

Efficiency Studies

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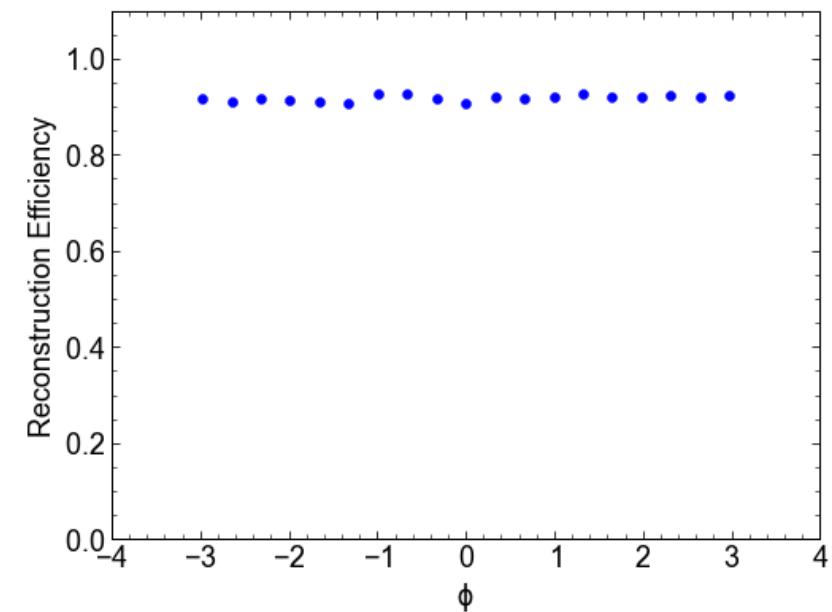
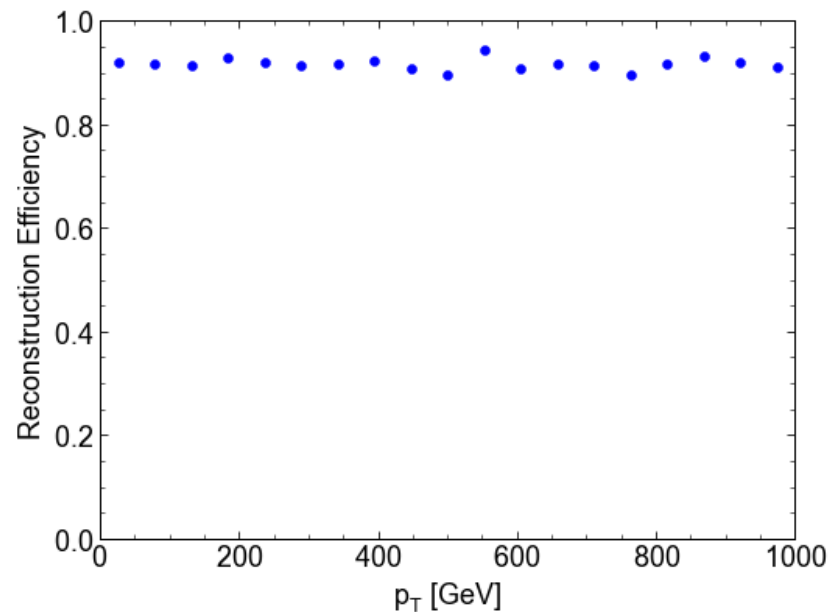
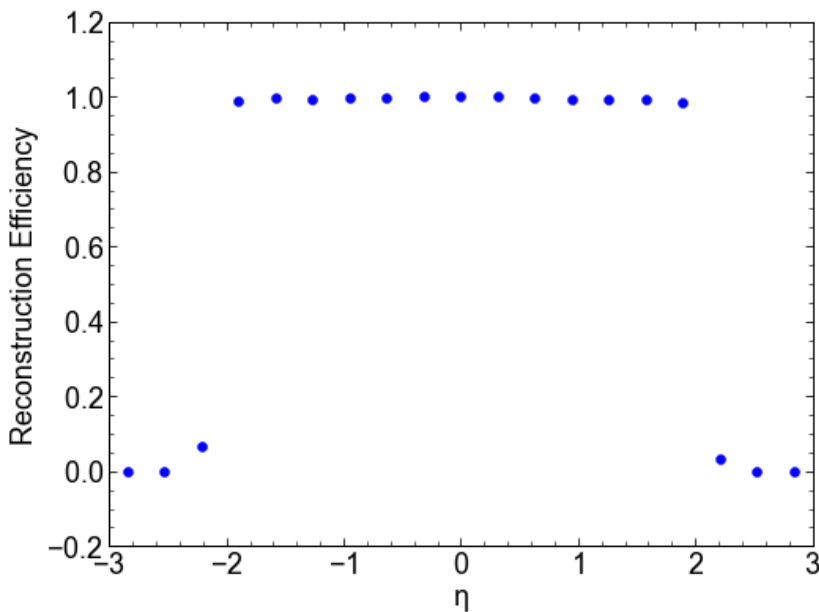
- Efficiency Studies
 - Without nhits requirement
 - With nhits requirement
- Residuals and nhits
 - pT and d0 studies
- Nhits Studies

Muon Gun Data Selection

- Data from /tank/data/snowmass21/muonc/fmeloni/DataMuC_MuColl10_v0A/reco/muonGun_pT_0_50, pt_50_250, and pt_250_1000 (note: no BIB)
- I matched the reconstructed Muon tracks to truth Muons using only dR matching with $dR < 0.005$
- Where there were multiple reconstructed tracks for a single event, I chose the track with the highest nhits
- Efficiencies are calculated by taking the number of reconstructed tracks in a truth pt/eta/phi bin and dividing them by the number of truth muons in a pt/eta/phi bin

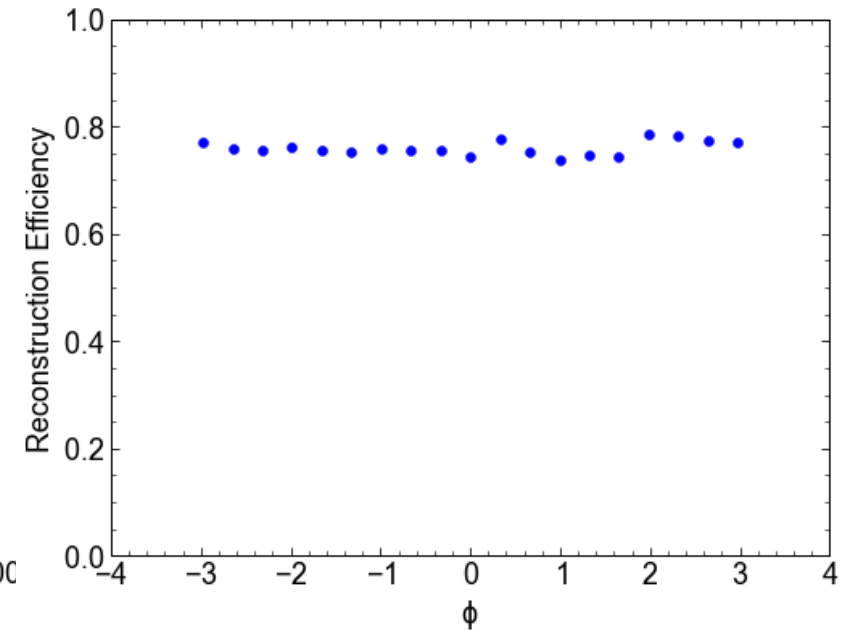
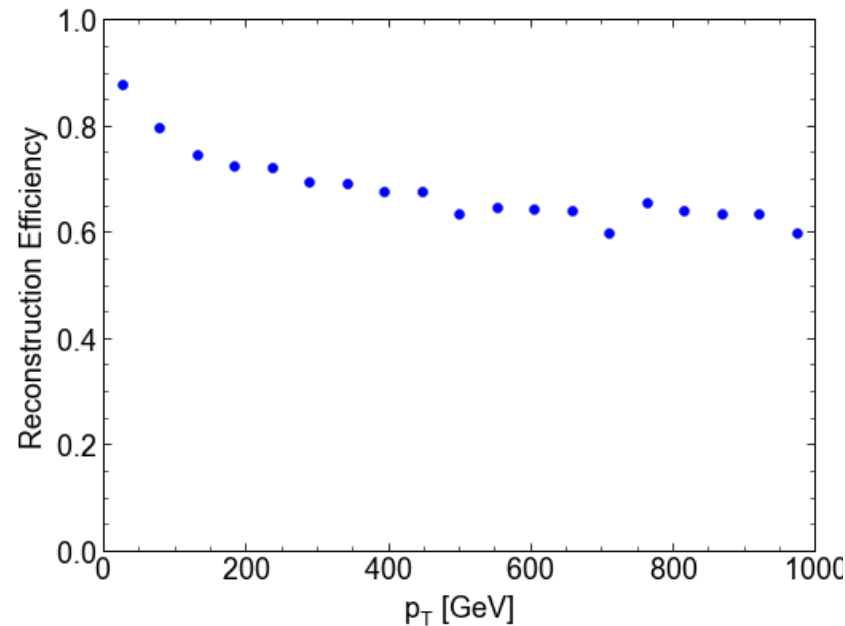
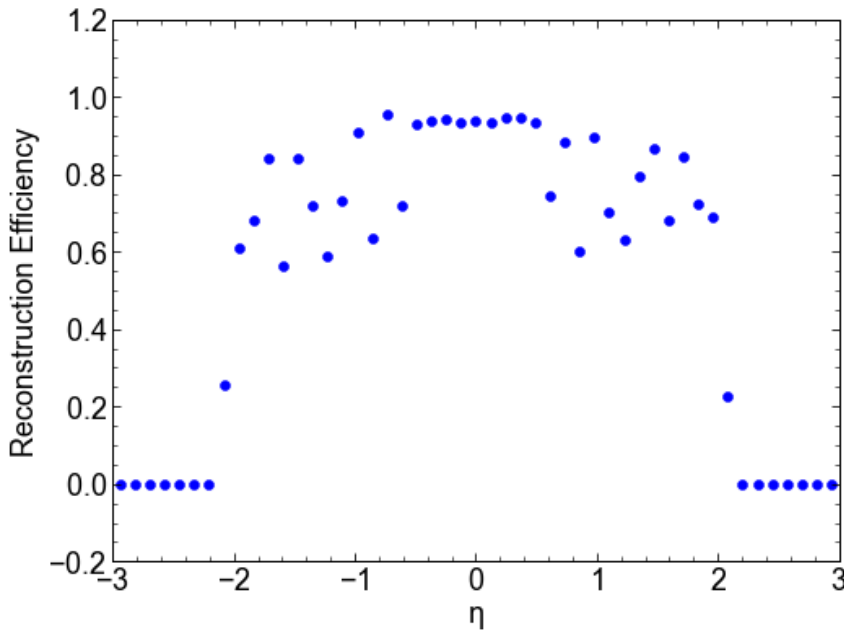
Basic Efficiency Plots

- No nhits requirement has been applied
- Eta (left), pT (middle), phi (right)
- Note how eta is (nearly) 1 without any nhits requirement



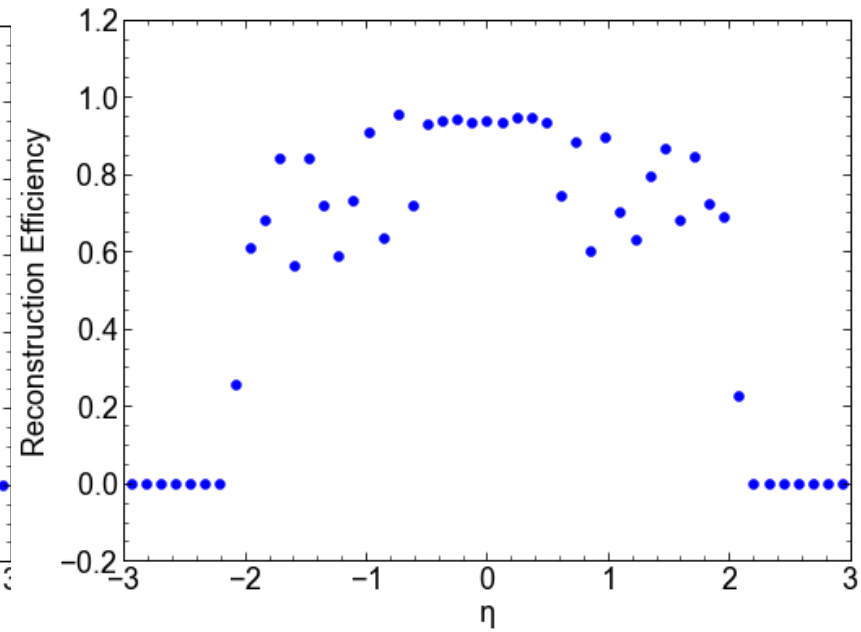
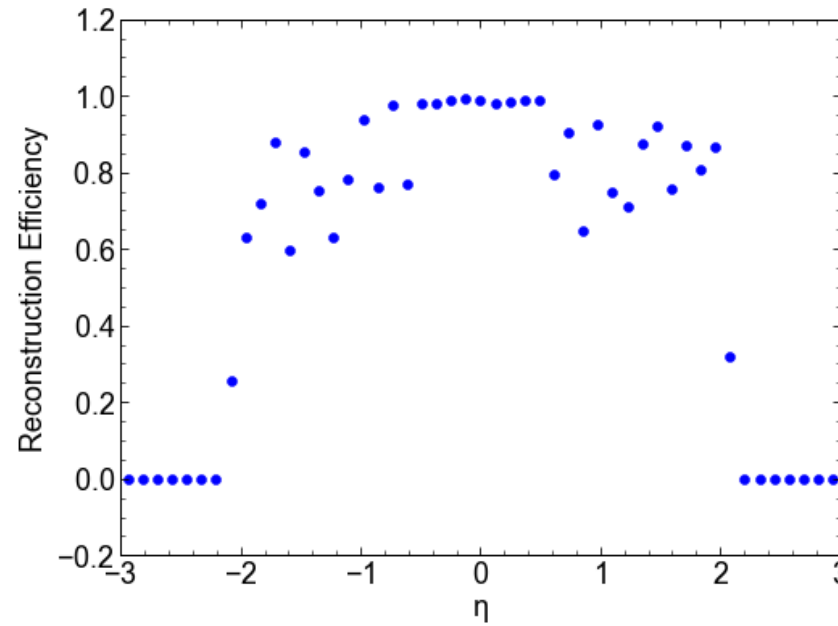
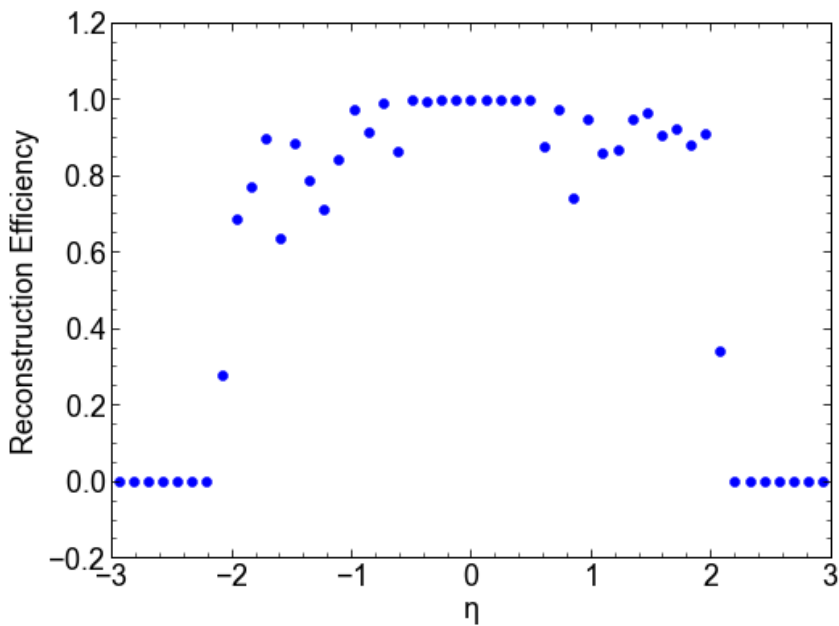
Advanced Efficiency Plots

- Nhits > 6 requirement has been applied (will discuss more later)
- We've lost some efficiency across the board particularly at higher pT and |eta|



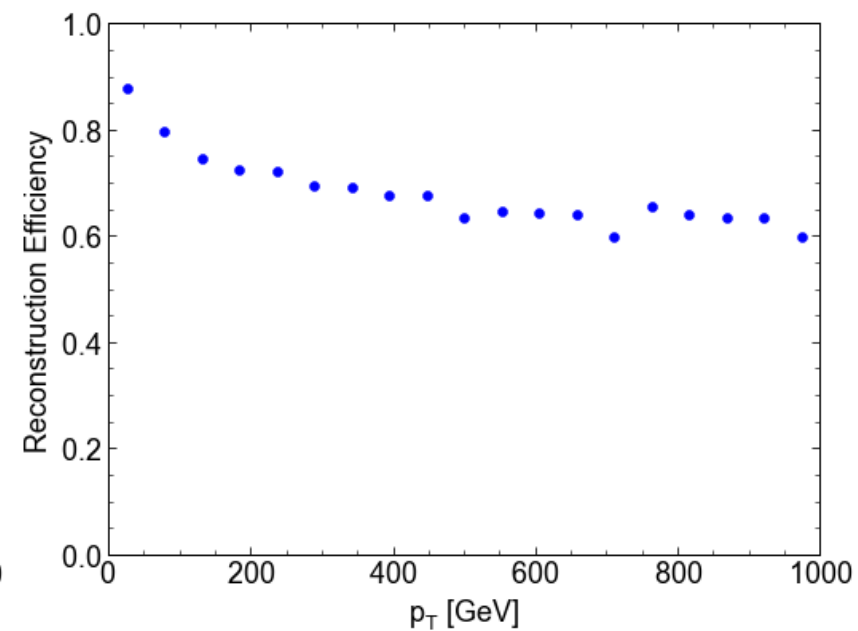
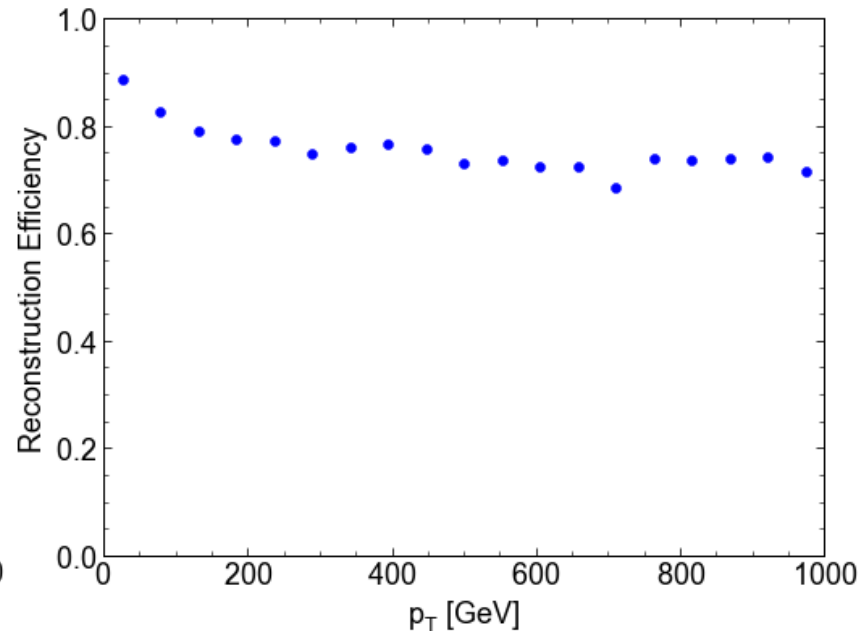
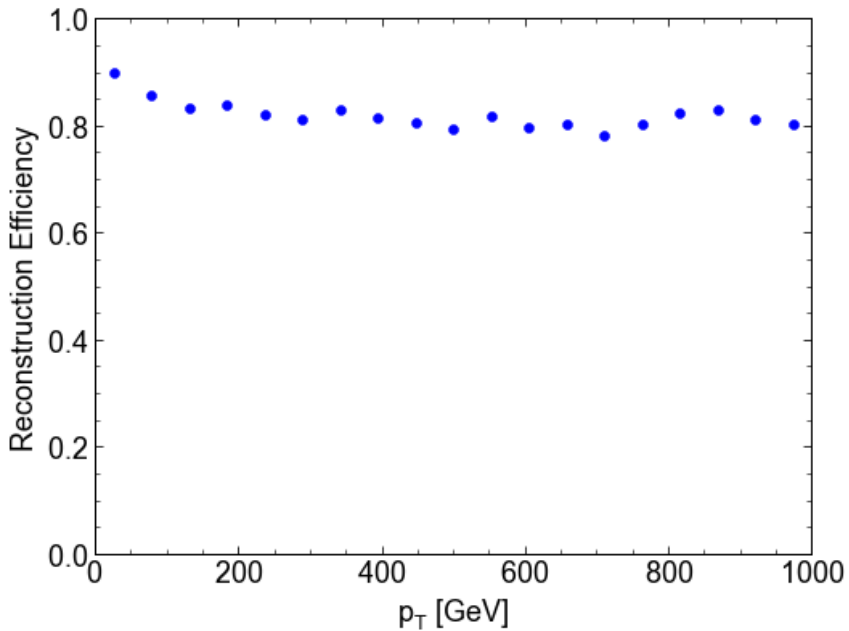
Advanced Eta Efficiency Plots

- Looking at different nhit requirements for eta
- Nhits > 4,5,6 (left to right)



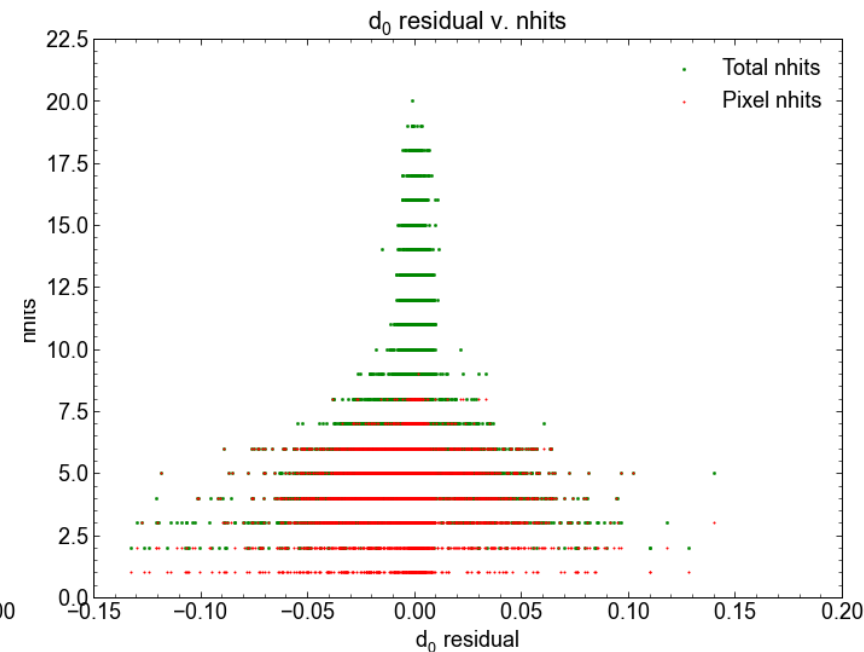
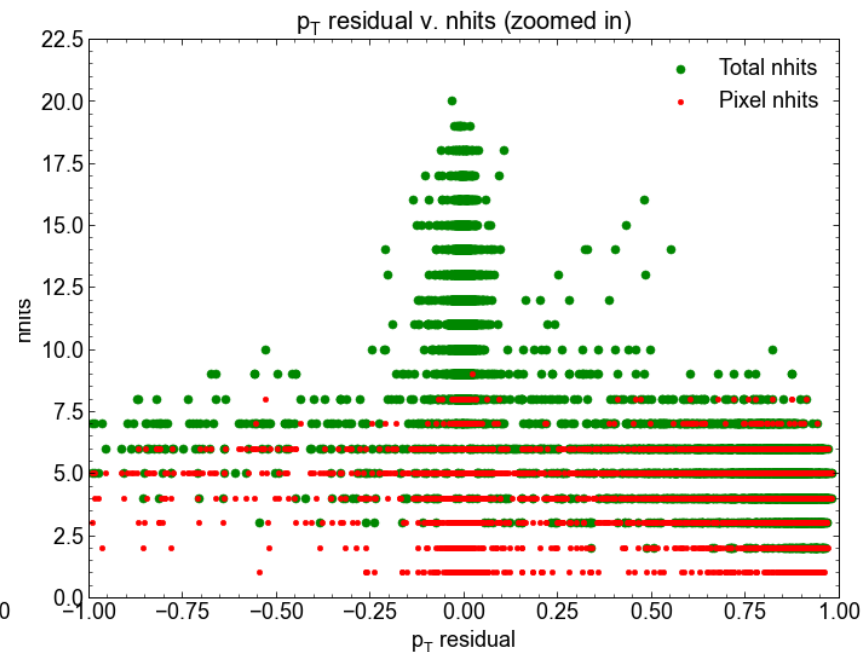
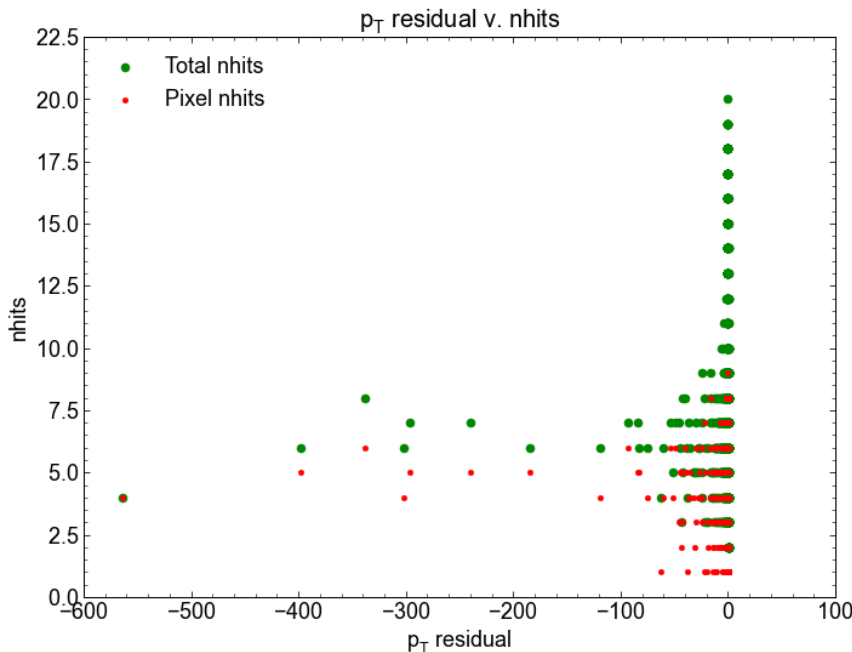
Advanced pT Efficiency Plots

- Looking at different nhit requirements for pT
- Nhits > 4,5,6 (left to right)

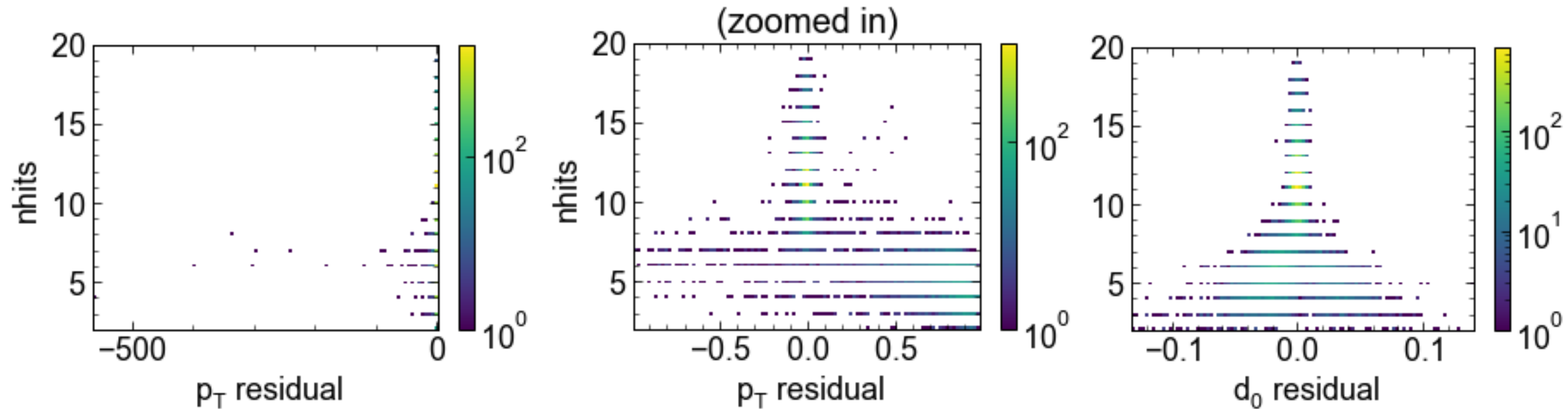


Residuals and Nhits

- p_T residual = (truth p_T – reco p_T)/truth p_T ; d_0 residual = track d_0 – truth d_0 = track d_0
- At very low nhits we see some crazy p_T residuals which become good at around 10 hits
- D_0 residuals are generally ok but also become very good at around 10 hits
- Let's dive into this some more

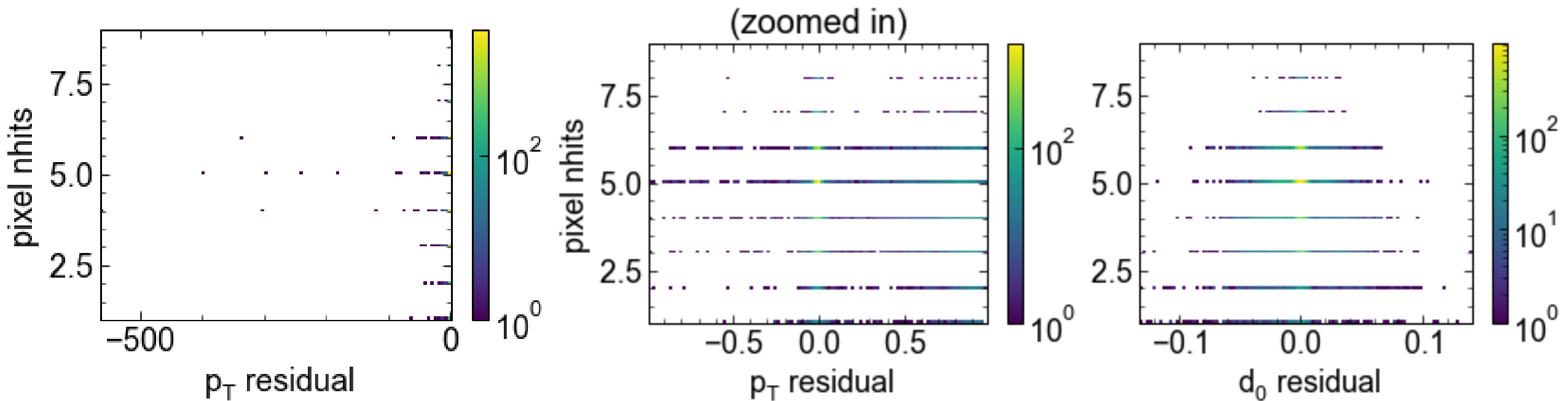


- 2D Histograms for residuals



Pixel Nhits Advanced

- 2D Histograms for residuals with pixel nhits instead of nhits



Nhits vs Pixel nhits and eta

- 2D Histograms for nhits vs pixel nhits and vs eta

