



Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

Update on CRT Analysis

Richie Diurba (Minnesota)

`diurb001@umn.edu`



Background

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

- Using toy CRT model with CRT tracks drawn using MatchingWithTwoCRTsSlope module on MCC10.
- Previous talk of nonsigned biases and signed biases on Indico.
- This is likely the last presentation of toy model before we move to CRT detsim and the real thing.

Spread was too large to convince bias in mean CRT track and TPC track displacement last time.



Notes

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

- Track angles measured from initial TPC point to TPC track's midpoint
- Still a toy model that matches tracks using a front and a back CRT
- Ran over around 25,000 SCE enabled beam events and around 20,000 SCE disabled beam events with $p=\pm 7$ GeV with SCE enabled and SCE not enabled.



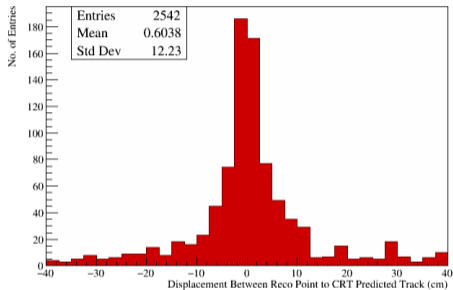
Track Displacement

Update on CRT
Analysis

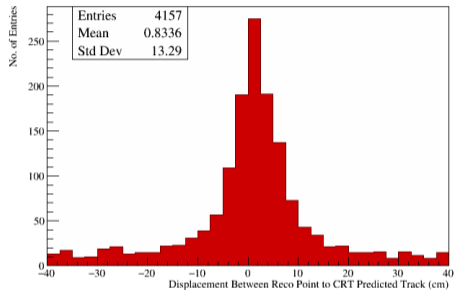
Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

Average Displacement Between Reco Track and EMT Prediction



Average Displacement Between Reco Track and EMT Prediction



Overall spatial displacement between reco track and CRT track with SCE off (left) and SCE on (right)

SCE bias differs from 0 by $4\sigma_\mu$ ($\sigma_\mu=0.206$ cm)

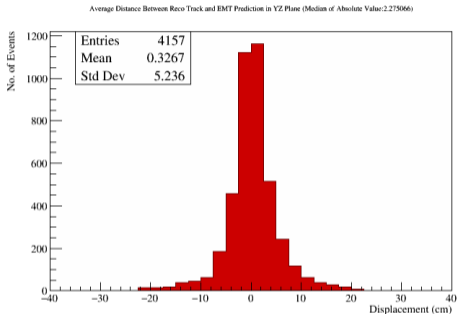
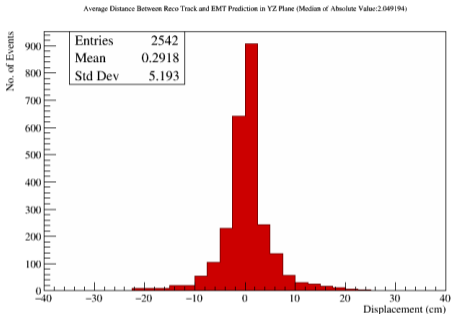


Y Displacement

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline



Displacement in Y between reco track and CRT track with SCE off (left) and SCE on (right)

SCE bias differs from 0 by $4\sigma_\mu$ ($\sigma_\mu=0.081\text{cm}$)

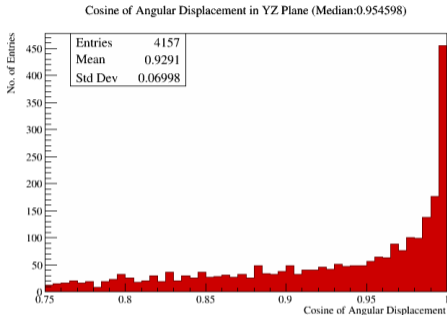
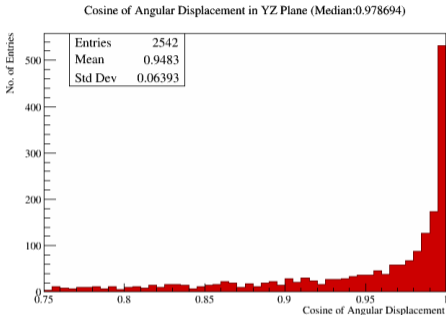


Angular YZ Displacement

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline



Cosine of the angular displacement in YZ between reco track and CRT track with SCE off (left) and SCE on (right)

Central value with SCE corresponds to a difference between CRT and reco track of 17.4 degrees.



Summary

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

- Spatial displacement is not centered around 0 when comparing CRT tracks with reco tracks (Around 4σ with SCE and $>2.5\sigma$ without SCE)
- Work needs to be done to see if the same trends are seen with only one CRT using a CRT detsim model.

Time permitting, I will try and post all plots to docdb SCE corrections will be enabled in CRT detsim study hopefully



Introduction

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

- Andrew Olivier has implemented a CRT into the geometry that is simulated in MCC11.
- Next step is to reconstruct CRT tracks and compare to TPC tracks.



Outline

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

This is a gluing project between Arbin's work with a toy model and Andrew's work on detsim.

- ① Find CRT triggers and their locations.
- ② Create a CRT hit at a specific location.
- ③ Match tracks and compare to TPC trackpoints.



art Outline

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

- Take `CRT::Trigger` and find the `AuxDetSensitiveID` for the CRT channel corresponding to the trigger.
- Find hits from a collection of triggers in an event.
- Form a hit(X, Y, Z)
- Connect CRT front hits to TPC hits or back CRT hits.
- Measure biases ($\Sigma \text{CRT_track}[i] - \text{TPC_track}[i]$)



Future

Update on CRT
Analysis

Toy Model
Conclusion

CRT
Reconstruction
using Detector
Simulations
Outline

Finish CRT reconstruction and hopefully have something to present next week. Recommendations to how CRT hits should look like are encouraged!