Z quark matches Subjet Charge in ZH events

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Jet Charge

Signal Sample:
HZ with Z→qq, cross-section: 3.67 fb, concentrate on H→bb

Jet Charge definition(s)

$$Q^{\kappa} = \frac{1}{(p_{\mathrm{T}}^{\mathrm{jet}})^{\kappa}} \sum_i Q_i (p_{\mathrm{T}}^i)^{\kappa}, \quad \Rightarrow$$

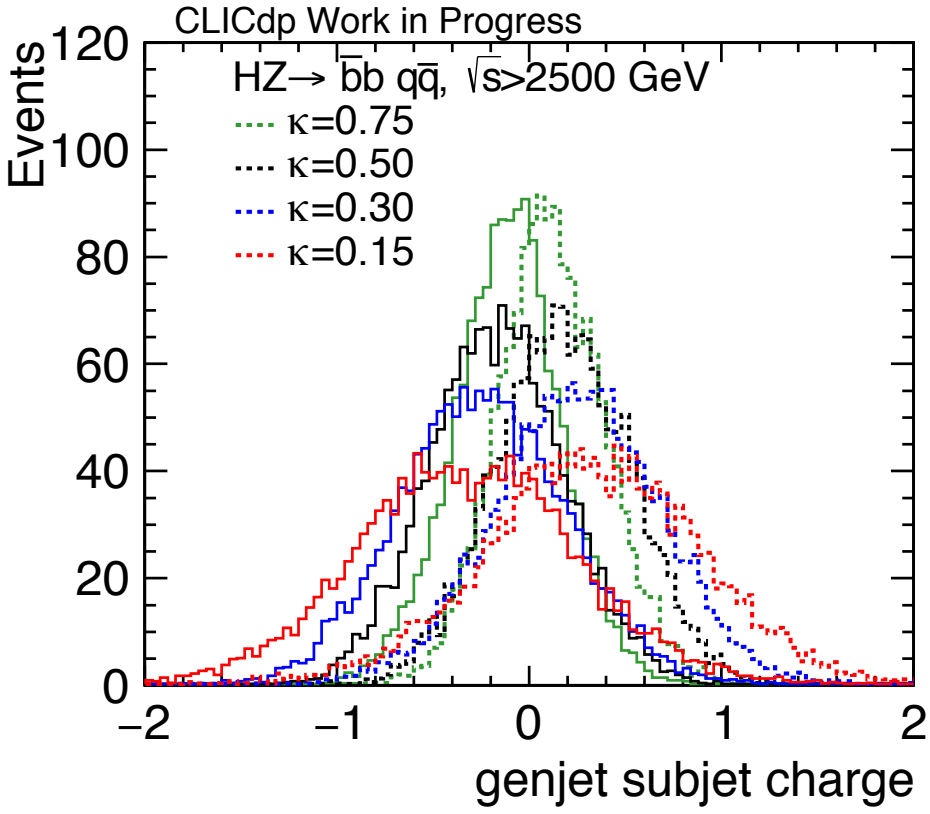
Used now, can also be replaced by weighting with energy, or projection parrallel to jet axis

$$Q_L^{\kappa} = \sum_i Q_i \left(p_{\parallel}^i\right)^{\kappa} \Big/ \sum_i \left(p_{\parallel}^i\right)^{\kappa},$$

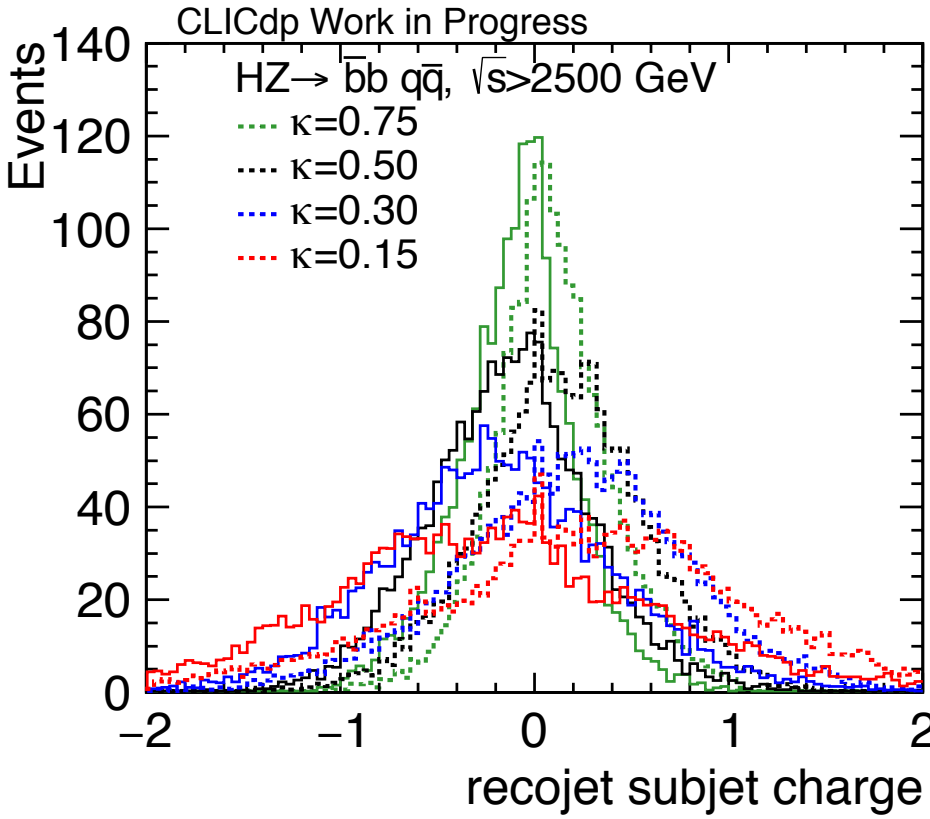
Subjet Charge: different kappa values

Try to differentiate between negatively and positively charged subjet:
→study different kappa parameters to find out which one seems most discriminant

MC truth genjets



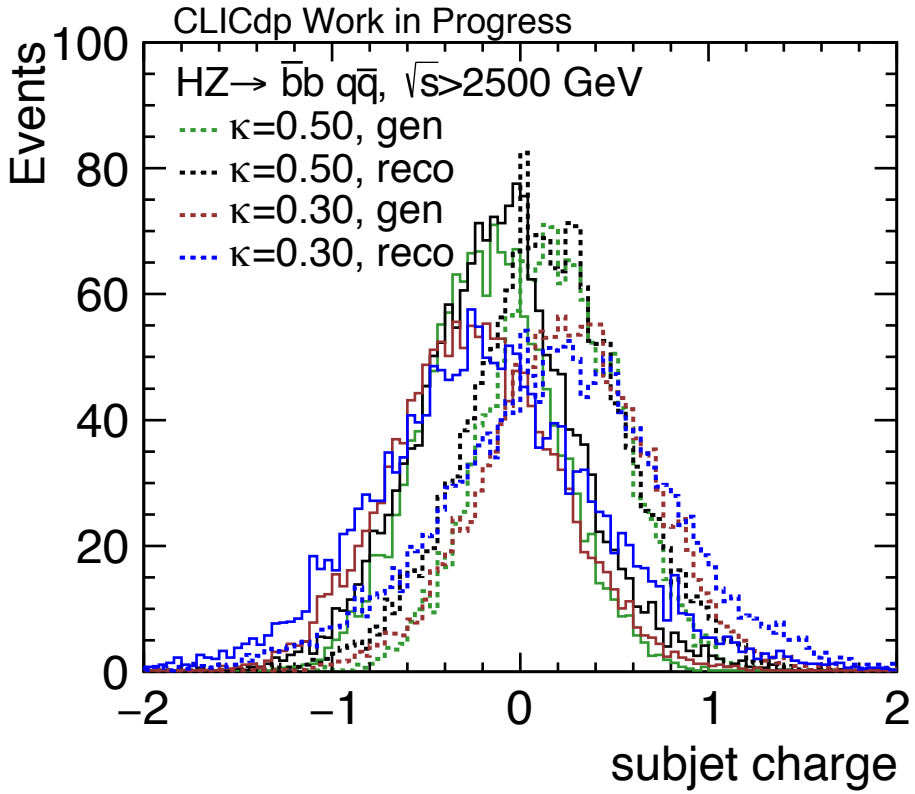
Detector level recojets

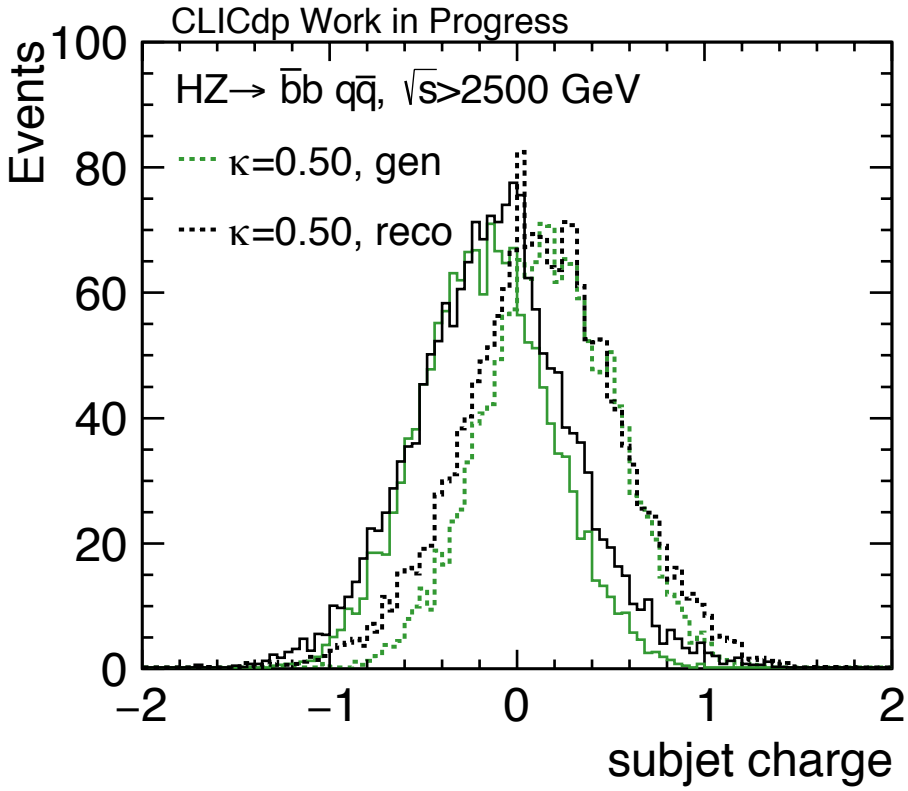


κ values between 0.20 and 0.50 better suited (study done via overlap)→κ=0.30

Subjet Charge: MC truth vs detector jets

Try to differentiate between negatively and positively charged subjet:
→compare MC truth with detector level jets

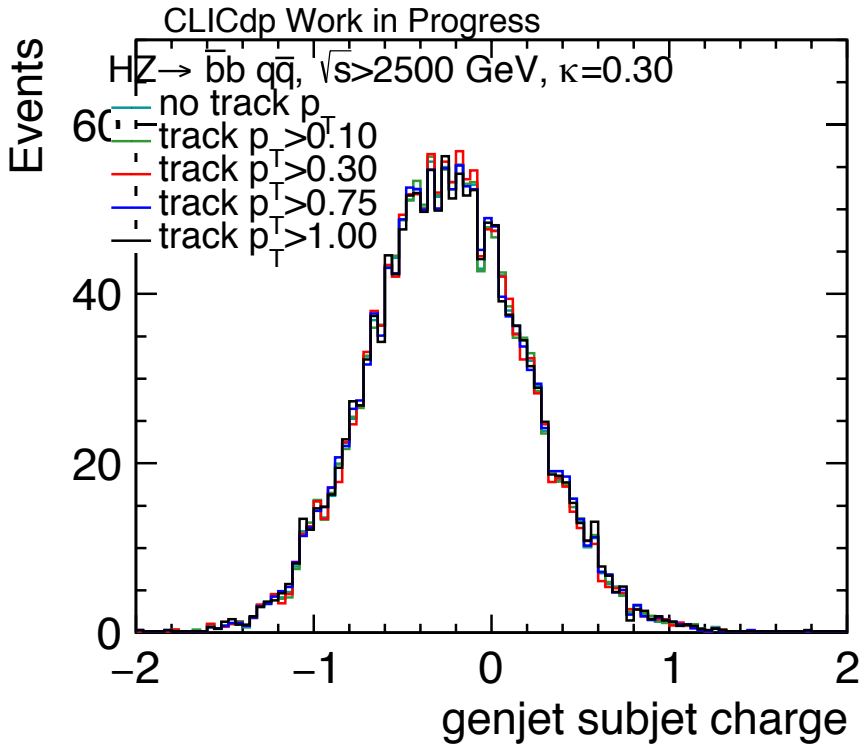


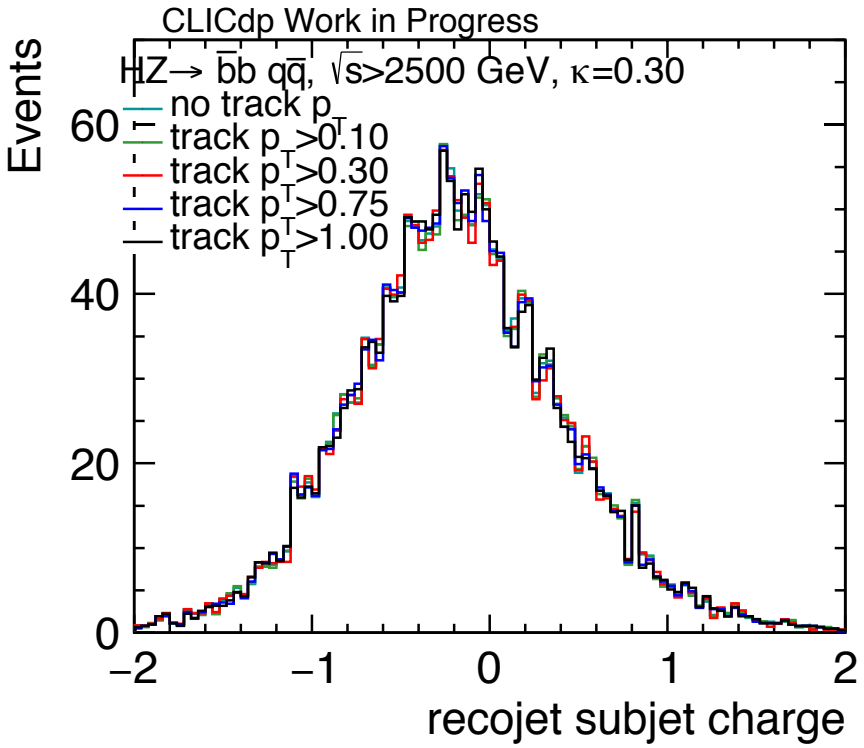


Peak between MC truth and detector jet level relatively stable, though larger tails for detector subjet charge distributions

Subjet Charge: MC truth vs detector jets

Larger Tails in MC truth vs detector level subjet charge → is it track efficiency
→ Study impact of p_T threshold on requirement, fix kappa=0.30

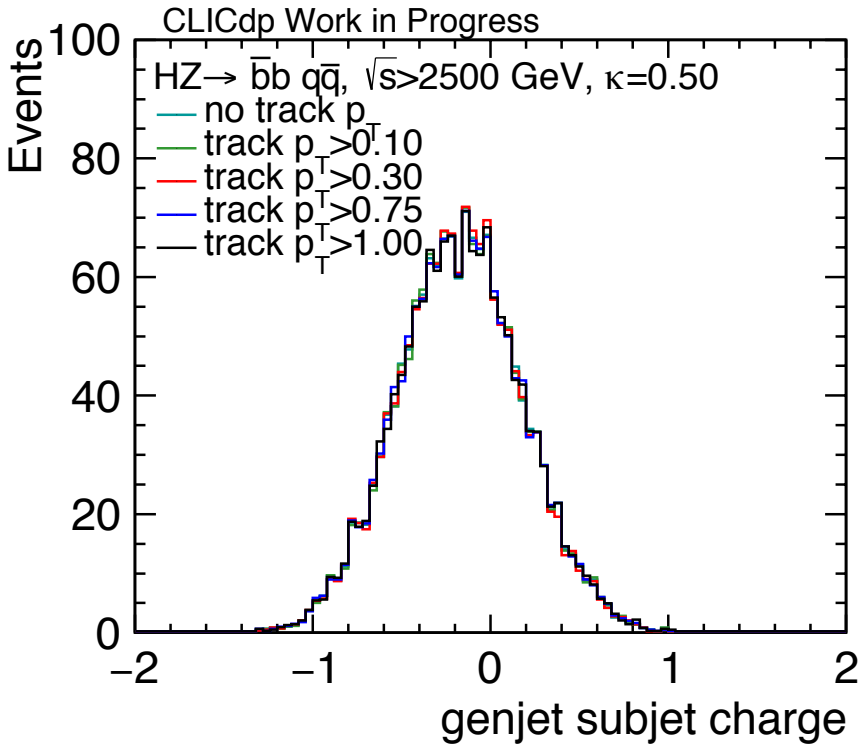


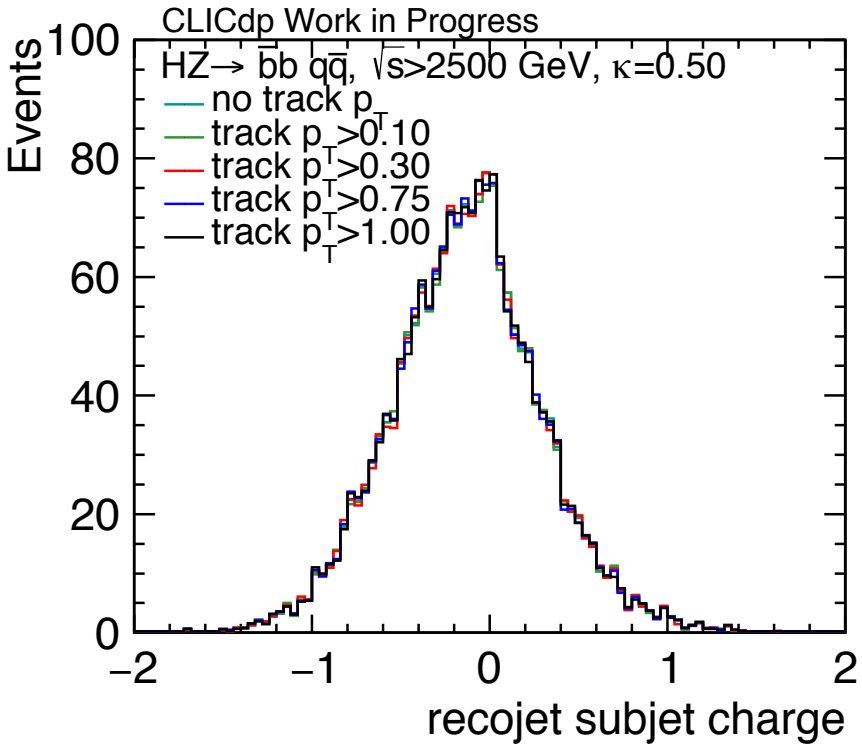


Seems no visible impact of lower trackPt requirement →so tracking efficiency seems not to be the issue

Subjet Charge: MC truth vs detector jets

Larger Tails in MC truth vs detector level subjet charge → is it track efficiency
→ Study impact of p_T threshold on requirement, fix kappa=0.50





Seems no visible impact of lower trackPt requirement →so tracking efficiency seems not to be the issue