

MCS in LH_2 , Field-off



Content

- Assessing beam momentum in Data/MC

TOF10 in Data/MC

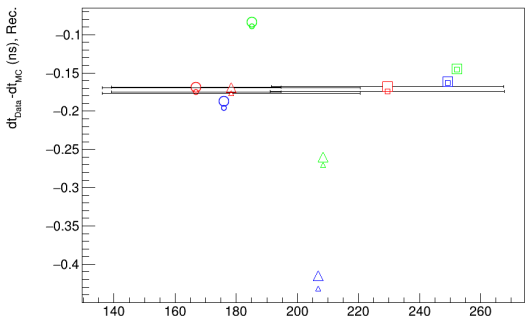


TOF offset between Data/MC can be explained by:

- Different beam momenta
- A combination of ΔL and Δt , a beam path and systematic TOF residual between Data/MC

The ΔL and Δt has been previously assessed. Now pion and muon peak momenta are calculated by their inter-peak distance in TOF, independently of ΔL and Δt .

TOF10 Data-MC Offset



Legend

Large/small: Full/Empty abs.

○ 170 MeV/c Pions

△ 200 MeV/c Muons

□ 240 MeV/c Electrons

P_z (MeV/c), Truth

TOF10 in Data/MC



The below method is used:

$$[1] dt_{TOF10}^i = \frac{L}{v^i} + \Delta t$$

with $i = e, \pi, \mu$

$$[2] R = \frac{dt^{\mu-e}}{dt^{\pi-e}} = \frac{(c-v^\mu)v^\pi}{(c-v^\pi)v^\mu} = \frac{(1-\beta^\mu)\beta^\pi}{(1-\beta^\pi)\beta^\mu}$$

$$[3] \beta^\mu = \frac{(R-M)}{M(M-R)}$$

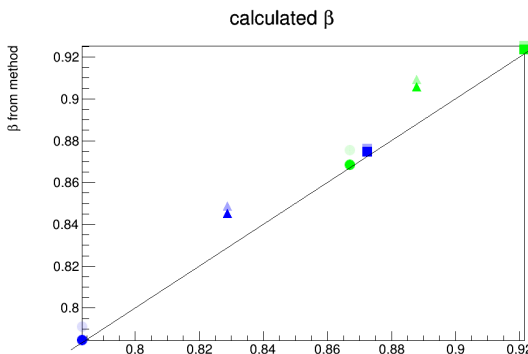
$$[4] \beta^\pi = \frac{(M-R)}{1-R}$$

$$\text{with } M = \frac{\beta^\pi}{\beta^\mu}$$

Time-of-flight is assumed to be in the form of [1].

Calculating [2] eliminates $\Delta L, \Delta t$. The ratio M is taken

for MC truth.



Legend

Solid/transparent: Data/MC

○ 170 MeV/c

△ 200 MeV/c Pions

□ 240 MeV/c Muons

$\beta_{MC Truth}$

TOF10 in Data/MC

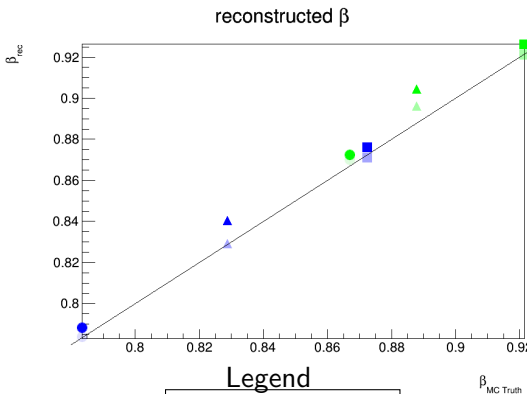


$$\beta_{Rec} = dt_c / dt_i$$

with $dt_c = \frac{7.642}{c} 10^9$, dt_i peak TOF of $i = \pi, \mu$

$$\beta_{Truth} = \frac{P_{zTruth}}{\sqrt{m^2 + P_{zTruth}^2}}$$

The raw TOF is distributions are used to get the time-of-flight of particle species.



Legend

Solid/transparent: Data/MC

○ 170 MeV/c

△ 200 MeV/c Pions

□ 240 MeV/c Muons

TOF10 in Data/MC



The ratio $M = \frac{\beta_{\pi}}{\beta_{\mu}}$ is plotted

