Track Efficiency Study Using Sand-Muons

Alex Clifton
Raj Das
Walter Toki (advisor)

October 11, 2012
Overview

- 4C MC sand-muon sample used as independent sample to check cosmics MC efficiency
- No pre-selection that exists that produces sand-muon data sample.
- Use "homebrew" matching method
- Plot momentum, $\cos\theta$ comparisons and efficiencies

Numerator = number of tracks w/ P0D track that was successfully matched to tracker track

Denominator = number of tpc1 tracks that point back into p0d with momentum $> 250$MeV
Initial Plots

- $\cos\theta$ angle for angle of tracks in denominator of efficiency
- $\cos\theta_N$ for angle of tracks in numerator of efficiency
- Red squares: $\cos\theta$
- Black dots: $\cos\theta_N$
Initial Plots

- Tracker Cosθ efficiency
Initial Plots

- Trackermom is momentum for tracks in denominator of efficiency
- Trackermom_N is momentum for tracks in numerator of efficiency
- Red squares: Trackermom
- Black dots: Trackermom_N
Initial Plots

- Tracker momentum efficiency
Conclusion

- Total integrated efficiency(sand-muons): 4959/5155 = 96.2%
- Total integrated efficiency(FGD MC cosmics): 92.8%
- Aren't the same because they are sampling different parts of phase space

- Better efficiency for P > 6000MeV
- Better efficiency as Cosθ → 1