



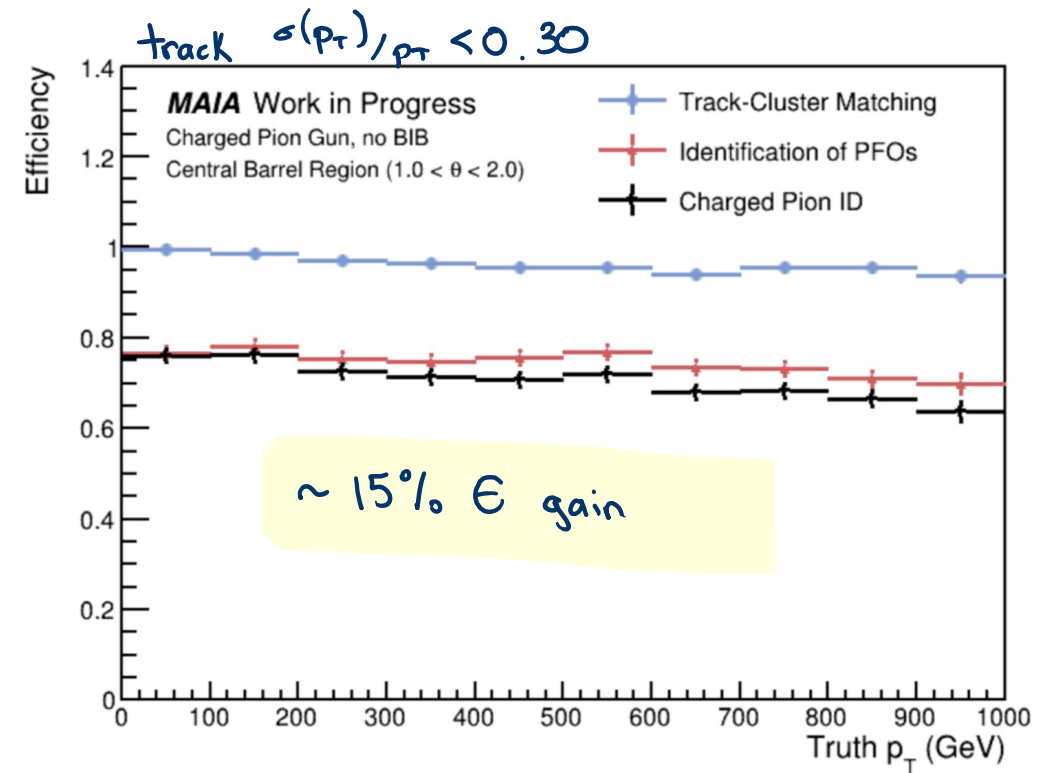
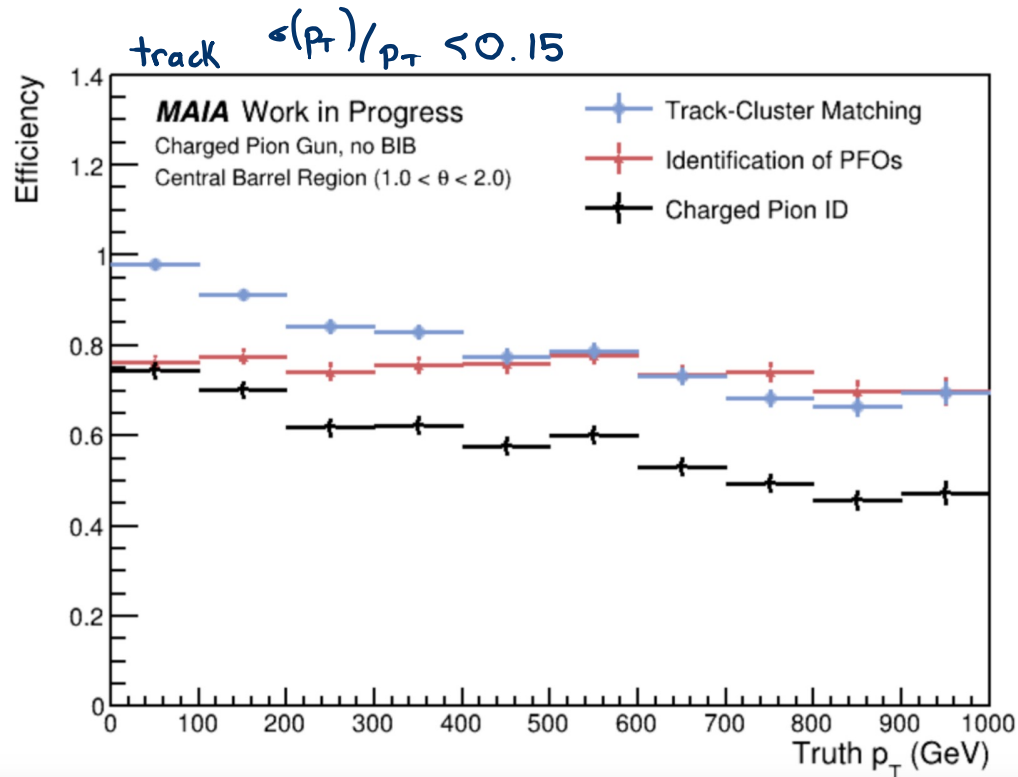
Charged Pions Tracks in MAIA

Gregory Penn
Yale University



Context

- [Recently](#), I showed that there was a limitation in charged pion reconstruction efficiency from track resolution
- Pandora default cut: $\text{Track } \sigma(p_T)/p_T < 0.15$
 - Good track resolution is required when matching clusters to tracks based on E / p_T
 - This is the **track fit momentum resolution**, defined by the covariance matrix (not residuals)

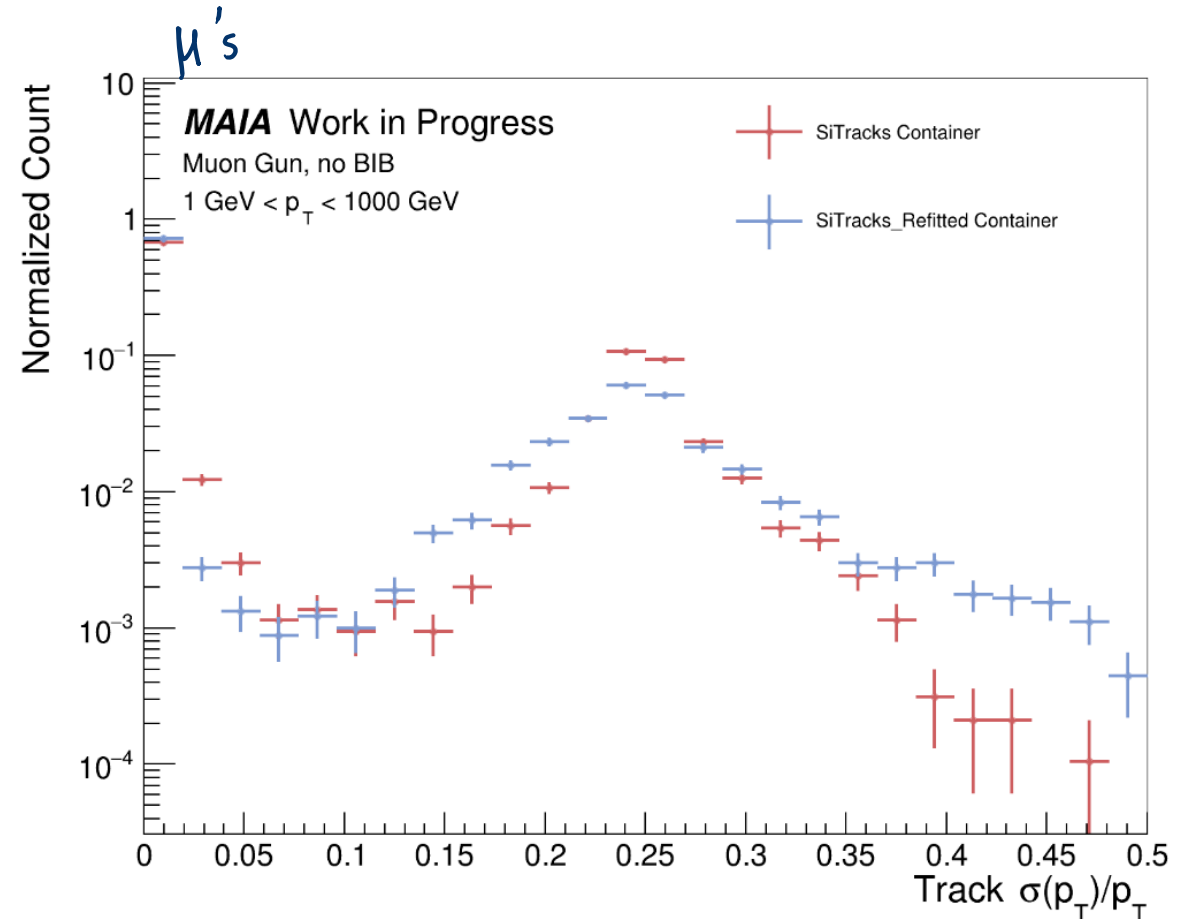
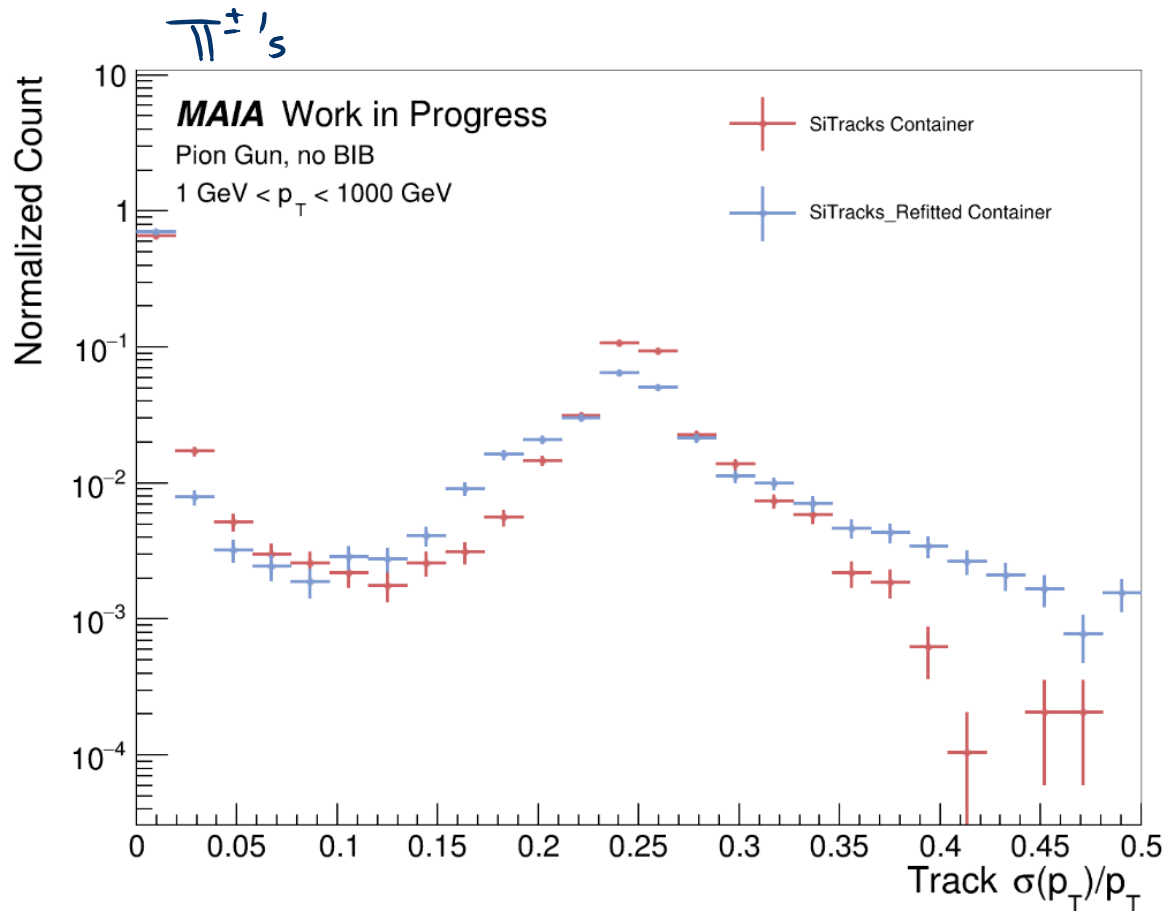


Context

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- Pandora default cut: Track $\sigma(p_T)/p_T < 0.15$
 - Good track resolution is required when matching clusters to tracks based on E / p_T
 - This is the ***track fit momentum resolution***, defined by the covariance matrix (not residuals)
- **Problem:** $\sigma(p_T)/p_T < 0.15$ is relatively poor
 - Could lead to significant confusion in track-cluster matching
- Motivates closer study of pion tracks

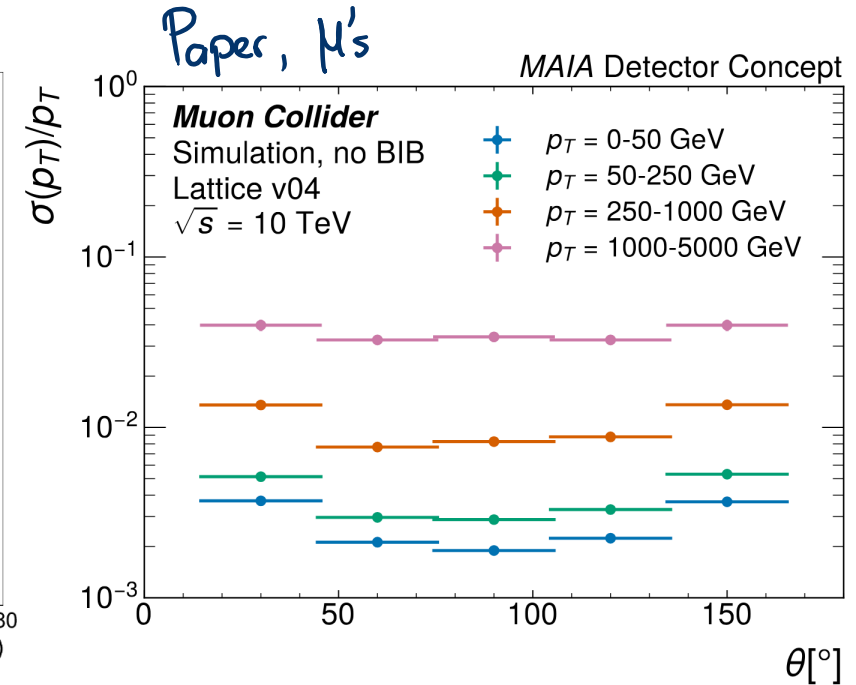
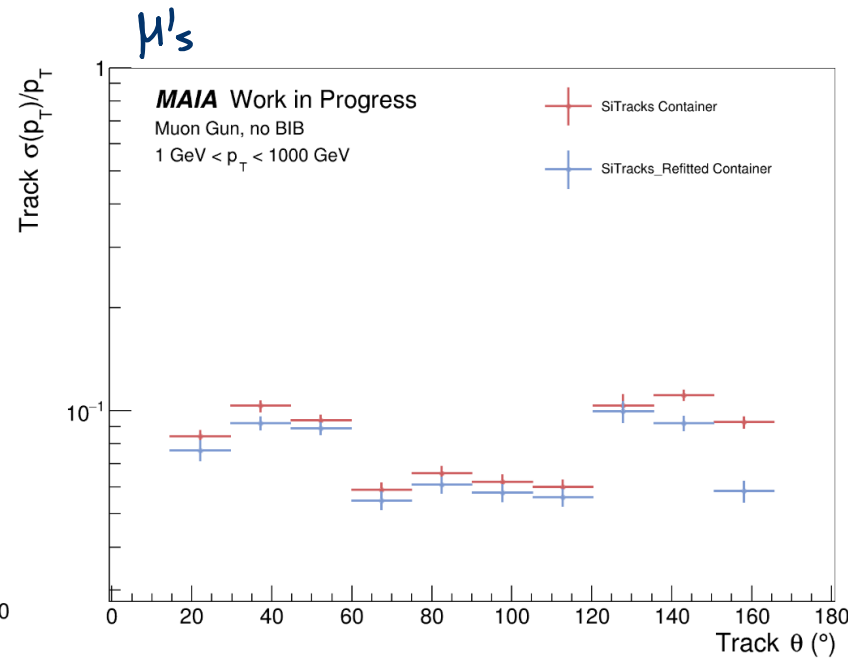
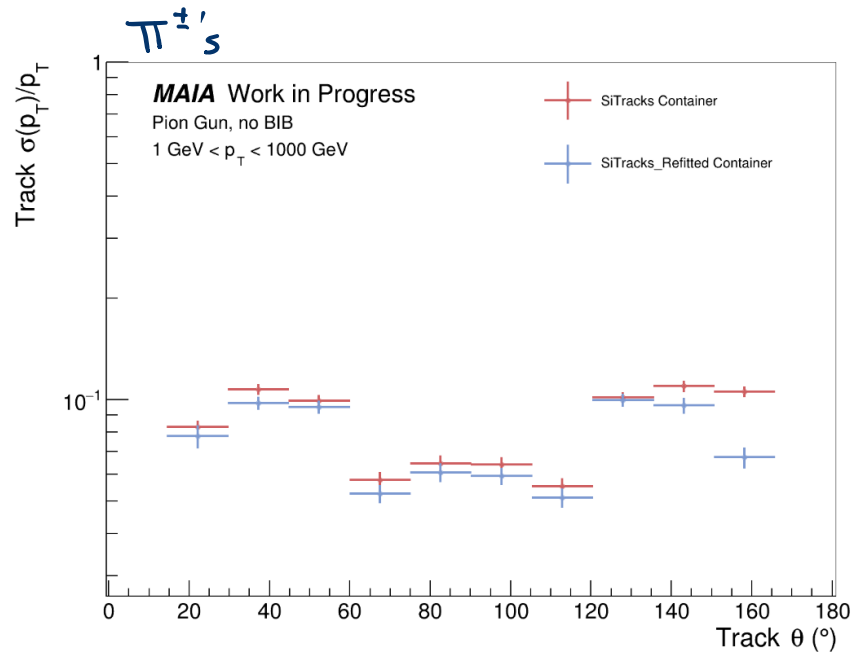
Showed Last Week: Track $\sigma(pT)/pT$

- Clear trend when plotting each tracks' momentum resolution from track fit
 - Seen in charged pions and muons
- Track refit is better, but doesn't help much



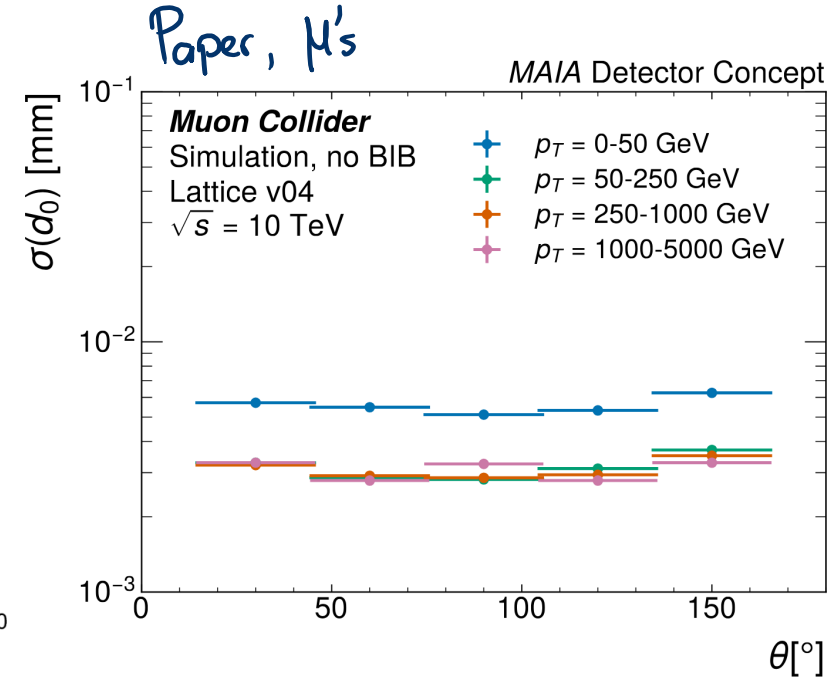
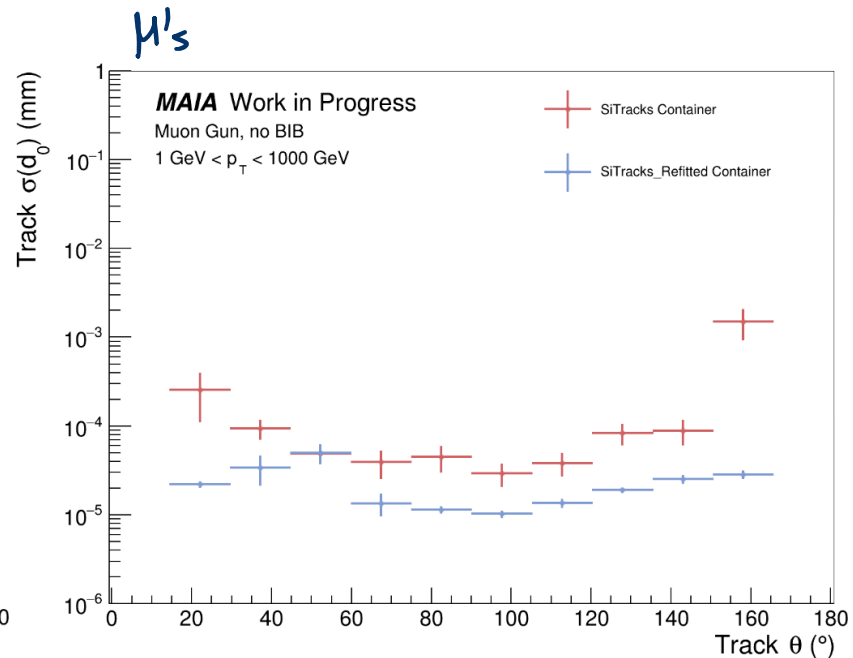
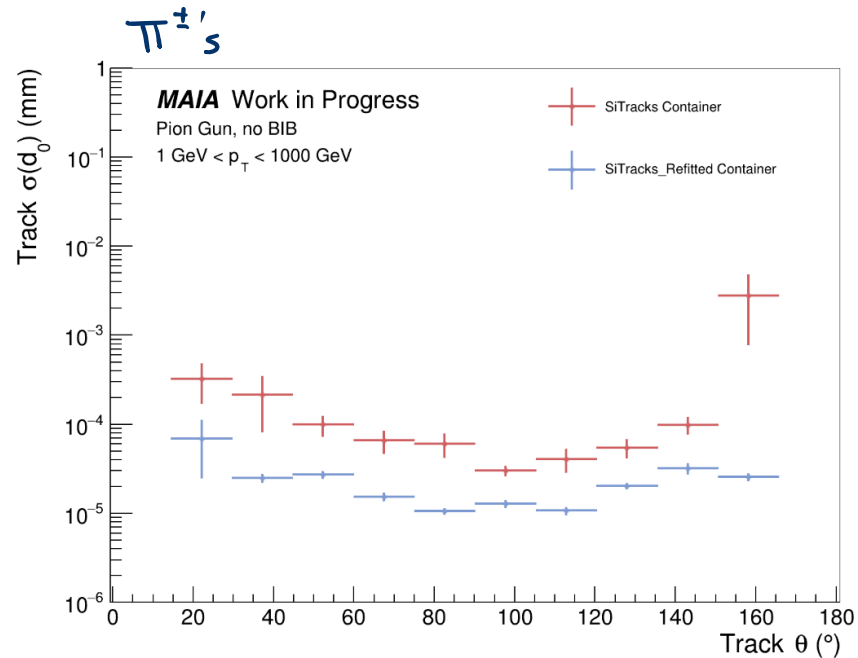
Showed Last Week: Track $\sigma(p_T)/p_T$

- I found worse p_T resolution than the arXiv [paper](#) results
 - (Haven't moved on to plot $\sigma(p_T)/p_T^2$)
- (Even when accounting for my inclusiveness of track p_T)



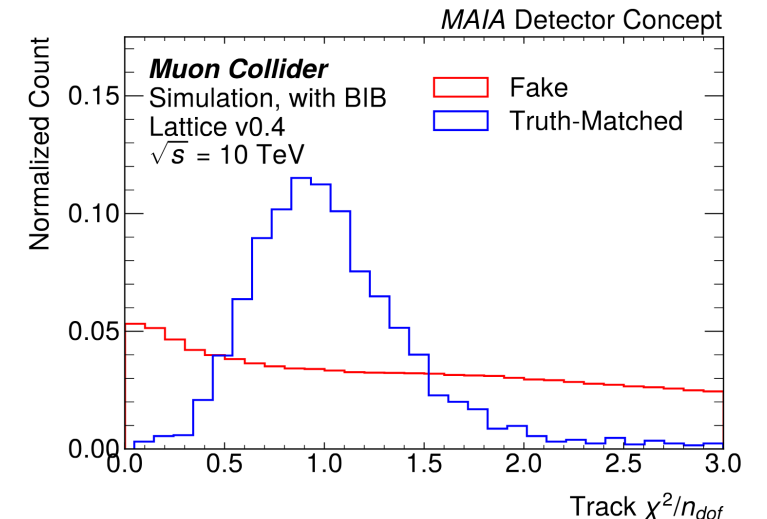
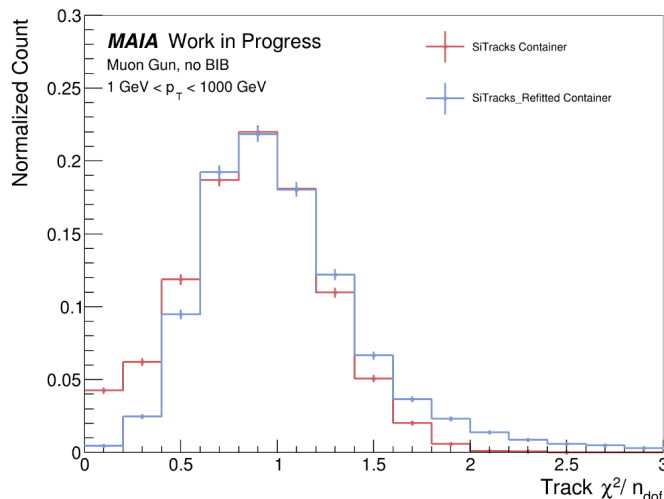
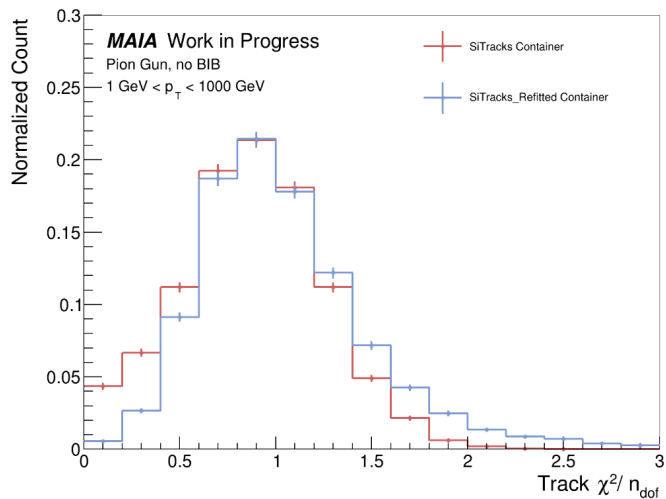
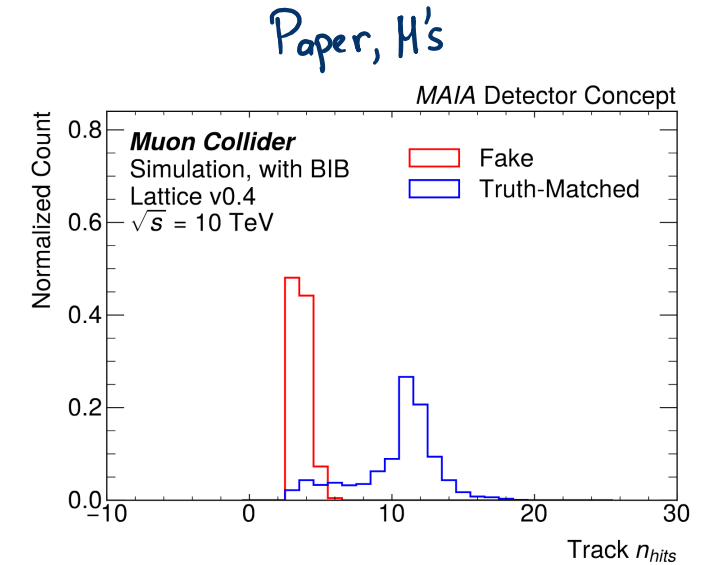
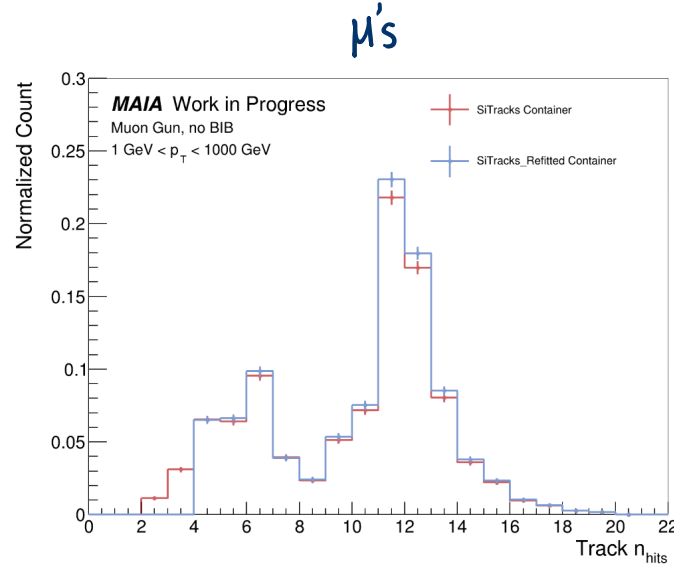
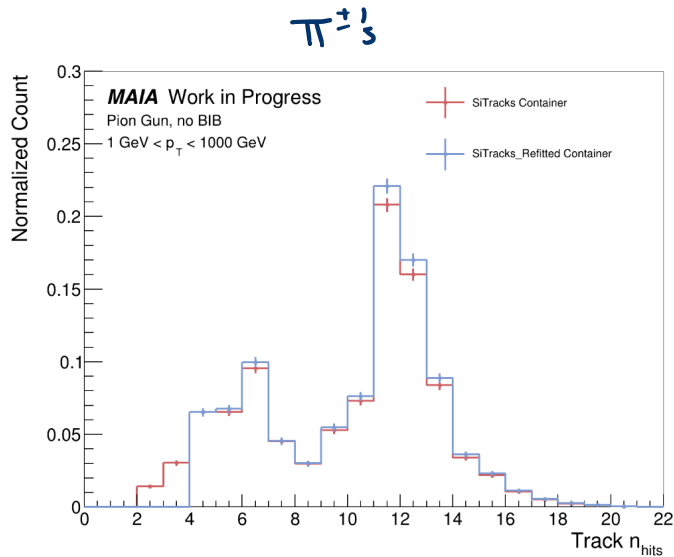
Showed Last Week: Track $\sigma(d_0)$

- While track d_0 resolution is better than the paper results
- (Even when accounting for my inclusiveness of track p_T)



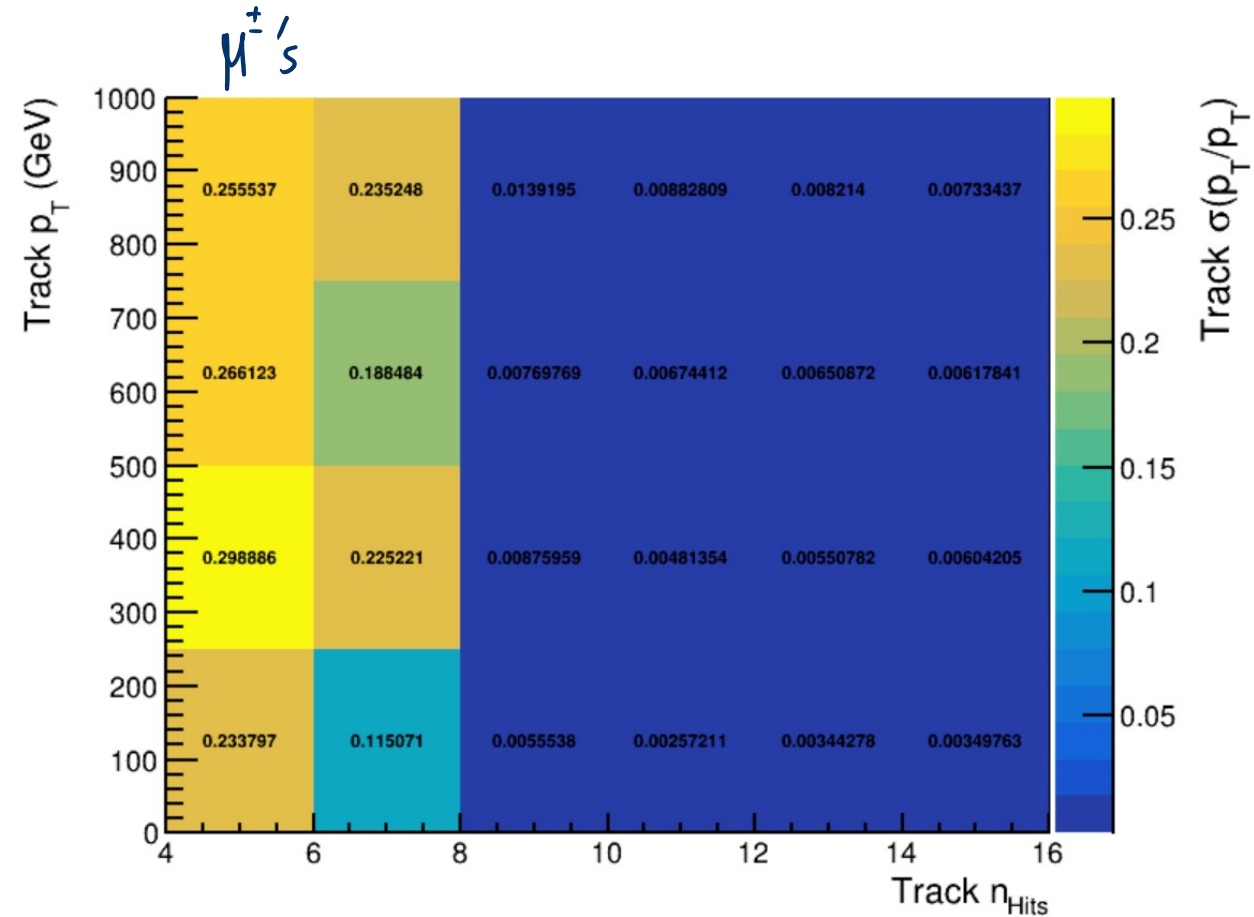
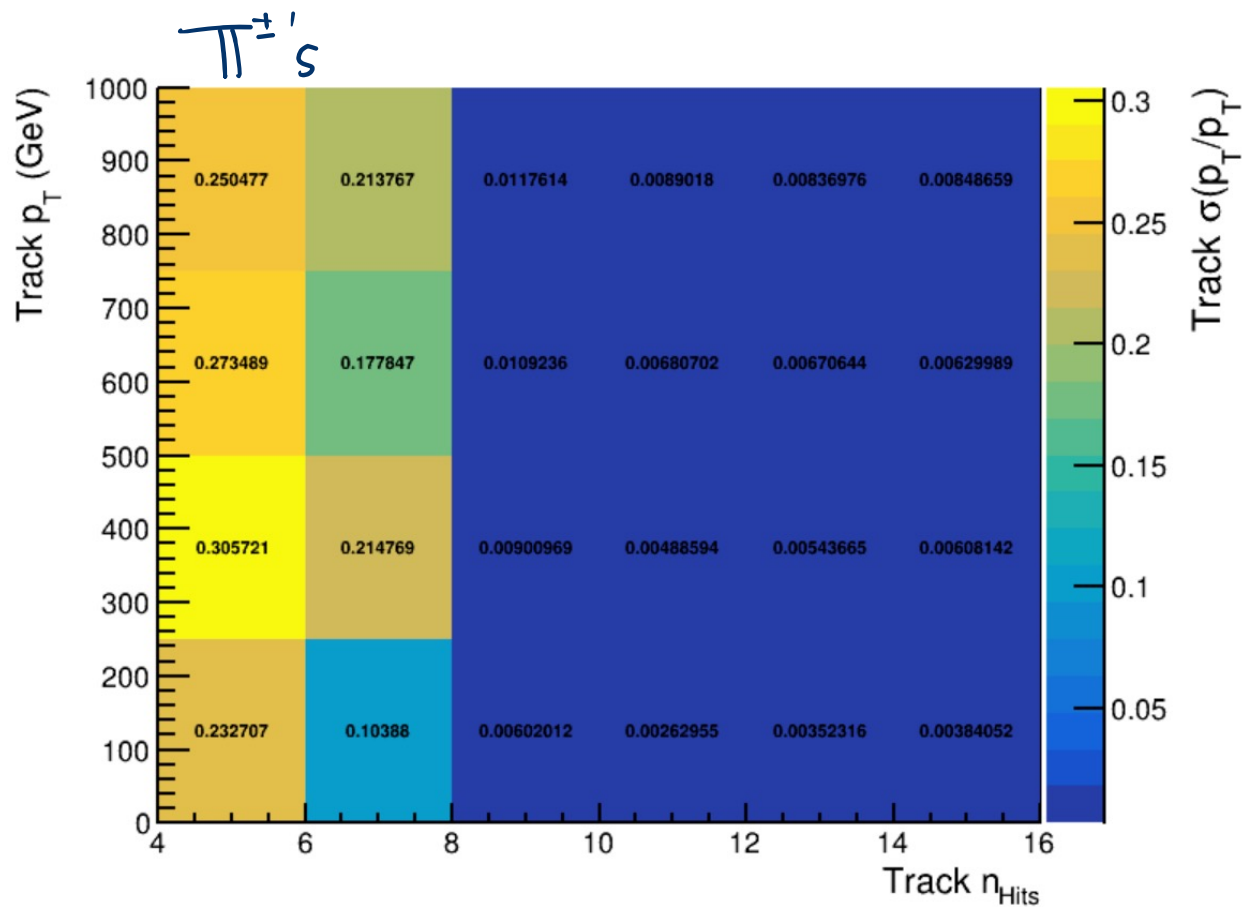
Showed Last Week: Consistency w/ Paper

- First hint: Track n_{Hits} inconsistent with [paper](#)
 - Larger fraction of tracks with low n_{Hits} (no BIB present in my plots, very few “Fake”)



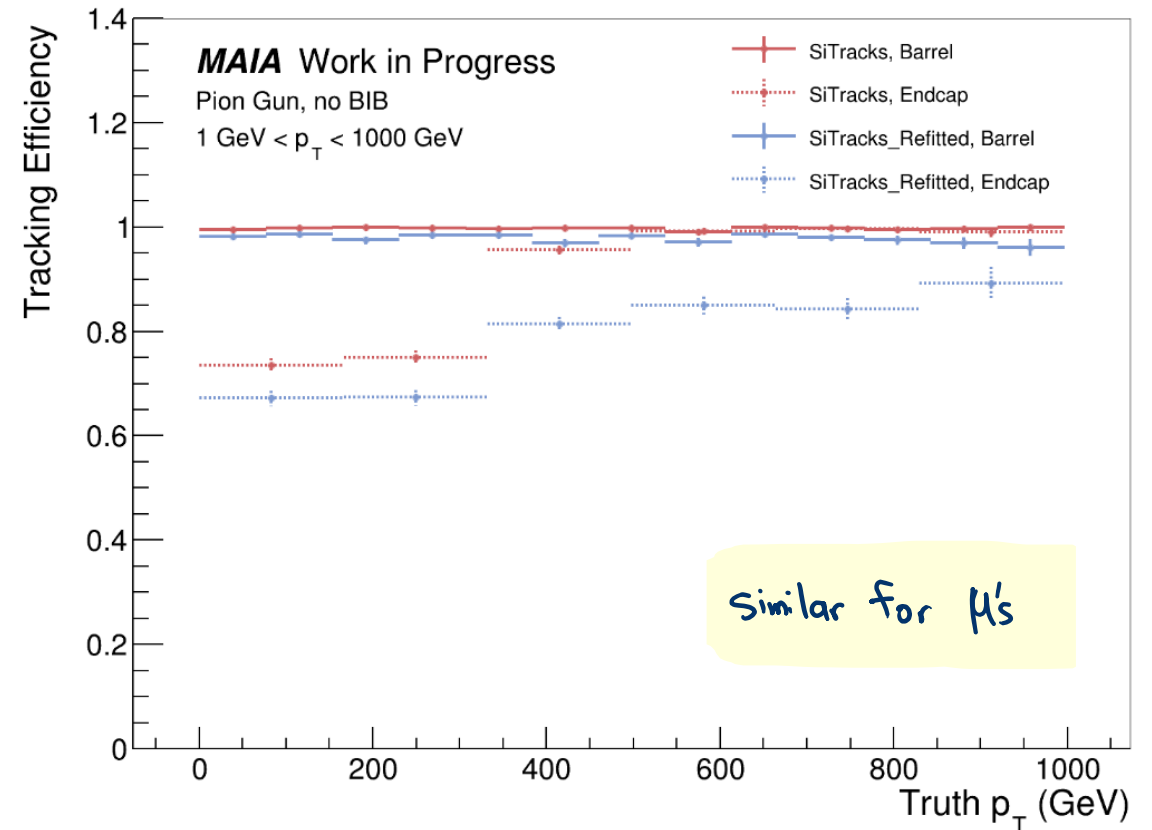
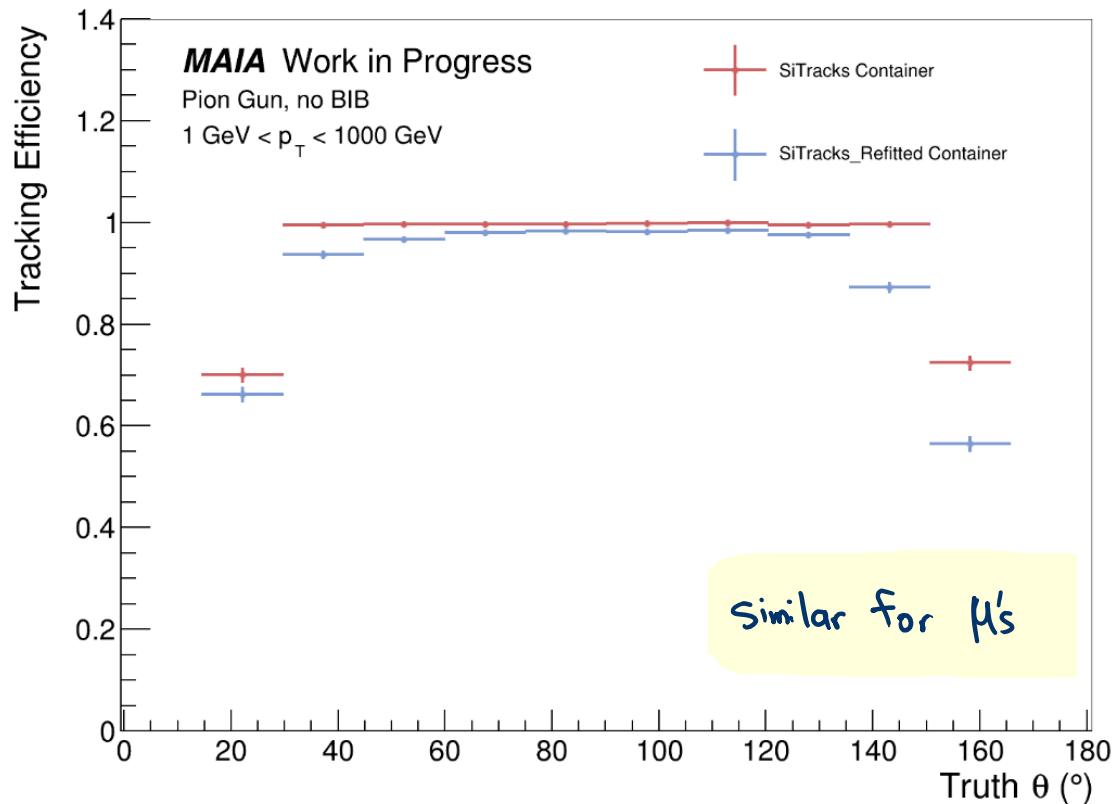
Track $\sigma(p_T)/p_T$ vs. n_{Hits}

- Clear trend: Poor track $\sigma(p_T)/p_T$ when < 8 hits
- In accordance with Mark's results



Track Refit Impact

- Track refit improves track resolution, but significantly degrades tracking efficiency
- Challenge: “SiTracks” container doesn’t contain track propagation to ECal face
 - We’re taking a ~5% (more) efficiency hit for charged pions in the barrel (endcap)
- How simple would it be to add track propagation in ACTS for SiTracks container?



Summary

- Tracking plots consistent with Mark's update today
- Troublesome tracking efficiency hit when using SiTracks_Refitted container
 - Particularly in the more forward regions
 - The only one that contains the necessary information for Particle Flow
- Will continue with Pandora optimizations
 - Running BIB samples

Thanks!