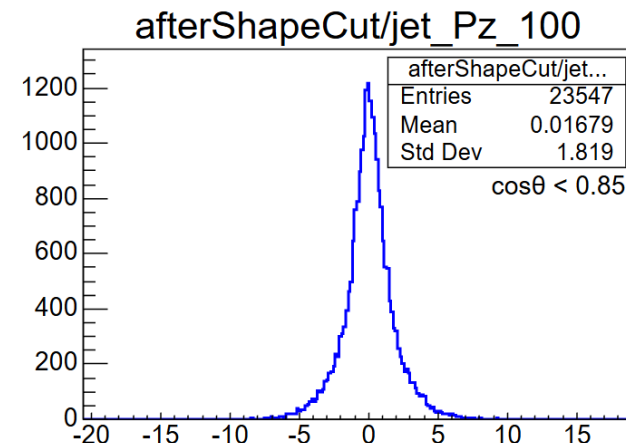
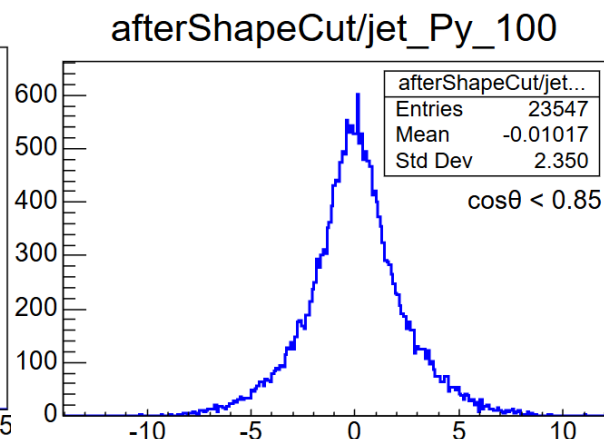
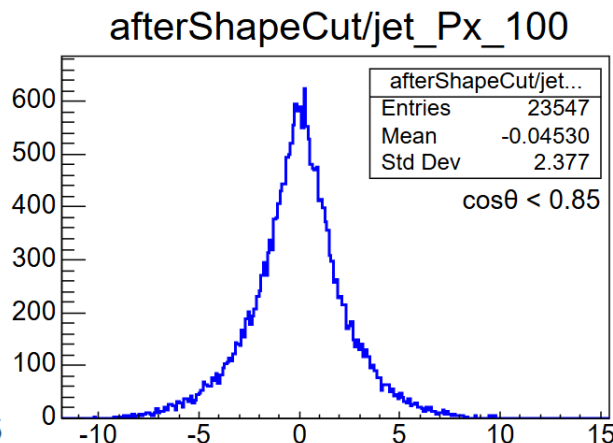
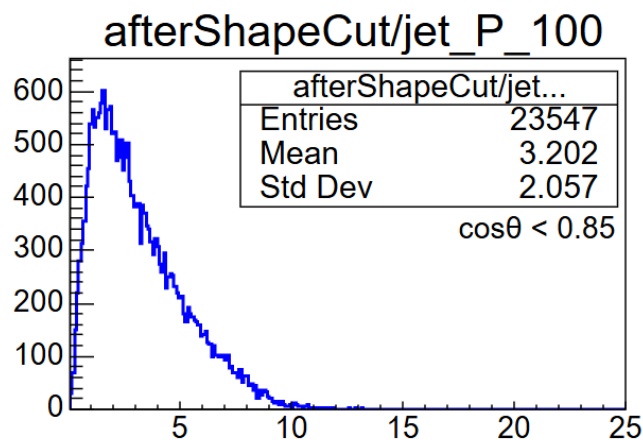
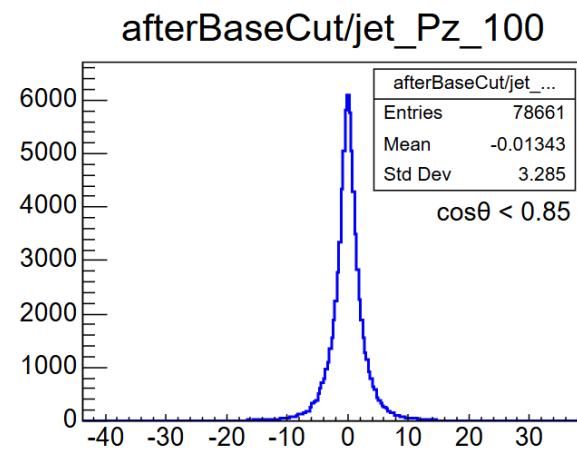
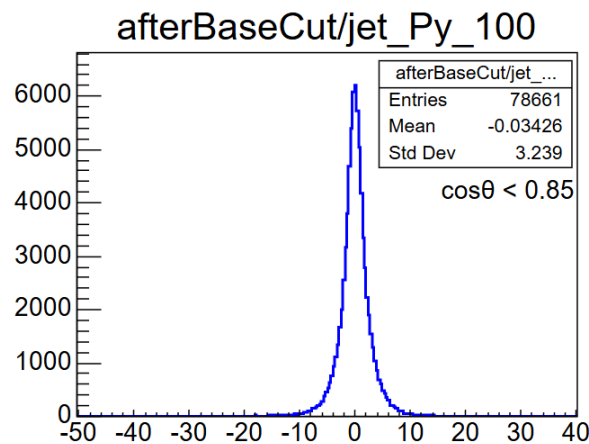
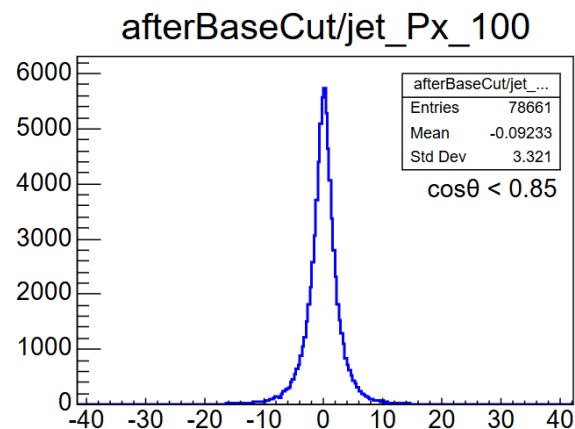
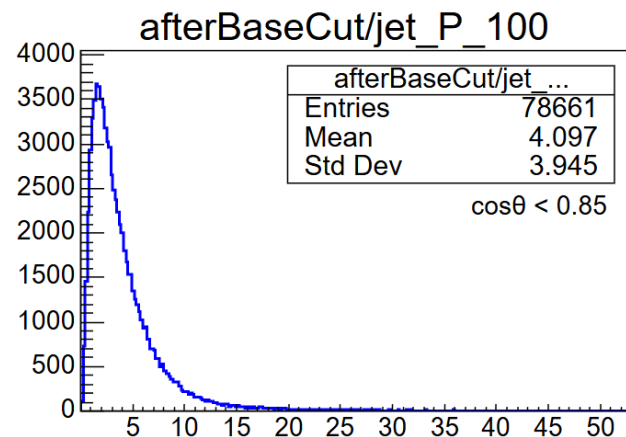


JER Exam Report

Hao Zhu / 27Jun2025

Jet Momentum

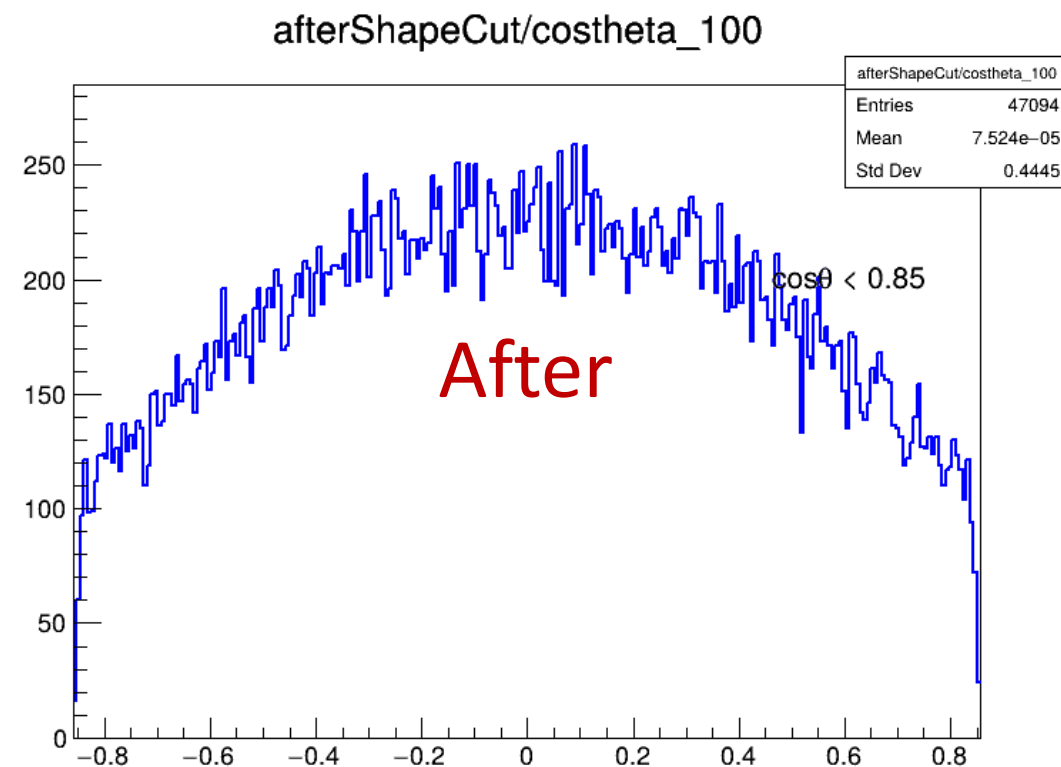
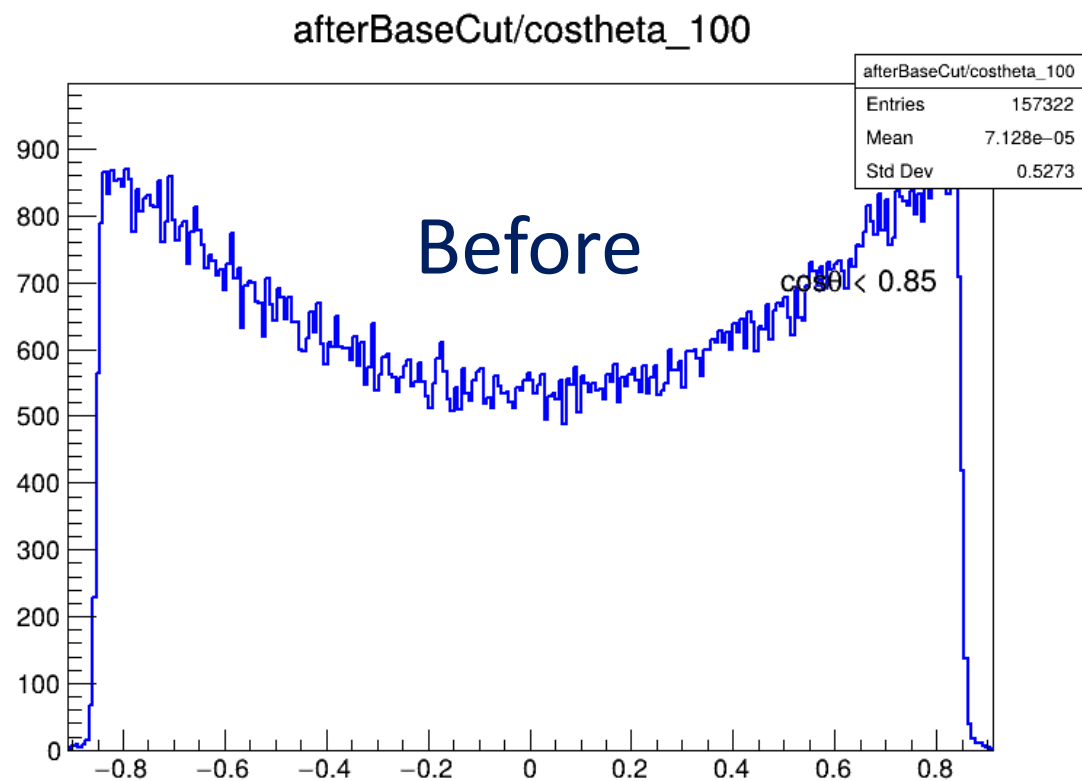


■ p_i = Sum of all PFO p_i in one event

Jet Angle

Cut for Jet Angle:

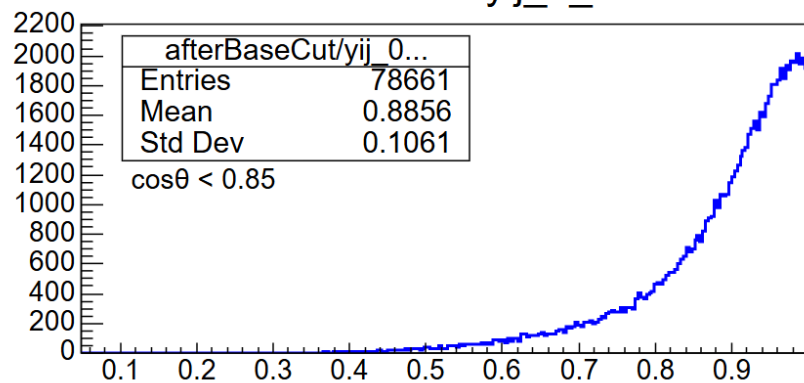
- Keep entry when $\cos\theta_{\text{Gen}} < 0.85$ (barrel)



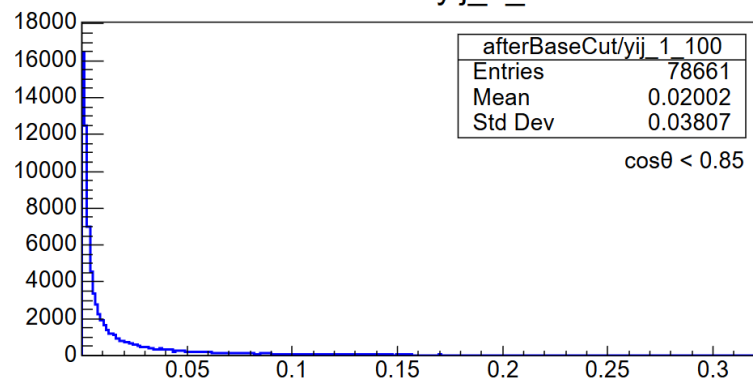


Before

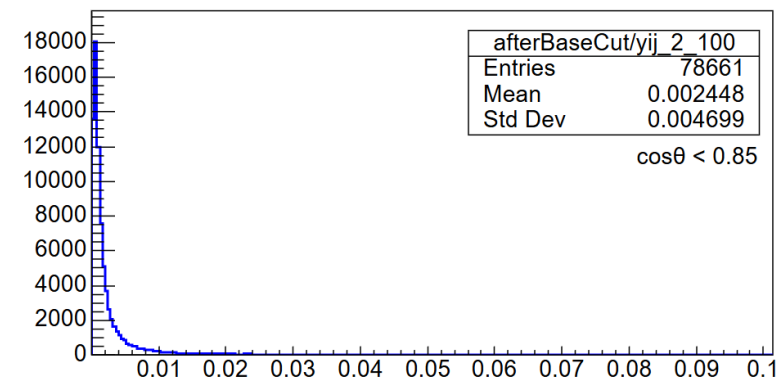
afterBaseCut/yij_0_100



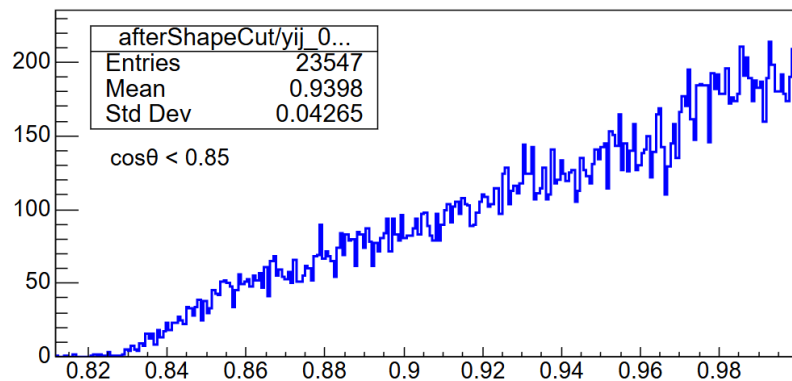
afterBaseCut/yij_1_100



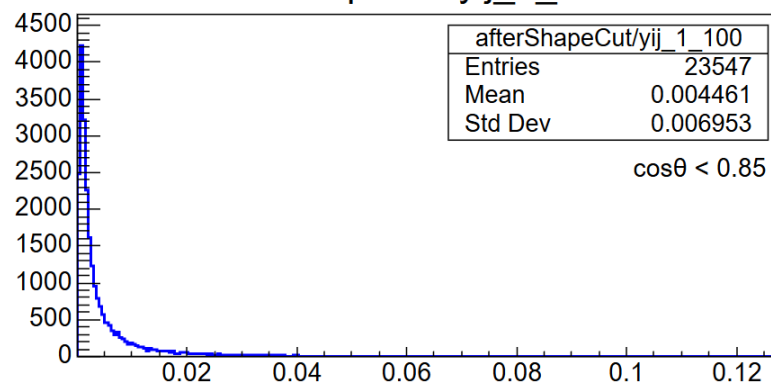
afterBaseCut/yij_2_100



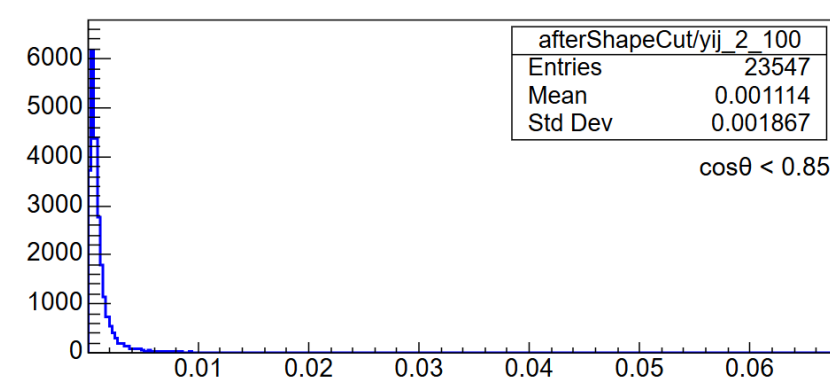
afterShapeCut/yij_0_100



afterShapeCut/yij_1_100



afterShapeCut/yij_2_100

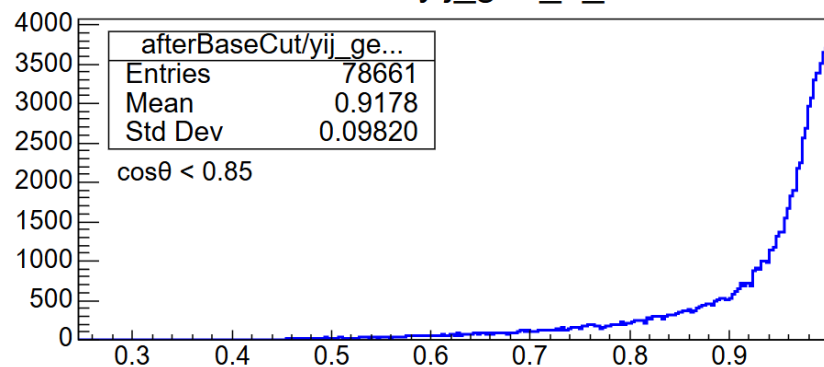


After

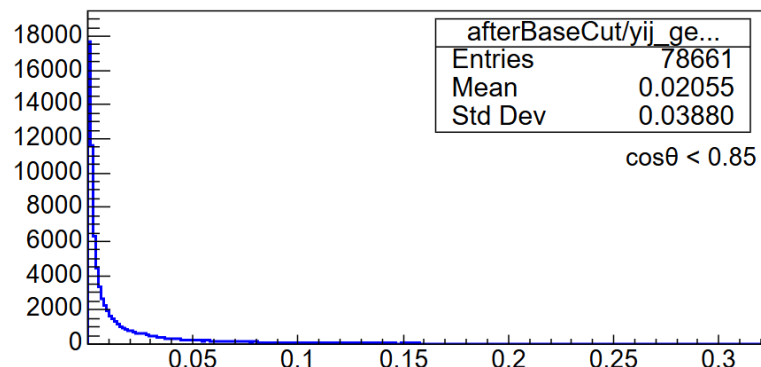


Before

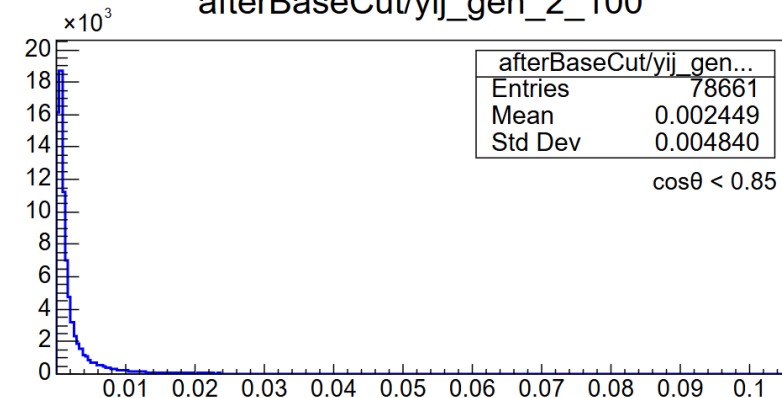
afterBaseCut/yij_gen_0_100



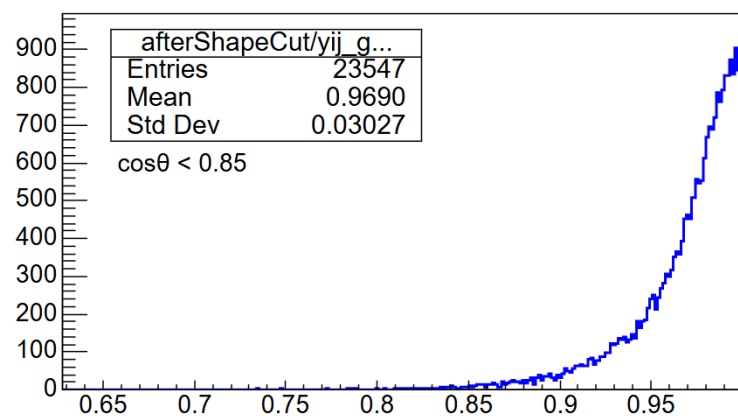
afterBaseCut/yij_gen_1_100



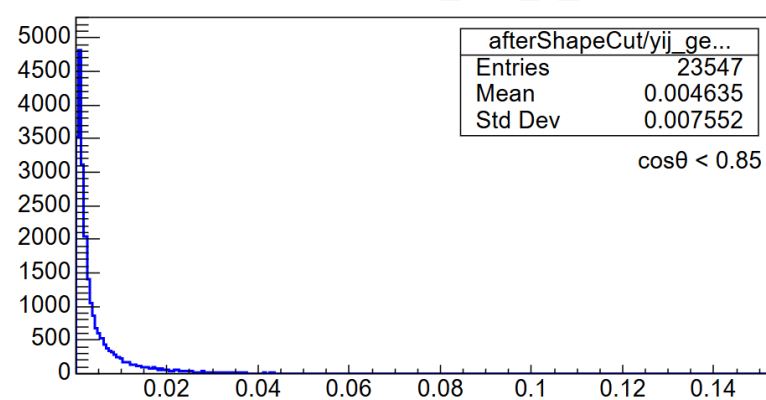
afterBaseCut/yij_gen_2_100



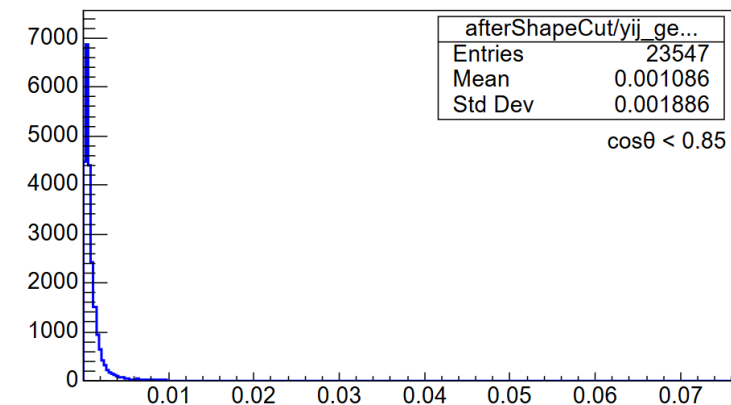
afterShapeCut/yij_gen_0_100



afterShapeCut/yij_gen_1_100



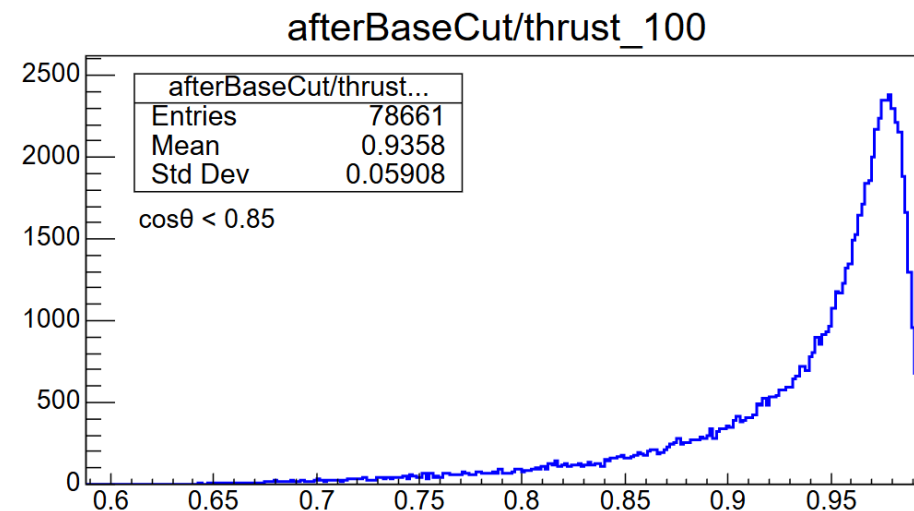
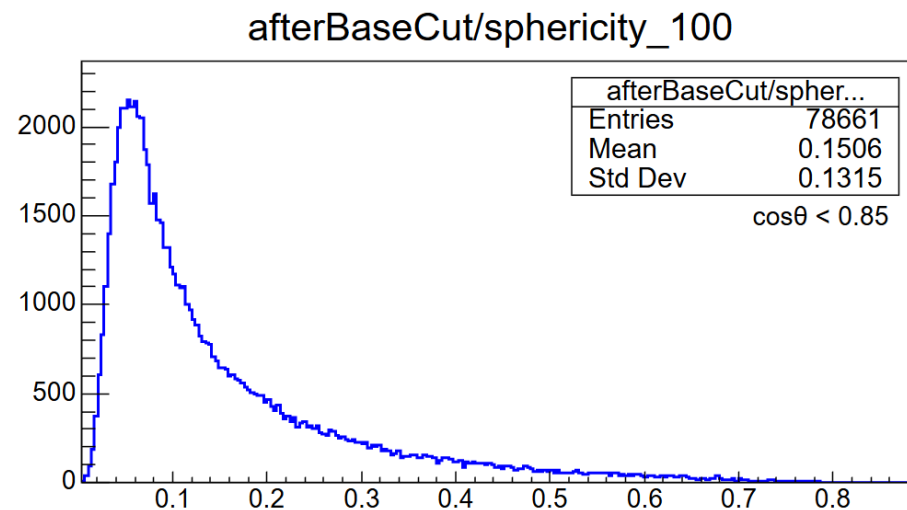
afterShapeCut/yij_gen_2_100



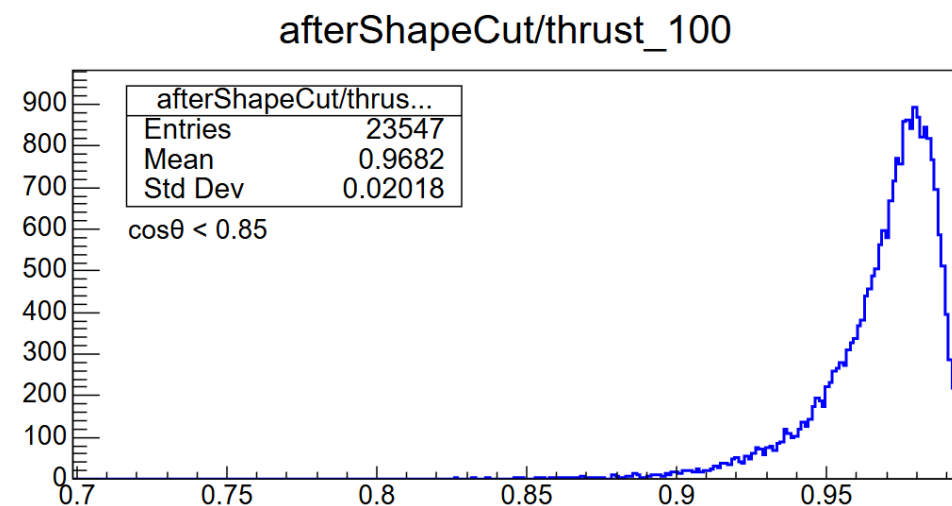
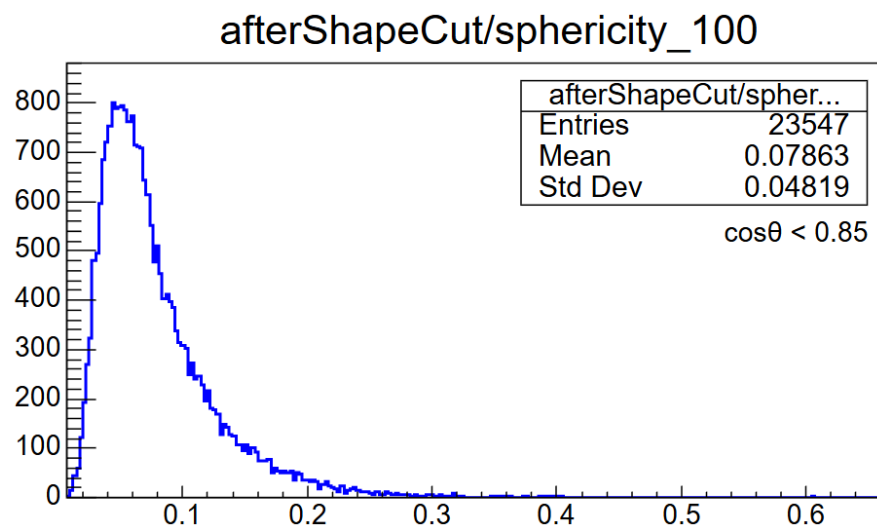
After

Sphericity & Thrust

Before



After



BackUp

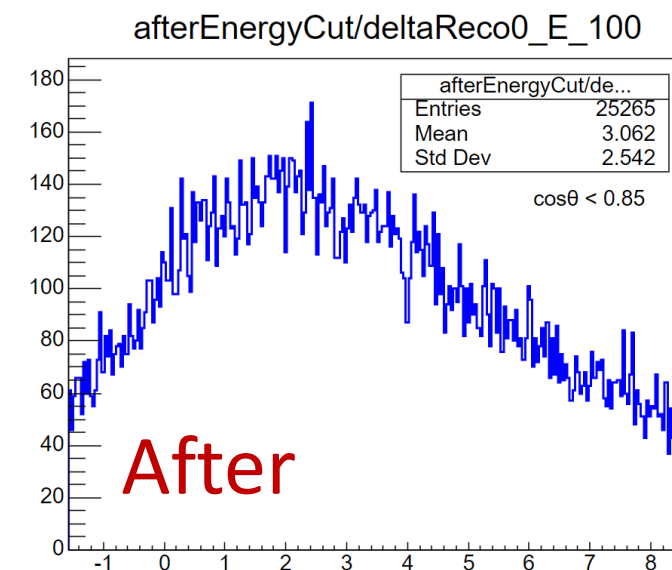
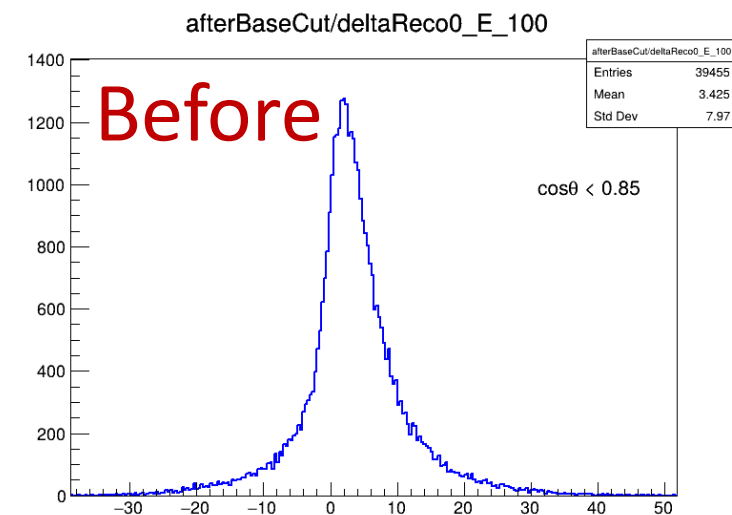
Cut for Jet Energy

Basic Cut:

- $dR < 0.4$
- $\text{jet1_ID} \neq \text{jet2_ID}$
- $\cos\theta < 0.85$ (barrel)

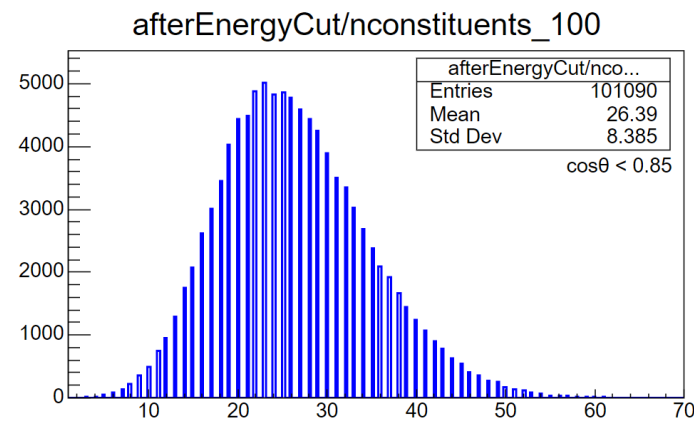
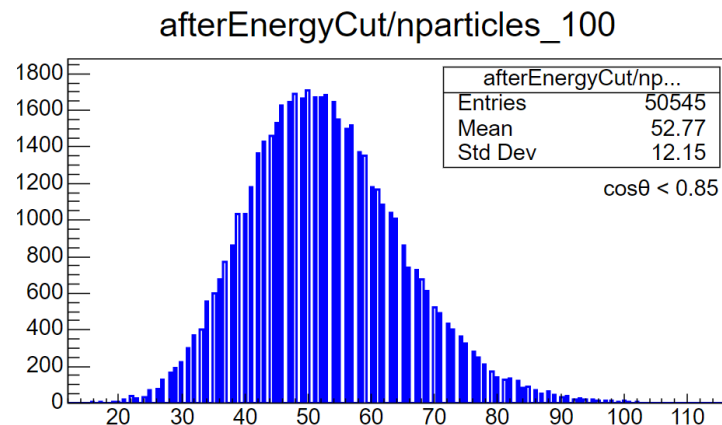
Extra Cut for Jet Energy:

- Remove entry when
 $|\text{jet1_RecoE} - \text{jet2_RecoE}| > \text{mean} + E_{\text{total}}/20$

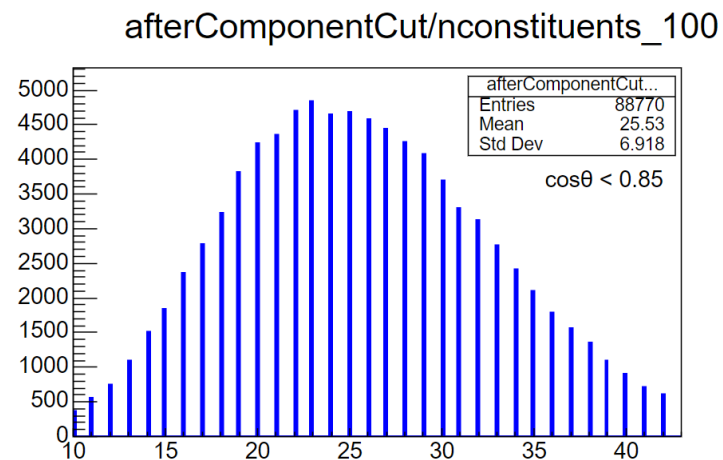
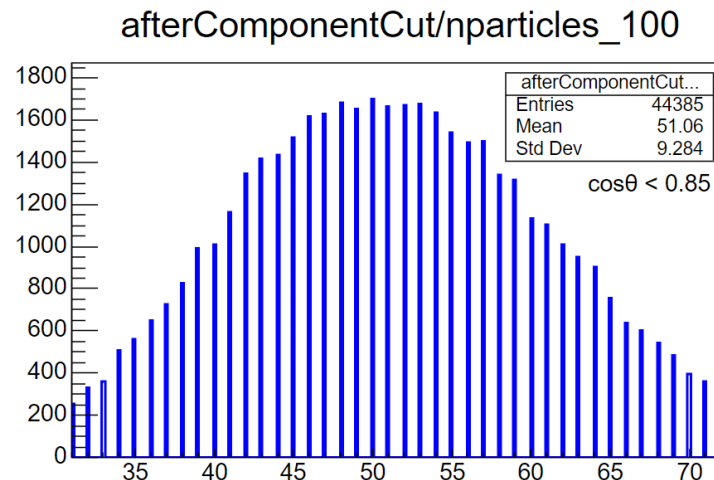


Cut for Jet Component

Before



After



Extra Cut for Jet Component :

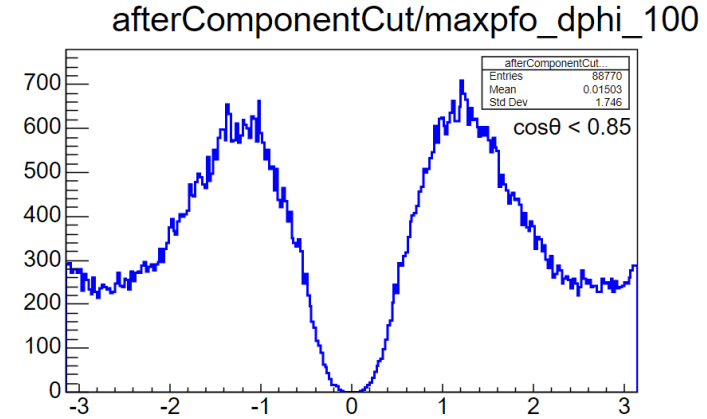
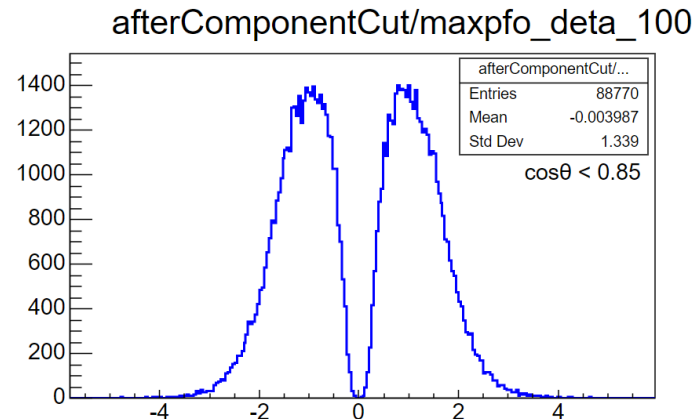
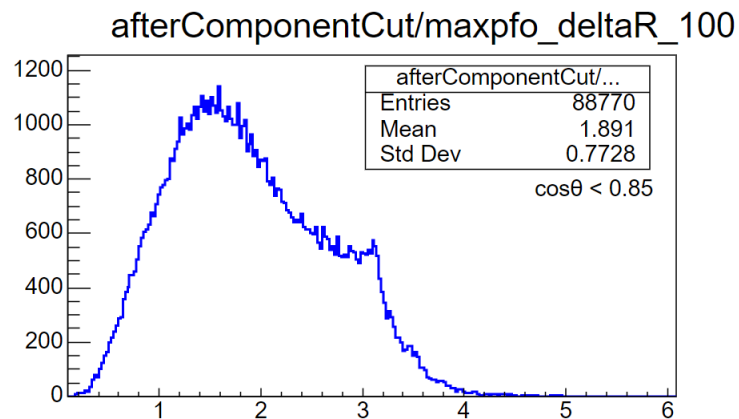
- Only keep entry when **nparticles** or **nconstituents** within $\text{mean} \pm 2 \cdot \text{sigma}$

Cut for Jet Shape

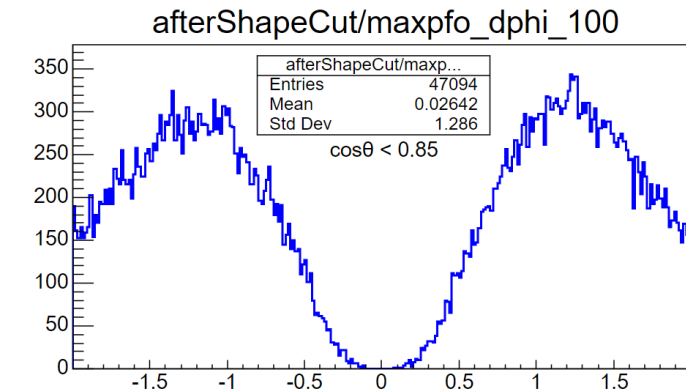
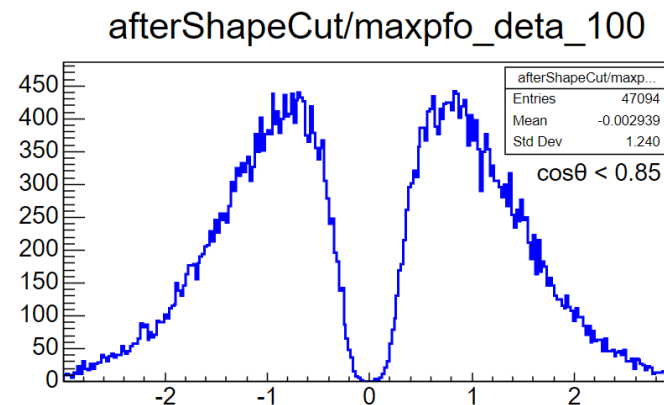
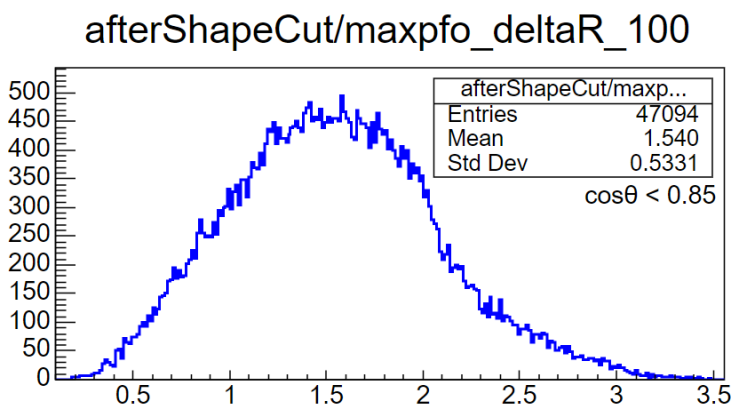
Extra Cut for Jet Component :

- Remove entry when max dR 、 $d\eta$ 、 $d\phi$ is too large

Before

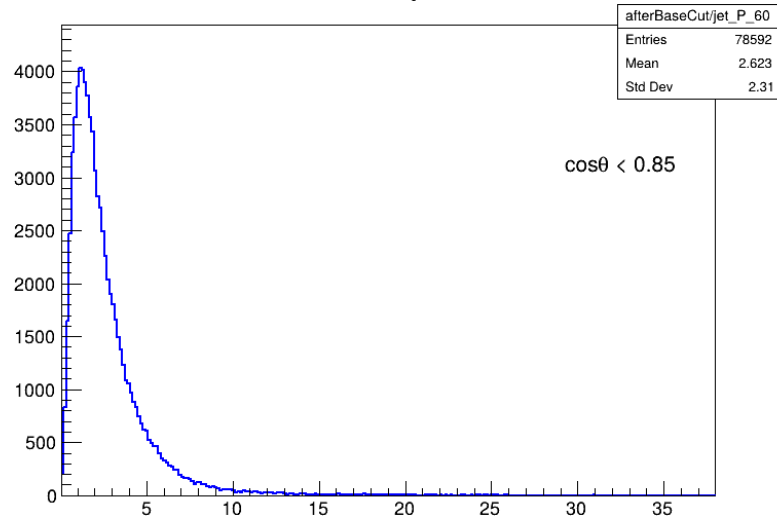


After

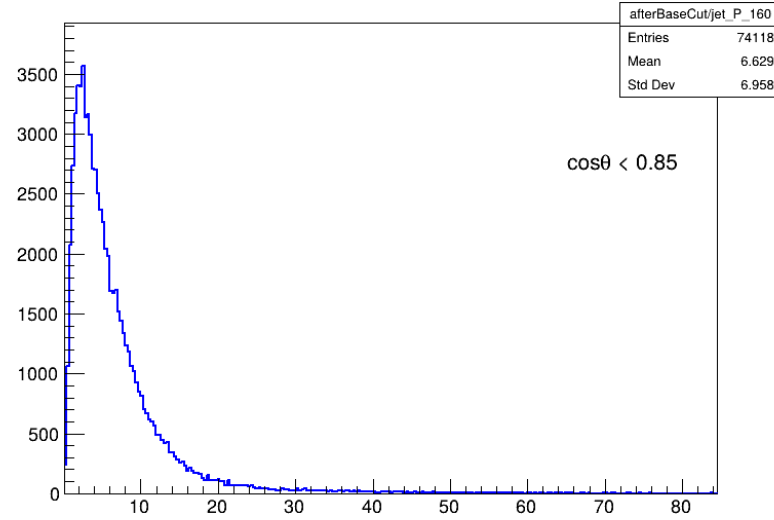




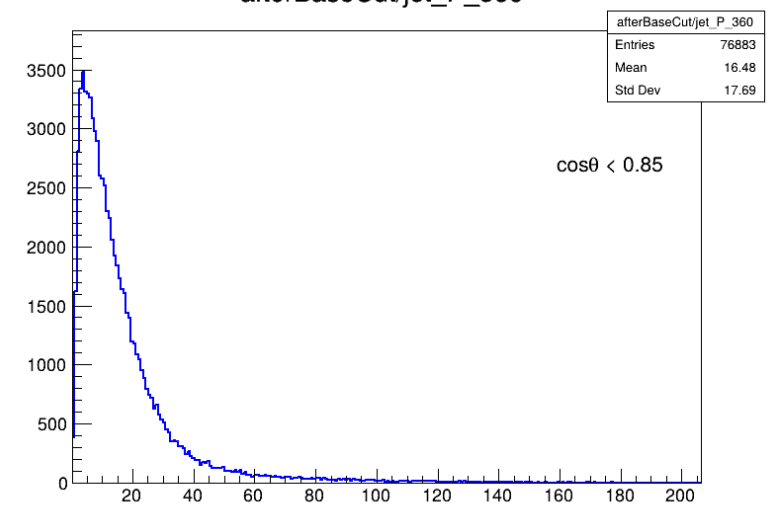
afterBaseCut/jet_P_60



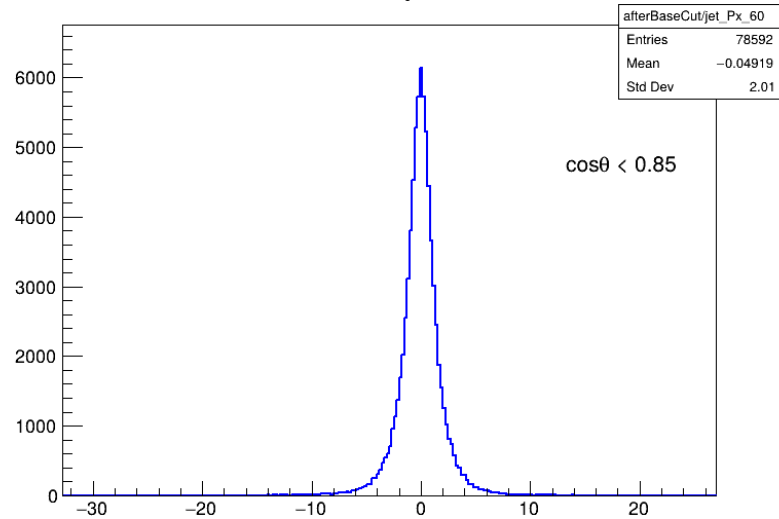
afterBaseCut/jet_P_160



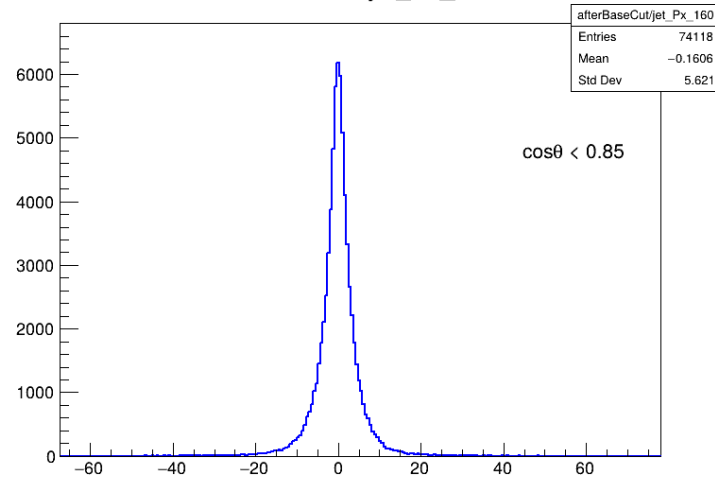
afterBaseCut/jet_P_360



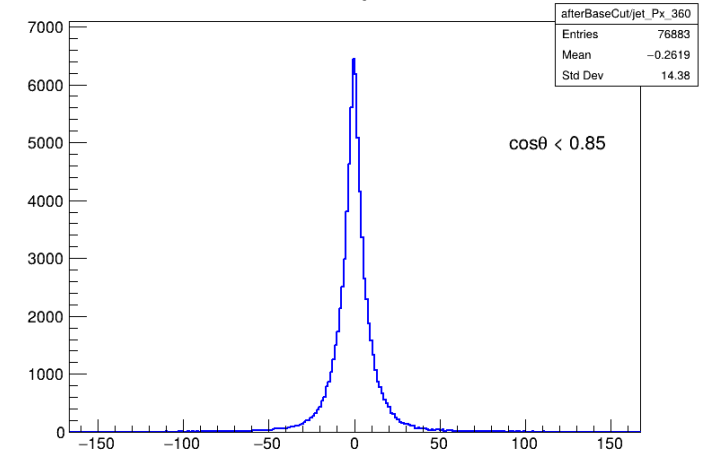
afterBaseCut/jet_Px_60

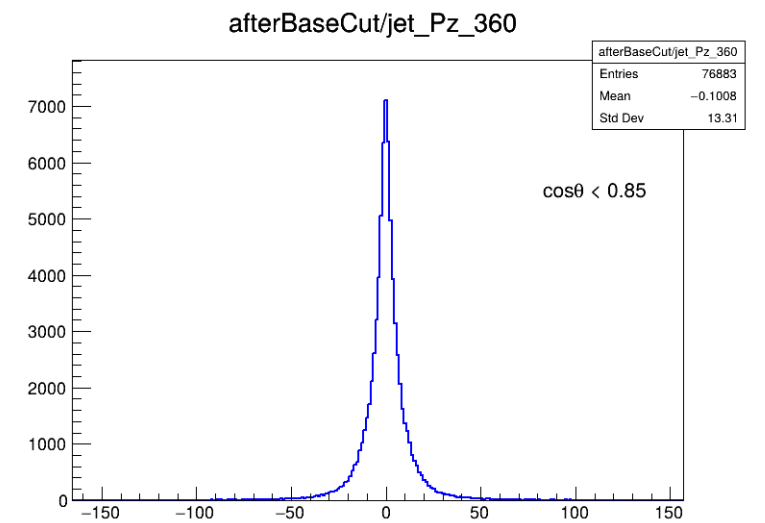
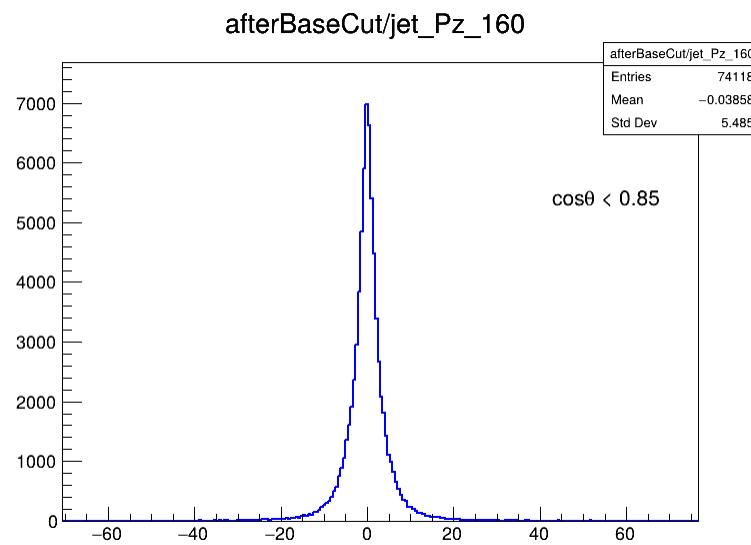
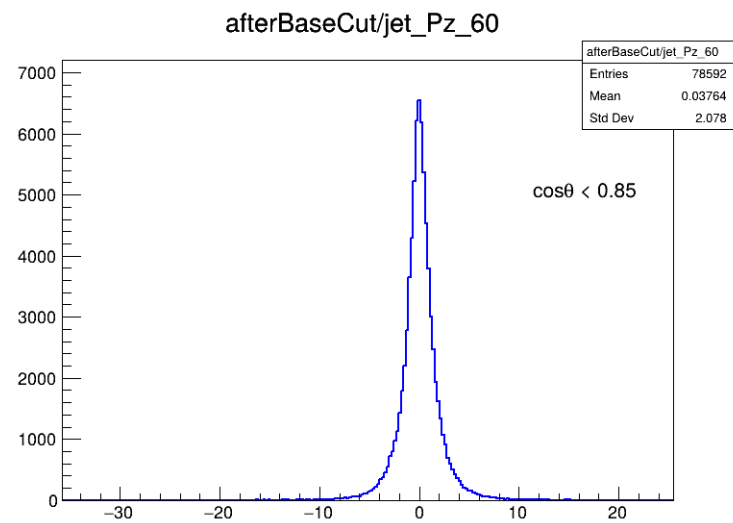
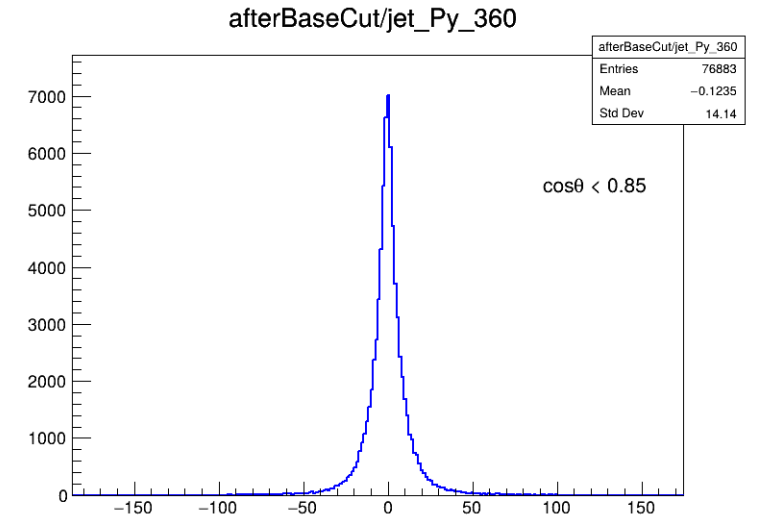
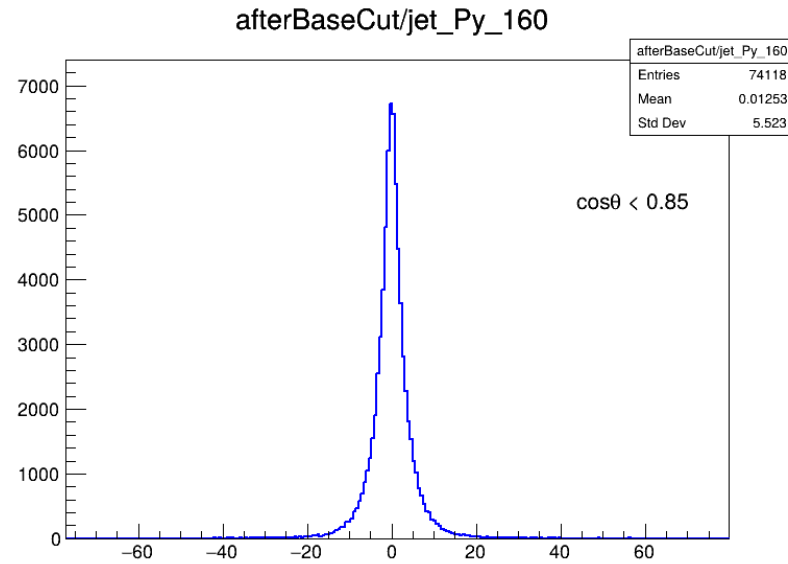
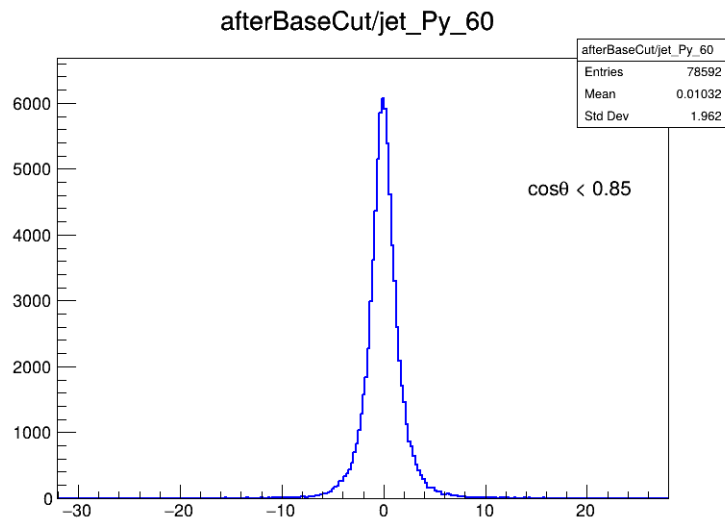


afterBaseCut/jet_Px_160

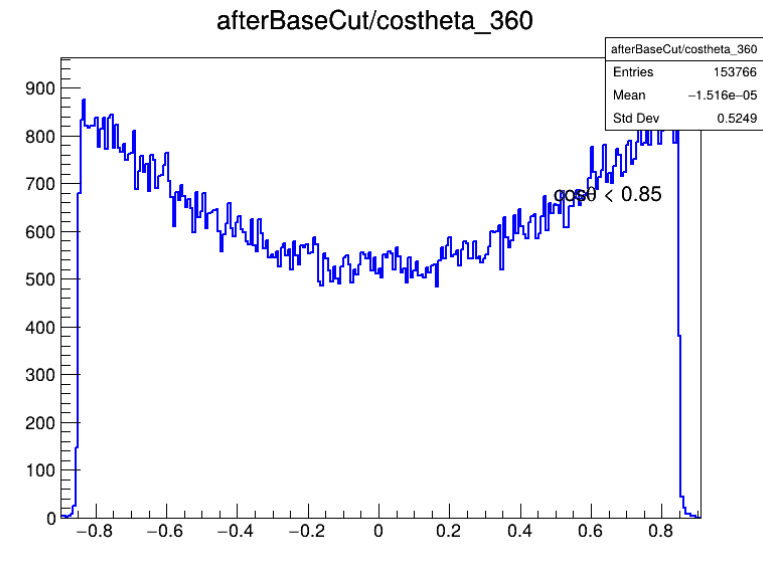
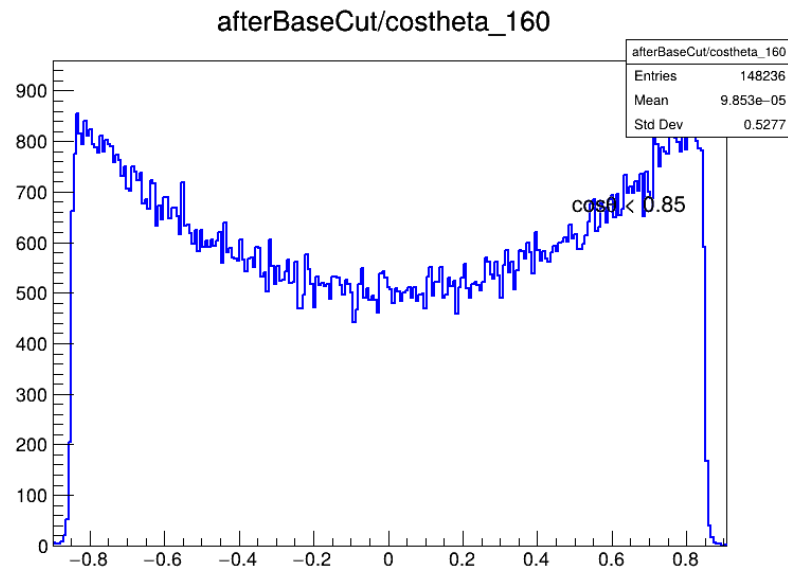
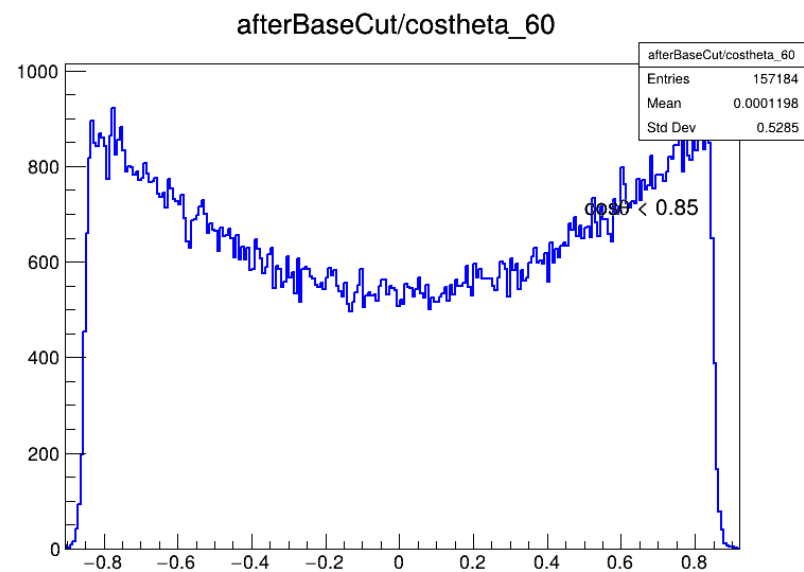


afterBaseCut/jet_Px_360



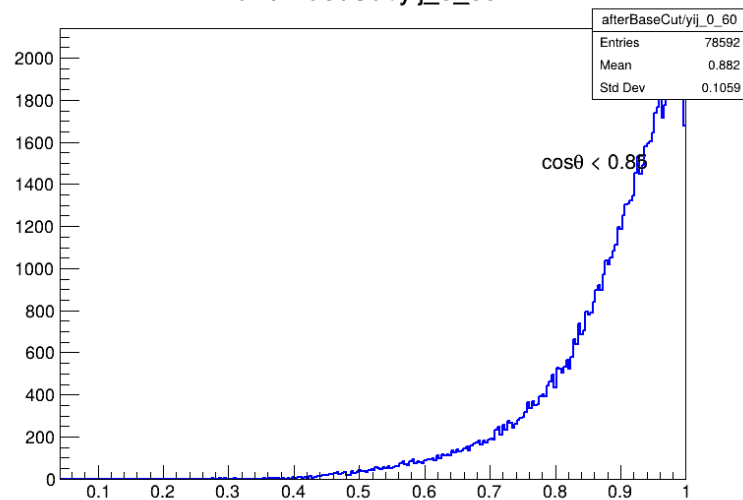


cos θ

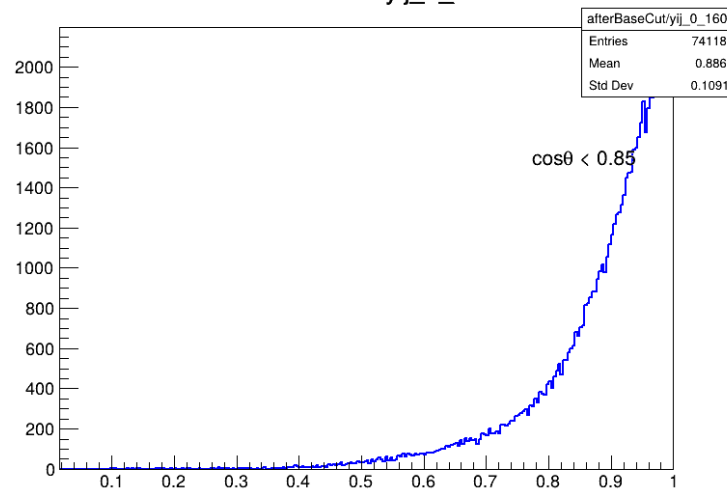


d_{12}

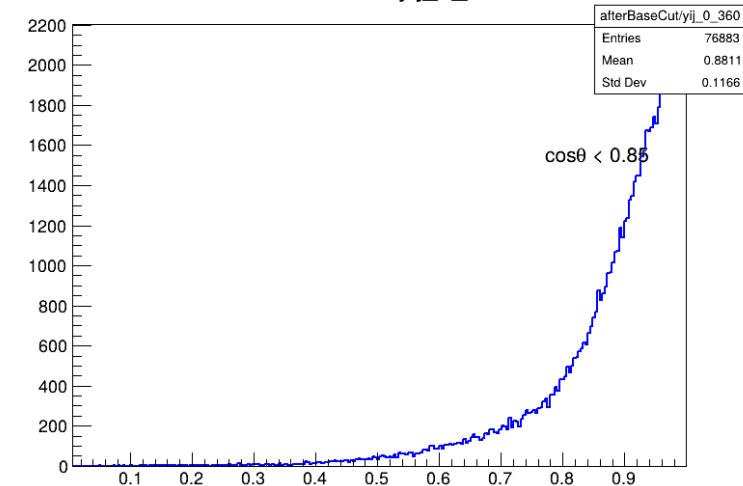
afterBaseCut/yij_0_60



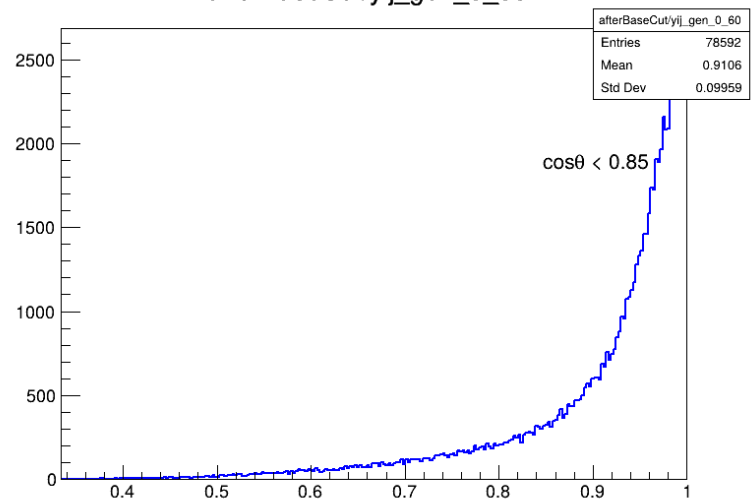
afterBaseCut/yij_0_160



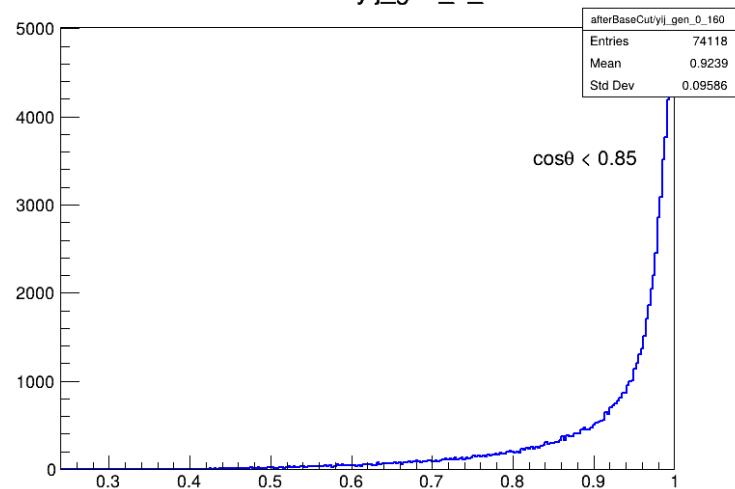
afterBaseCut/yij_0_360



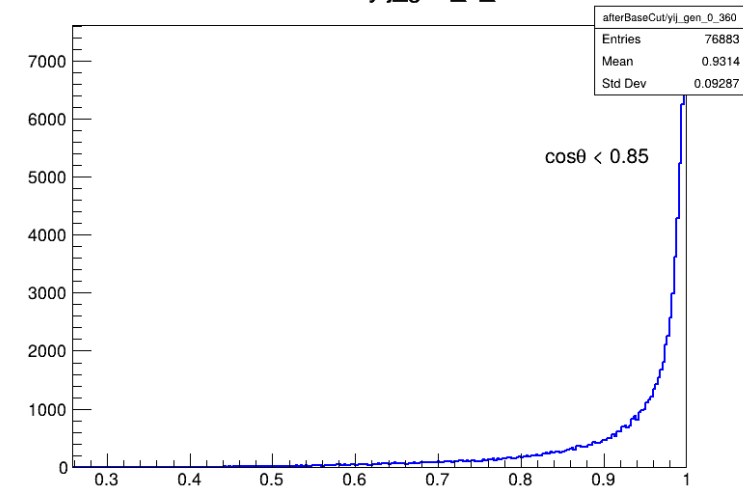
afterBaseCut/yij_gen_0_60



afterBaseCut/yij_gen_0_160

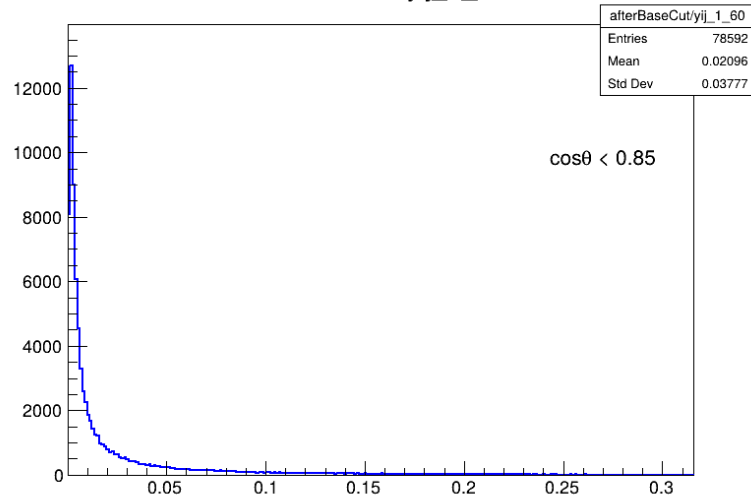


afterBaseCut/yij_gen_0_360

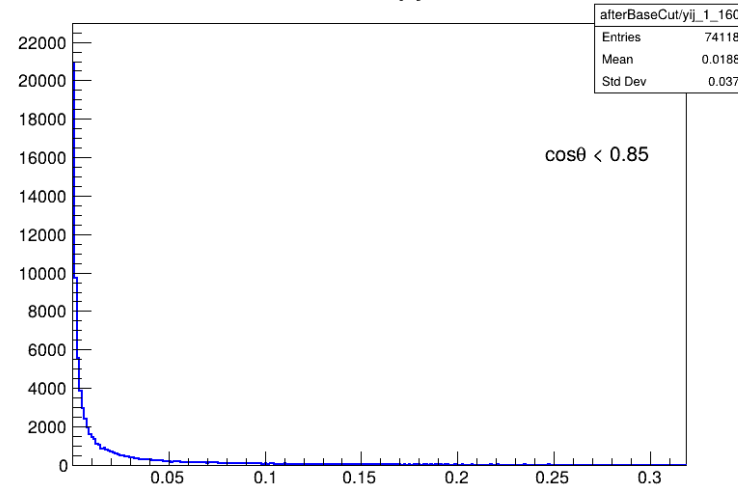


d₂₃

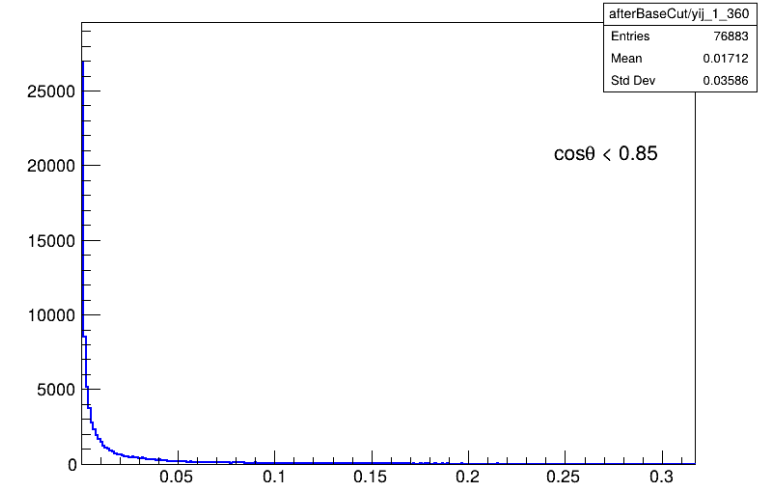
afterBaseCut/yij_1_60



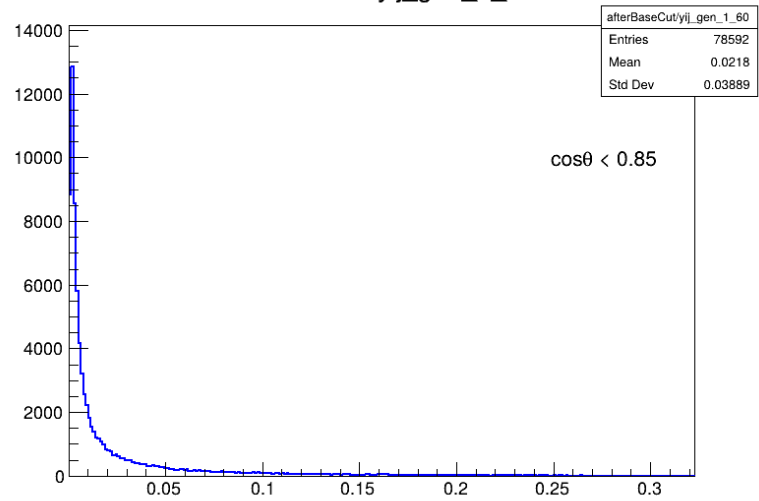
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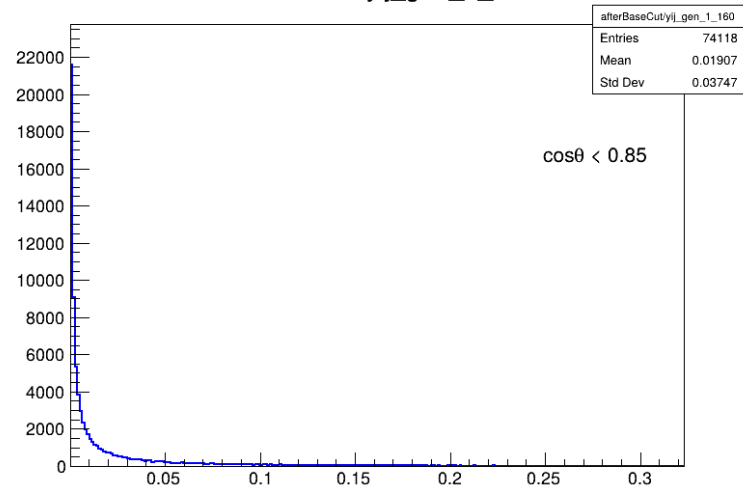
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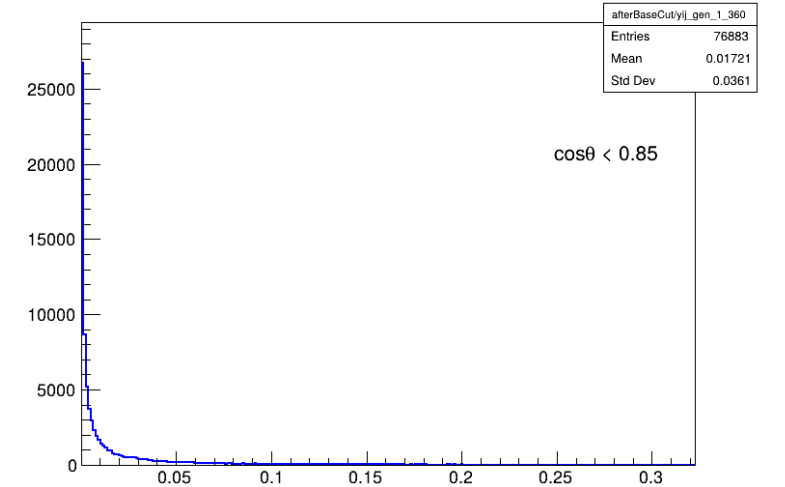
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afterBaseCut/yij_gen_1_160

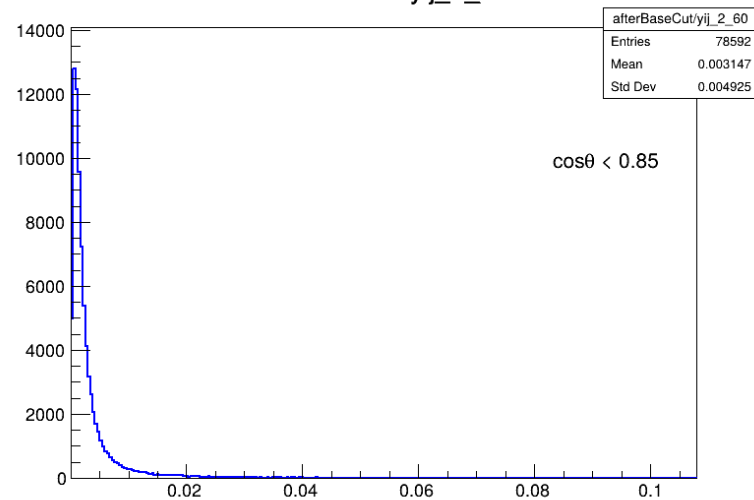


afterBaseCut/yij_gen_1_360

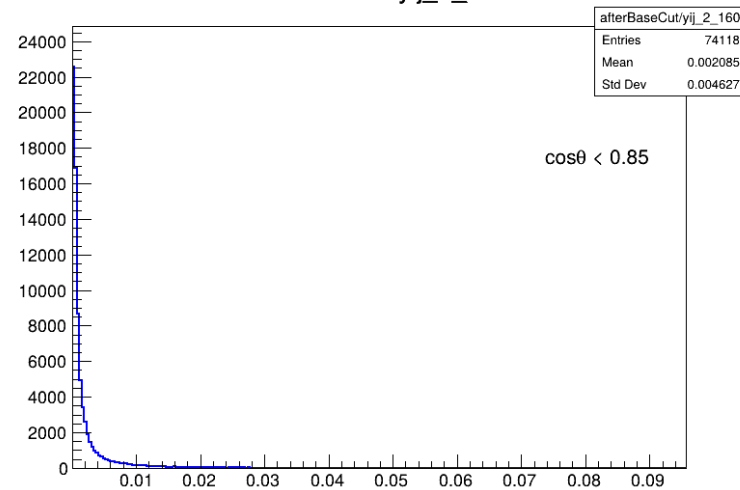


d₃₄

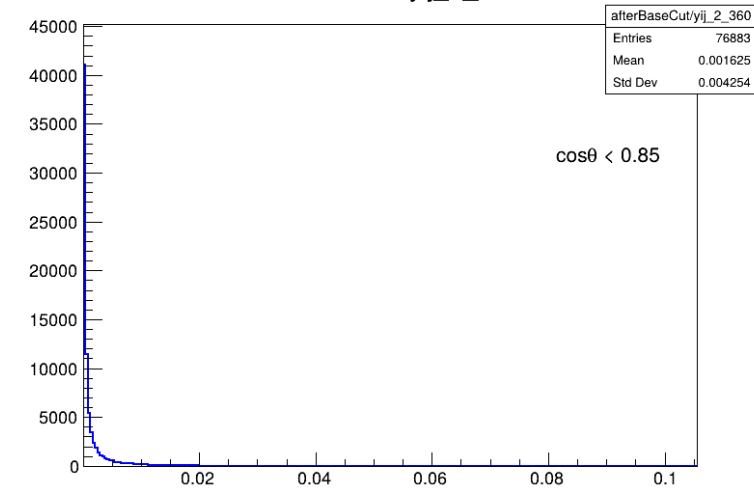
afterBaseCut/yij_2_60



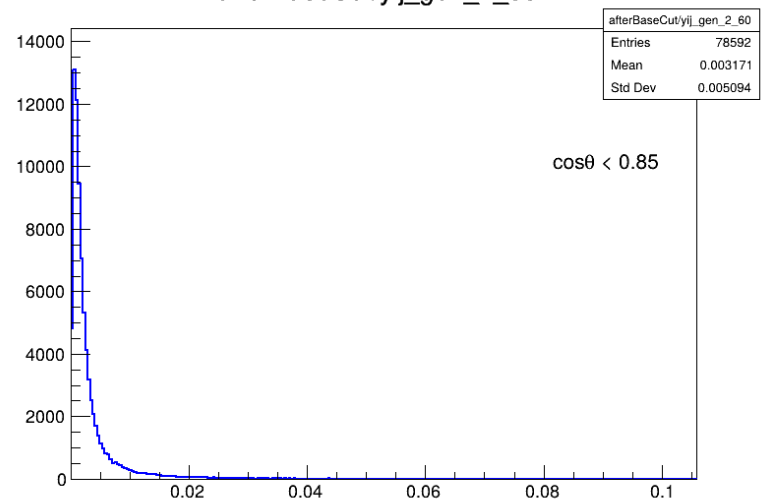
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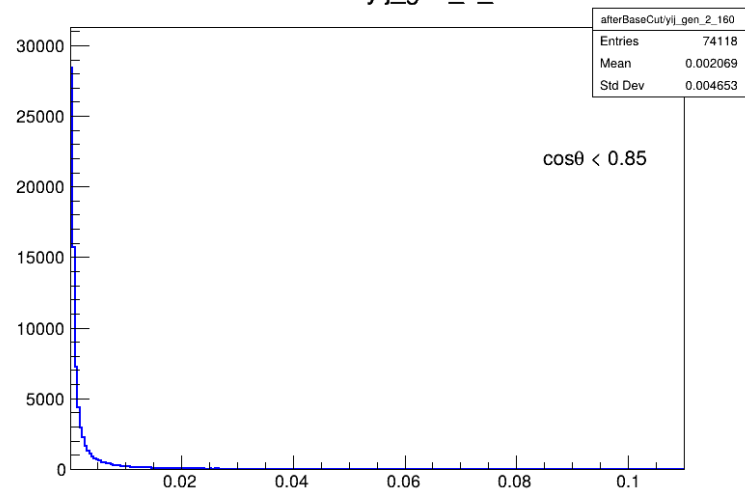
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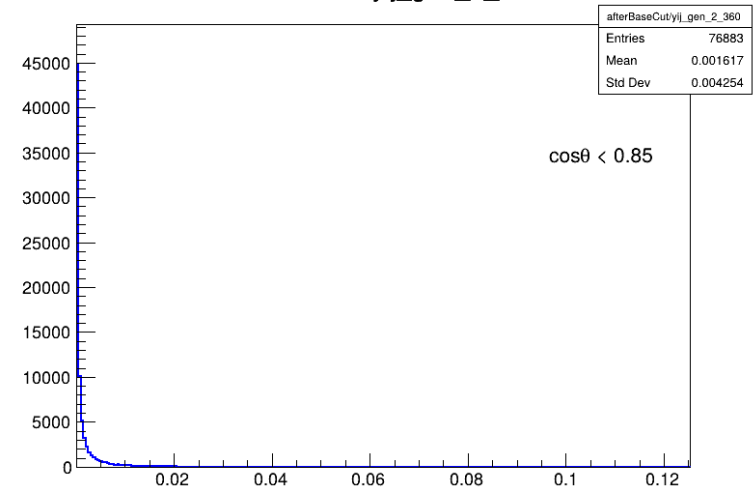
afterBaseCut/yij_gen_2_60



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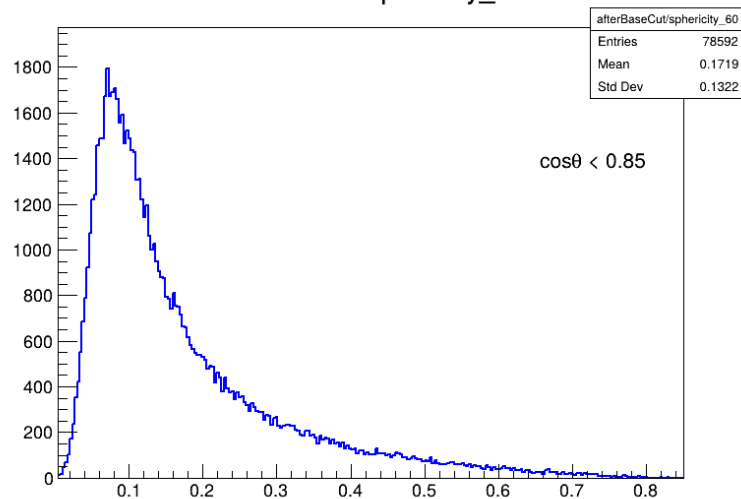


afterBaseCut/yij_gen_2_360

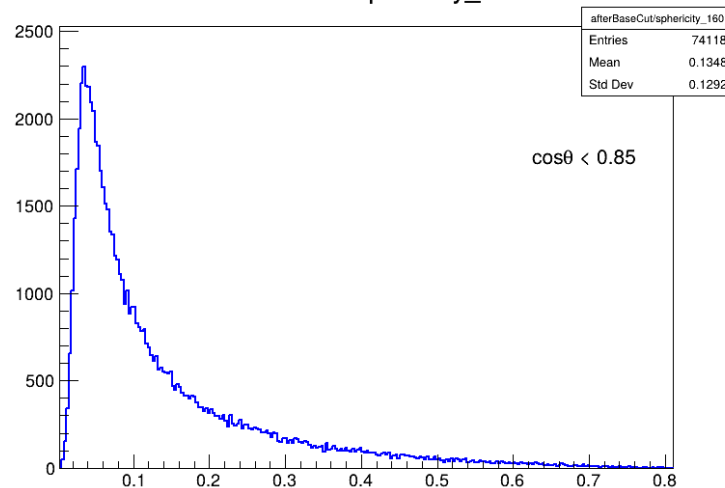


Sphericity & Thrust

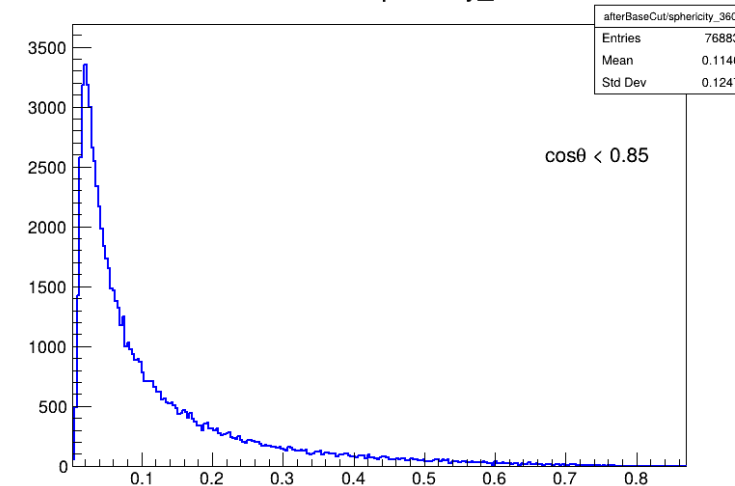
afterBaseCut/sphericity_60



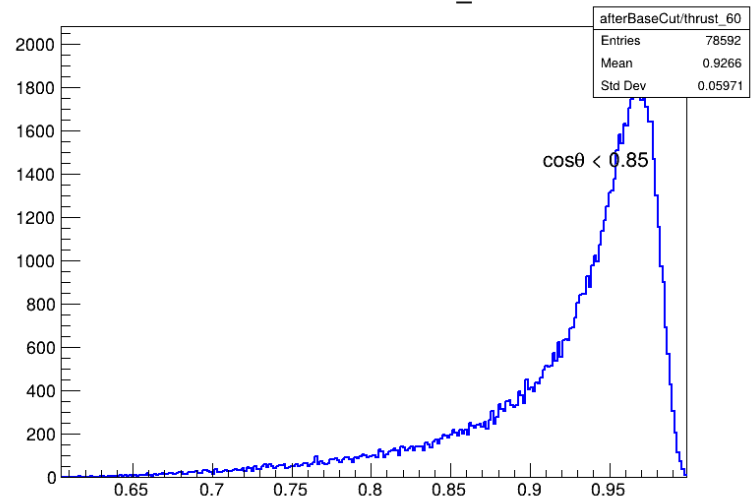
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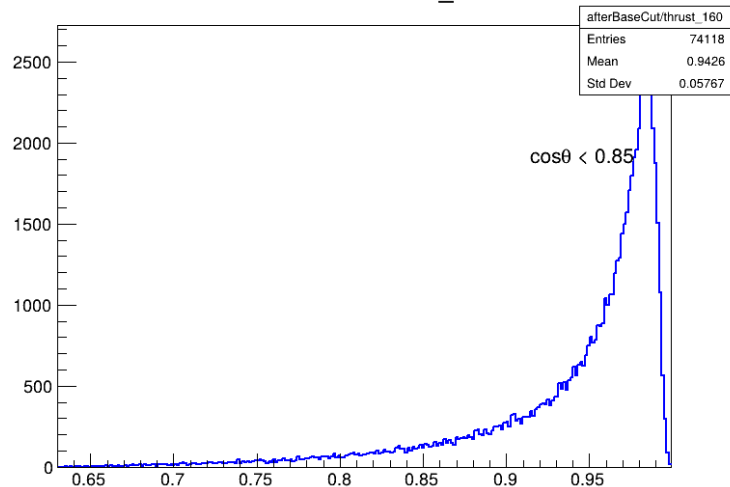
afterBaseCut/sphericity_360



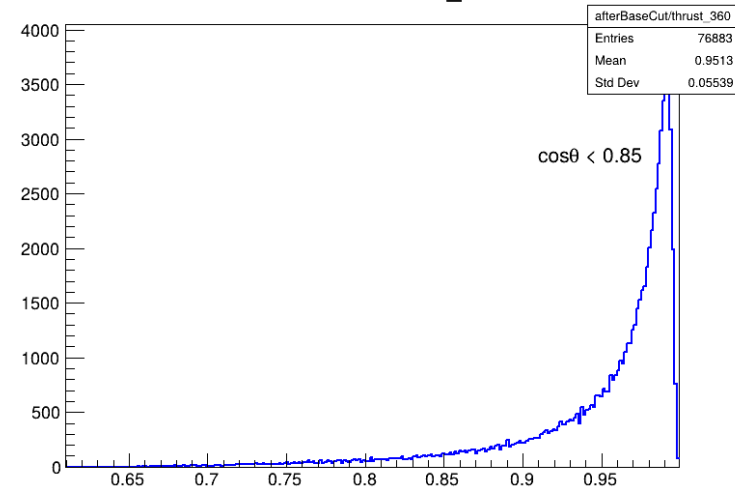
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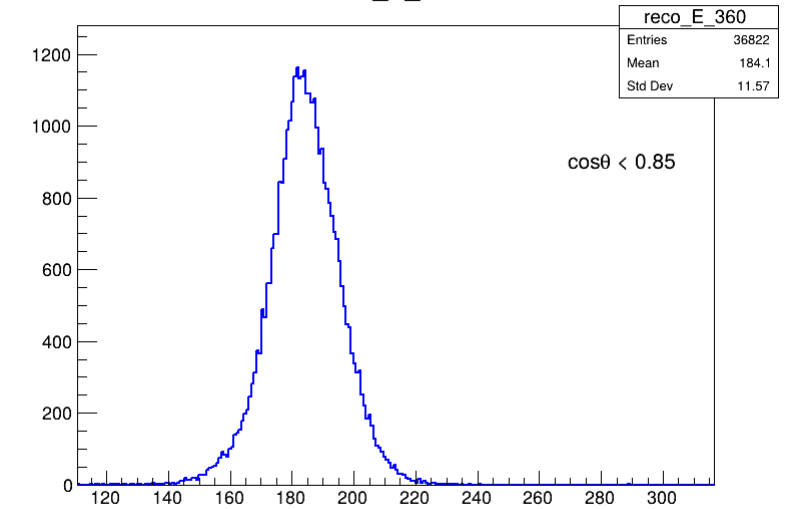
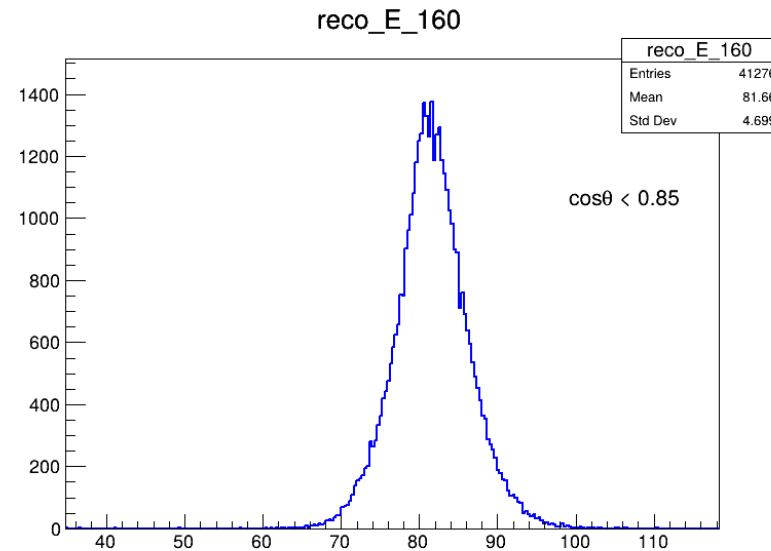
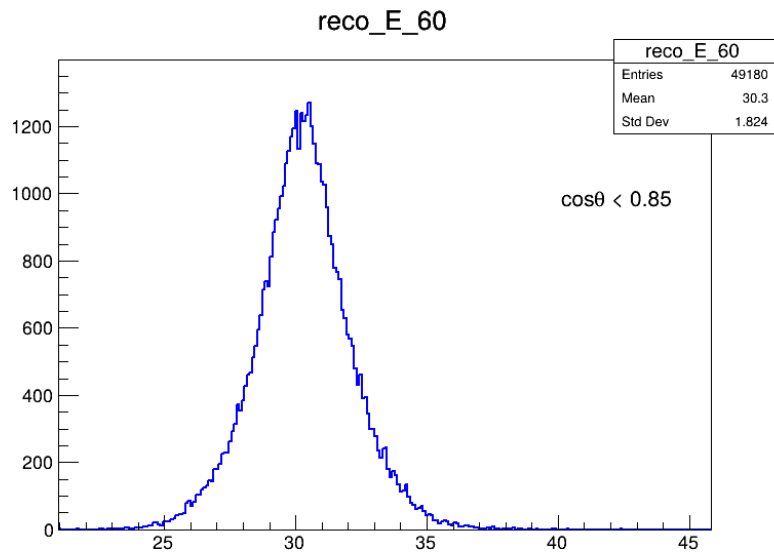
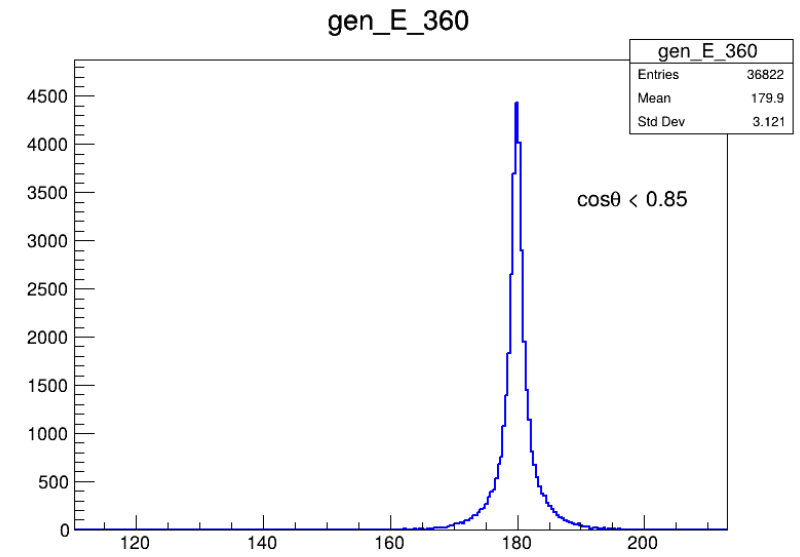
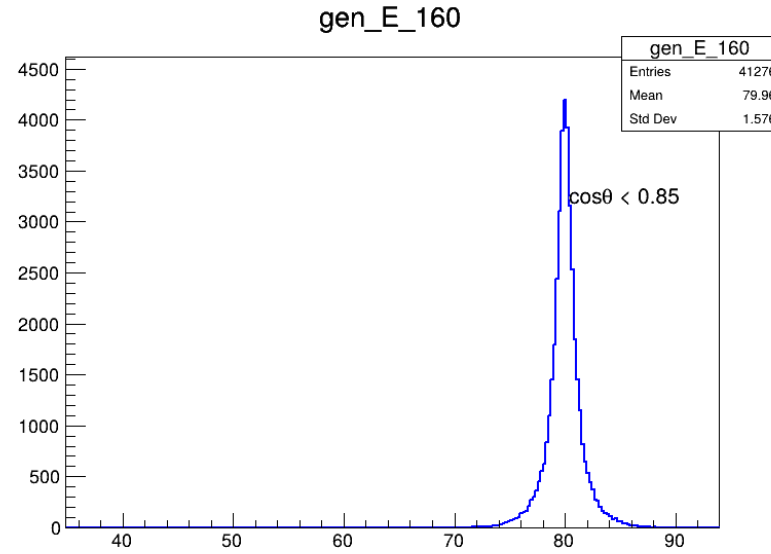
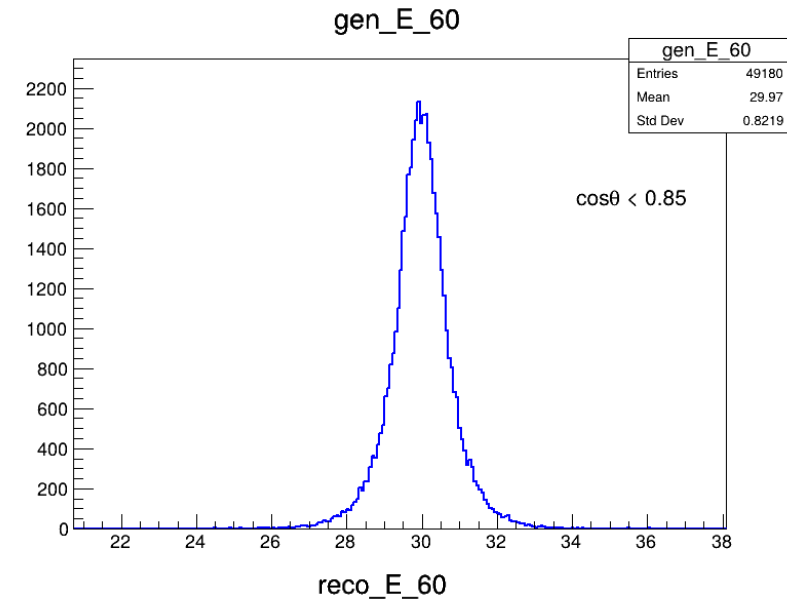
afterBaseCut/thrust_160



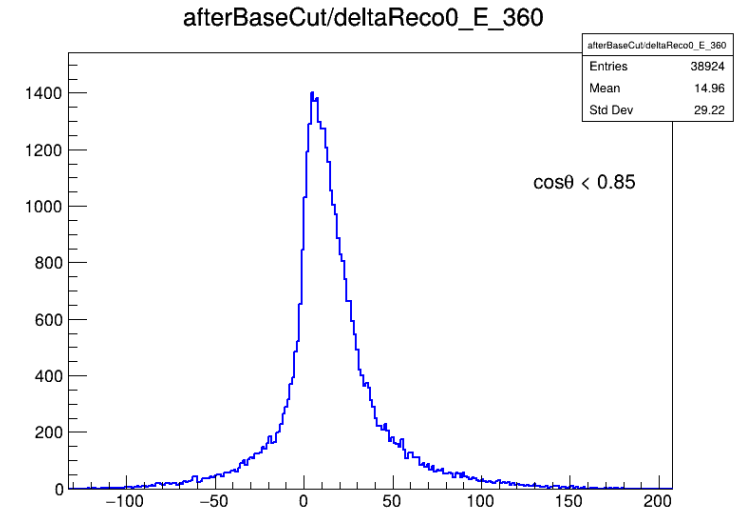
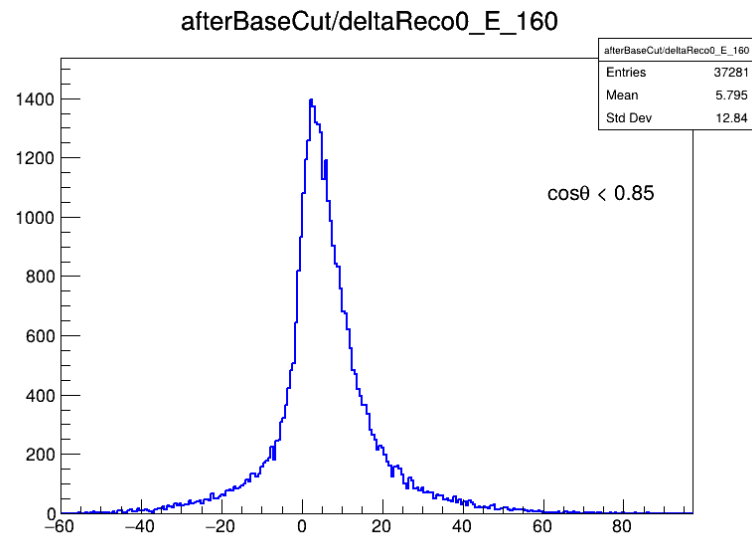
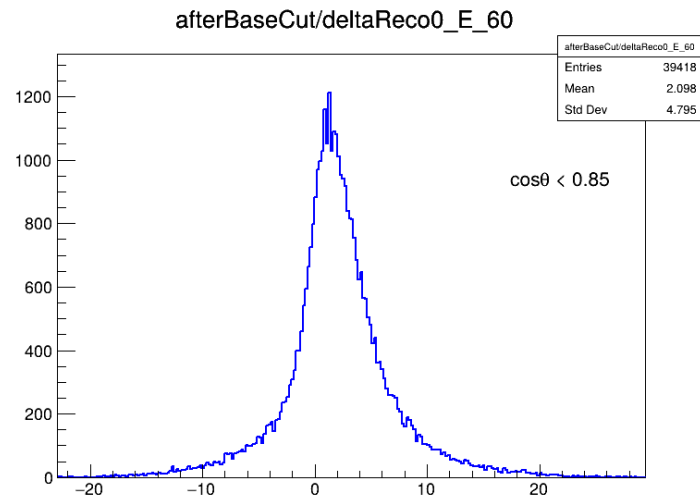
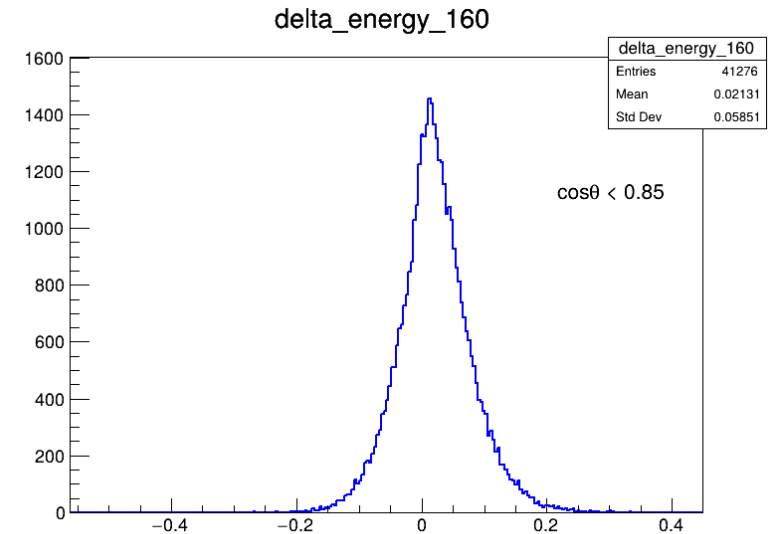
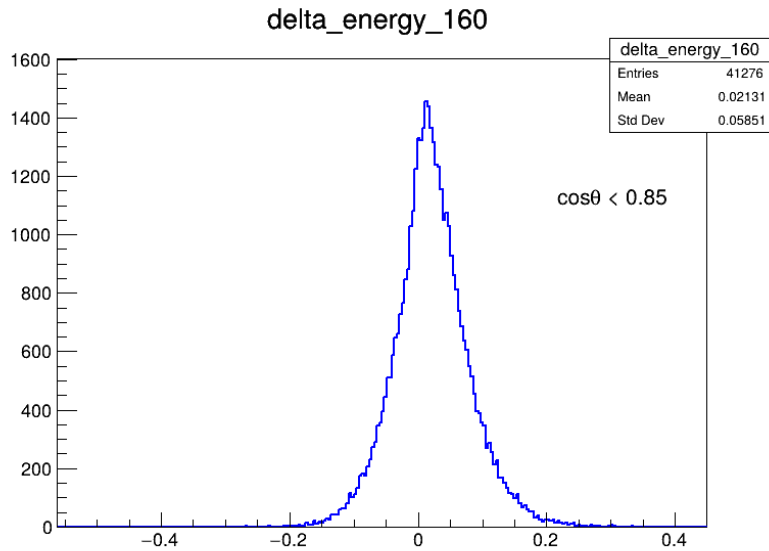
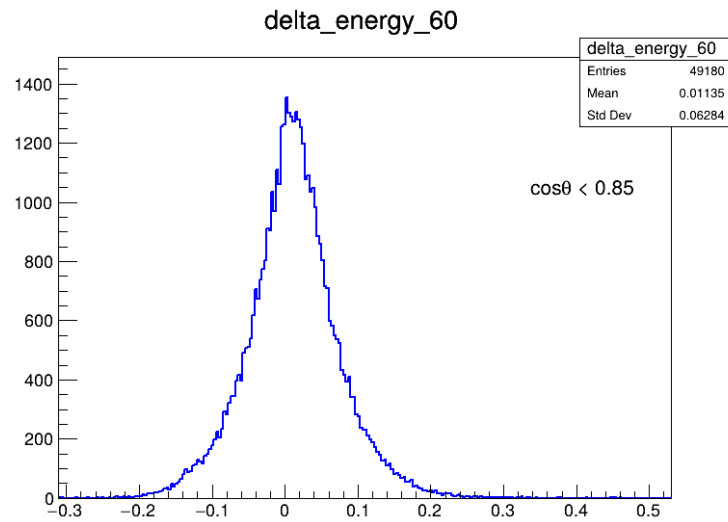
afterBaseCut/thrust_360



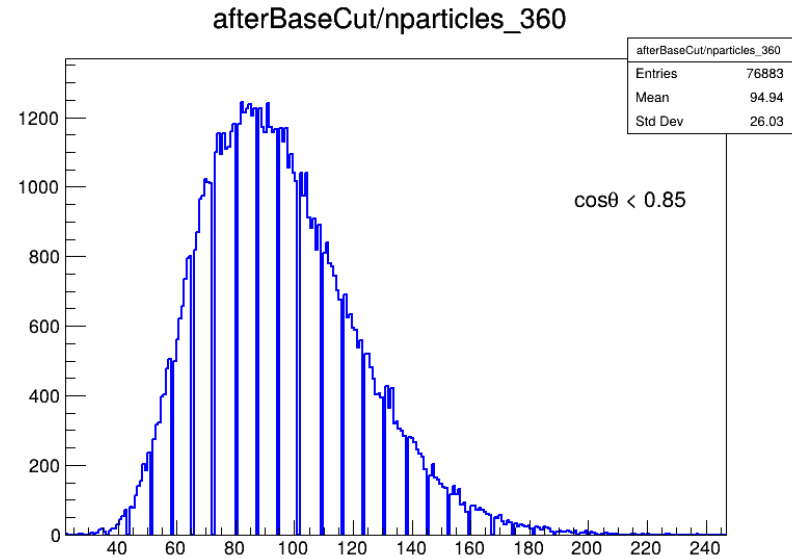
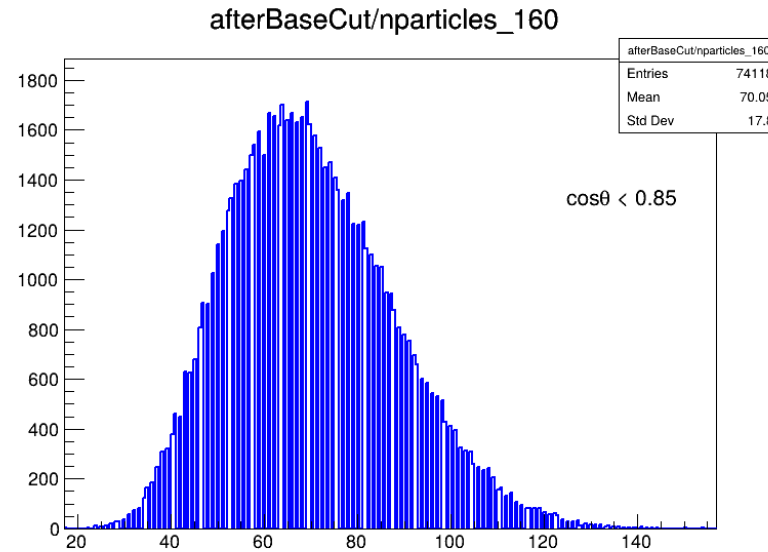
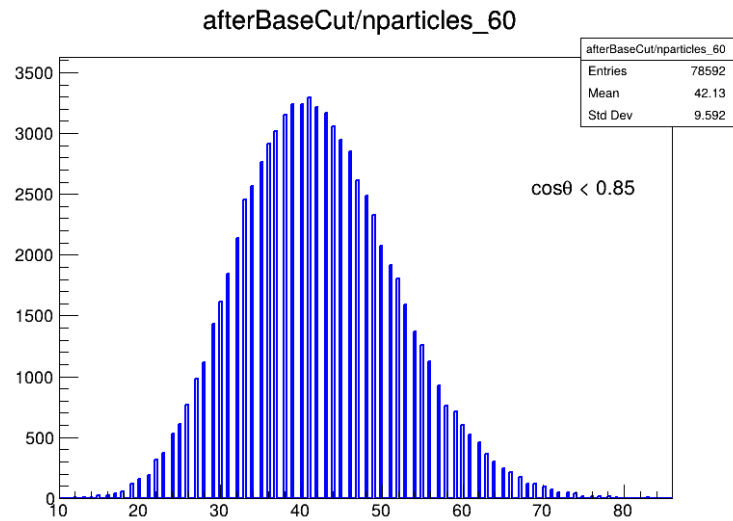
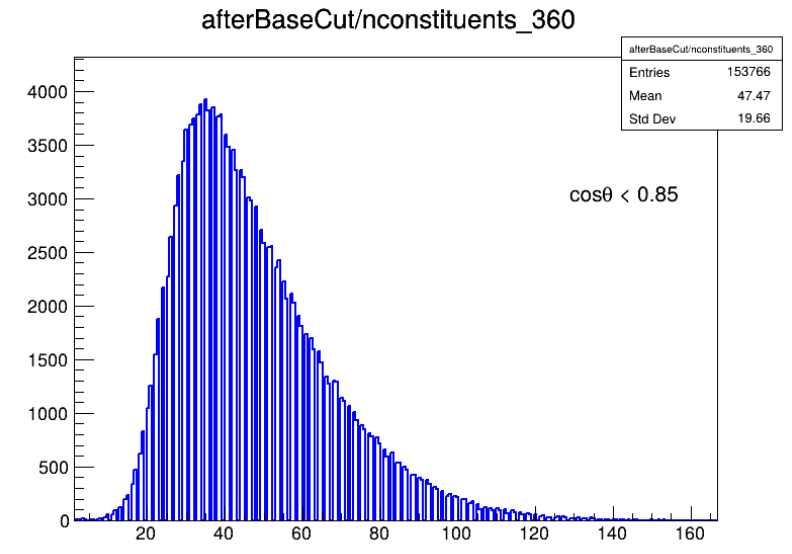
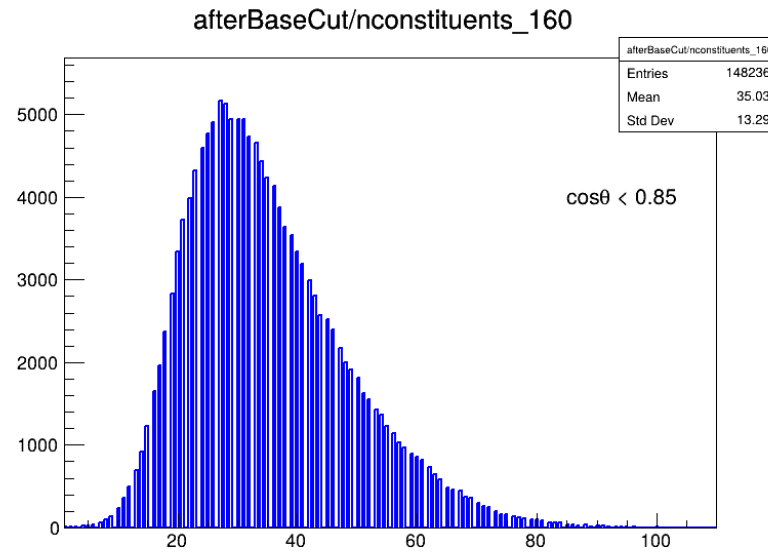
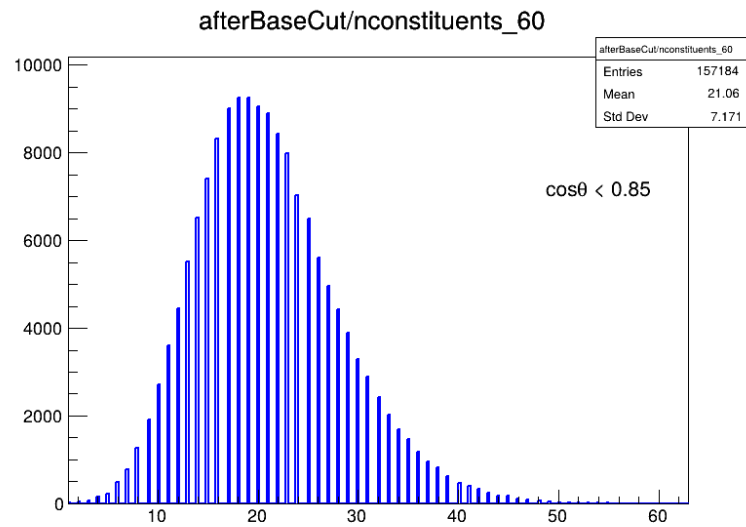
Energy



Energy

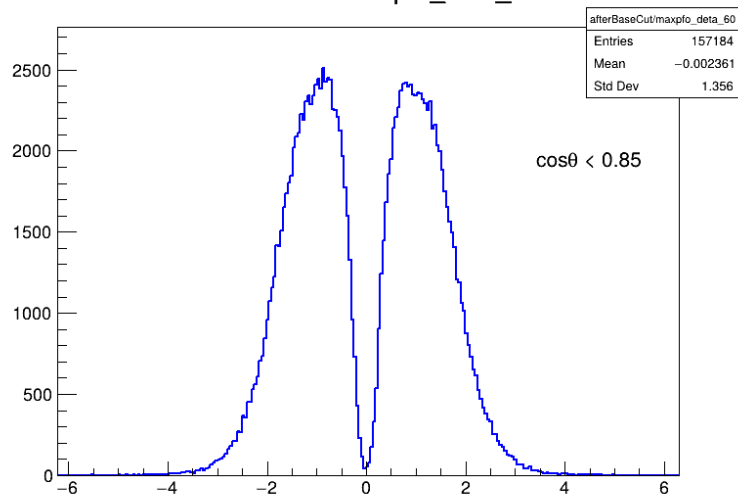


Component

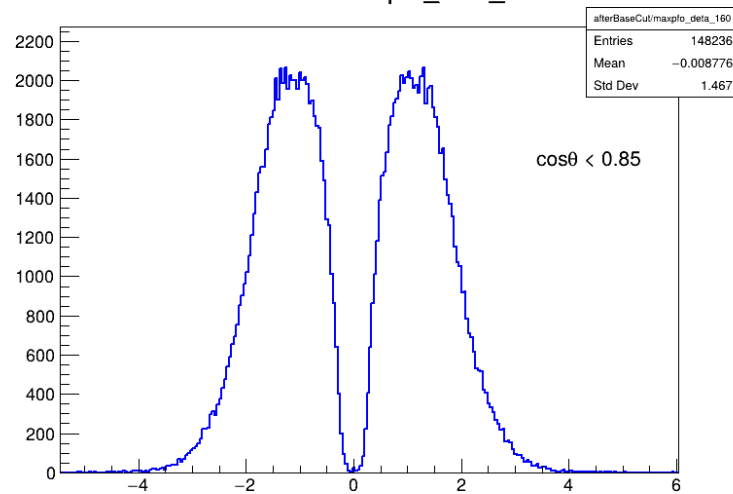


Shape

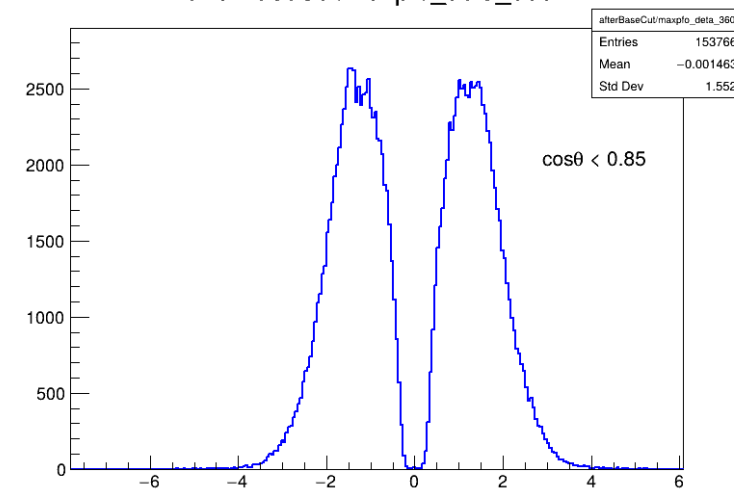
afterBaseCut/maxpfo_deta_60



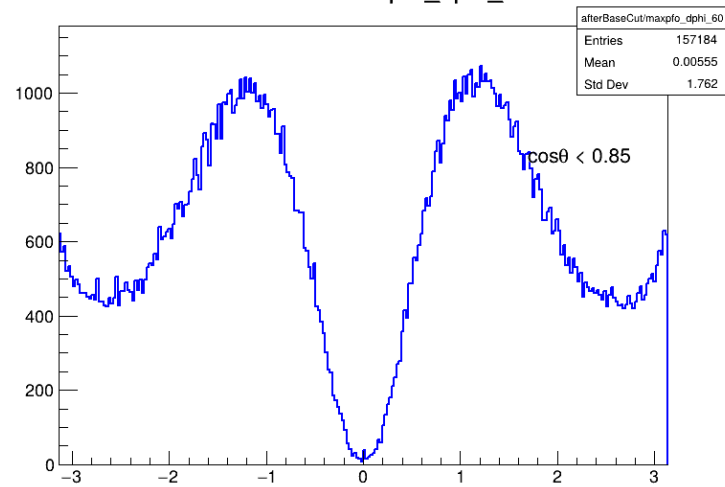
afterBaseCut/maxpfo_deta_160



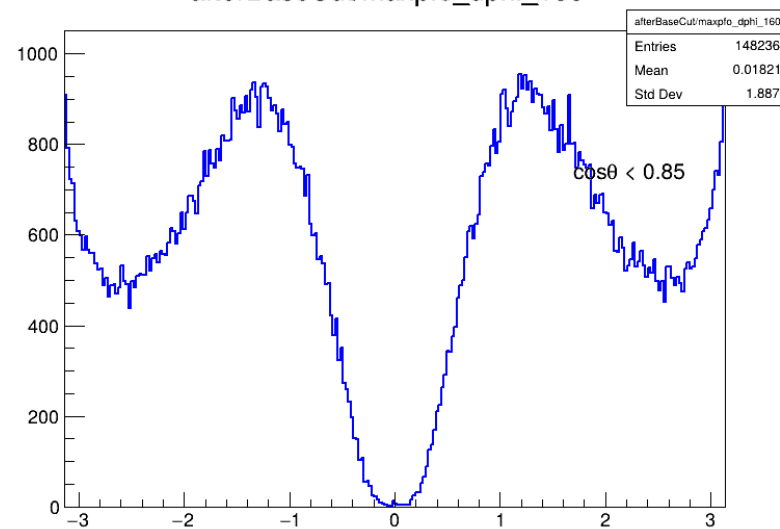
afterBaseCut/maxpfo_deta_360



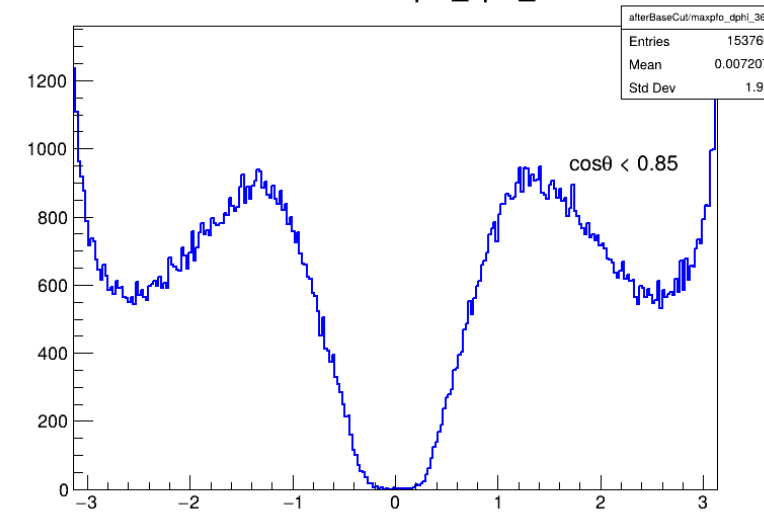
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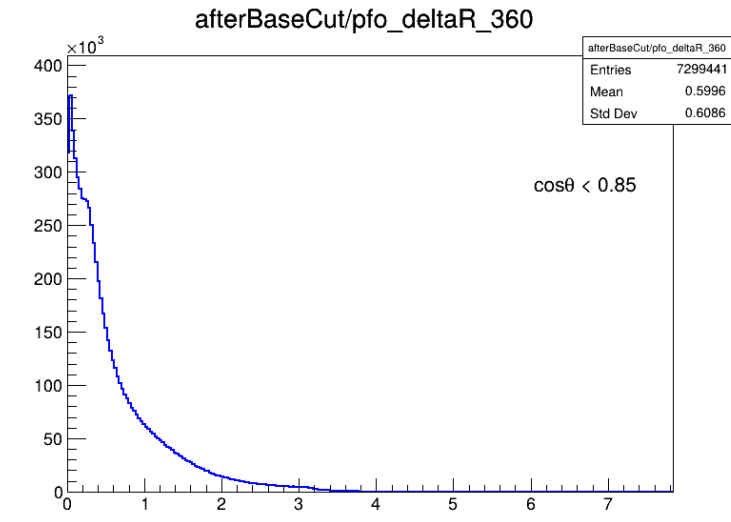
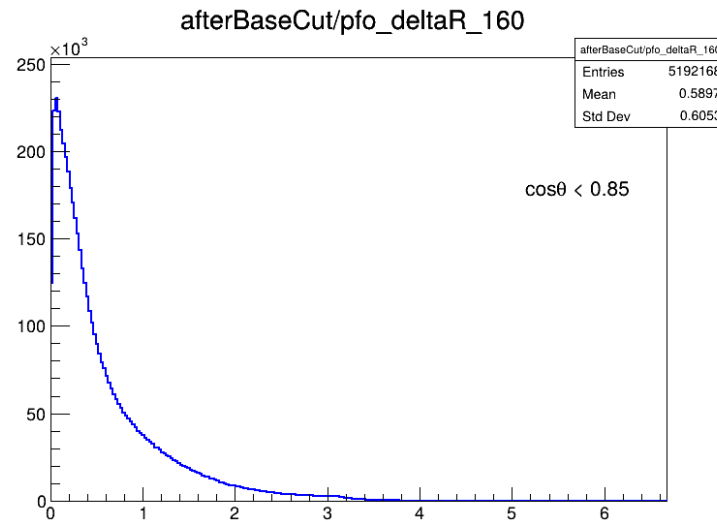
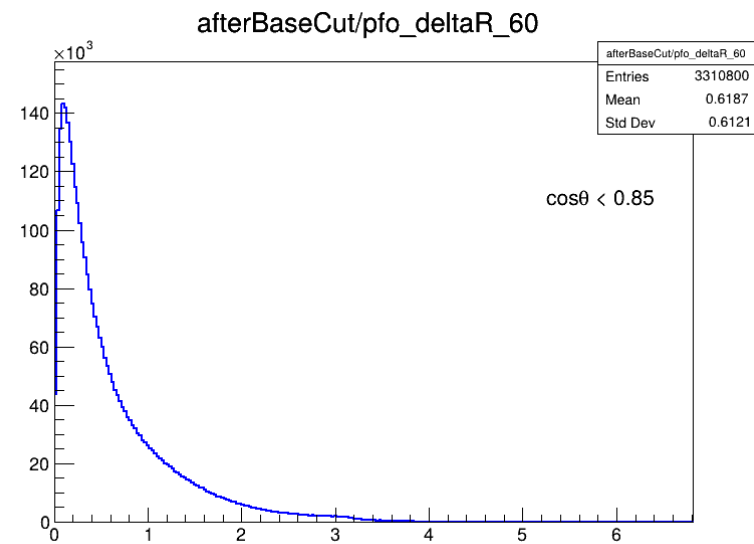
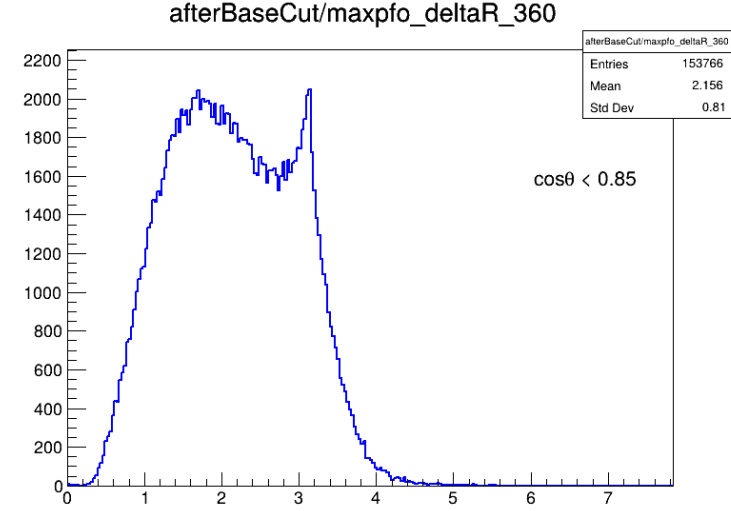
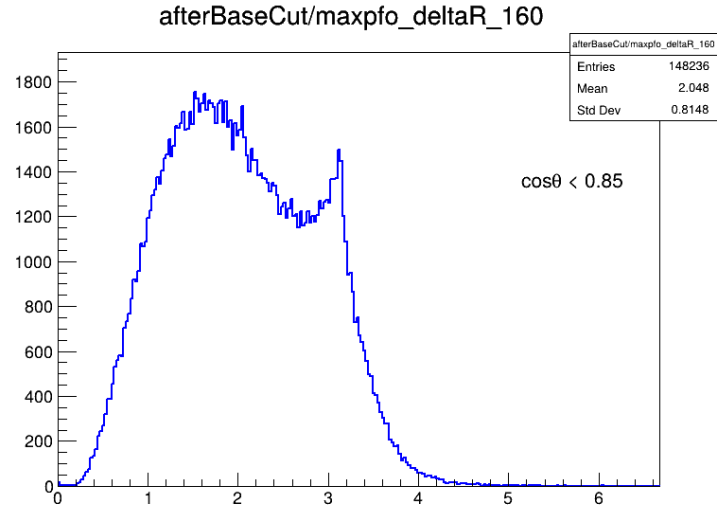
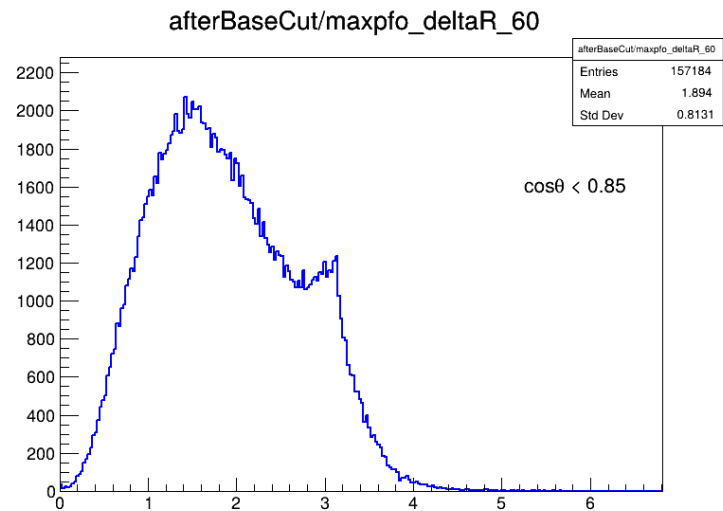
afterBaseCut/maxpfo_dphi_160



afterBaseCut/maxpfo_dphi_360

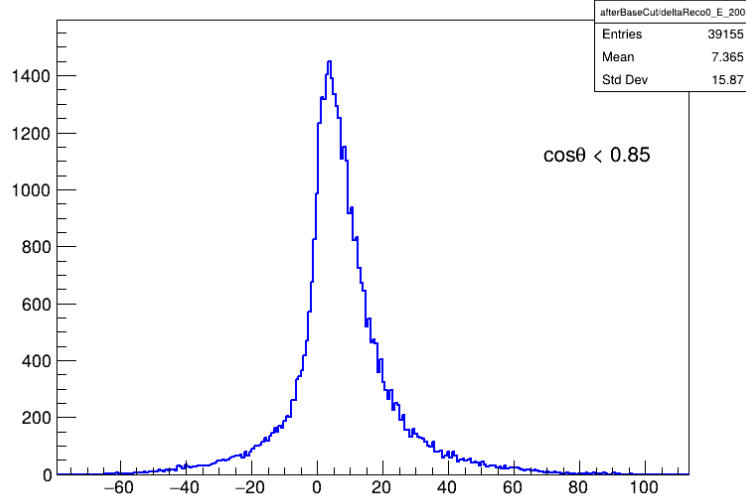


Shape

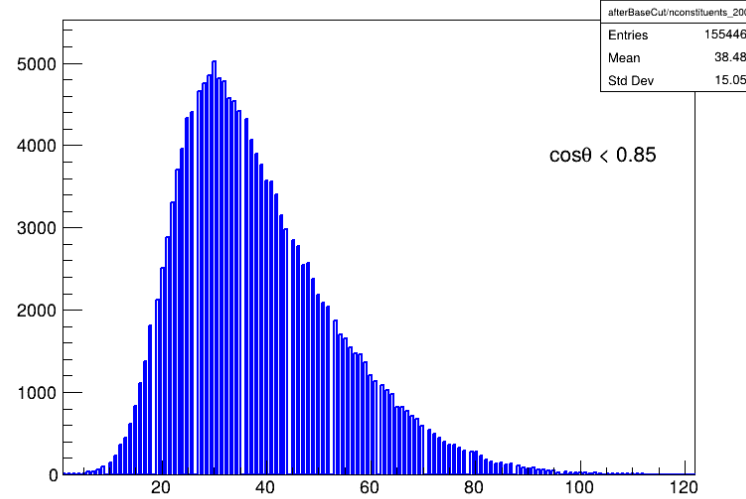


After Base Cut

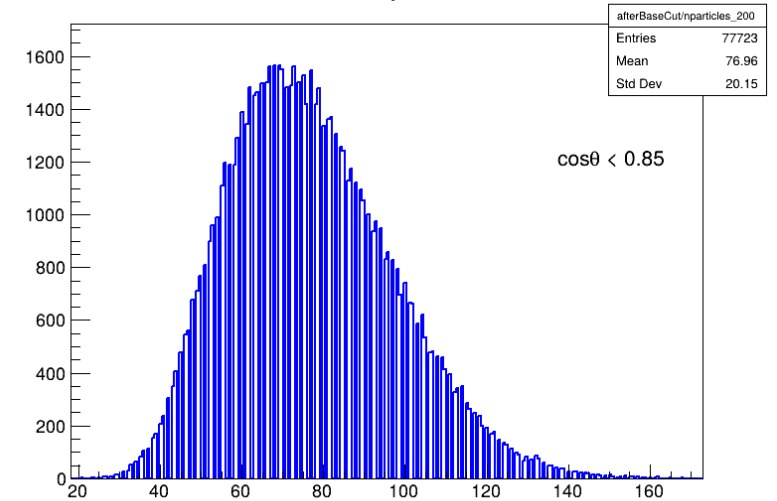
afterBaseCut/deltaReco0_E_200



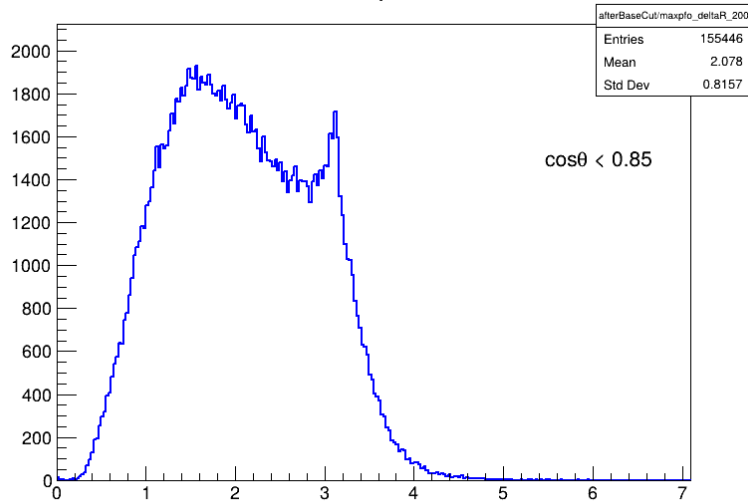
afterBaseCut/nconstituents_200



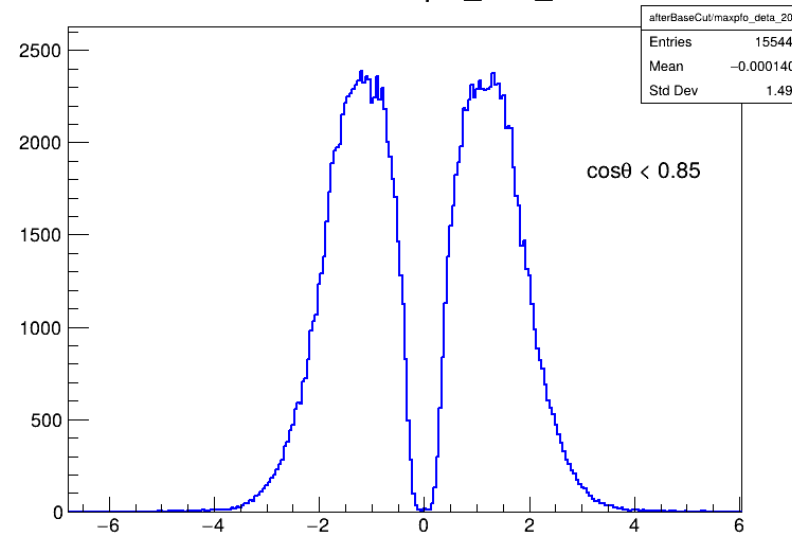
afterBaseCut/nparticles_200



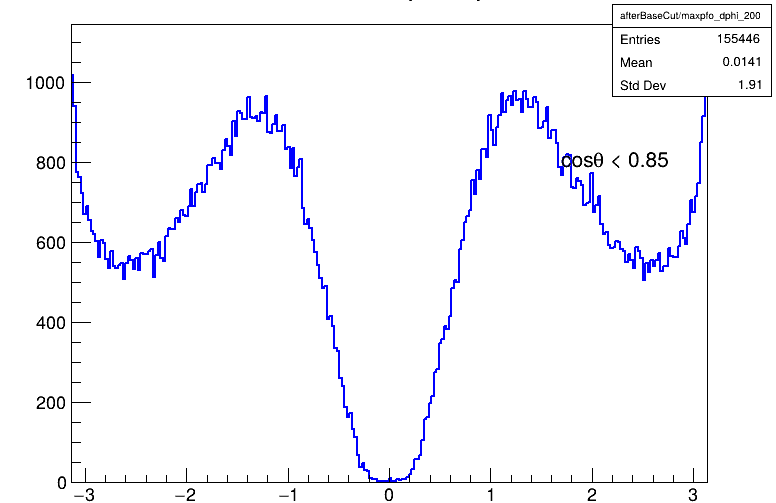
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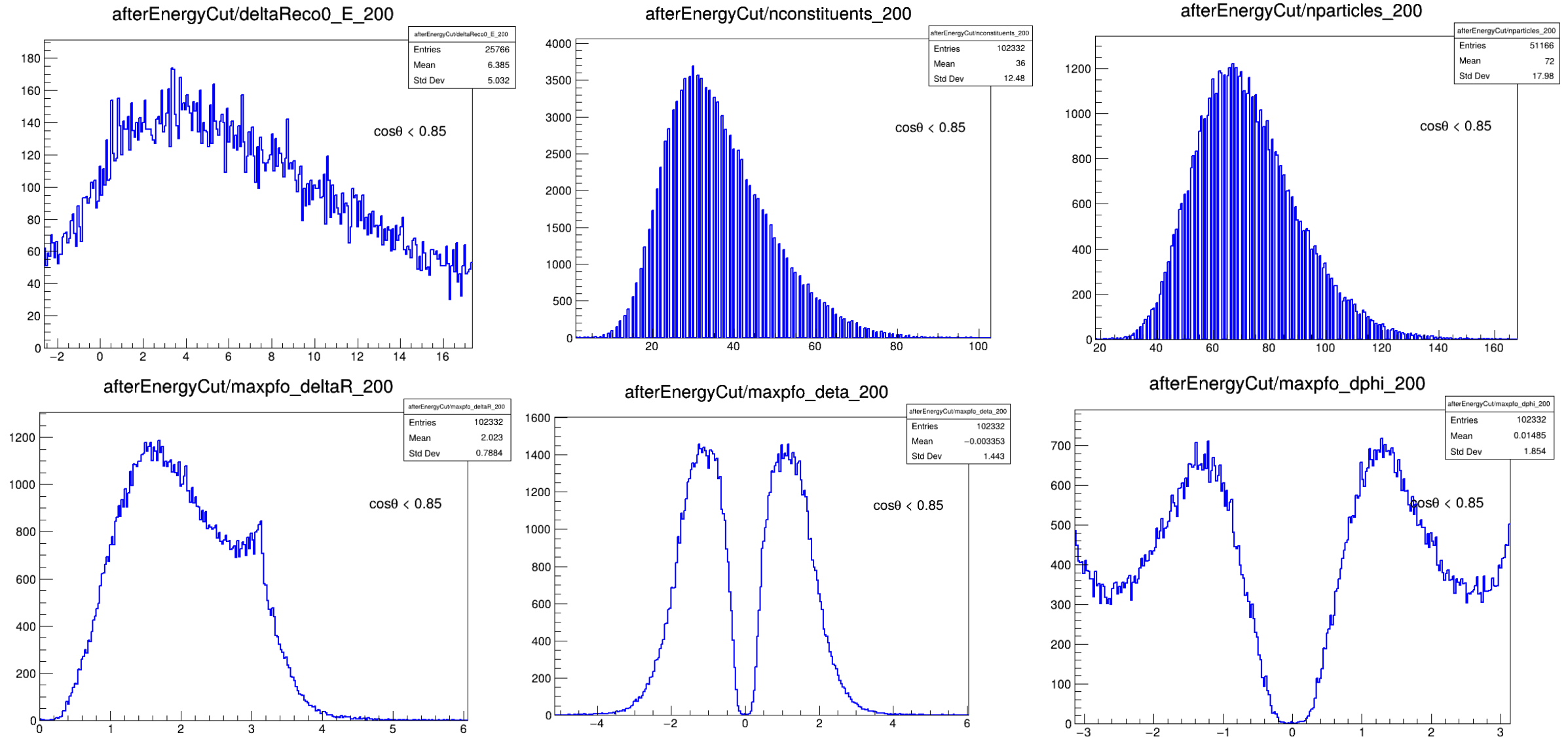
afterBaseCut/maxpfo_delta_200



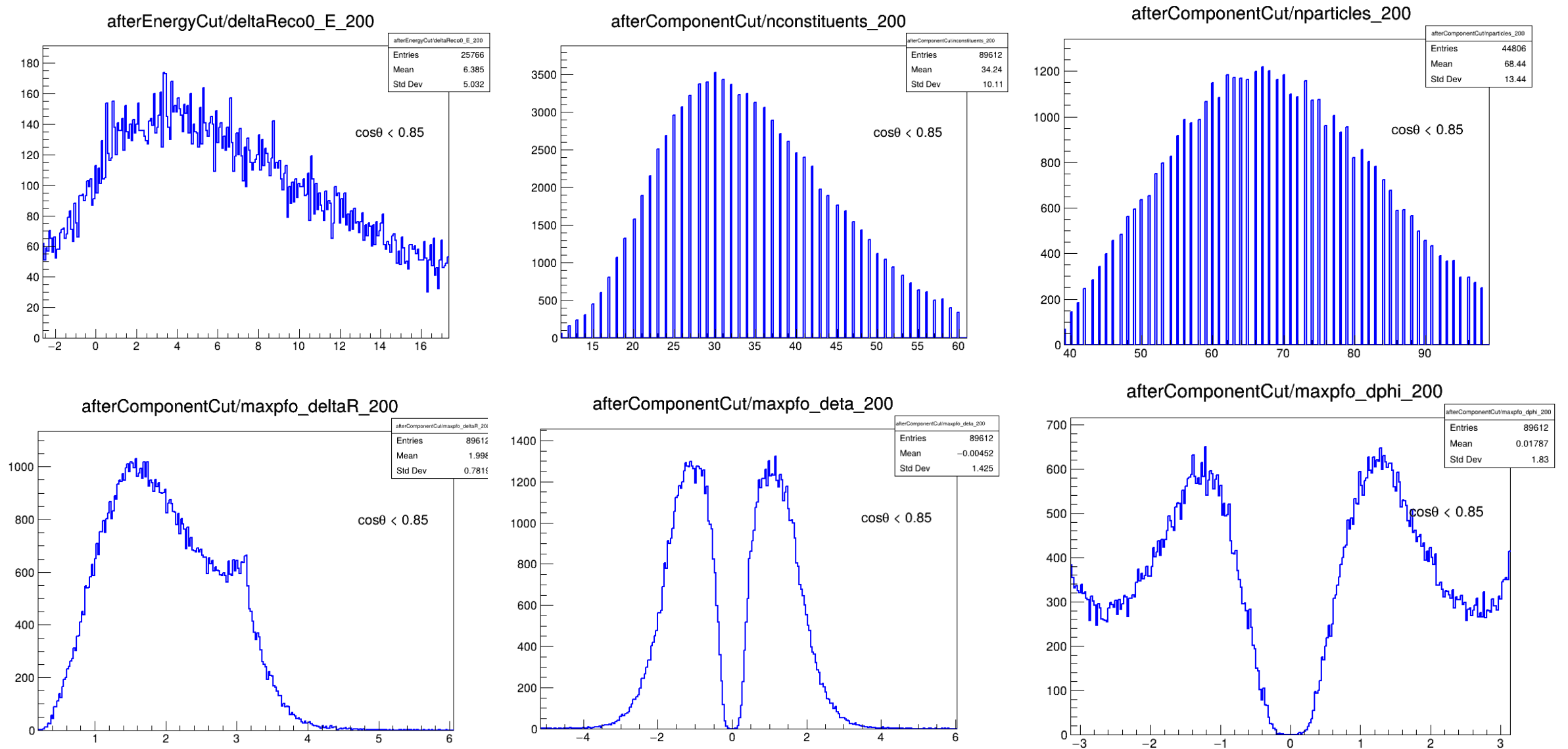
afterBaseCut/maxpfo_dphi_200



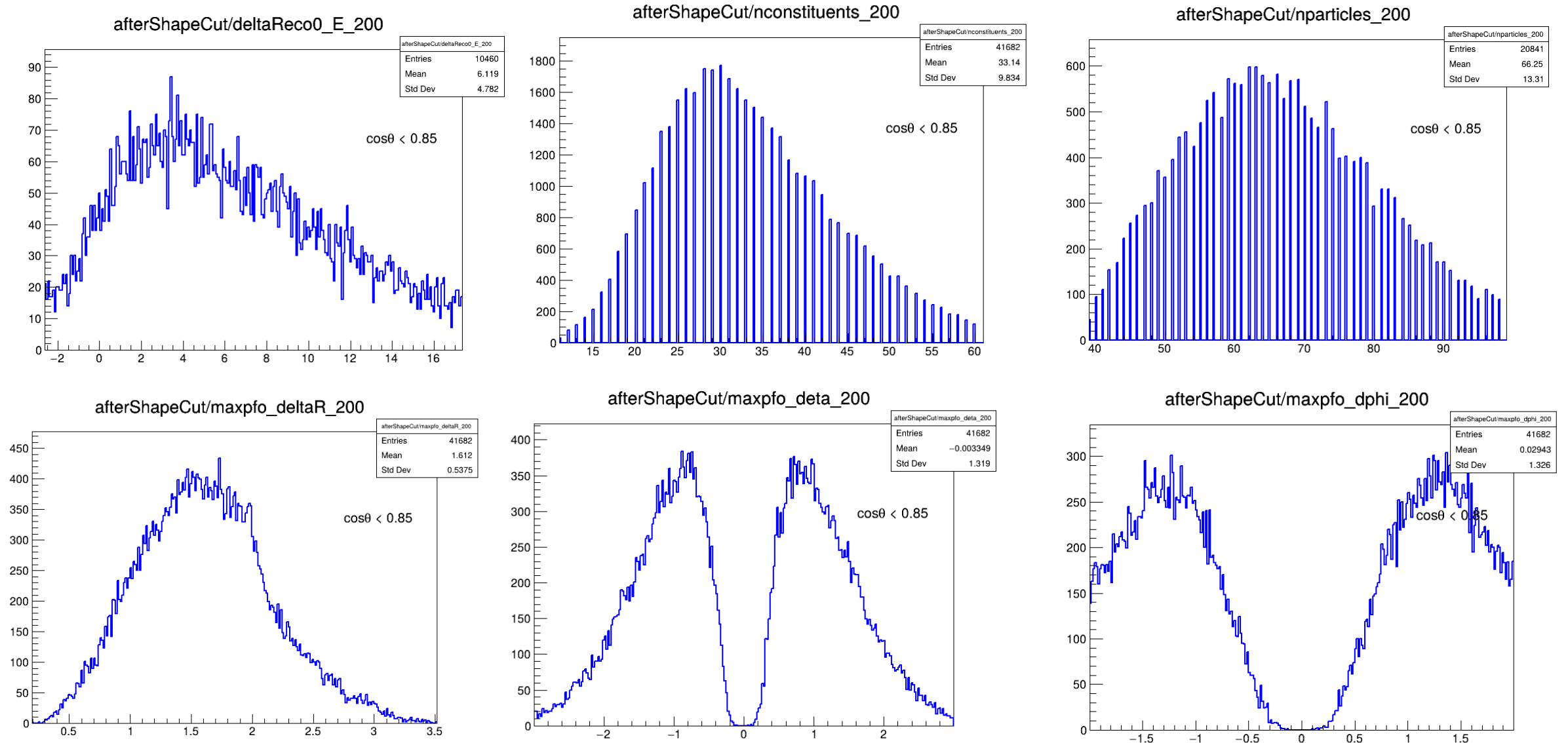
After Energy Cut



After Component Cut

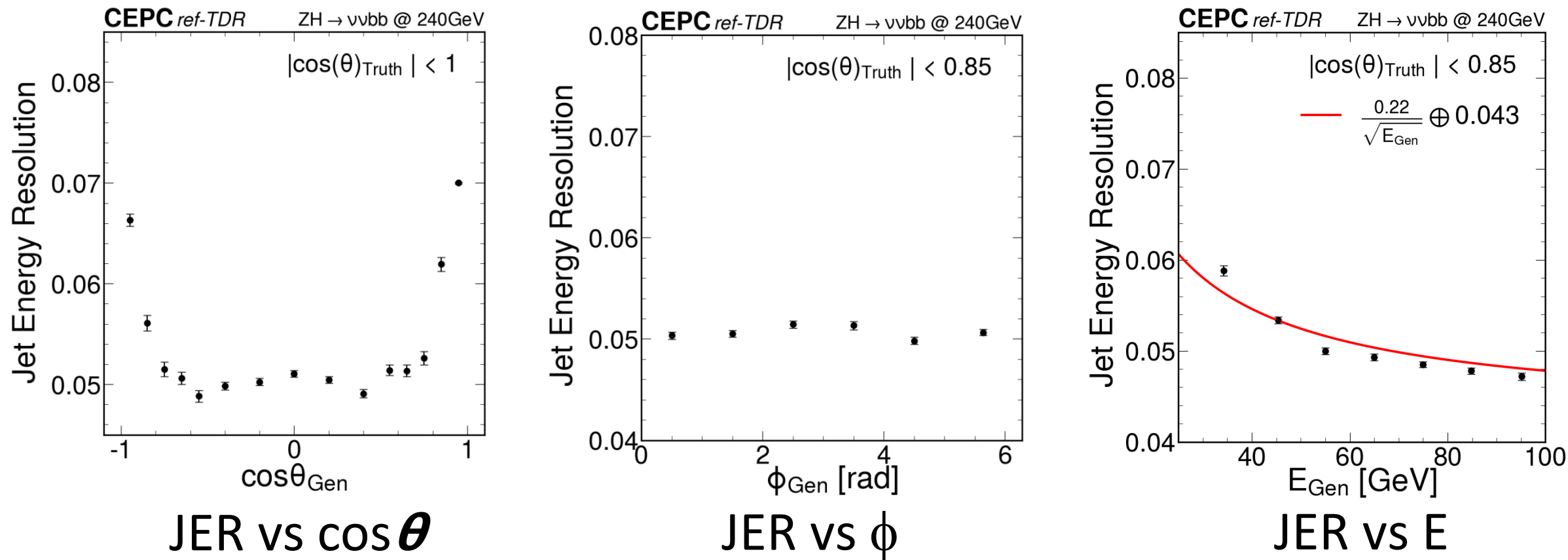


After Component Cut



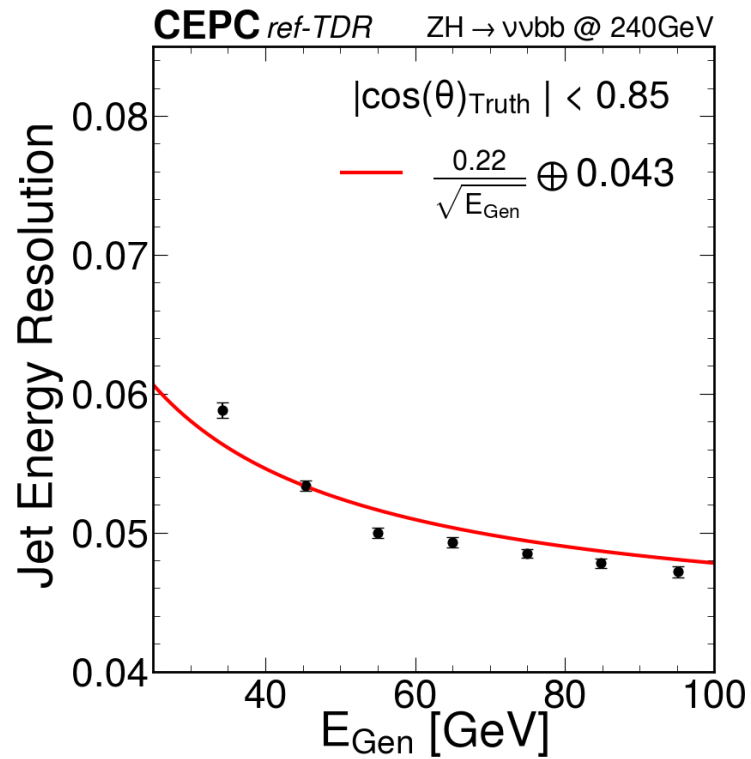
Cut for Jet Energy

Figure 15.13, updated

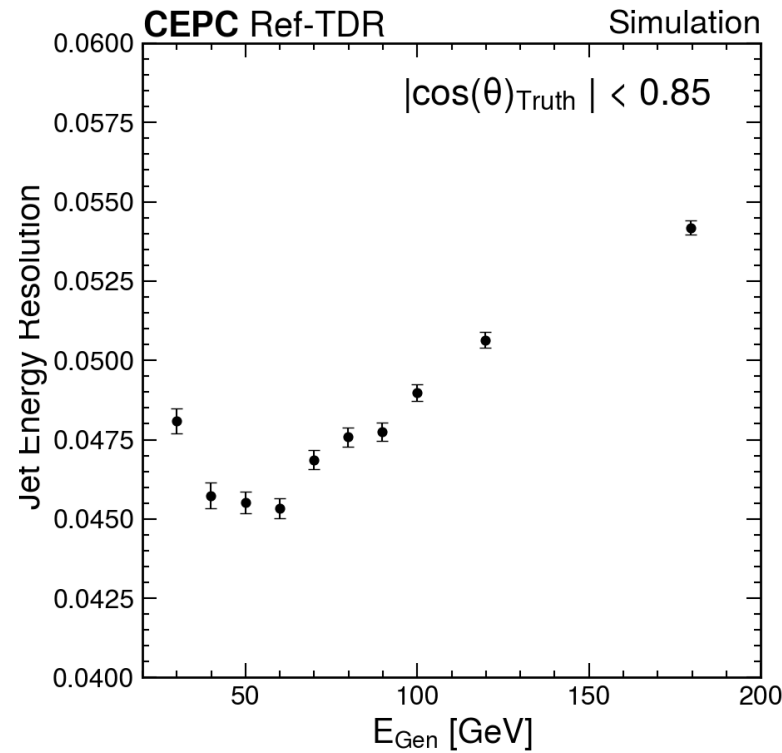


- ~5% in the barrel region, slightly worse in the endcap

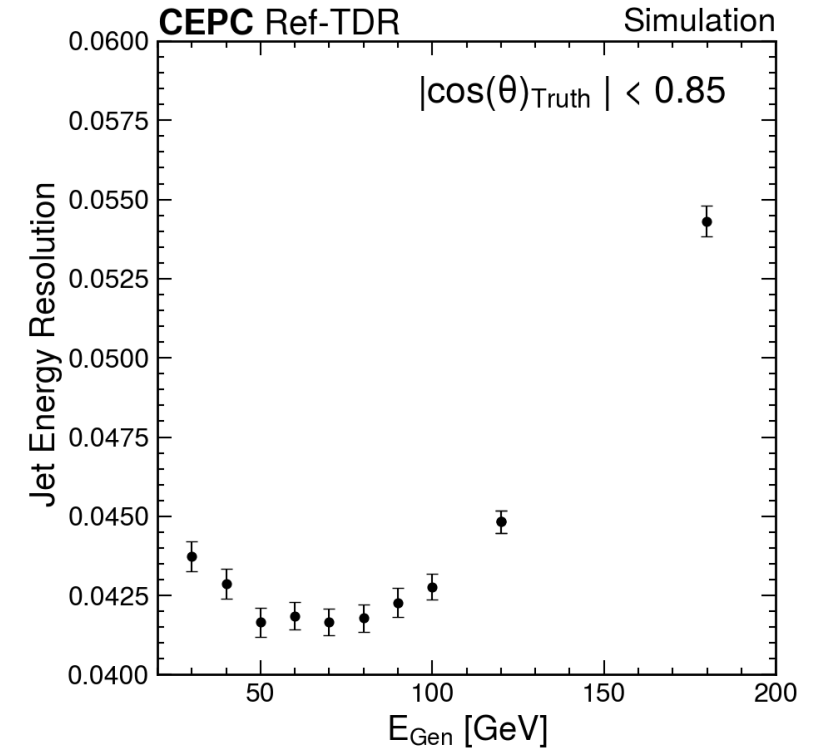
JER Result



ZHbb sample
(basic cut)



eeuu sample
(basic cut)



eeuu sample
(with extra cuts)

JAR

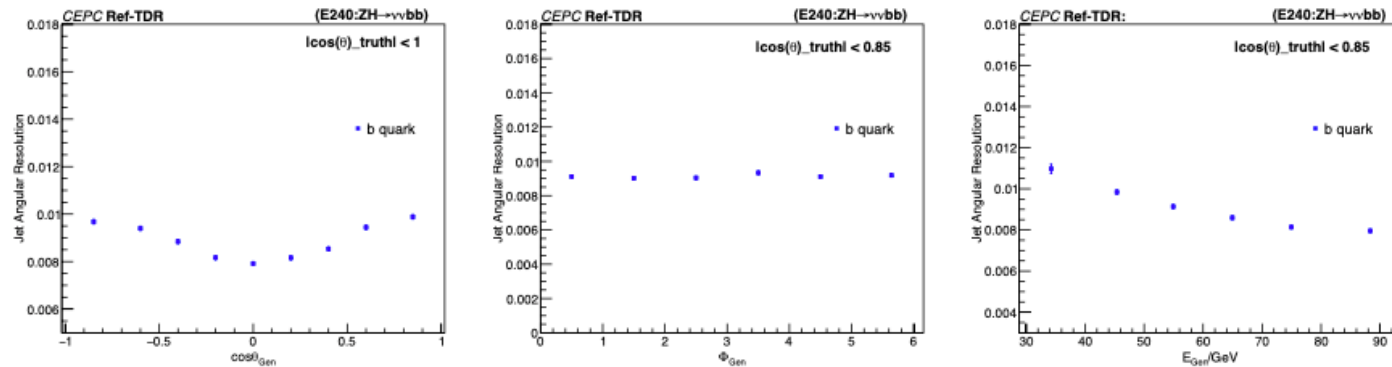


Figure 1.17: θ_{jet} resolution as functions of the $\cos\theta_{Gen}$ (left), the azimuth angle (middle), and the GenJet energy (right) for the $ZH \rightarrow \nu\nu bb$ process. The errors shown are only statistical.

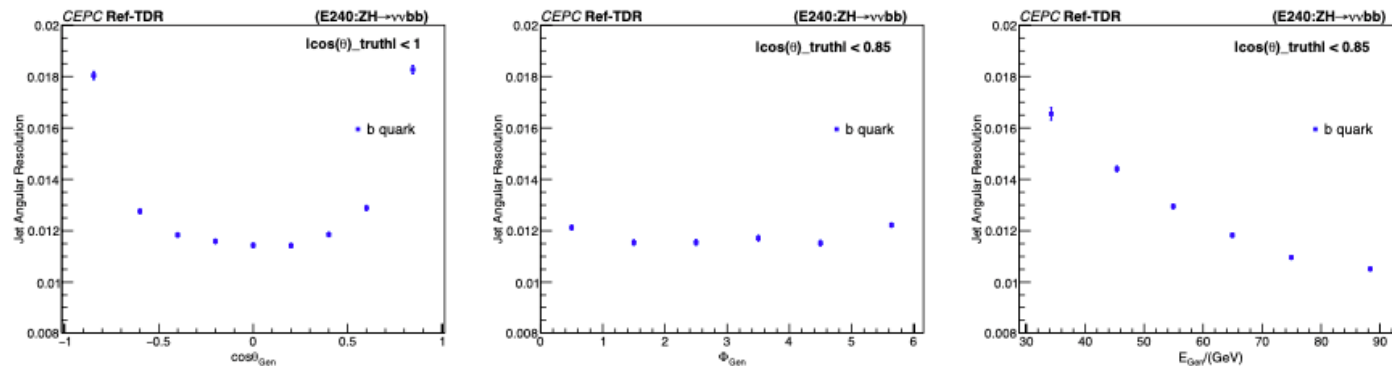


Figure 1.18: ϕ_{jet} resolution as functions of the $\cos\theta_{Gen}$ (left), the azimuth angle (middle), and the GenJet energy (right) for the $ZH \rightarrow \nu\nu bb$ process. The errors shown are only statistical.