Momentum and Position Resolution at the CKOV plane for the GlueX detector system

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Abstract

This is a position and momentum resolution study for the GlueX detector system at the z-position of the proposed Cerenkov detector. Tracks are generated from the reaction $\gamma p \to \eta_1(1800)p \to \pi^+\pi^-\pi^+\pi^- p$ (see Ref [1]).

1 Introduction

2 y- vs x-position at the face of the CKOV

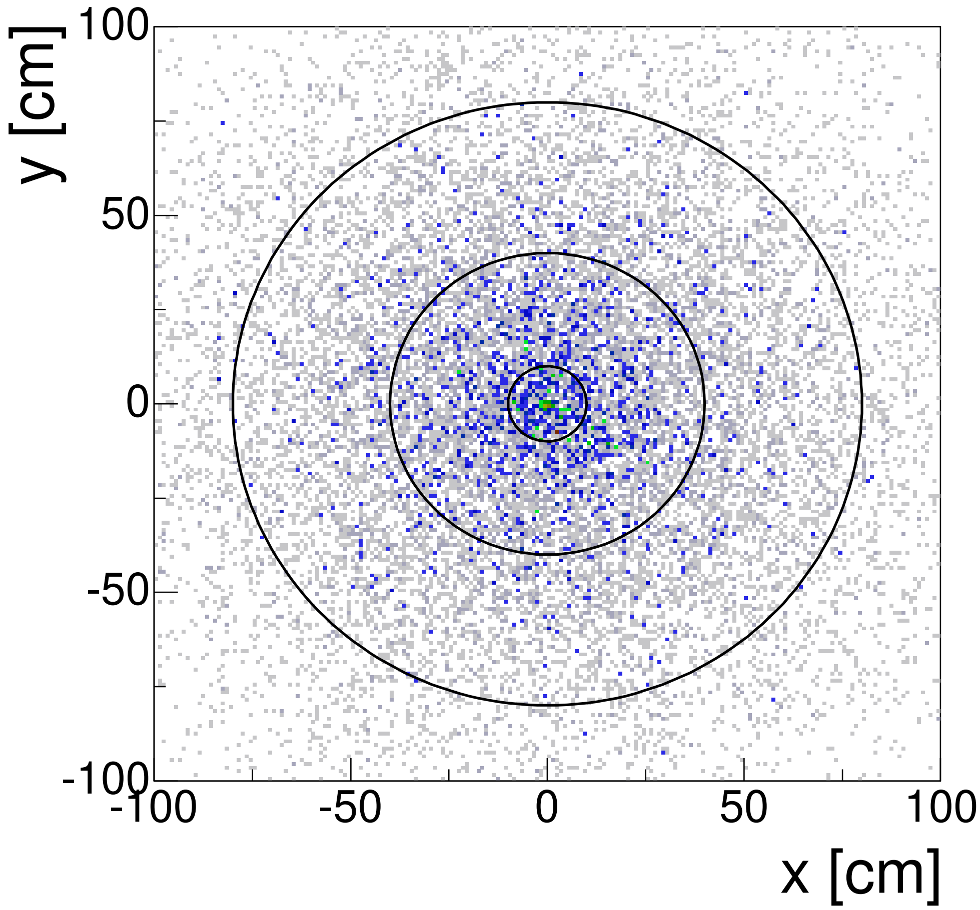
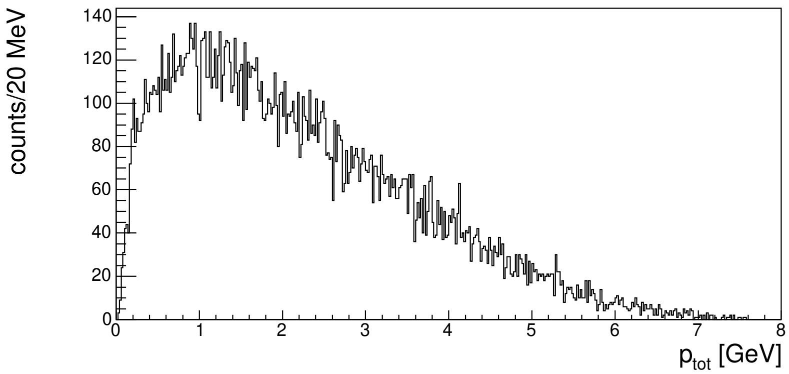
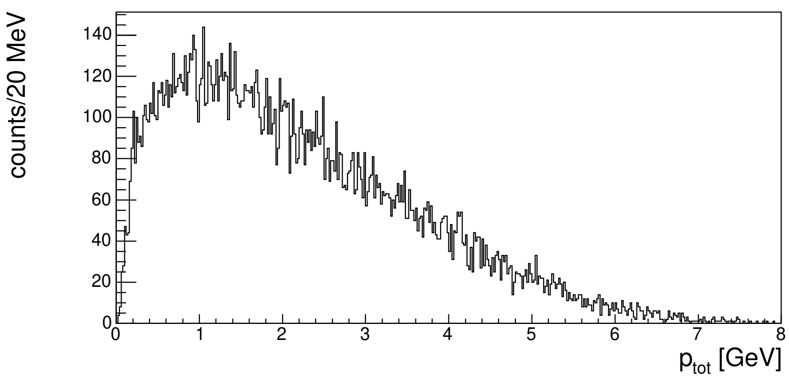


Fig. 1. y- vs x-position at $z = 420.0$ cm

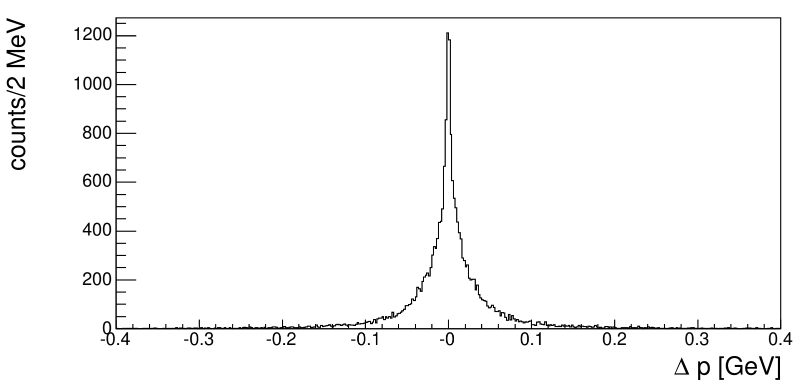
3 Momentum distribution at the face of the CKOV



(a) unsmeared tracks



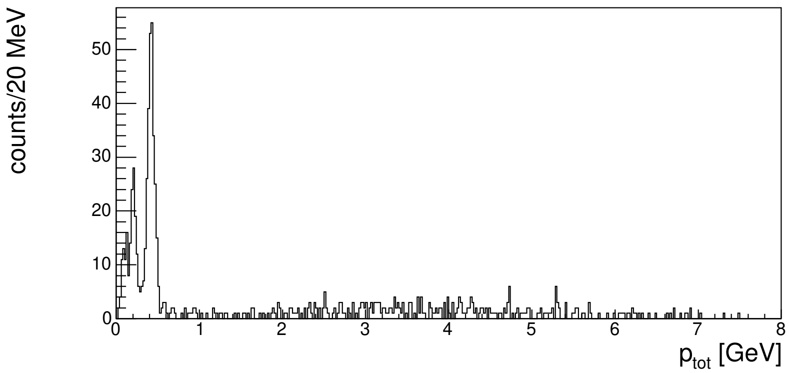
(b) smeared tracks



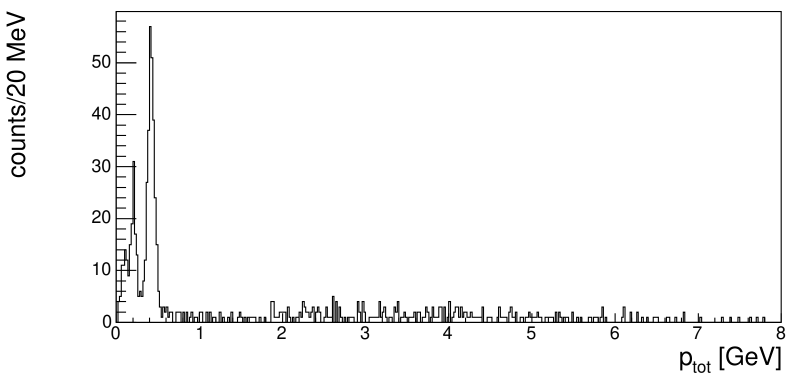
(c) Δp

Fig. 2. Momentum, $|\vec{p}|$, for all four tracks.

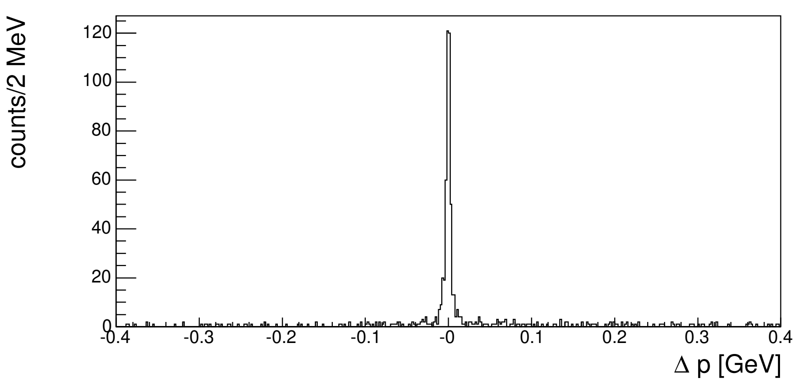
3.2 $R \leq 10.0$ cm



(a) unsmeared tracks



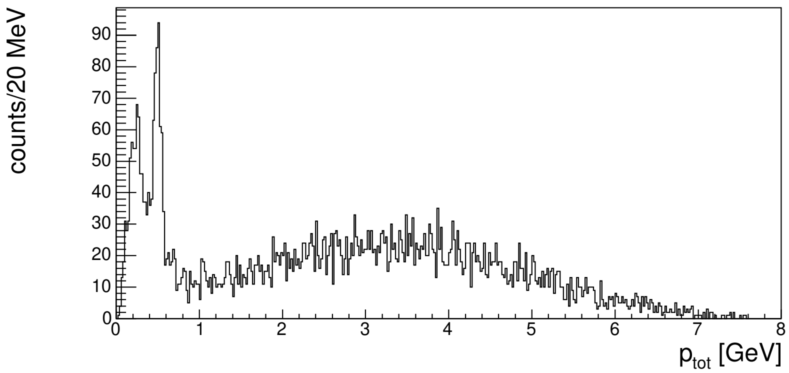
(b) smeared tracks



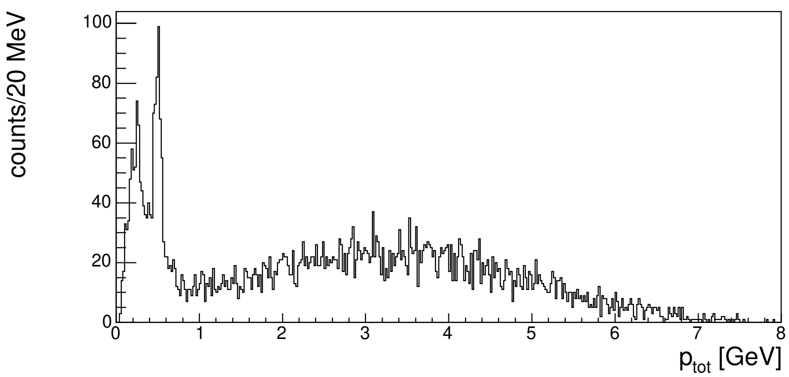
(c) Δp

Fig. 3. Momentum, $|\vec{p}|$, for tracks with $R \leq 10.0$ cm.

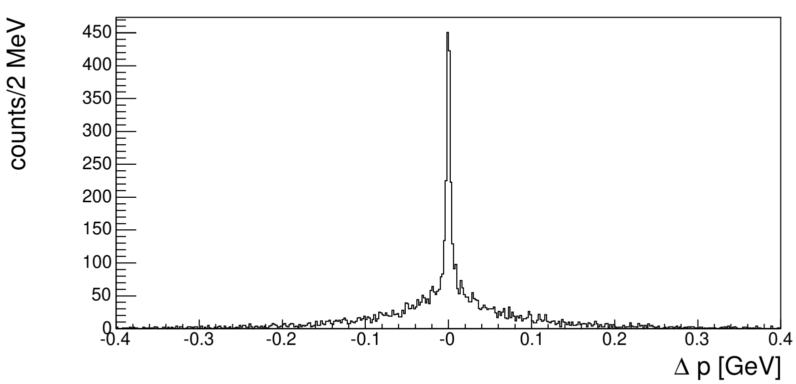
3.3 10.0 cm $< R \leq$ 40.0 cm



(a) unsmeared tracks



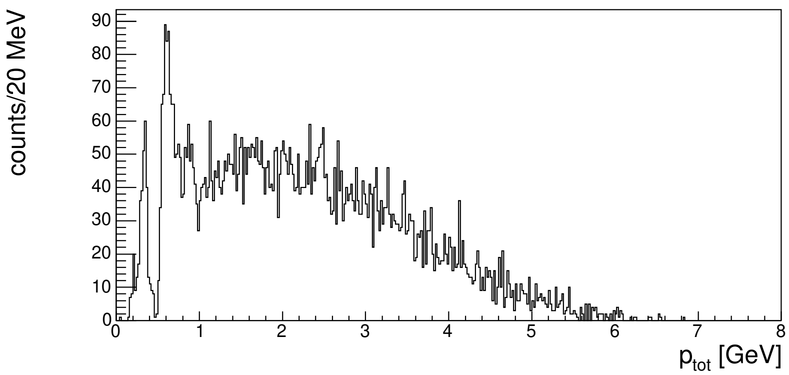
(b) smeared tracks



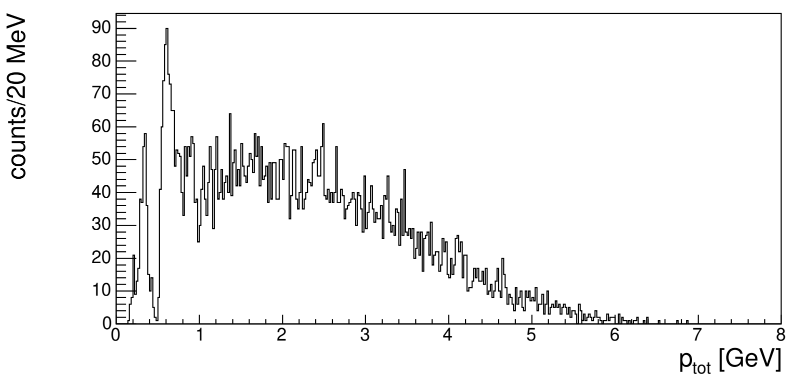
(c) Δp

Fig. 4. Momentum, $|\vec{p}|$, for tracks with 10.0 cm $< R \leq$ 10.0 cm.

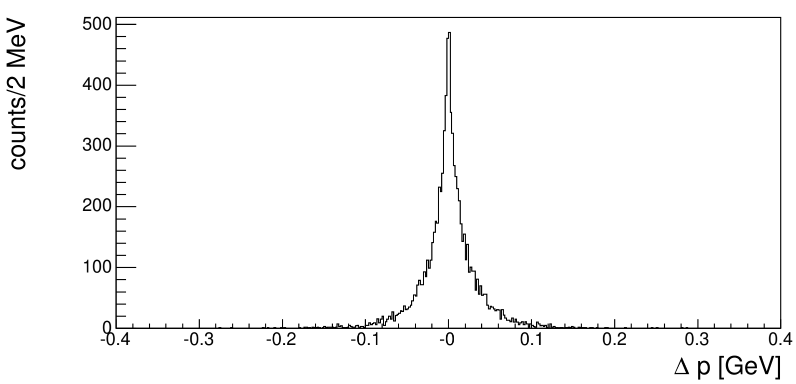
3.4 40.0 cm $< R \leq$ 80.0 cm



(a) unsmeared tracks



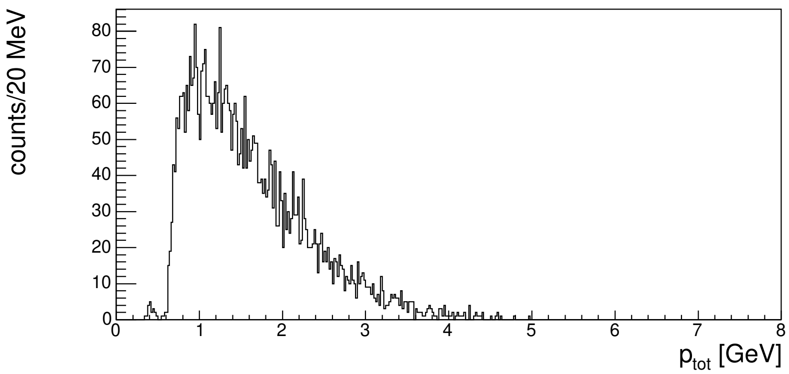
(b) smeared tracks



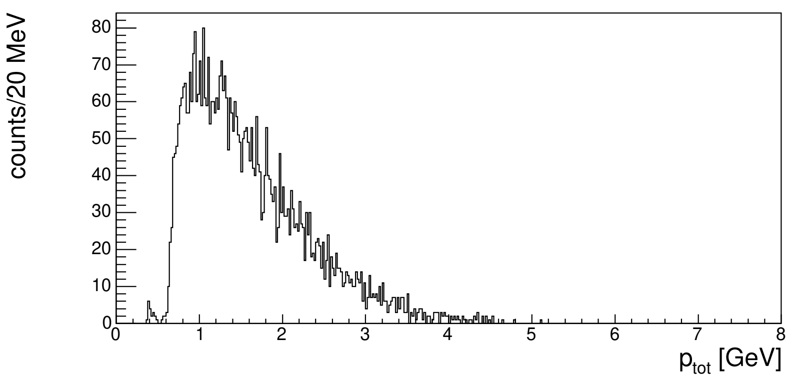
(c) Δp

Fig. 5. Momentum, $|\vec{p}|$, for tracks with 40.0 cm $< R \leq$ 80.0 cm.

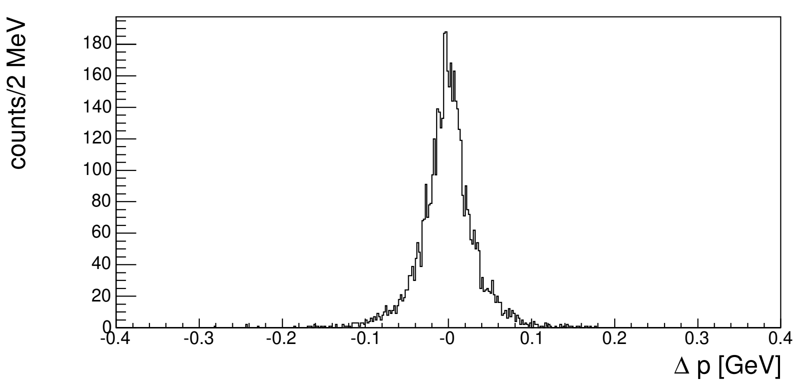
3.5 $R > 80.0$ cm



(a) unsmeared tracks



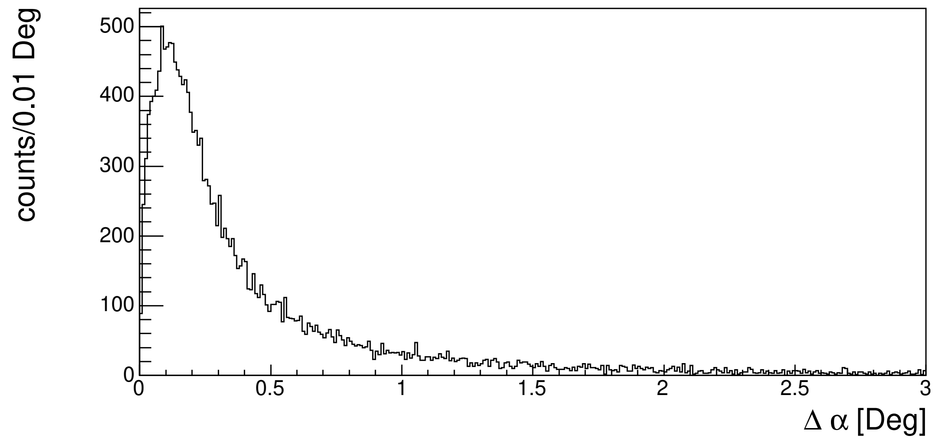
(b) smeared tracks



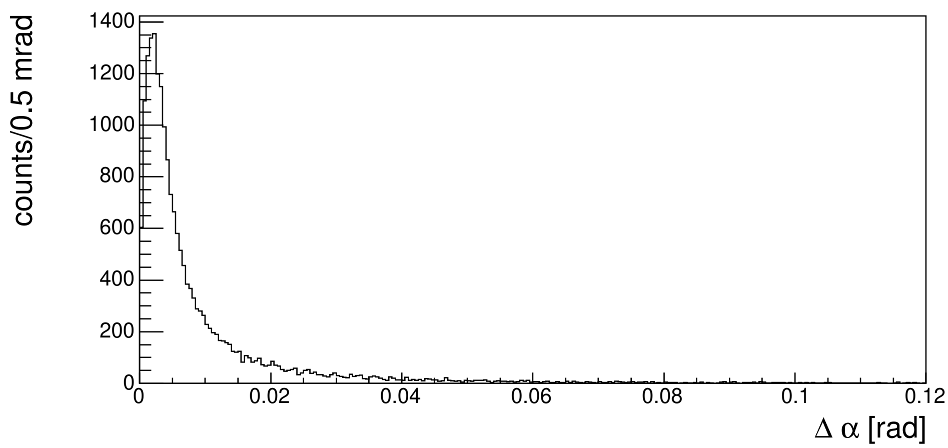
(c) Δp

Fig. 6. Momentum, $|\vec{p}|$, for tracks with $R > 80.0$ cm.

4 Angle between smeared and unsmeared tracks at the face of the CKOV



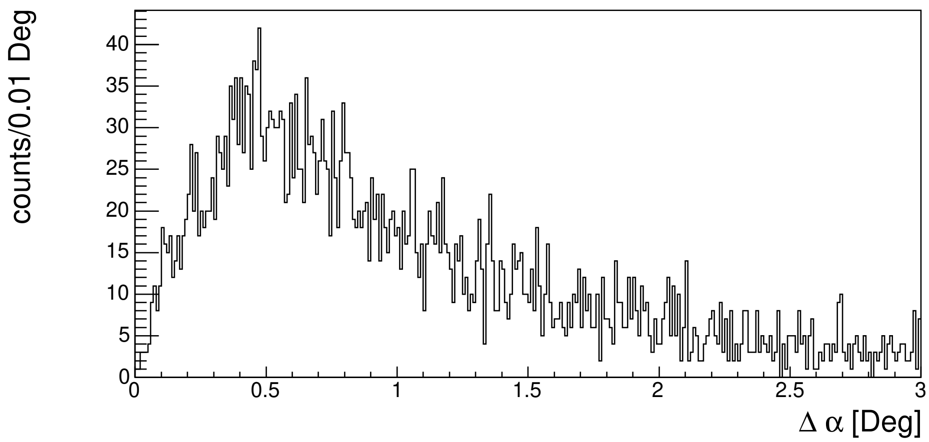
(a) Degrees



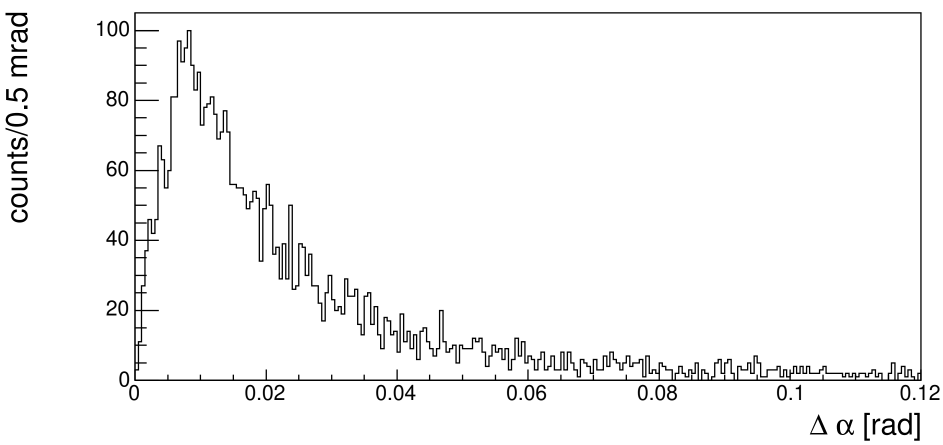
(b) Radians

Fig. 7. Opening angle $\Delta\alpha$ between smeared and unsmeared tracks for all four tracks.

4.2 $|\vec{p}| \leq 1.0$ GeV/c



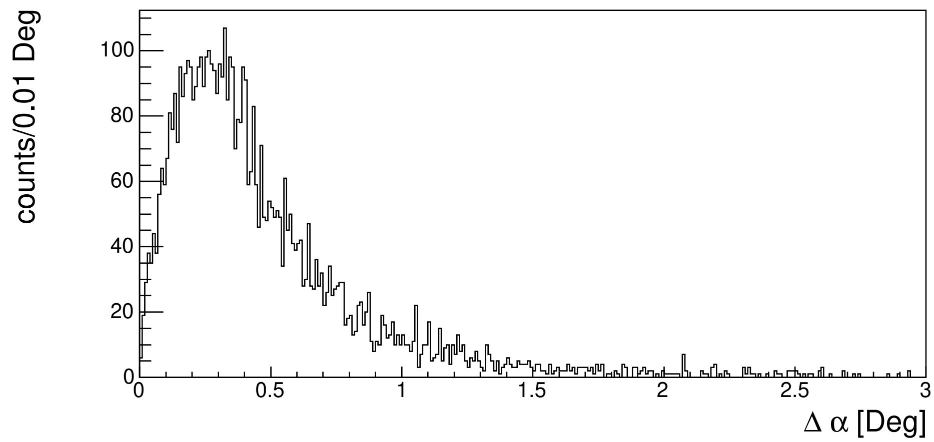
(a) Degrees



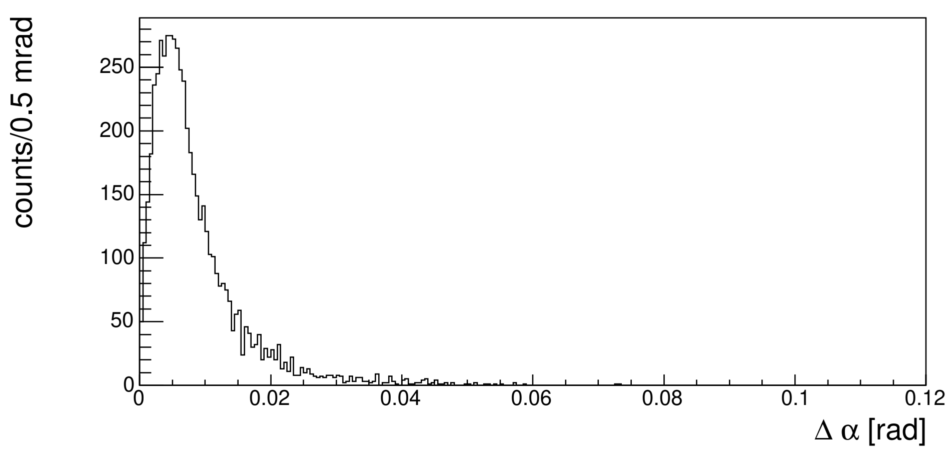
(b) Radians

Fig. 8. Opening angle $\Delta\alpha$ between smeared and unsmeared tracks for tracks with $|\vec{p}| \leq 1.0$ GeV/c.

4.3 1.0 GeV/$c < |\vec{p}| \leq 2.0$ GeV/c



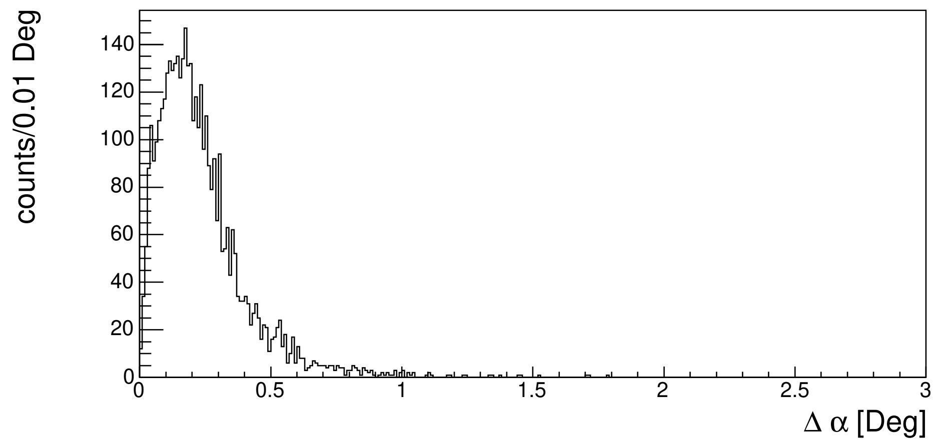
(a) Degrees



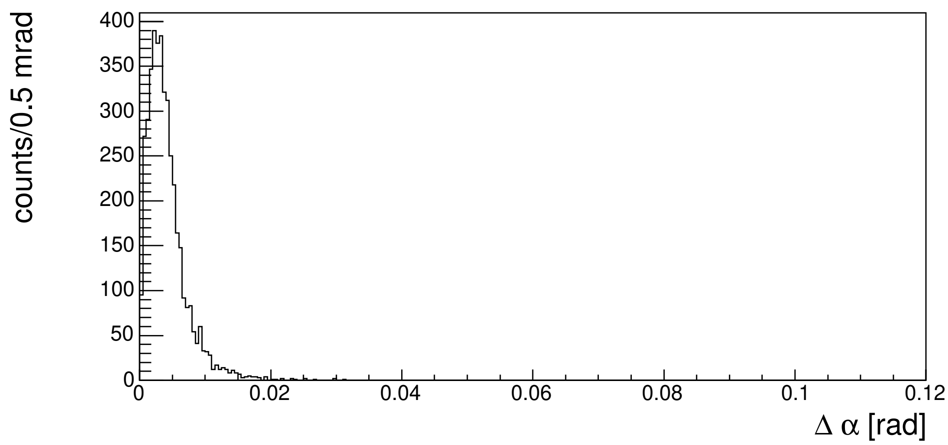
(b) Radians

Fig. 9. Opening angle $\Delta\alpha$ between smeared and unsmeared tracks for tracks with 1.0 GeV/$c < |\vec{p}| \leq 2.0$ GeV/c.

4.4 2.0 GeV/$c < |\vec{p}| \leq 3.0$ GeV/c



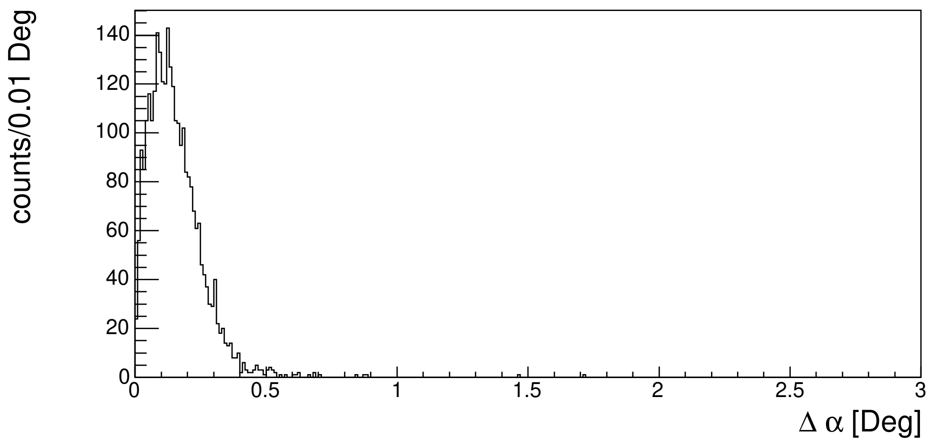
(a) Degrees



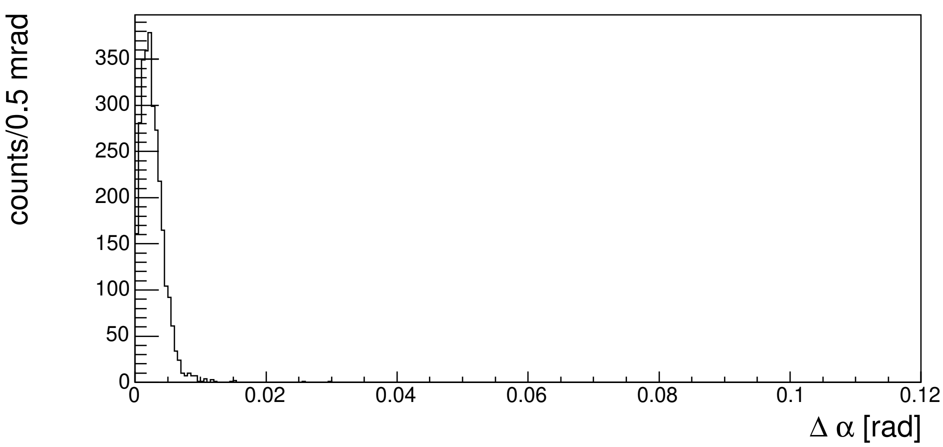
(b) Radians

Fig. 10. Opening angle $\Delta\alpha$ between smeared and unsmeared tracks for tracks with 2.0 GeV/$c < |\vec{p}| \leq 3.0$ GeV/c.

4.5 3.0 GeV/$c < |\vec{p}| \leq 4.0$ GeV/c



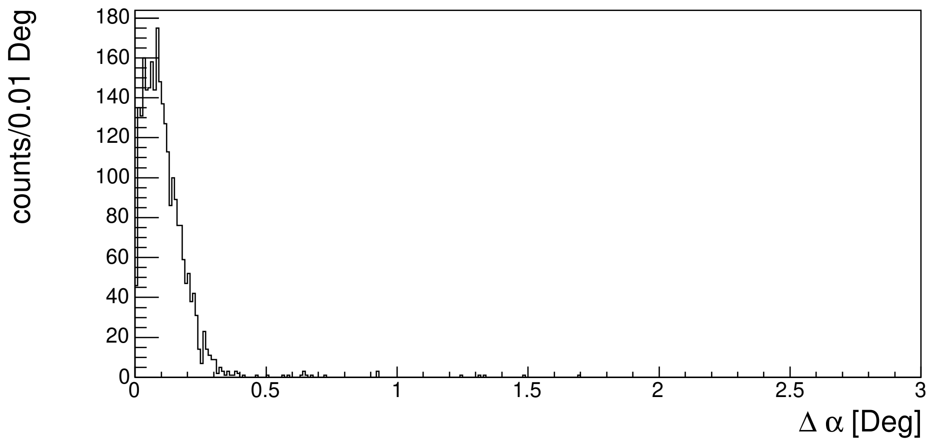
(a) Degrees



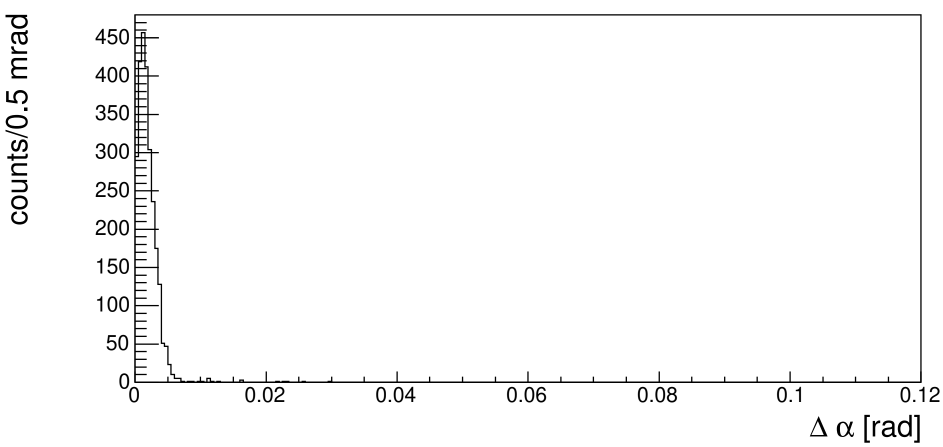
(b) Radians

Fig. 11. Opening angle $\Delta\alpha$ between smeared and unsmeared tracks for tracks with 3.0 GeV/$c < |\vec{p}| \leq 4.0$ GeV/c.

4.6 $|\vec{p}| > 4.0$ GeV/c



(a) Degrees



(b) Radians

Fig. 12. Opening angle $\Delta\alpha$ between smeared and unsmeared tracks for tracks with $|\vec{p}| > 4.0$ GeV/c.

References

[1] J. Kuhn, C. A. Meyer, Acceptance study for the gluex detector, gluex-doc-264, Carnegie Mellon University (2004).