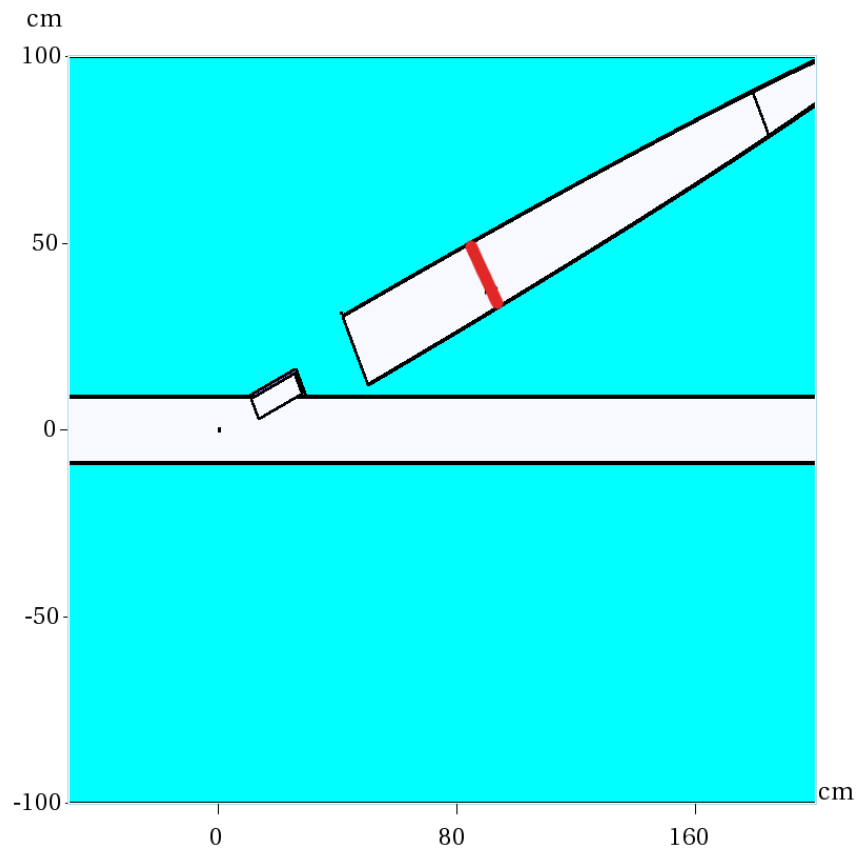
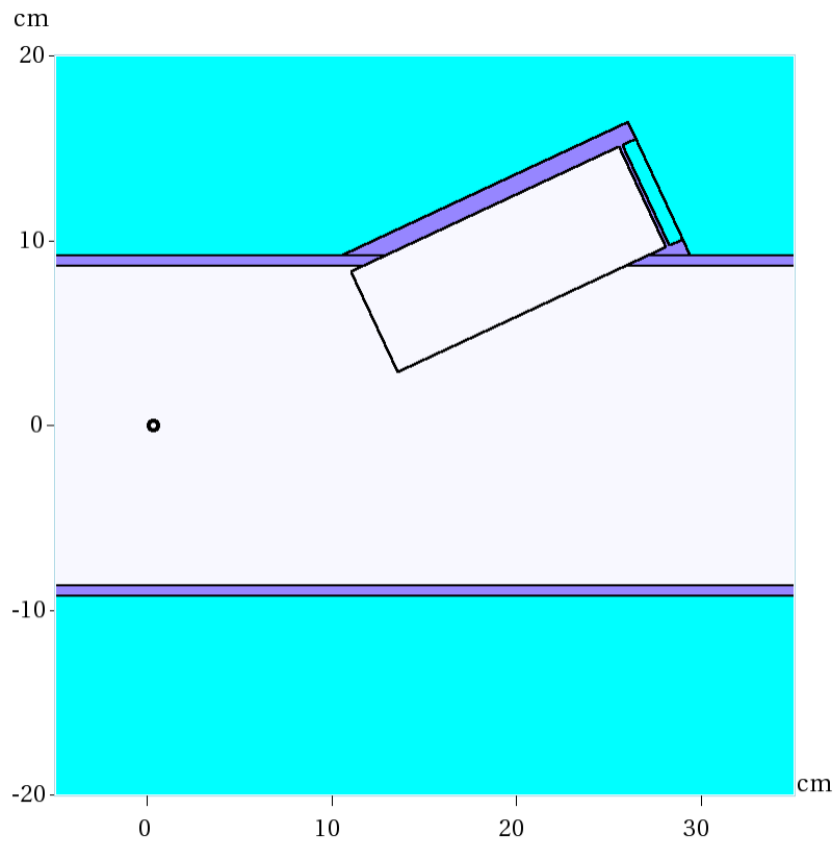


Target Model - Pion Production at Target

T. Lord, P. Franchini

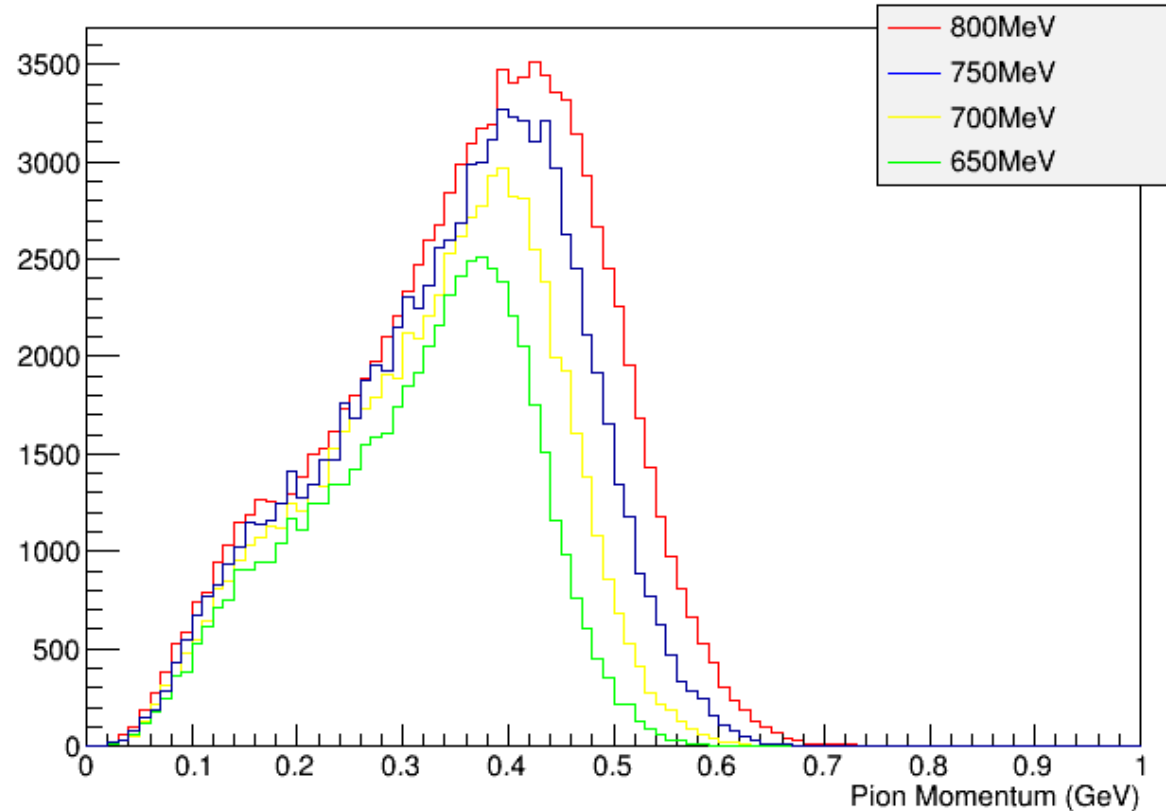
12/10/2018 / Rutherford Appleton Laboratory / MICE CM52

MARS Target & Beampipe Geometry



- Simulated output Pi^+ distributions for 650, 700, 750 & 800 MeV ISIS Protons
- Particles selected 1m downstream of target IP, inside MICE Beampipe

Pion Momentum from $2.6\text{E}12$ Protons in ISIS Beam

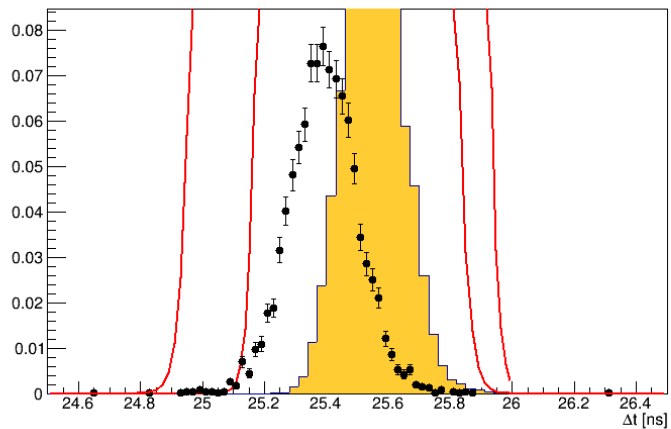


Target Model Improvements

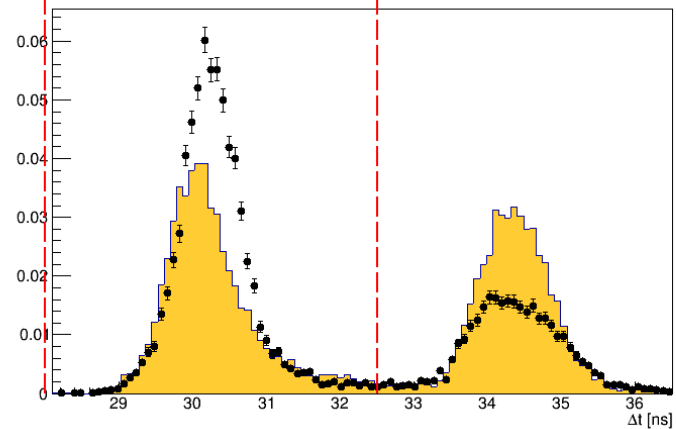
- Better agreement of MARS handover point within G4BL model at 1m downstream
- Sufficient Pi^+ statistics for 650, 700, 750, 800MeV
- Simulated with MAUS for run 10049, 3-140+M3-Test4

650 MeV - 3-140+M3-Test4

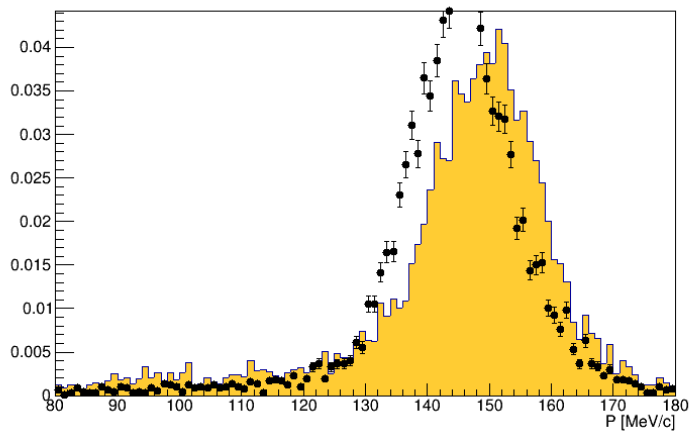
Positrons Δt TOF0-TOF1



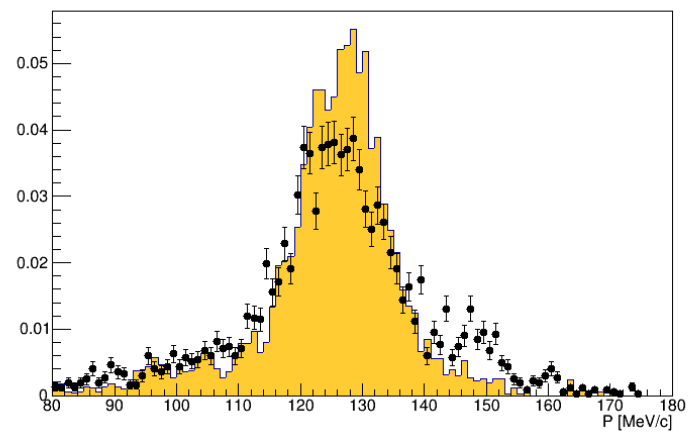
Δt TOF0-TOF1 (rescaled)



Muons at TKU-Station 5 - P

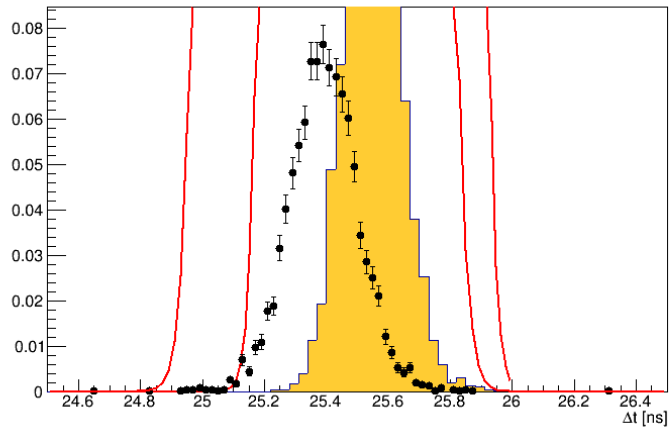


Pions at TKU-Station 5 - P

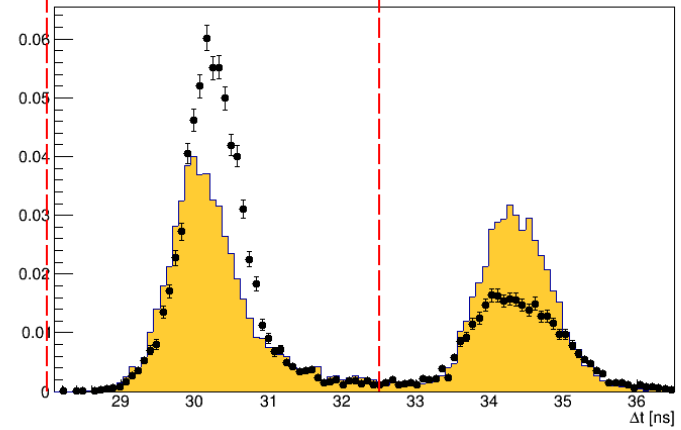


700 MeV - 3-140+M3-Test4

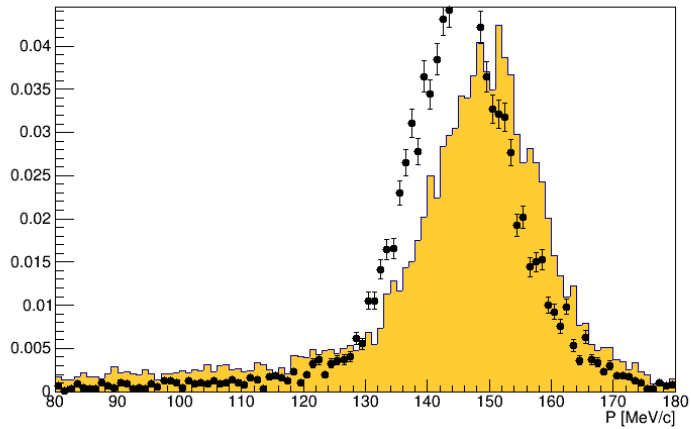
Positrons Δt TOF0-TOF1



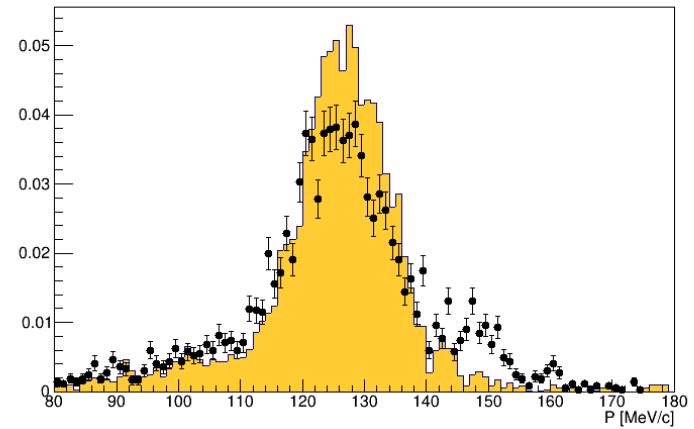
Δt TOF0-TOF1 (rescaled)



Muons at TKU-Station 5 - P

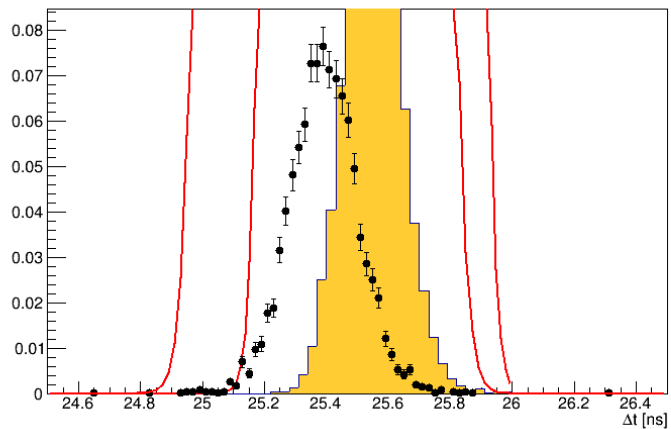


Pions at TKU-Station 5 - P

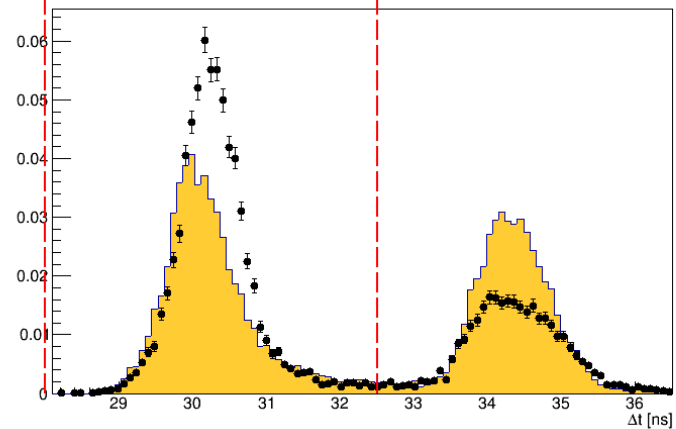


750 MeV - 3-140+M3-Test4

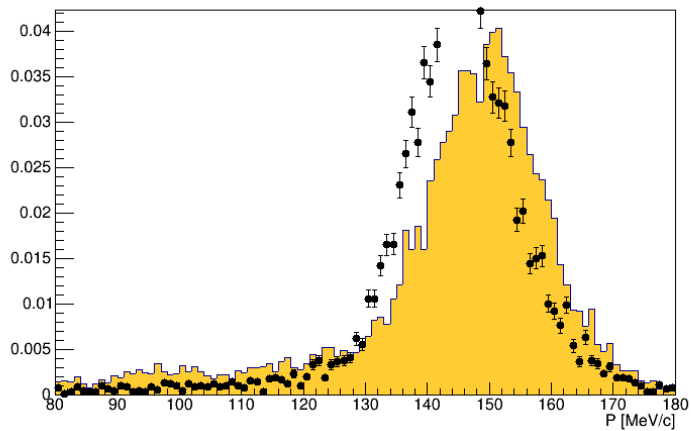
Positrons Δt TOF0-TOF1



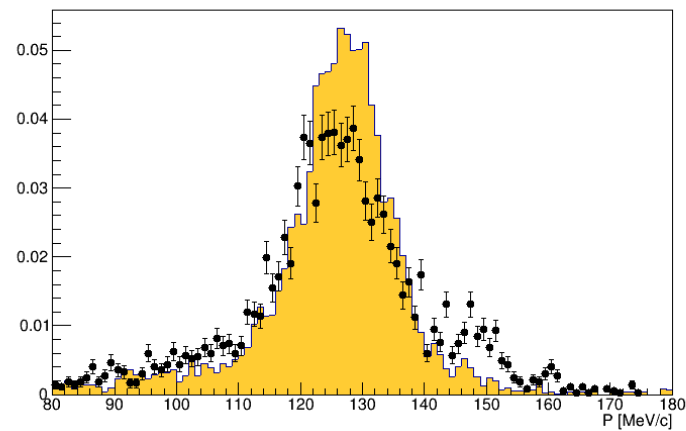
Δt TOF0-TOF1 (rescaled)



Muons at TKU-Station 5 - P

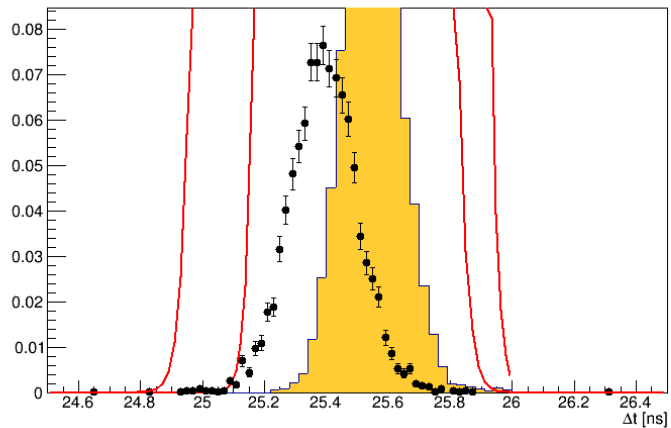


Pions at TKU-Station 5 - P

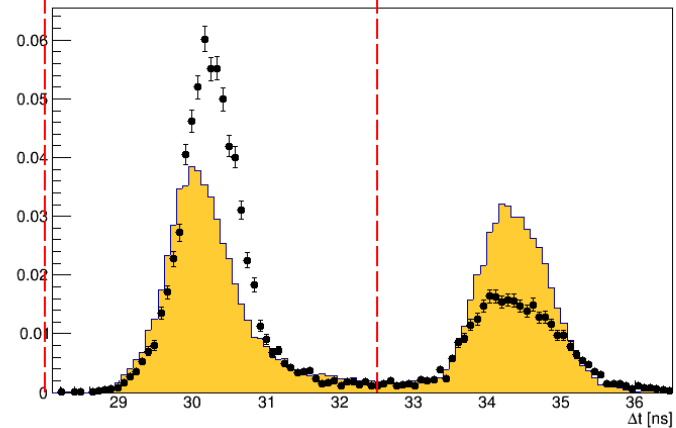


800 MeV - 3-140+M3-Test4

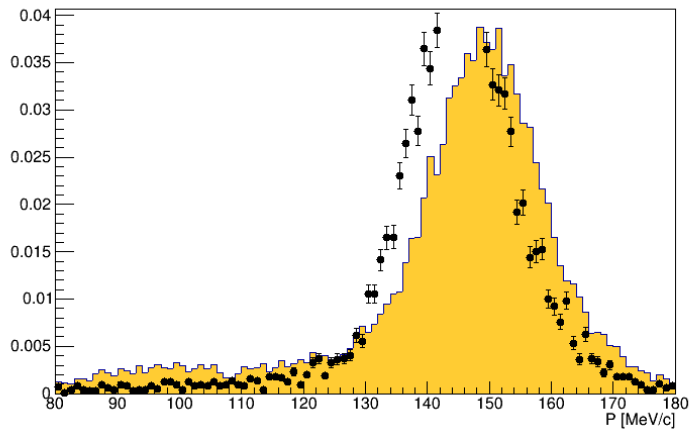
Positrons Δt TOF0-TOF1



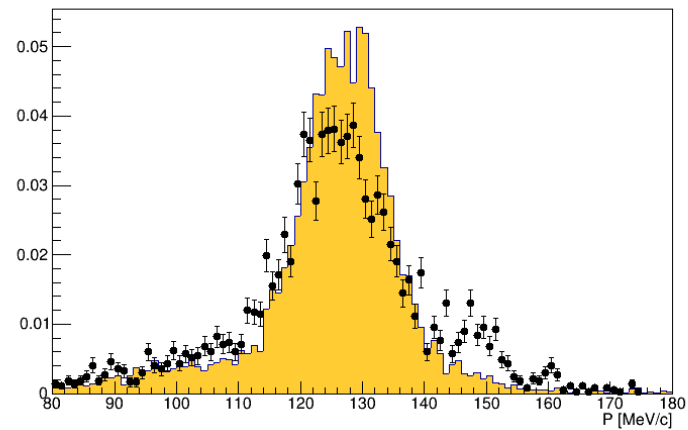
Δt TOF0-TOF1 (rescaled)



Muons at TKU-Station 5 - P



Pions at TKU-Station 5 - P



- Improvements to target model have shown little / no dependency of downstream distribution on ISIS proton beam energy -> positive result
- Similar agreement of MC and data as previous iteration – still observe muon momentum shift

- LM is modelled in geant4 following MARS target coordinate frame
- LM receives only ~ 2000 triggers per spill (from CDB) with $\sim E15$ POT



Larger statistics necessary for full modelling of triggers with timing coincidence gates

Alternatively could scale up size of LM detector as in previous study

- Improvements to target model have shown there is little / no dependency of downstream distribution on beam energy
- Similar agreement between MC and data as previous iteration
- May see better fit for muon/pion yields after considering larger set of analysis cuts
- Likely still some misalignment issues downstream
- MICE note on target simulation is being updated