Status of TMS studies

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THE UNIVERSITY of MISSISSIPPI

Schedule agreed to at Jan TMS workshop

Due dates:

First pass – mid April

Final pass – mid July

Chapters Due –
End August

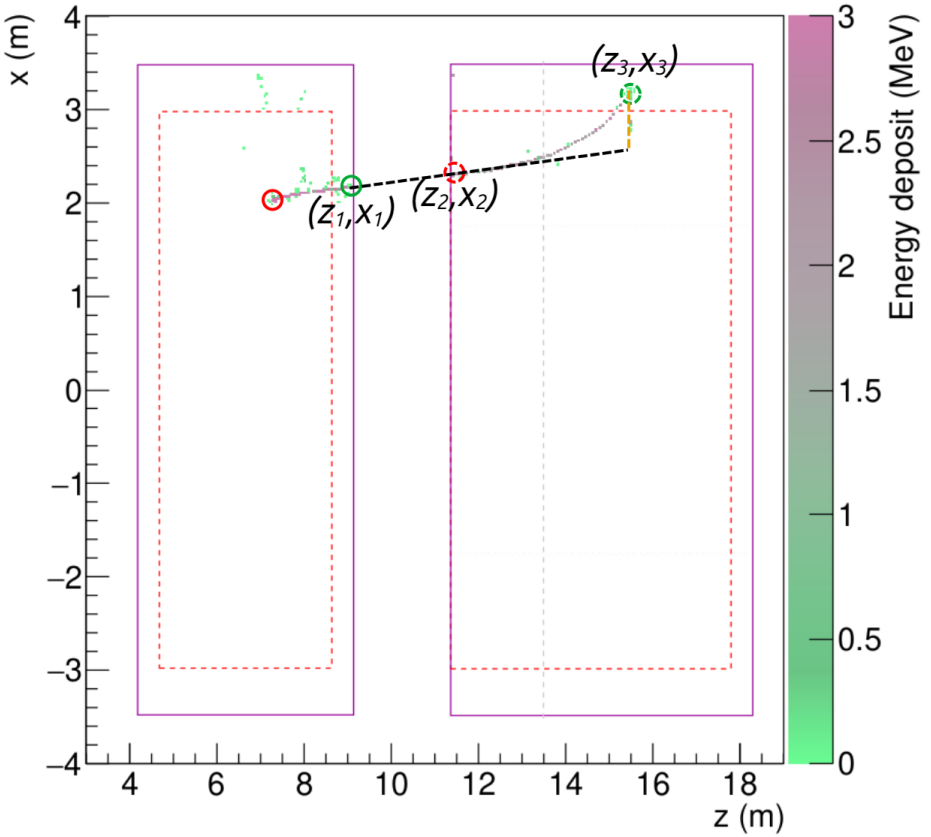
TMS Studies Sheet

Priority	Status	Study	Specific plots, measurements	Champions	Advisors	Experience needed	Truth level?	Specialized Files?
Medium - Needed for PDR	Needs updated/more files	Charge mis-id	Charge mis-id rate. Plot reco charge id hist split by true charge.	Xiaoyan		Beginner -…	☐	☐
High - Needed to understand if additional studies are needed	Waiting for technical update	Scattering between LAr and TMS	Rate that muon is lost. Rate that wrong muon is connected	Xiaoyan	Jeffrey	Beginner -…	☑	☐
High - Needed to understand if additional studies are needed	Needs updated/more files	Muon-like TMS events in first planes	Rate that there are interactions in the first few planes	Xiaoyan	Jeffrey	Beginner -…	☑	☐
High - Needed to understand if additional studies are needed	Unknown	Pileup rate for track matching	Rate that pileup confuses tracks in TMS		Jeffrey	Intermedi…	☑	☑
Unknown - Depends on results of another study	Unknown	Truth-level stereo vs orthogonal vs first-layer	Correct match vs incorrect matching rates	Kate?		Beginner -…	☐	☐
Medium - Needed for PDR	Unknown		Muon E resolution, track matching, and charge id given the options		Thomas LeCompte	Beginner -…	☑	☑
Unknown - Depends on results of another study	Unknown	Reco-level stereo vs orthogonal vs first-layer study	Muon E resolution, track matching, and charge id given the options	Asa?	Thomas LeCompte	Expert - …	☐	☑
Medium - Needed for PDR	Unknown	Effect of Y resolution of muon E	Muon E resolution		Thomas LeCompte	Beginner -…	☑	☐
Medium - Needed for PDR	Unknown	Effect of Y resolution on track matching	Track matching eff			Beginner -…	☑	☐
Choose priority	Unknown	Bragg peak	Rate for Bragg peak at end (to compare to exiting muon rate), E resolution for muons with bragg peaks			Beginner -…	☐	☐
Choose priority	Unknown	CC events in TMS iron	Various energy resolution plots			Beginner -…	☐	☑
Choose priority	Unknown	Momentum by curvature	Momentum resolution using curvature, all muons and only exiting muons			Expert - …	☐	☐
Choose priority	Unknown	Noise	Validation plots as function of noise			Expert - …	☐	☑
Choose priority	Unknown	Dead channels	Validation plots as function of dead channels			Expert - …	☐	☑
Choose priority	Unknown	Michel electrons	Michel eff vs position, michel reco at muon endpoint rate, e resolution for muons with michels			Expert - …	☐	☐
Choose priority	Unknown	Rock muons / side / bottom entering muons				Beginner -…	☐	☐
Choose priority	Unknown	Off-axis performance	Validation plots as function of off-axis distance. Collated figures of merit, event counts, pileup rates, occupancy, etc. all as function of distance			Intermedi…	☐	☑
Low - Would be nice to have	Unknown	B field impact				Expert - …	☐	☑
Medium - Needed for PDR	Unknown	Deadtime				Intermedi…	☐	☑
Choose priority	Unknown	Flux monitoring 2.0				Intermedi…	☐	☑
			Study of expected electronics					

Link here - please update status column

What I'm currently working on

- Truth-level info in TMS files is too sparse
- Adding all true particle info
- Birth/death pos/momentum
- Pos/momentum at key points
  - Leaving LAr, entering TMS, leaving TMS
  - Needed for truth level track matching studies



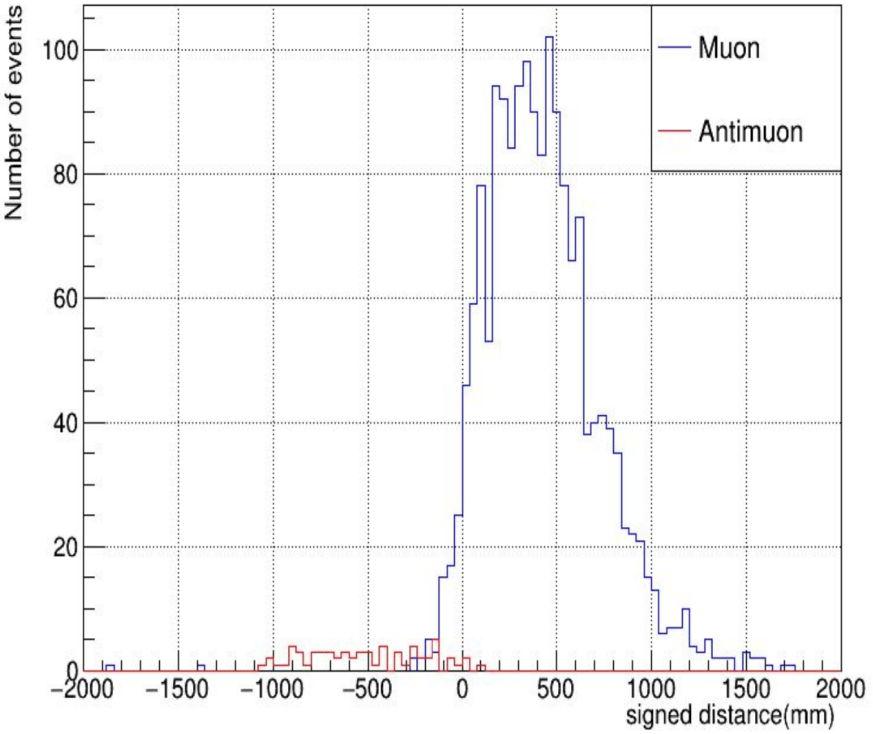
- Primary and secondary particle contributing to reco track energy

Status of files

- Asa has done great work updating the reco
- Want new processing that incorporates those changes
- Will make one after adding truth info as well
  - And will write up instructions on the wiki

Status nersc files

- Alex Booth is copying the TMS files at nersc here:
  - /pnfs/dune/persistent/users/abooth/Production/MiniProdN1p2-v1r1/run-tms-reco/output/MiniProdN1p2_NDLAr_1E19_RHC.tmsreco/TMSRECO
  - At this point LAr reco is not working so we will only have truth-level LAr info
    - If we want, we can simulate reco level errors ourselves by just randomly adding error
  - These will allow Xiaoyan to finish signed distance study



Status of Overlay/Pileup Simulation

- Nersc processing does overlay sim a bit differently
- TMS code needs updating to understand the different technique
  - See previous talks
- Wasn’t able to get it to work before paternity leave
- For now, any overlay studies can be done with “old” technique
  - Slightly different beam structure and no rock simulation

Geometry question

- How long is a scintillator bar supposed to be?
- gdml has 309.6mm, pdr has 3.1m, Asa mentioned they should be 3.2m
- If we need to change the bar length, requires change and then additional study to avoid overlap
- See this issue on git

Conclusion

- Missed a bunch of talks while I was on paternity leave
  - Please update the TMS studies sheet
  - Some studies have no champion
- Deadlines are pretty tight
  - Do we need to prioritize different studies**?**
- Currently adding truth-level info as that seems like the highest priority
  - A number of additional technical tasks remain