

Containment vs. Resolution

2024-12-17

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Introduction

- End point resolution influenced by muon contained or not
- So far plotted resolution without considering containment
- Contained means
 - True momentum at last recorded point is $< 1 \text{ MeV}/c^2$
- Not contained if this is not the case

- Now comparing resolution of containment selection and not



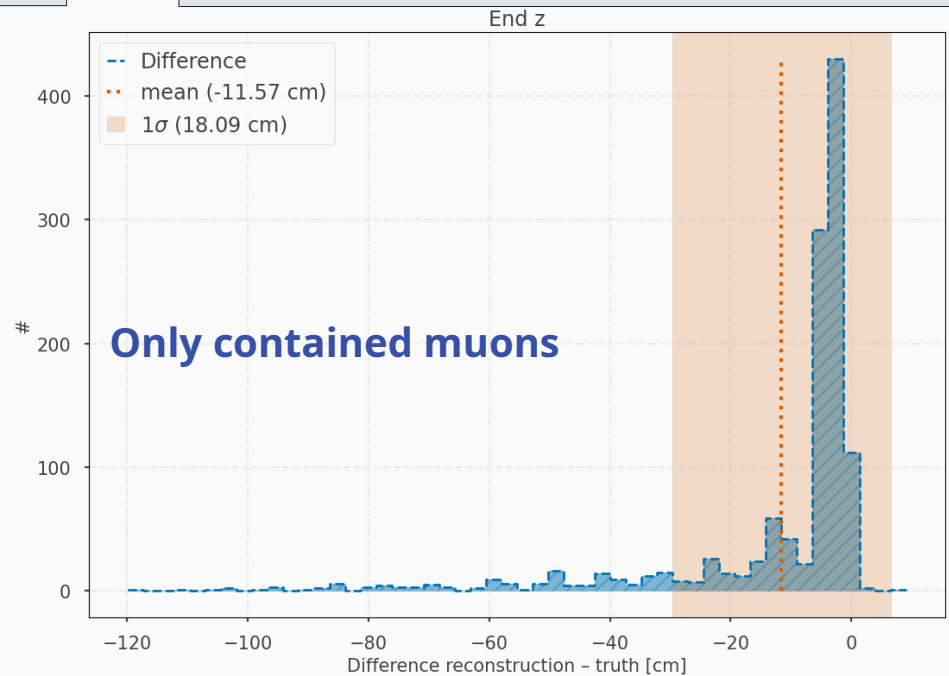
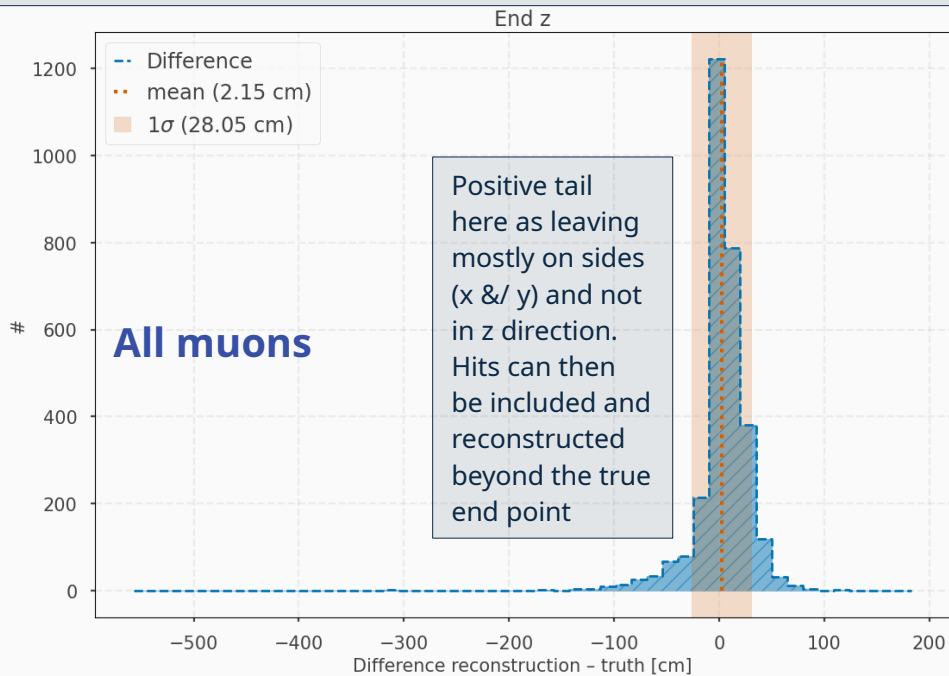
Comparison – z direction

- Stereo
- Not contained 1908 of 3109 total muons (61.4%)

- Fiducial volume (→ truth) is smaller than instrumented TMS volume (→ reco).

- Last hits for contained muons will have very low energy and might not get picked up (no signal, 'random' direction of hits)

Negative difference → reco smaller (towards negative) than truth



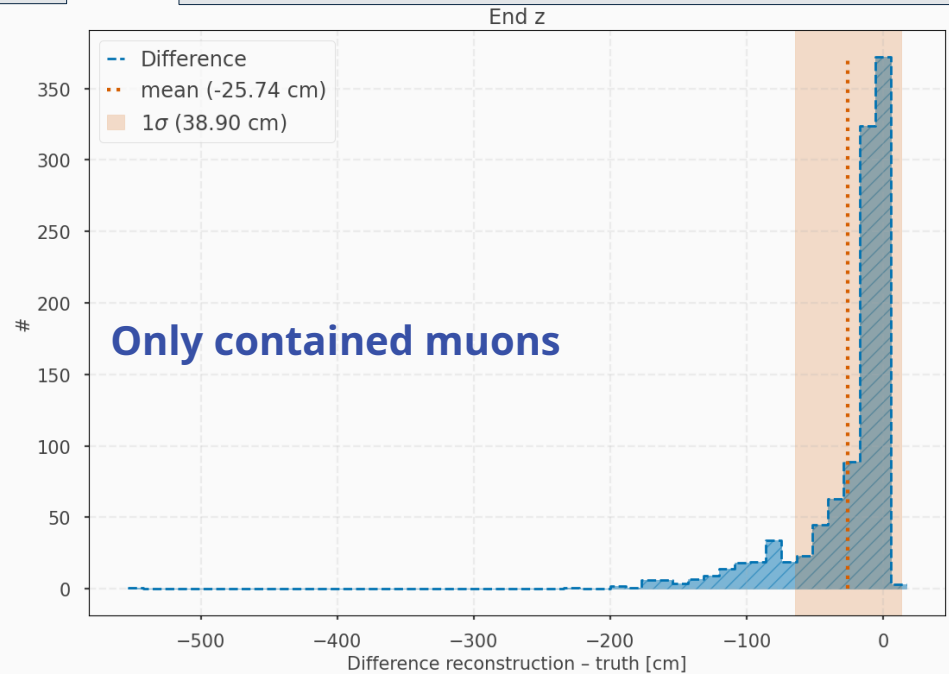
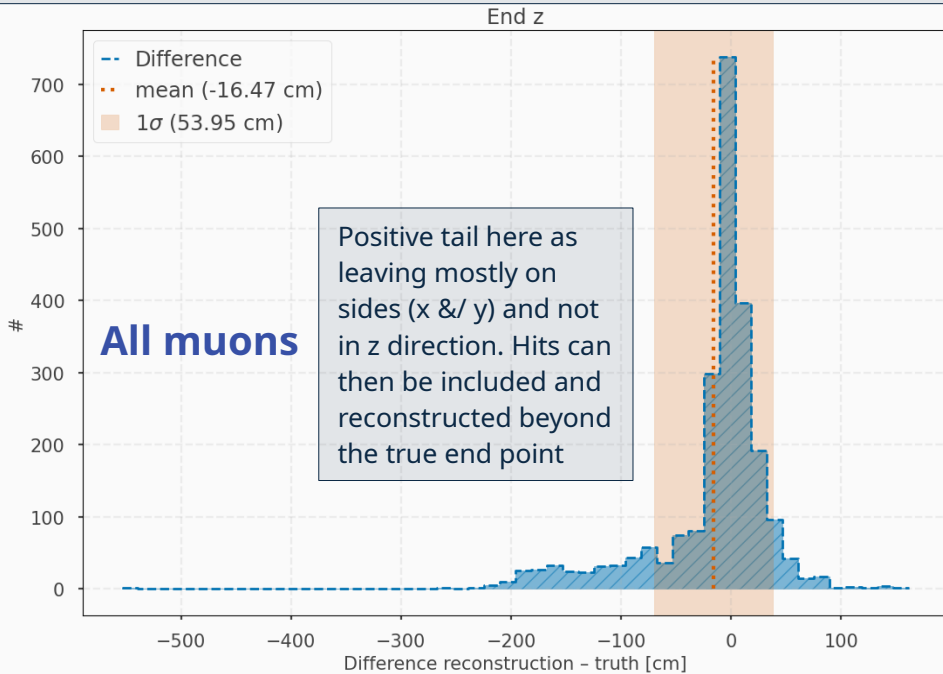


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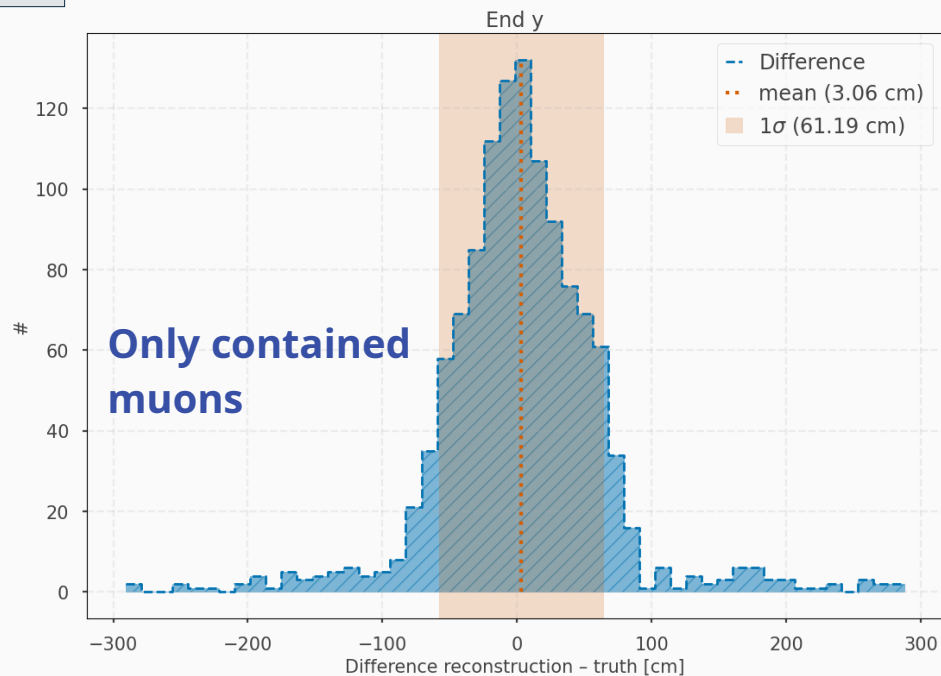
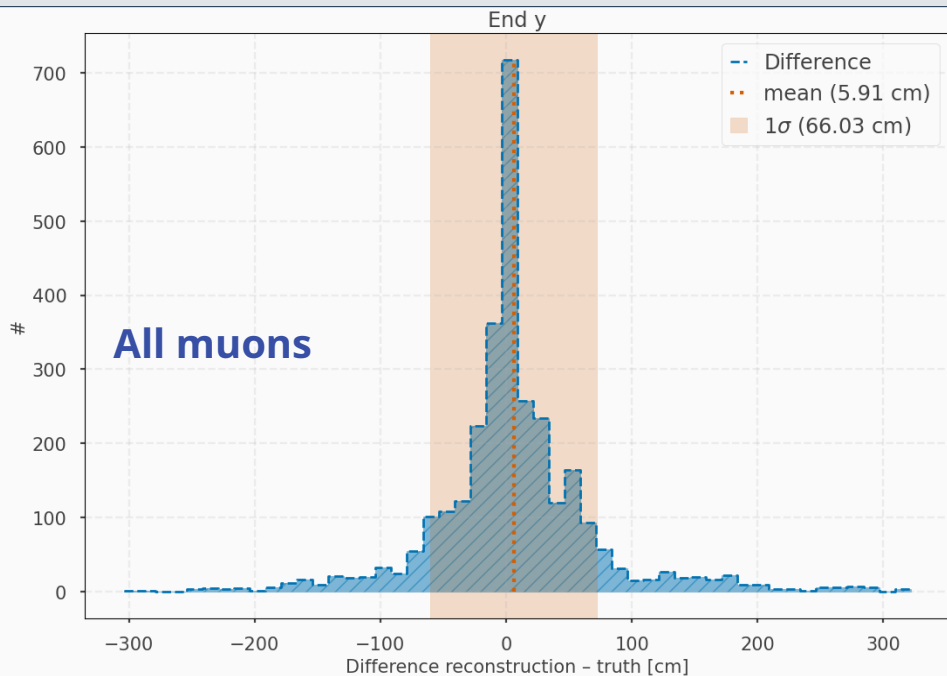




Comparison – y direction

- Stereo
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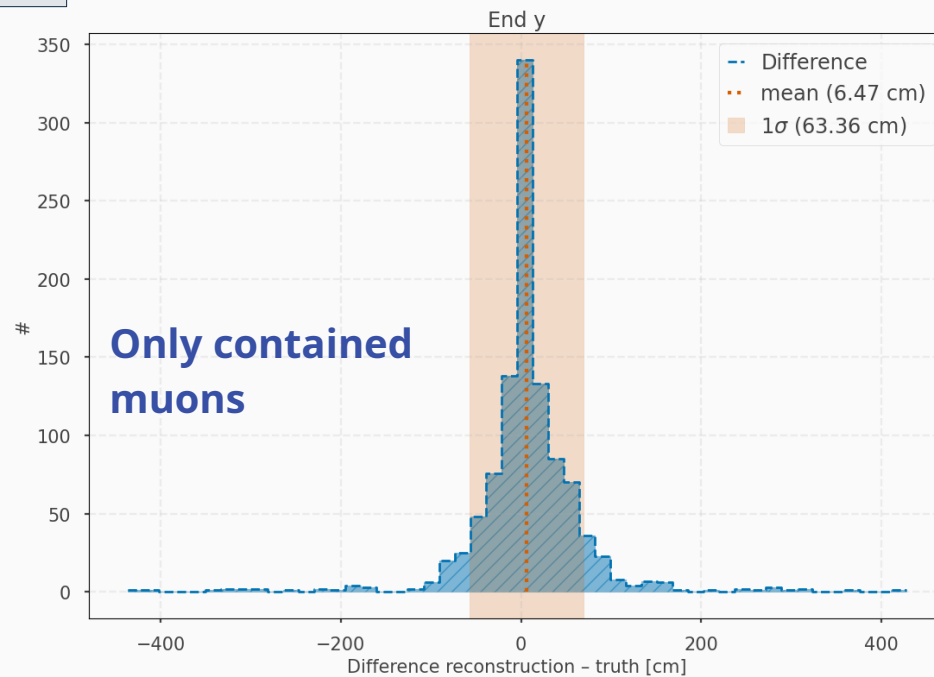
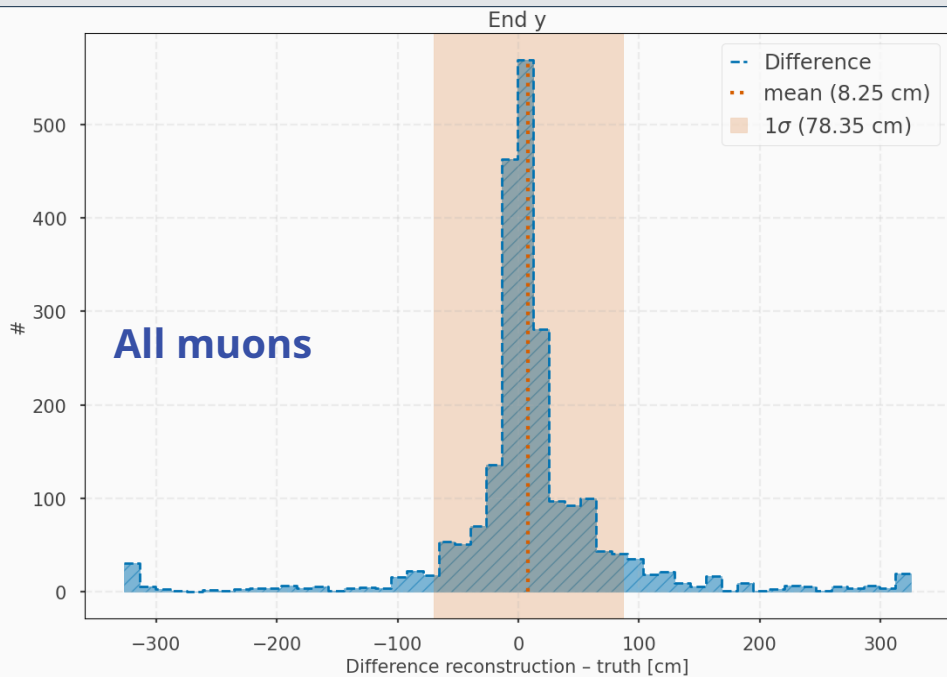




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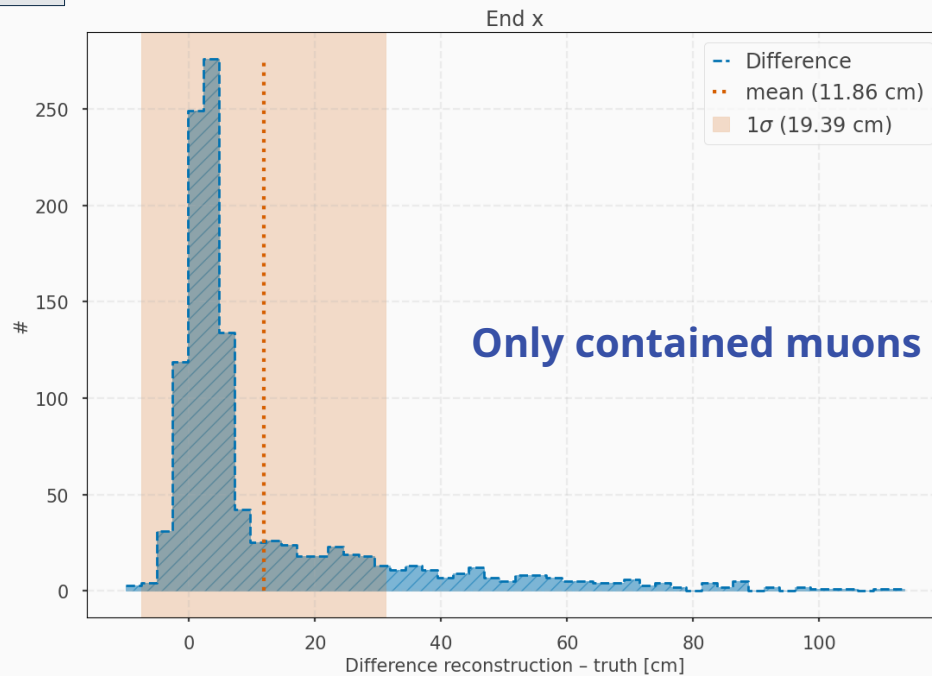
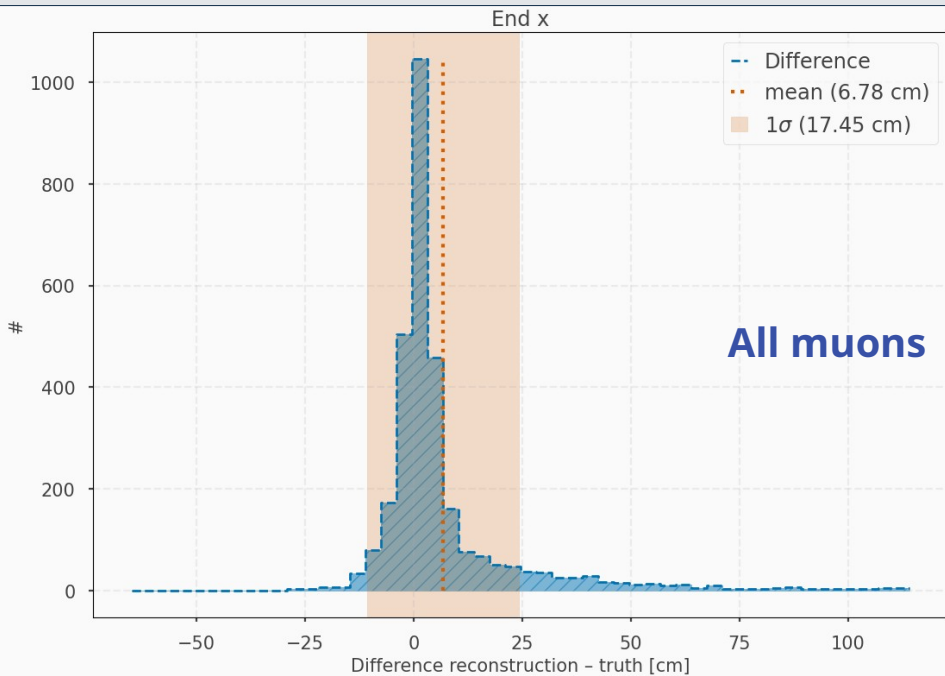


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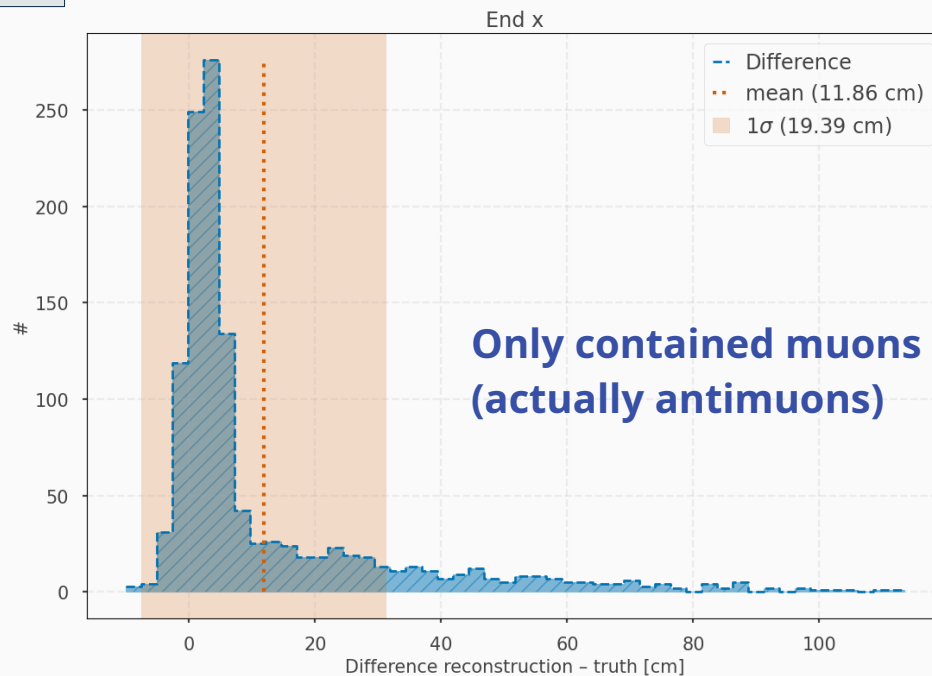
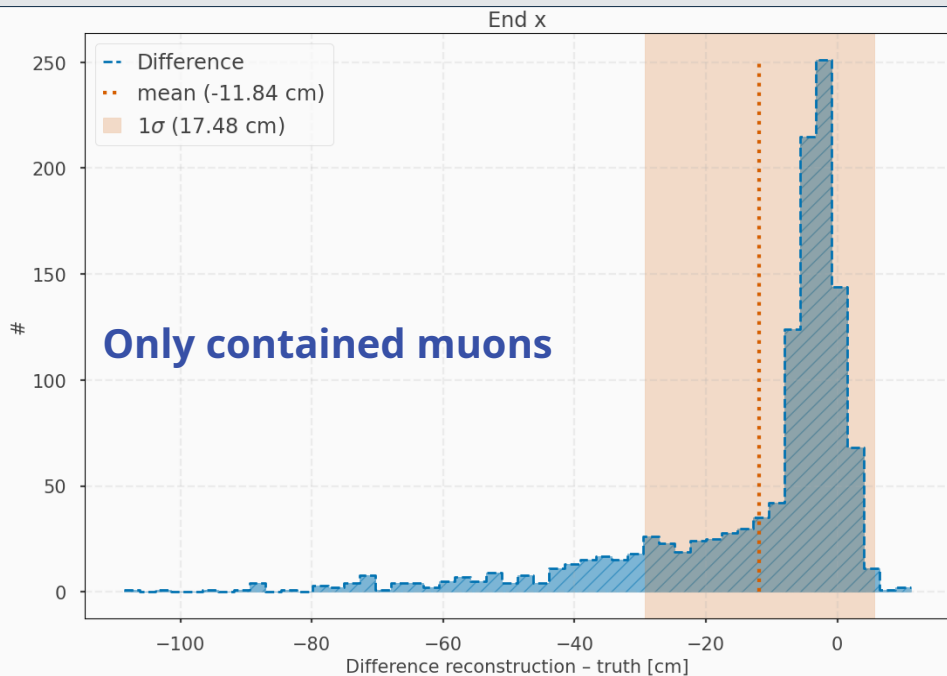


Comparison – x direction

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- The tails don't appear for the start point
- End products (showers etc.) of muon could 'confuse' the reconstruction
- Not get picked up properly due to 'random' direction
- Lower energy, so more deflected by magnetic field → direction of tail

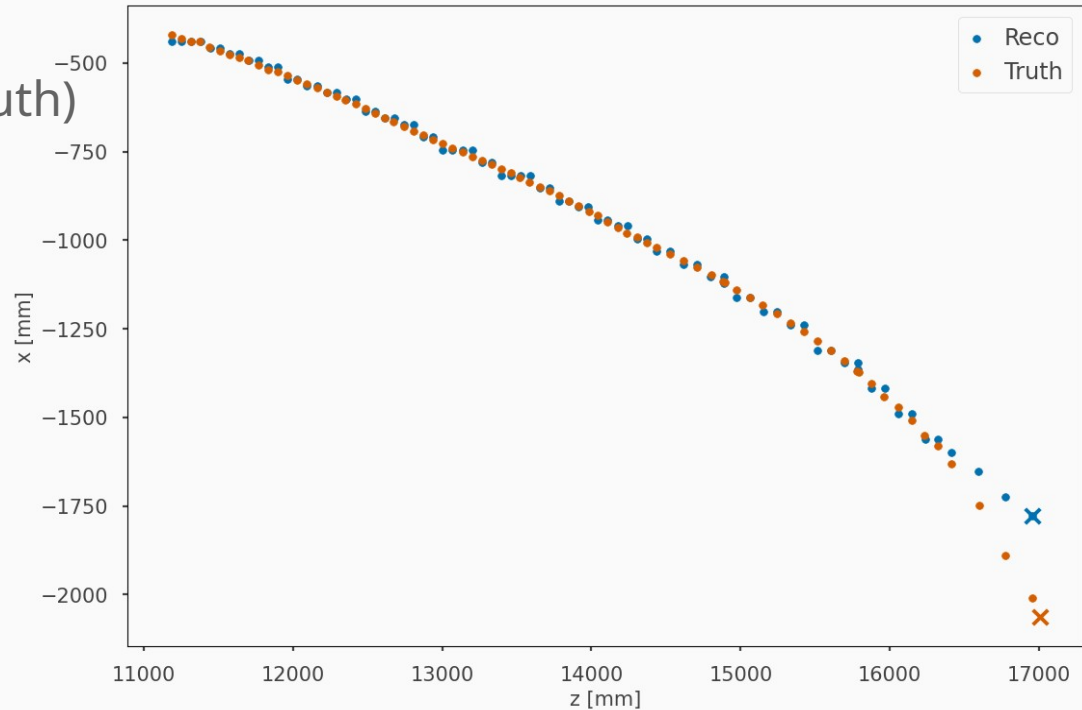
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Comparison – x direction

- Stereo
- There is also an issue with energy of hits in reconstruction (→ number of PE)
- Only hits with >3 PE should go in reconstruction (lower threshold for truth)
 - Currently hits with ~ 0 PE still enter the reconstruction
- Working with Jeffrey to fix this
- The curvature of the track could also be better reconstructed in the future e.g. improvement of the extrapolation



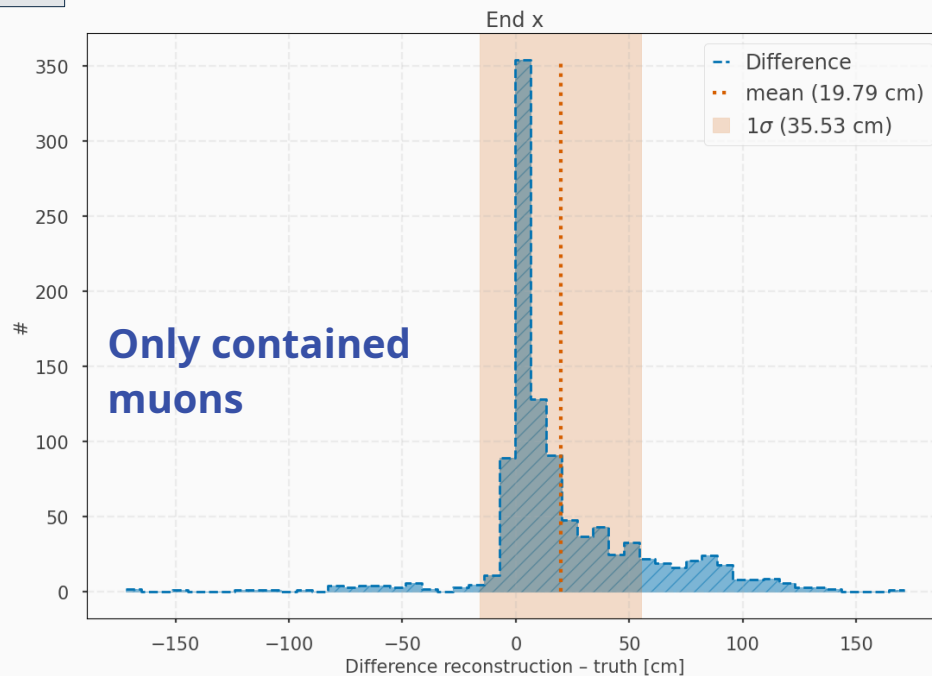
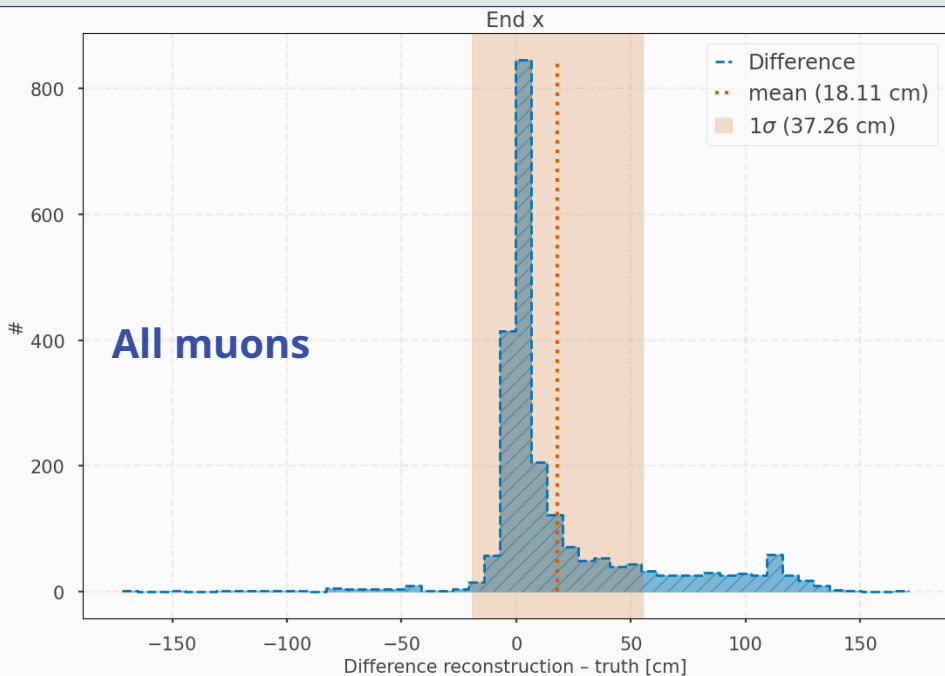


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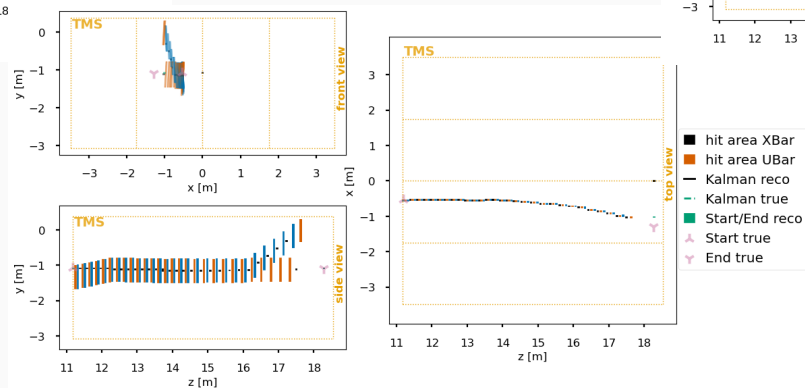
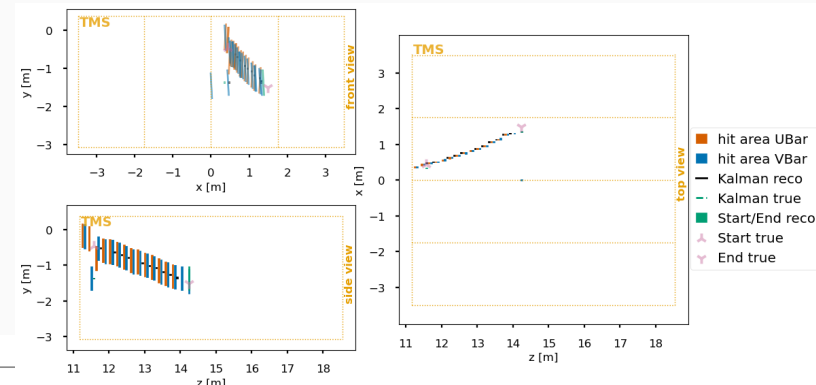
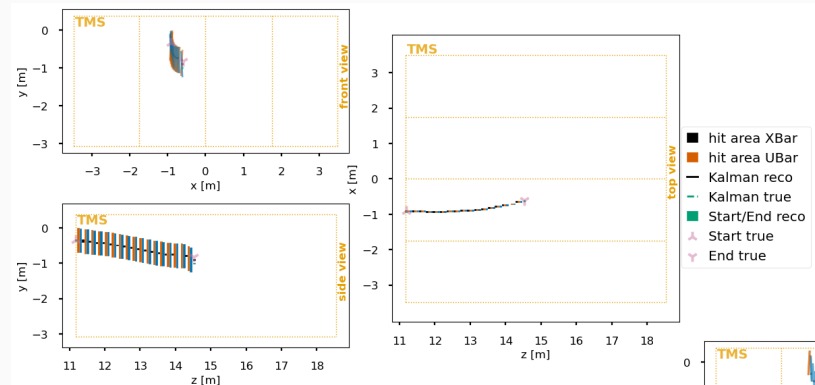




New data file(s)

- Mike got to simulate with the new geometry on NERSC
- Testing a single hybrid file, then simulate the stereo files

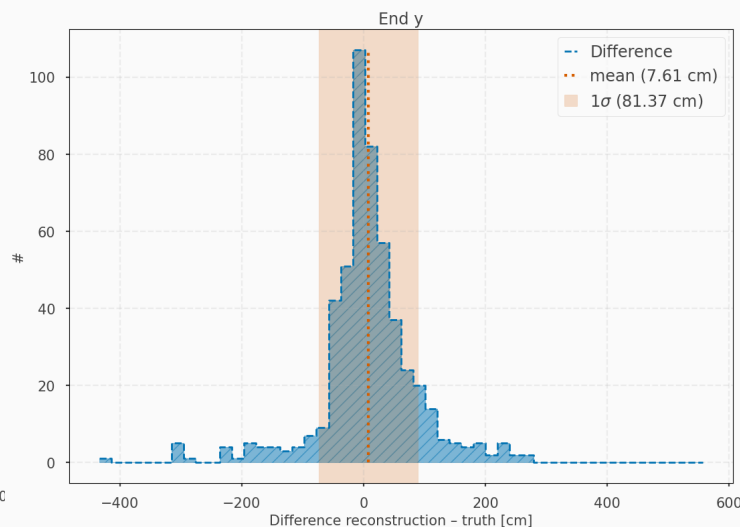
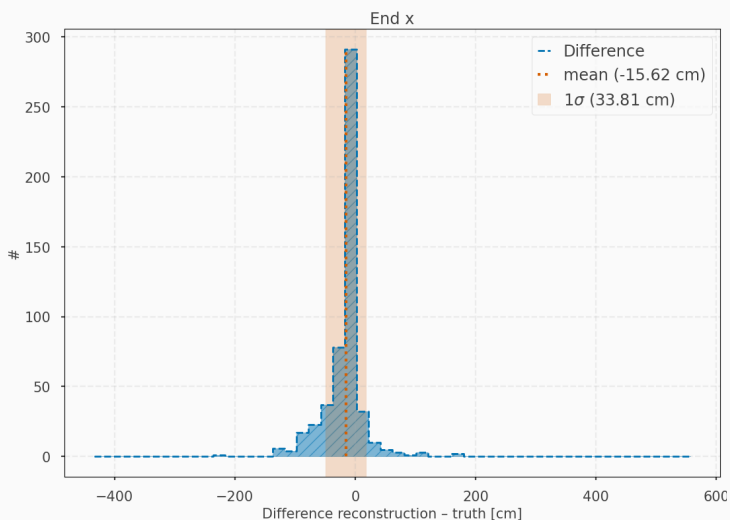
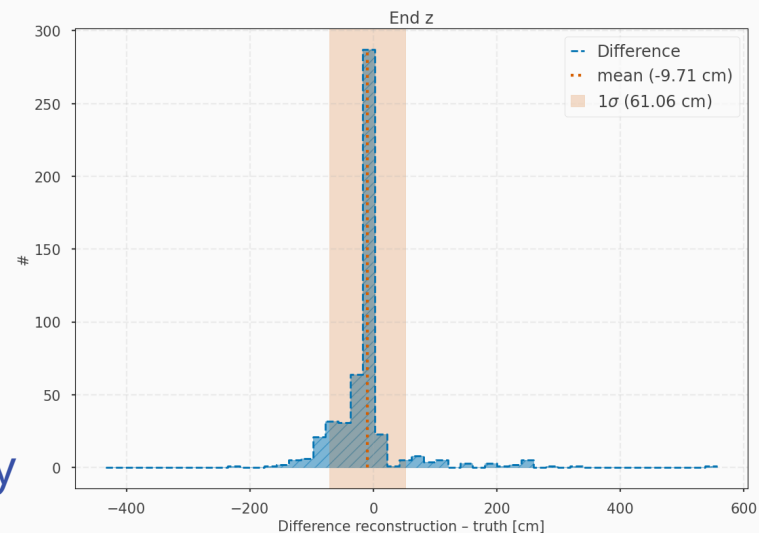
Reconstruction ran through without a problem
Some events could be improved, but looks fine overall



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Contained only



Plots now with same x axis for all plots allowing easier comparison



Conclusion

- Containment should be considered for end point resolution plots
- Need to fully understand differences and impact
 - Explanation found



Backup

Event displays leaving in x or y

