

# Pion Contamination Step I Analysis: Progress Report

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## Description of MC Sample

- Official G4BL deck used, part of MAUS as of version 0.8.3
  - ▶ Validated with MICE Step I data, see talk at CM38
  - ▶ G4beamline simulates MICE from target to upstream face of TOF0
- Run interface code G4BL→MAUS over output
- Simulate beam in MAUS with KLMCDigitizer mapper switched on
- MAUS legacy geometry for Step I
- Beams generated are (6, 200) + two pion beams 3253 & 3426

# Offset in TOF profiles

- Calibration
  - ▶ TOF calibration was done with legacy code in data taking
- Geometry
  - ▶ Geometry in MAUS, G4beamline and Step IV surveys do not agree, ~cms difference in distance between TOF0 & TOF1
- Momenta of beams at D2, G4BL is actually at BPM1

Table: Beam momenta

Beam	Magic Spreadsheet	G4BL
3253	294	290.3
3426	362	346.1
(6, 200)	238	244.3

## Offset in TOF profiles

- Fit a gaussian to positron peak
- Normalise to the positron peak for each beam
- For every entry,  $\text{TOF} = \frac{\text{TOF entry}}{\text{TOF positrons peak}}$

# Positron Peak for MC beams

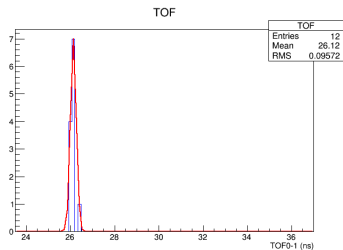


Figure: Pion beam 3253

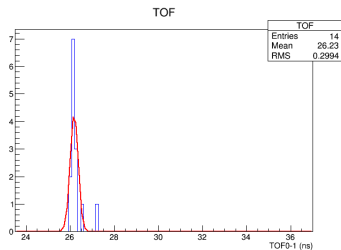
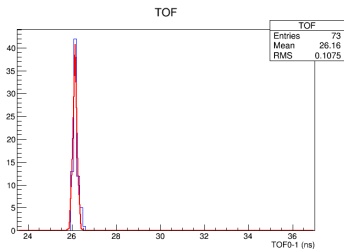


Figure: Pion beam 3426



# TOF plots

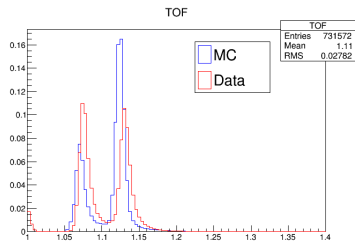


Figure: Pion beam 3253

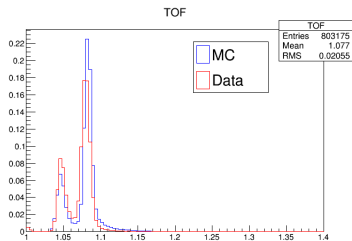
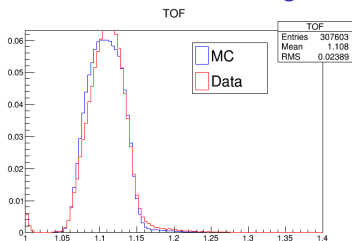


Figure: Pion beam 3426



# KL Product Spectrum

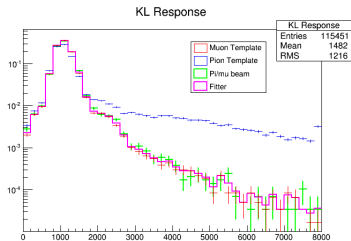


Figure: Data (6, 200)  $\mu^+$  beam

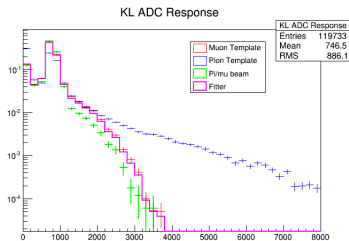


Figure: MC MAUS (6, 200)  $\mu^+$  beam

# Pion Contamination Measurement

**Table:** Pion contamination predicted by data and MC

P1 contamination MC Truth G4BL	0.22
P1 contamination MCDigitizer	$\sim 0\%$
P1 contamination Data	$0.6 \pm 0.6\%$



# Conclusions

- KLMCDigitizer may be subject to further tweaking
- Enhance smearing effect
- Discriminator cut to remove peak at zero