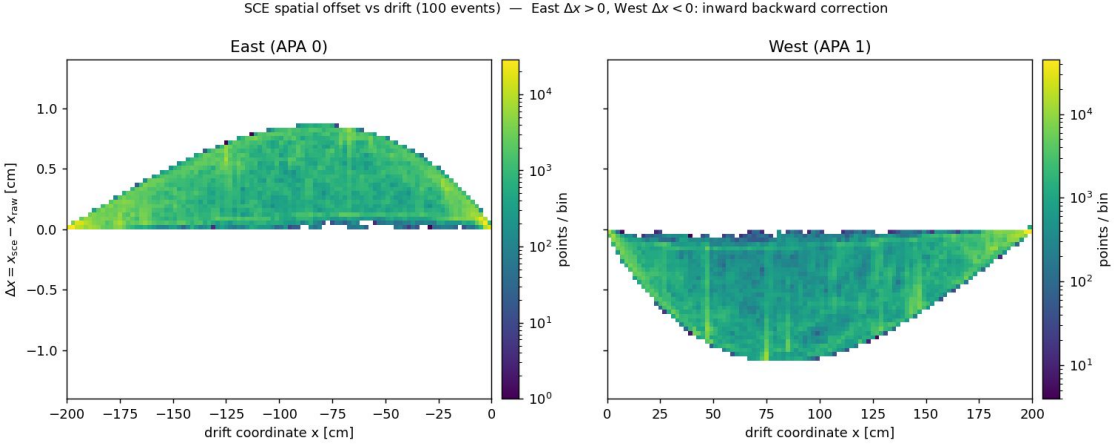




Cathode Crossing Muons (n=50)

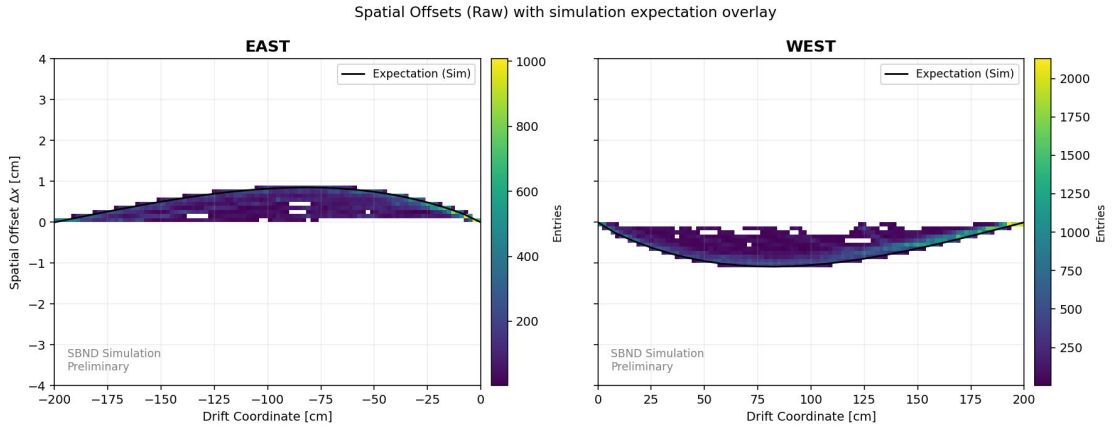


CORSIKA Cosmic Muons (n=100)



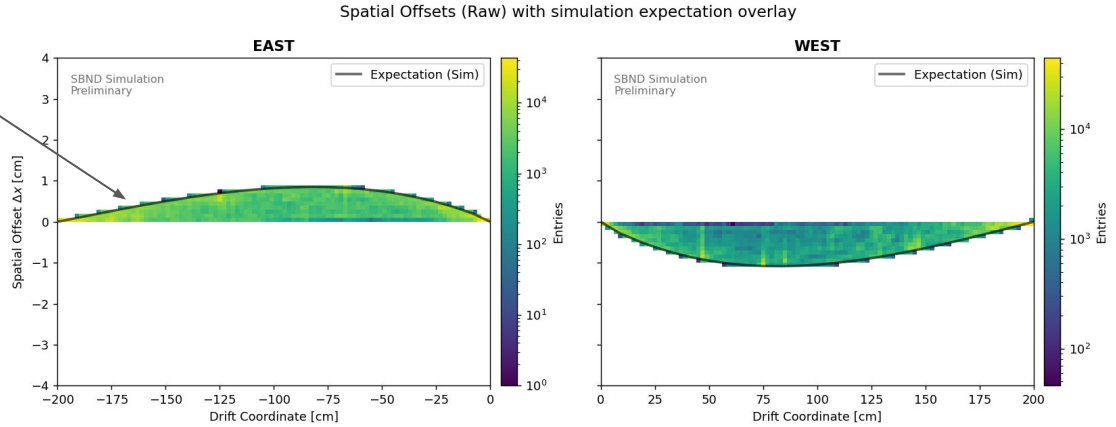
Note log scale
I don't think vertical/horizontal streaks mean much, n=100 is still a pretty small sample

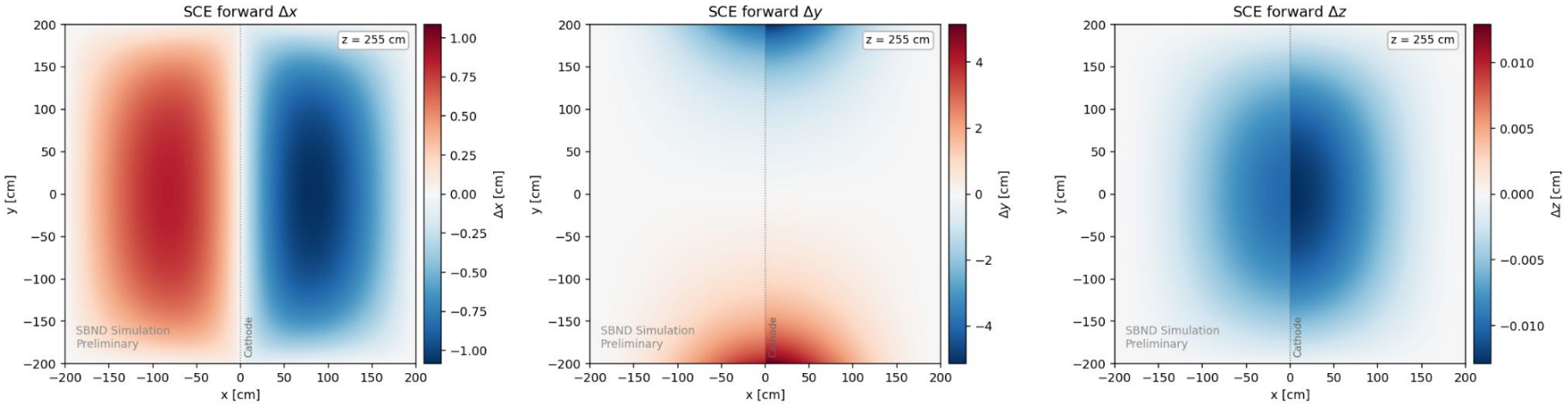
Cathode Crossing Muons (n=50)



CORSIKA Cosmic Muons (n=100)

Expectation at central y, z



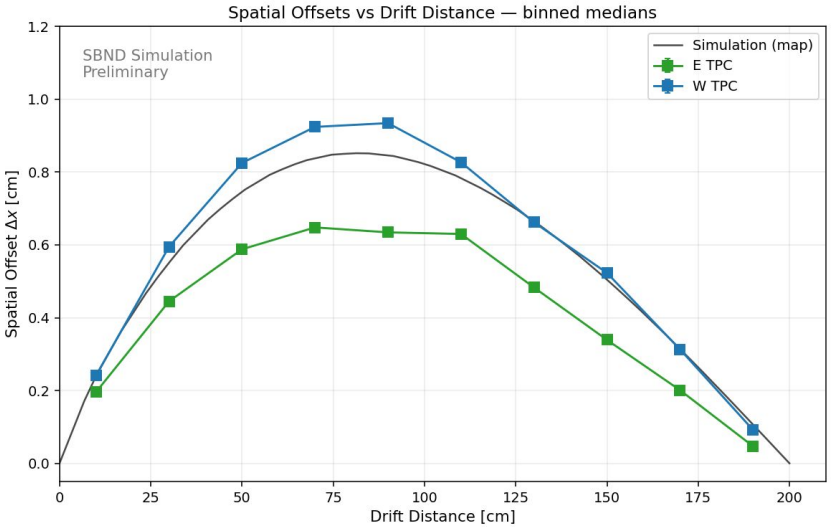


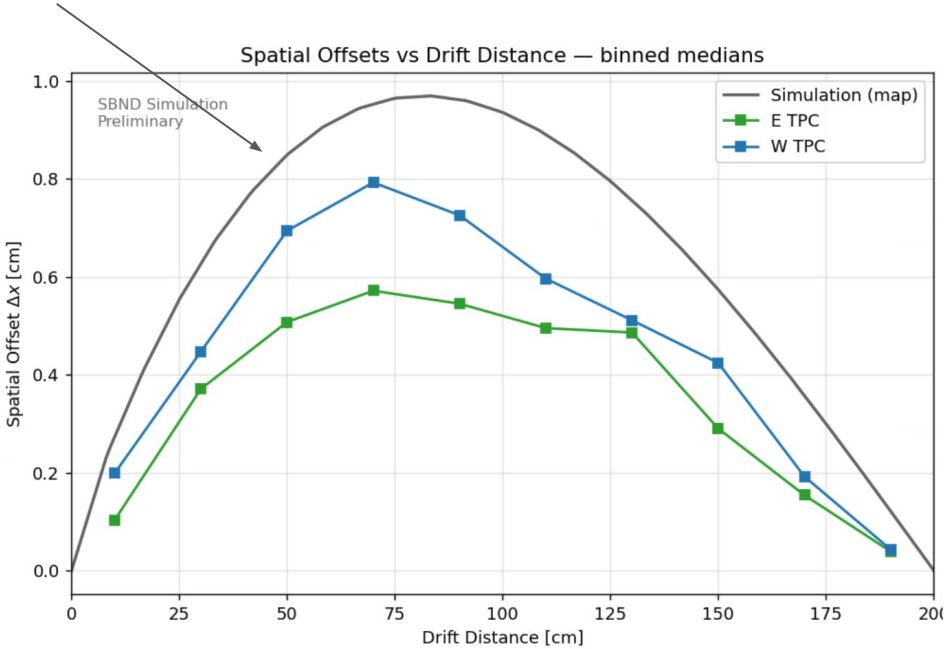
Corrected scale on right plot, just very small delta z correction

Cathode Crossing Muons (n=50)

CORSIKA Cosmic Muons (n=100)

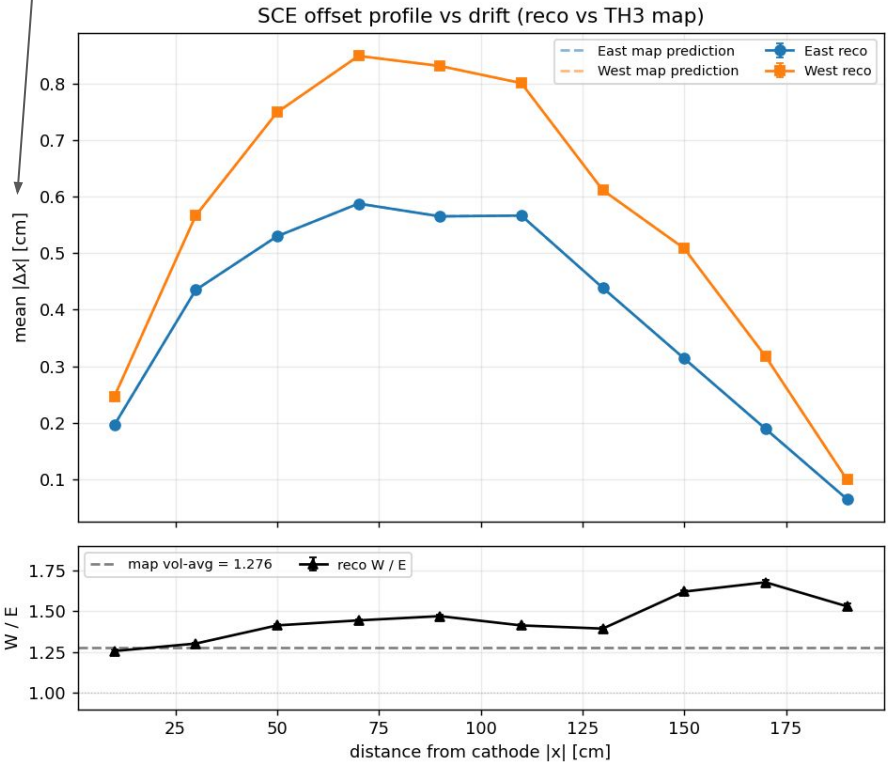
y=0, z = 250 correction





Cathode Crossing Muons (n=50)

Difference b/w this and last plot is mean vs median



CORSIKA Cosmic Muons (n=100)