

D^0 Tagged Jets at ePIC

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ePIC Jet & HF Working Group Meeting

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Analysis Details

Dataset location:

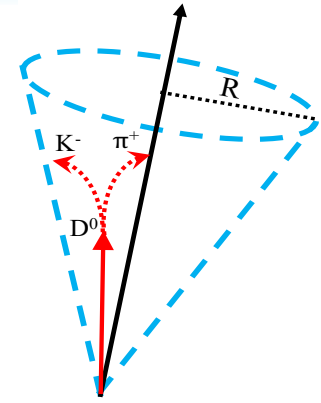
`/gpfs/mnt/gpfs02/eic/bpage/home/EPIC/fromOlga/d0Sample/recoOut/individual`

Sample: 18x275 GeV², **Campaign:** 23.12.0

Basic Cuts:

- **D⁰ reconstructed from *Kpi* channel only** (*We can revisit other channels, but ideally all D⁰s should decay to Kpi in simulation*)
- No cuts on D⁰ kinematics
- No cuts on pion/kaon kinematics
- R = 0.4 anti-k_T Jets
- Reco Level D⁰ jet tagged by D⁰ as the constituent

*s*Plot



- Native class in RooStats, and widely used in HEP
- Unbinned maximum likelihood fit to invariant mass integrated over all kinematics
- $p_{T,jet}$ and radial distributions with all D^0 -tagged jet candidates using sWeights
- Easy to include reconstruction efficiencies versus D^0 kinematics

$${}_s\mathcal{P}_n(m_{K\pi,i}) = \frac{\sum_{j=1}^{N_T} V_{nj} f_j(m_{K\pi,i})}{\sum_{k=1}^{N_T} N_k f_k(m_{K\pi,i})}$$

Unbinned max. likelihood fit

n = n -th fit component(sig/bkg)

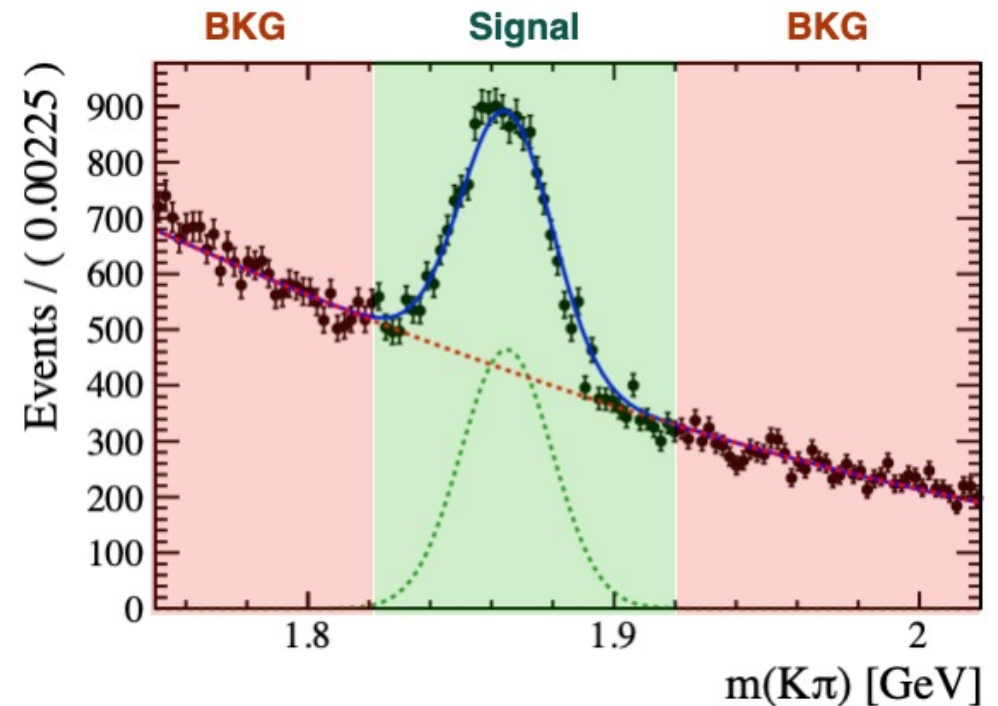
N_k = k -th yield (T=2)

$f_k(m_{K\pi,i})$ = per-event PDF value with k^{th} hypothesis

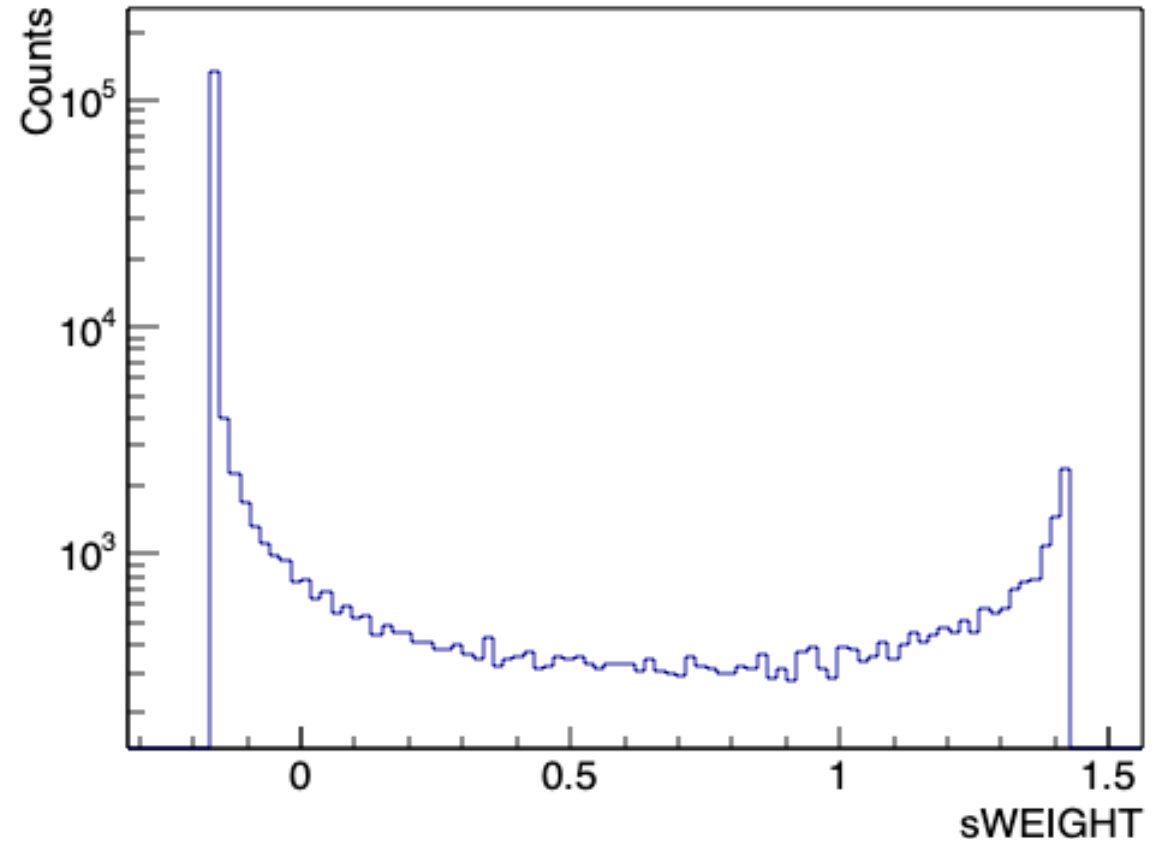
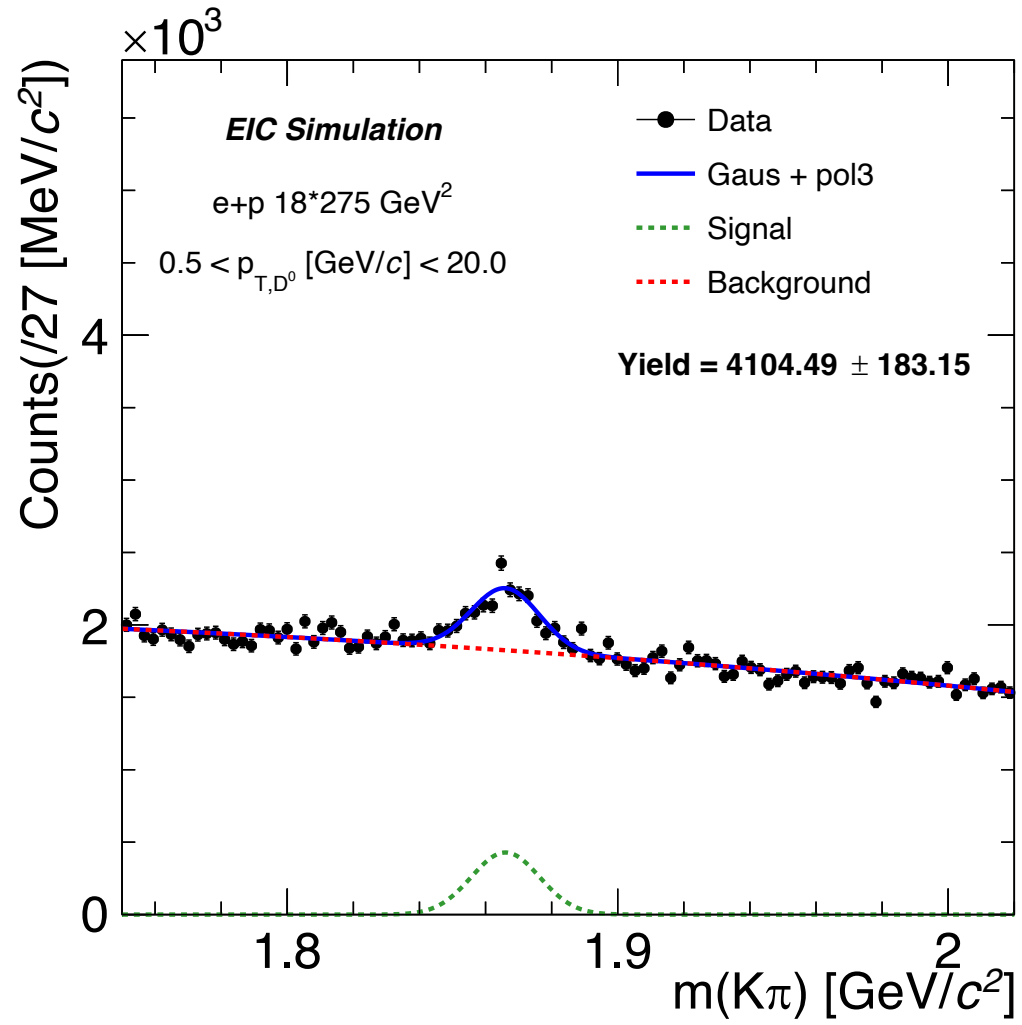
V = cov. matrix

Efficiency Correction \rightarrow

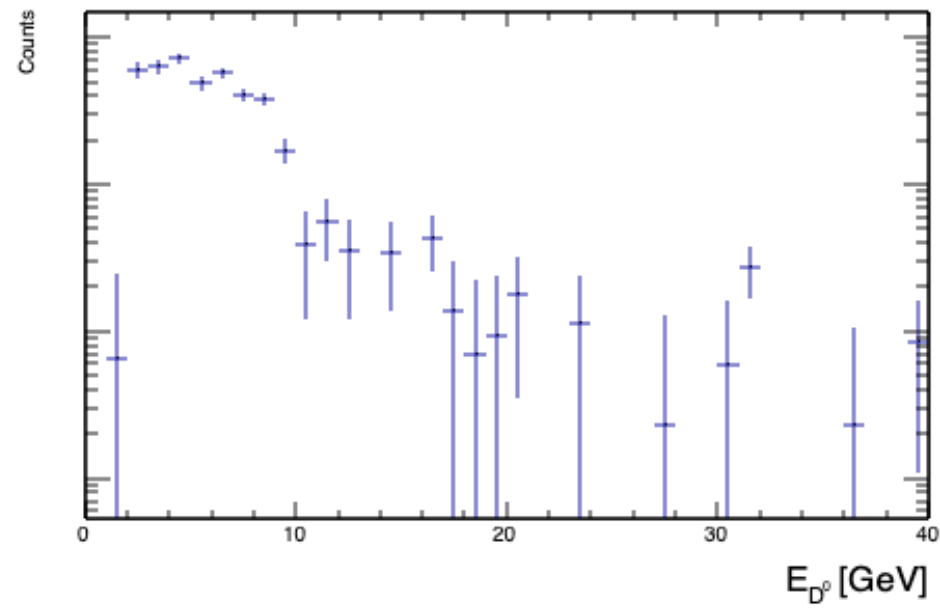
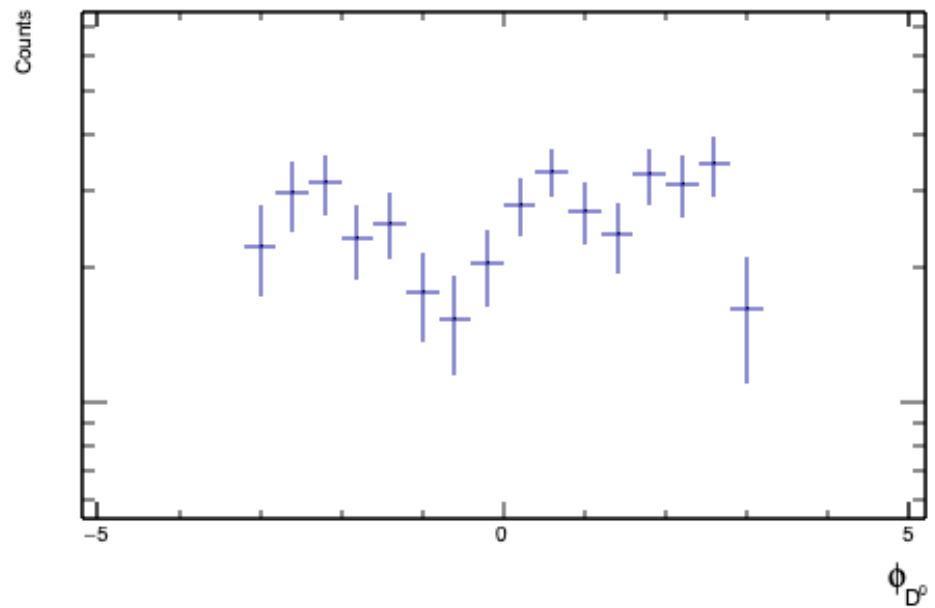
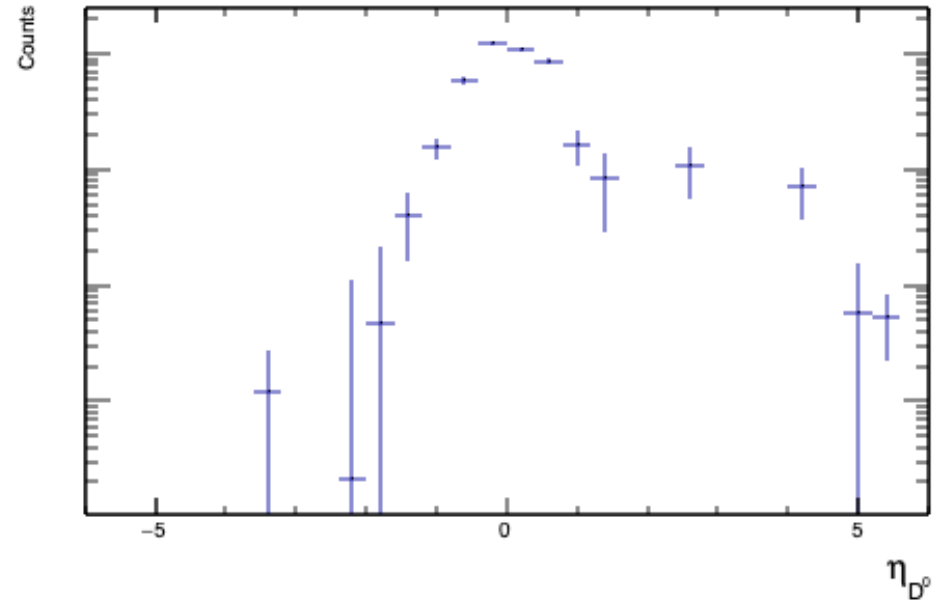
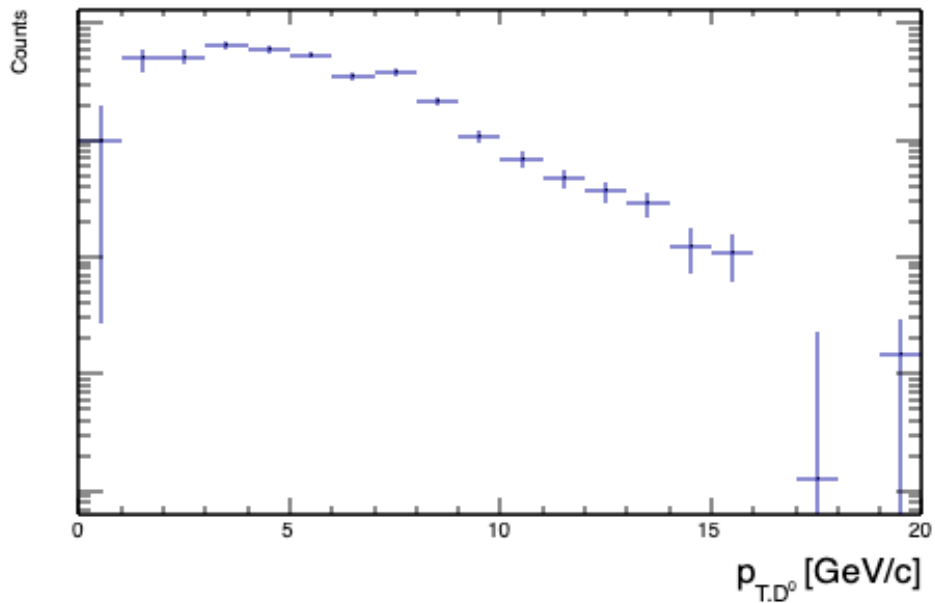
$${}_s\mathcal{P}_n(m_{K\pi,i}) \rightarrow \frac{{}_s\mathcal{P}_n(m_{K\pi,i})}{\varepsilon(m_{K\pi,i})}$$



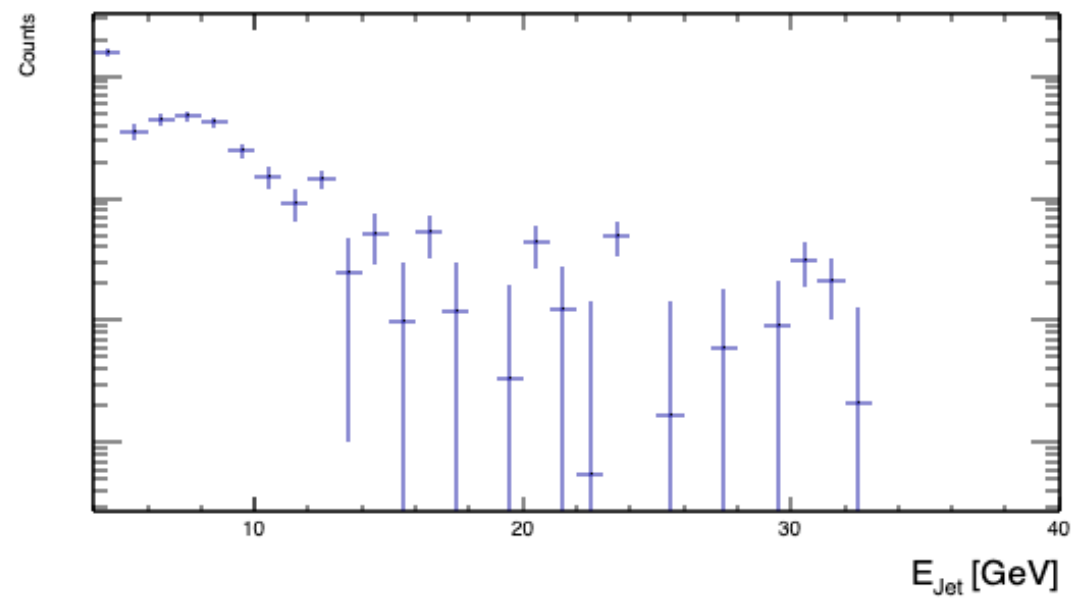
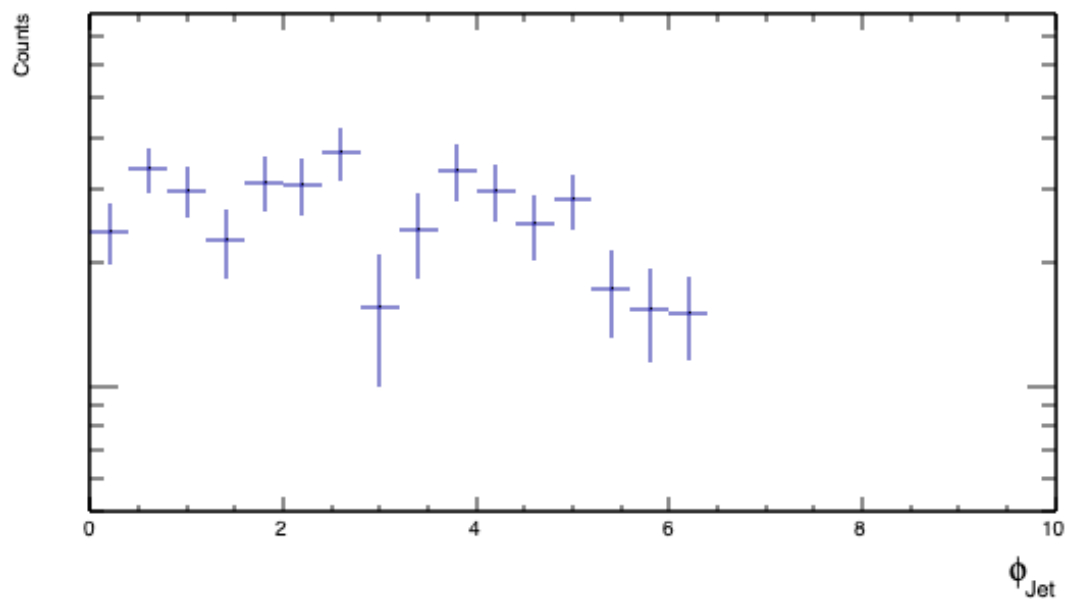
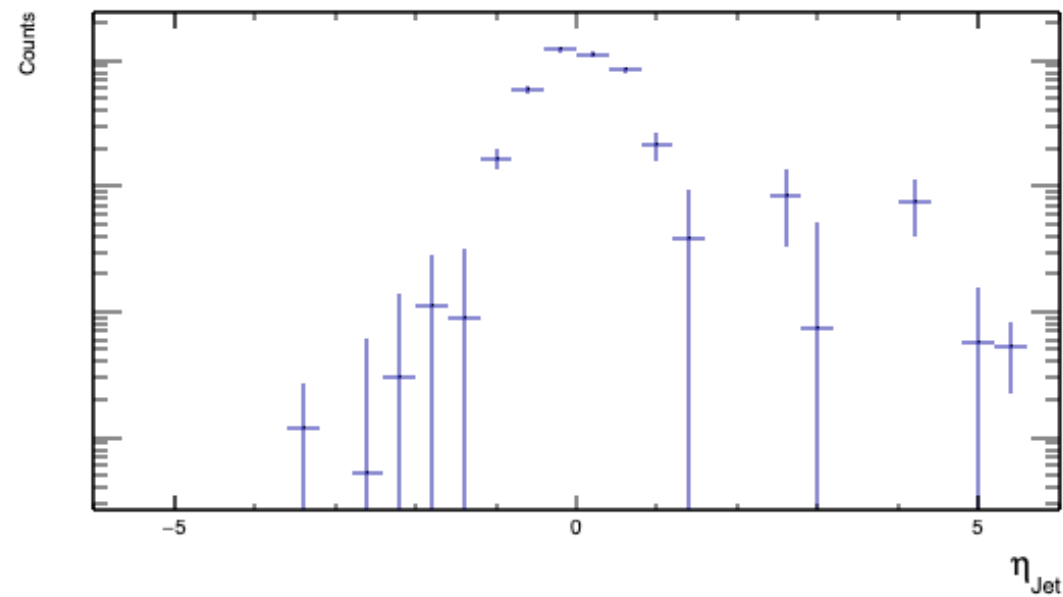
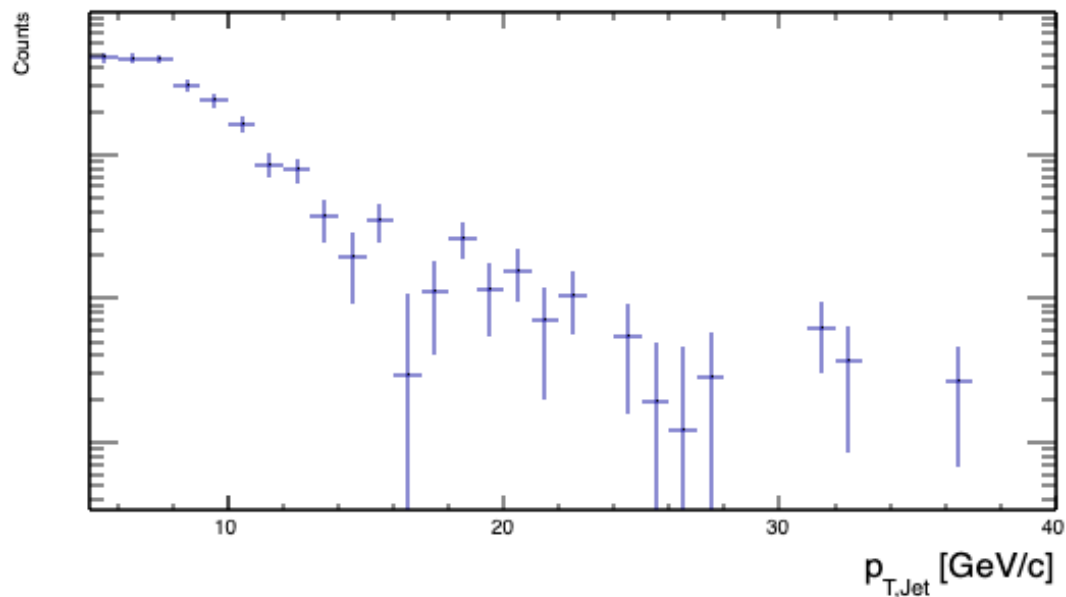
sPlot



D⁰ Spectra (Reconstructed Level Only)



D⁰ Jet Spectra (Reconstructed Level Only)



Outlook

1. Larger sample for a more systematic study
2. Comparison with side band method for the jets