

Field Off Scattering Studies: Current Status

John Nugent

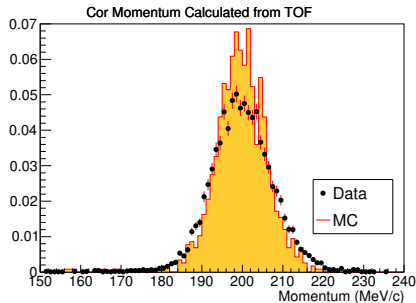
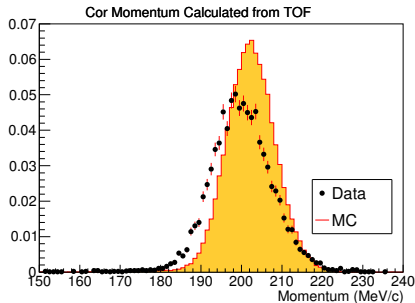
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8/8/2019

P discrepancy Data/MC

- Suggestion was that rerun G4bl and MAUS sim & scale current in D2 as per Roger's analysis to resolve discrepancy
- Reran G4bl, reran MAUS, reduced data and reran analysis
- Local production $\sim 1000\mu$ vs. full production $\sim 60000\mu$



P discrepancy Data/MC

- Significant improvement for small MC sample produced locally at Glasgow
- Why is it so much better without any D2 scaling?
- Had an email exchange with Paolo who was able to provide some details
 - ▶ New geometry used in latest productions

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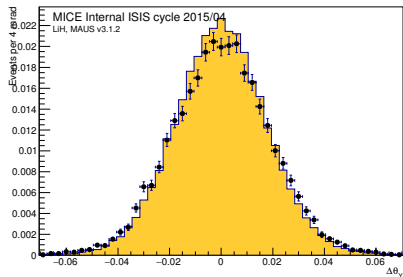
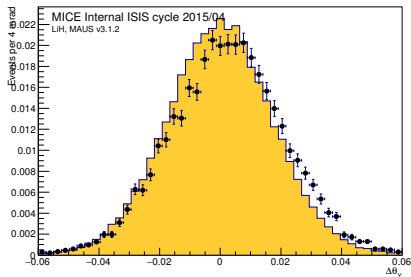
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Added diffuser material. Changed tracker glue composition according to CR. Fixed tracker glue. Fixed diffuser support. Fixed diffuser tungsten. Updated geometry for March 2016 LiH runs. Fixed LiH density. Fixed diffuser positions and material. Removed lh2 structure from absorber volume. Added virtual planes.

- Requested completely new MC production from Dimitrije on 9/7/19

θ_Y discrepancy

- I have shown at previous meetings that the most expedient way to resolve this issue is by rotating the upstream tracks
- Scripts have been written to scan in rotation angle and check mean, asymmetry, skewness etc.
- This correction was not applied in the last iteration - has now been added



Momentum Calculation

- 1 Momentum is measured with

$$p = \frac{m}{\sqrt{\frac{t_{\mu}^2}{t_e^2} - 1}} \quad (1)$$

- 2 If there is a hit in TOF2 this is done with TOF1+2 information
- 3 If there is no hit in TOF2 this is done with TOF0+1
- 4 Only in the case of TOF0+1 is a correction applied to account for the energy loss in the channel.

Momentum Correction

- Use Bethe-Bloch most probable energy loss for known material budget in channel

$$\Delta_p = \xi \left[\ln \frac{2mc^2\beta^2\gamma^2}{I} + \ln \frac{\xi}{I} + j - \beta^2 - \delta(\beta\gamma) \right] \quad (2)$$

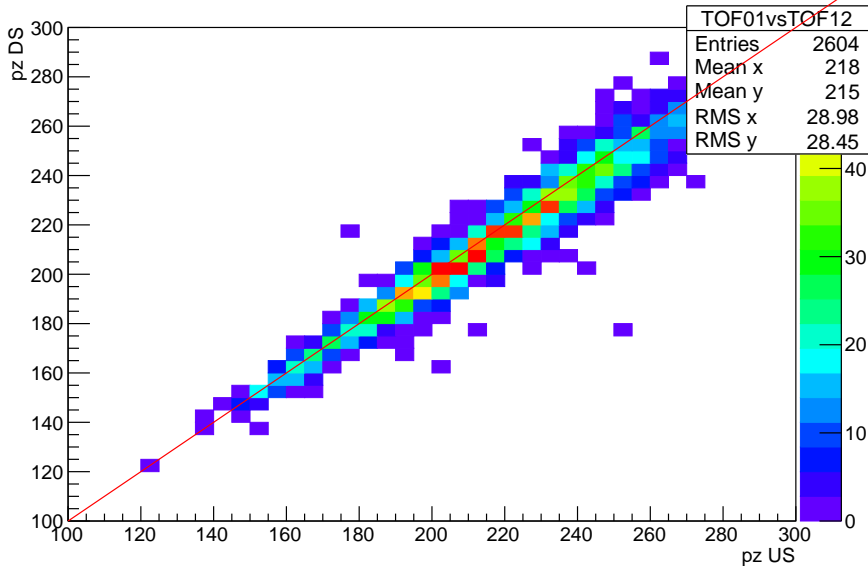
where

$$\begin{aligned} \xi &= (K/2)\langle Z/A \rangle z^2(x/B^2) \\ I &= \text{mean excitation energy} \\ j &= 0.2 \end{aligned} \quad (3)$$

- Tracks crossing the diffuser ring are cut

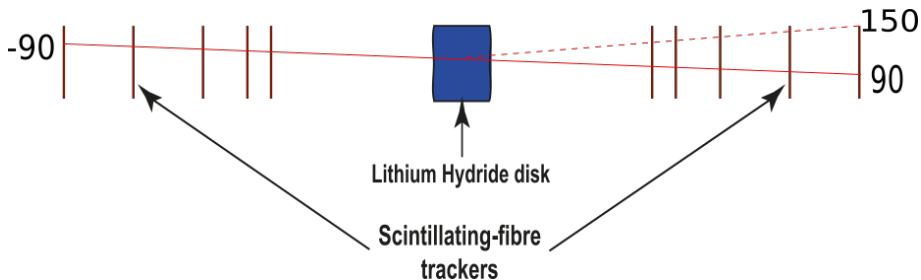
TOF01vsTOF12 P

TOF01vsTOF12



Efficiency Calculation & Models

- Efficiency calculation updated and currently being rerun on batch system
- John Cobb: There is a cutoff in θ_{scatt} - determined by geometry of channel & apertures. When calculating efficiency for projected angles must respect this cutoff. Has been added to calculation



- Replotted data to match model format produced by John Cobb - ensures valid comparison between models and data

Job List

- Put various pieces together ~few days
- Rerun entire analysis chain ~ 12 hrs
- Circulate updated version of Note