

Preliminary Figure Request: First Measurement of the Jet Charge in $\sqrt{s} = 200 \text{ GeV } pp$ Collisions at STAR

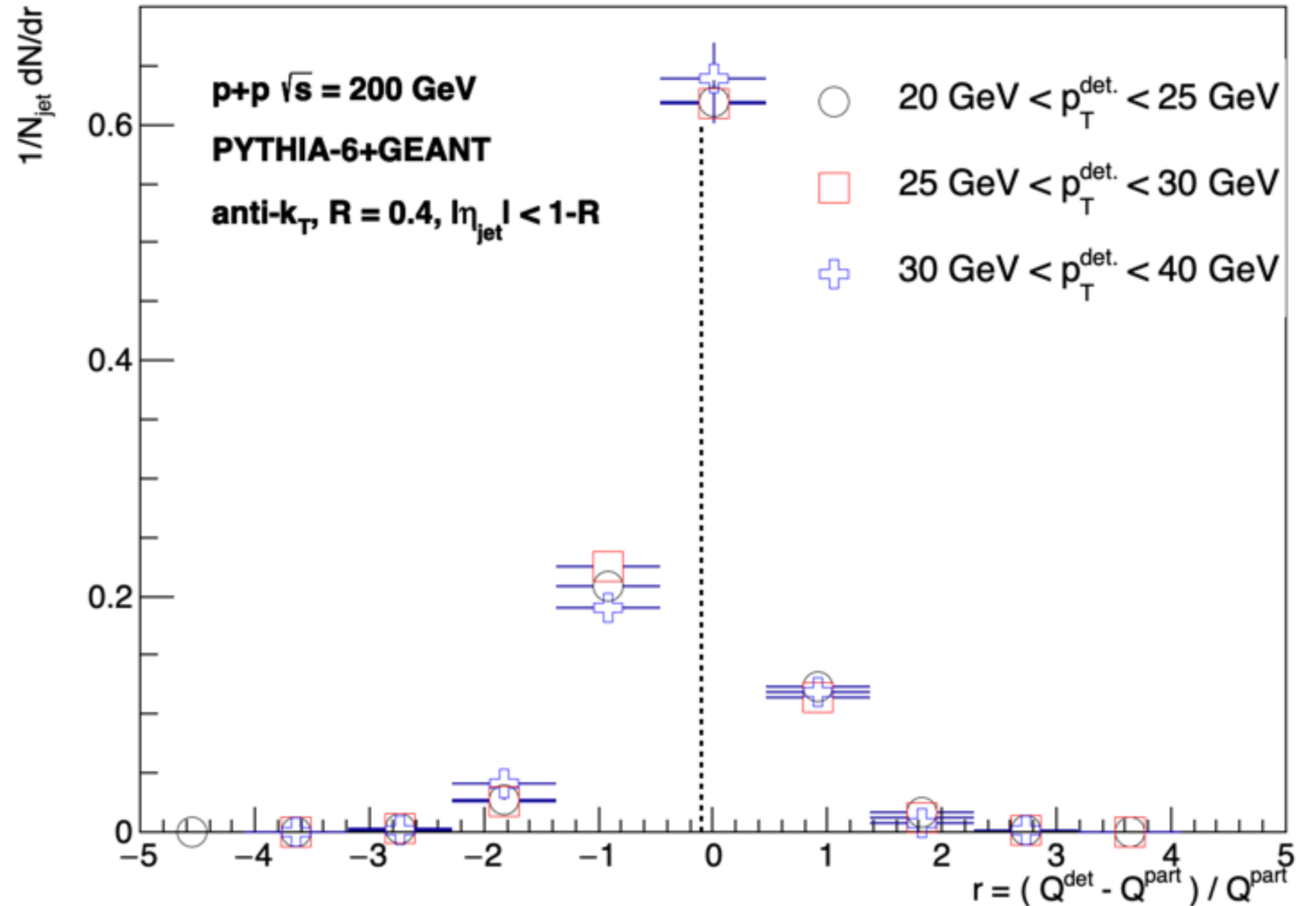
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Motivation

- The quark vs gluon fraction in pp collisions depends on both jet p_T and collision \sqrt{s}
- The energy loss in AuAu collisions depends on the flavor of parton
- Jet charge is sensitive to the quark vs gluon fraction

Jet Charge Resolution

- Scale mostly from track loss
- Resolution is independent on jet p_T , unfolding is easier

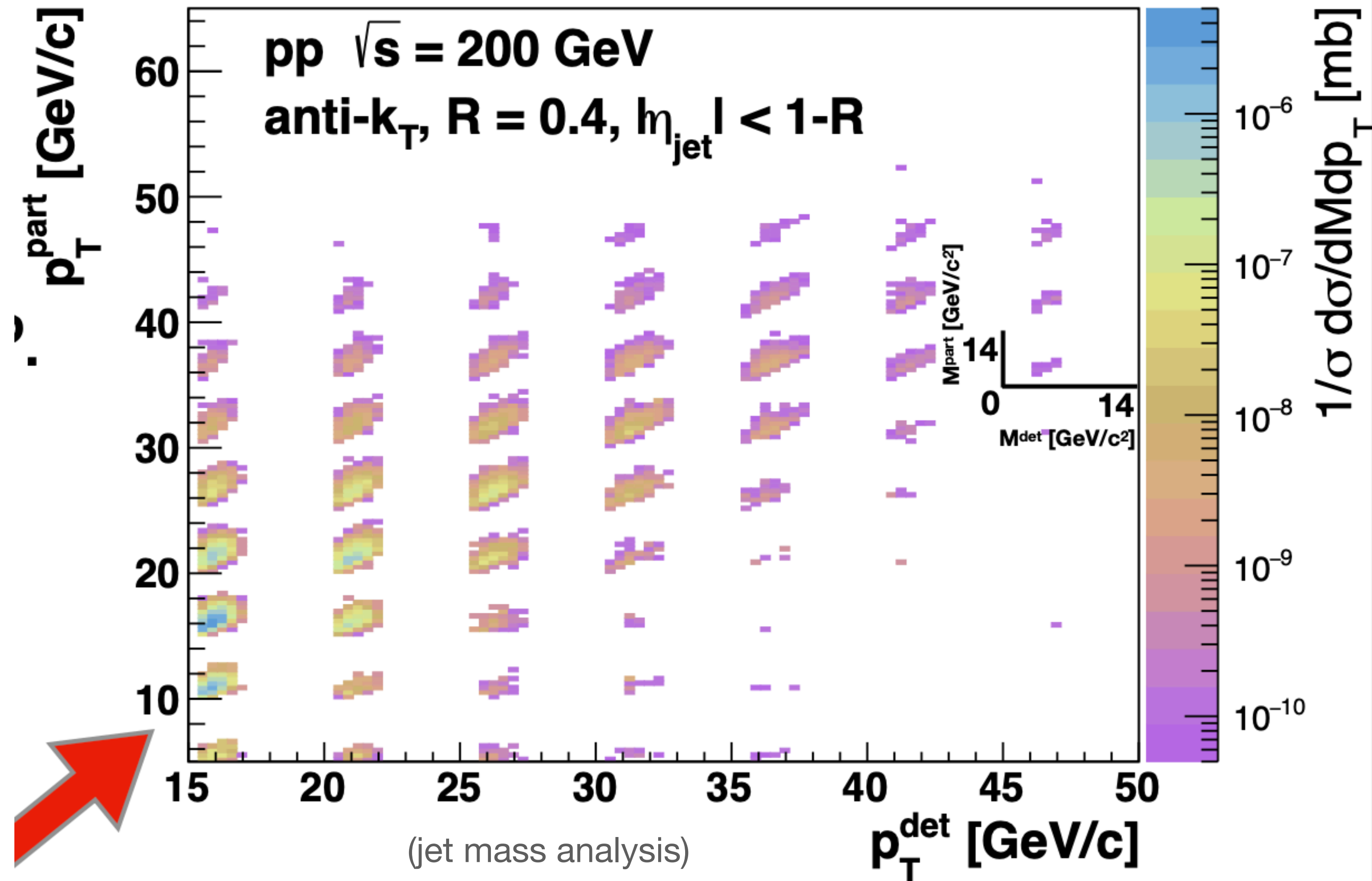


Unfolding Response

STAR Simulation

4D jet mass response matrix

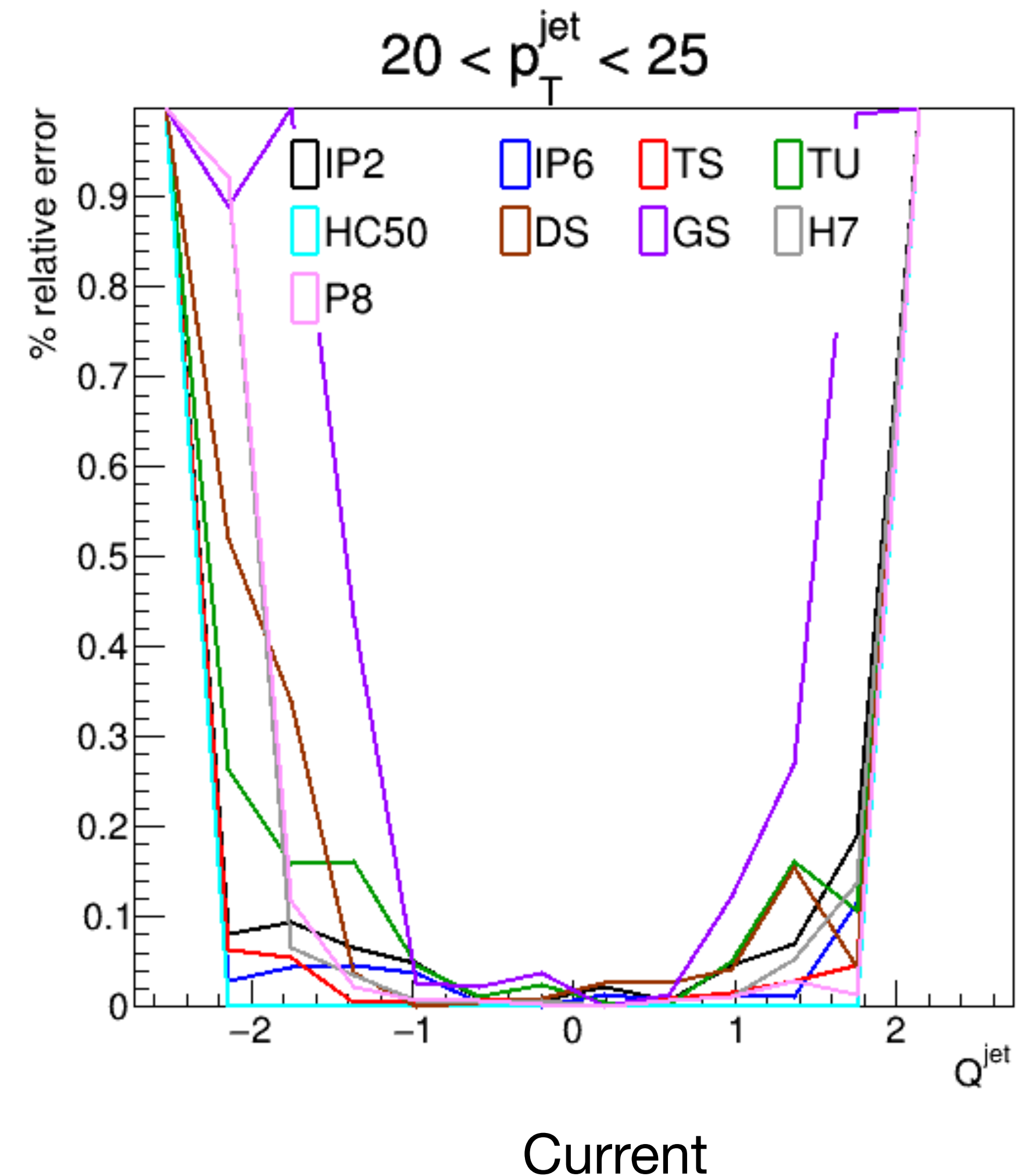
- In progress
- Correcting for detector effects
- Iterative Bayesian procedure from RooUnfold



Systematic Uncertainties

In progress

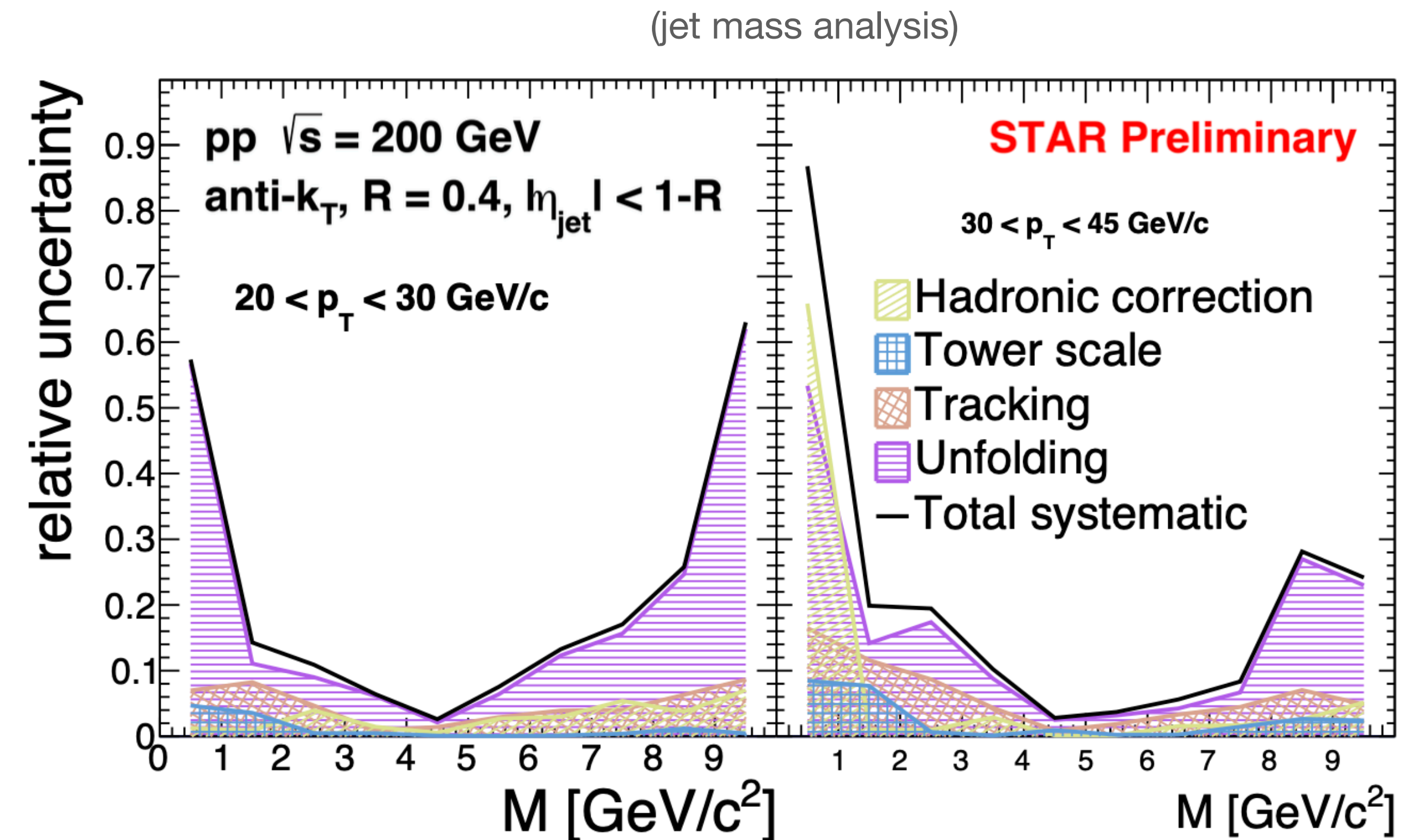
- IP2(6): variation of the unfolding iteration parameter to 2(6)
- TS: Tower scale variation
- TU: Tracking uncertainty
- HC50: hadronic correction changed from the nominal 100% to 50%
- D(G)S: detector(generator) p_T spectrum smearing
- H7(P8): smearing the prior spectrum for Q based on Herwig-7(Pythia-8)



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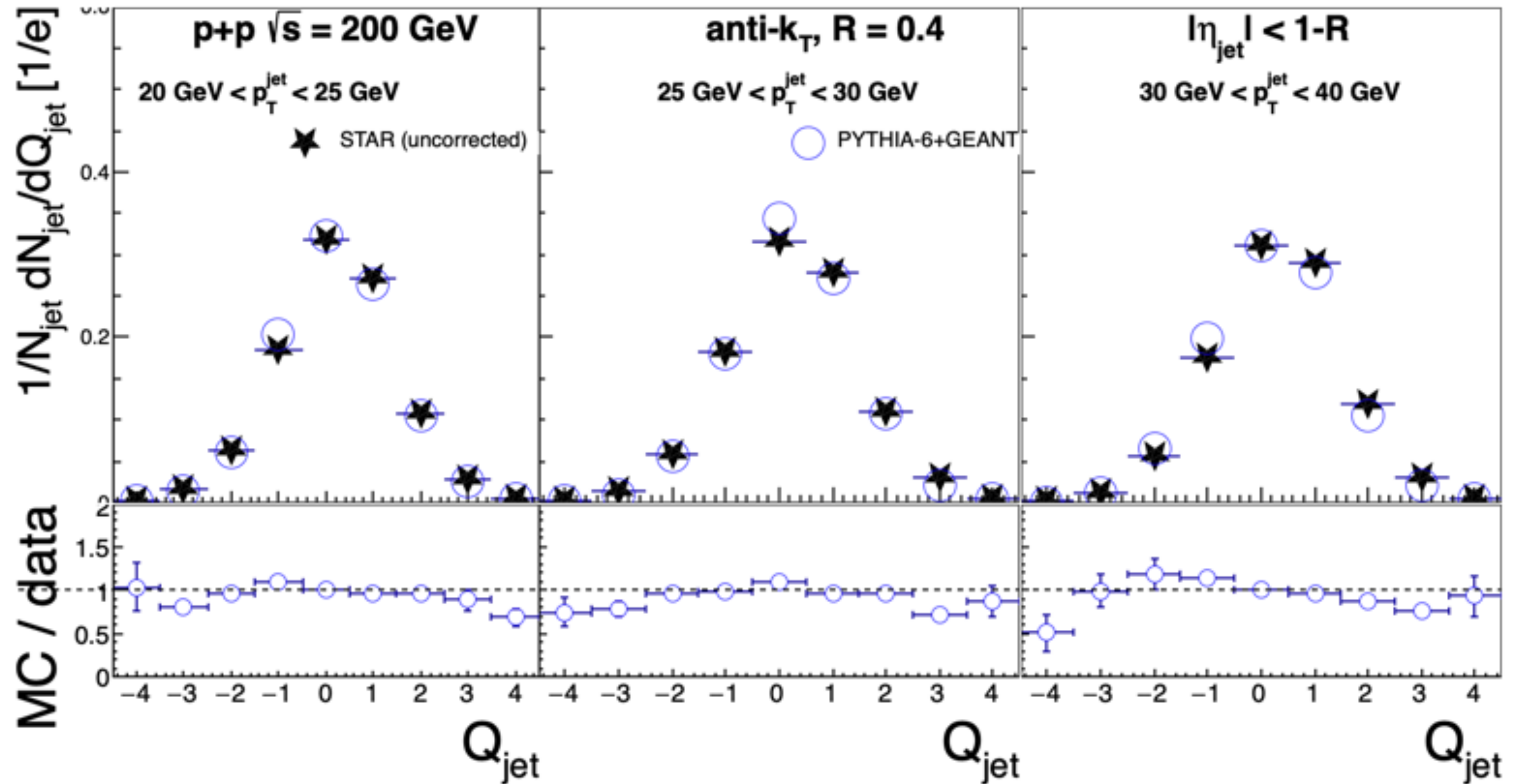
Future

Dataset and cuts

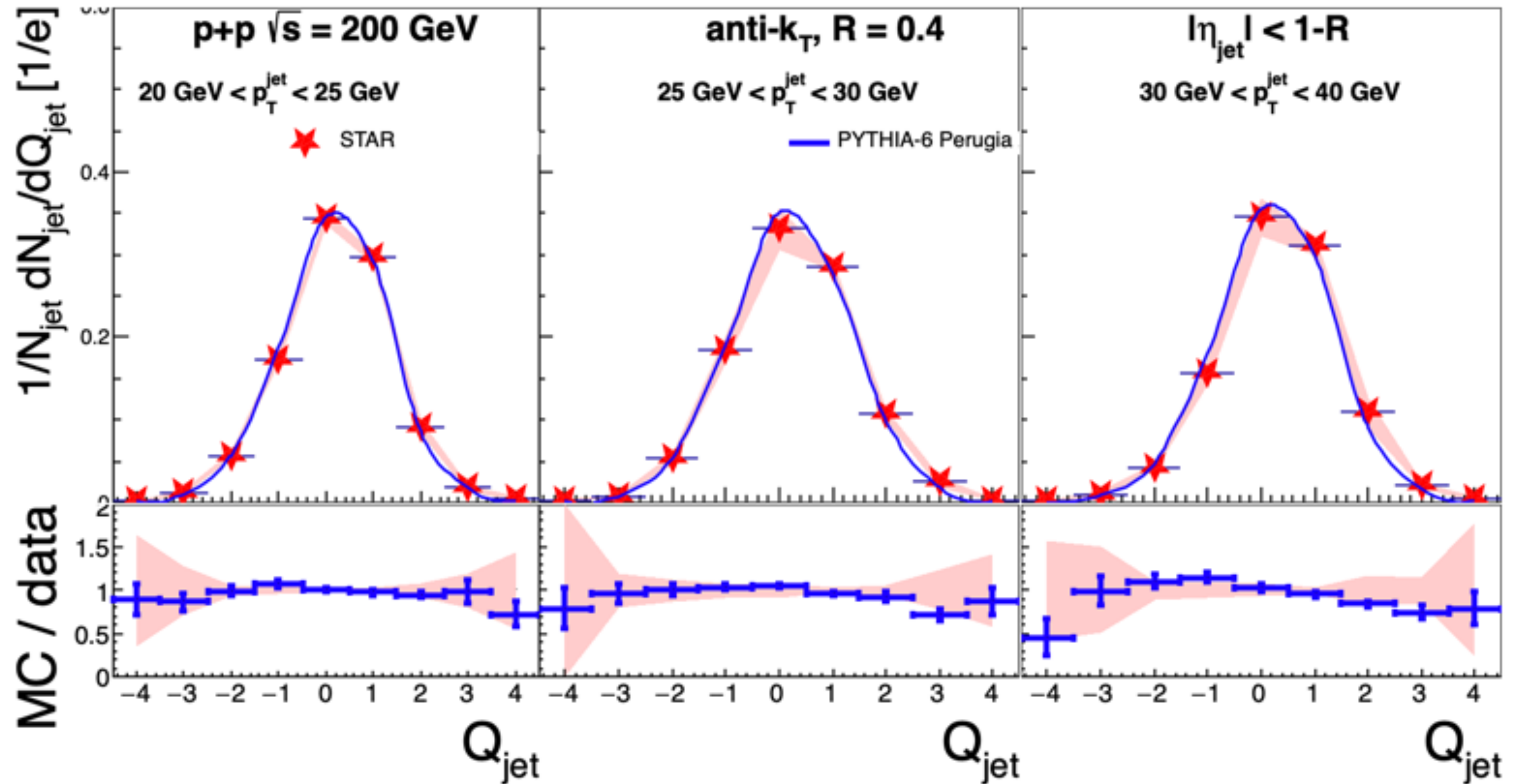
- 2012 pp data at $\sqrt{s} = 200$ GeV
- Jet-patch trigger
- anti- k_T jets with $R = 0.4$
- Full hadronic correction
- Charged and neutral particles used to cluster into jets

<https://doi.org/10.1016/j.physletb.2020.135846>

<https://doi.org/10.48550/arXiv.2009.04962>



- PYTHIA-6+GEANT reproduces the raw data well
- 2D unfolding of jet p_T and Q_{jet} can be performed to correct for detector effects

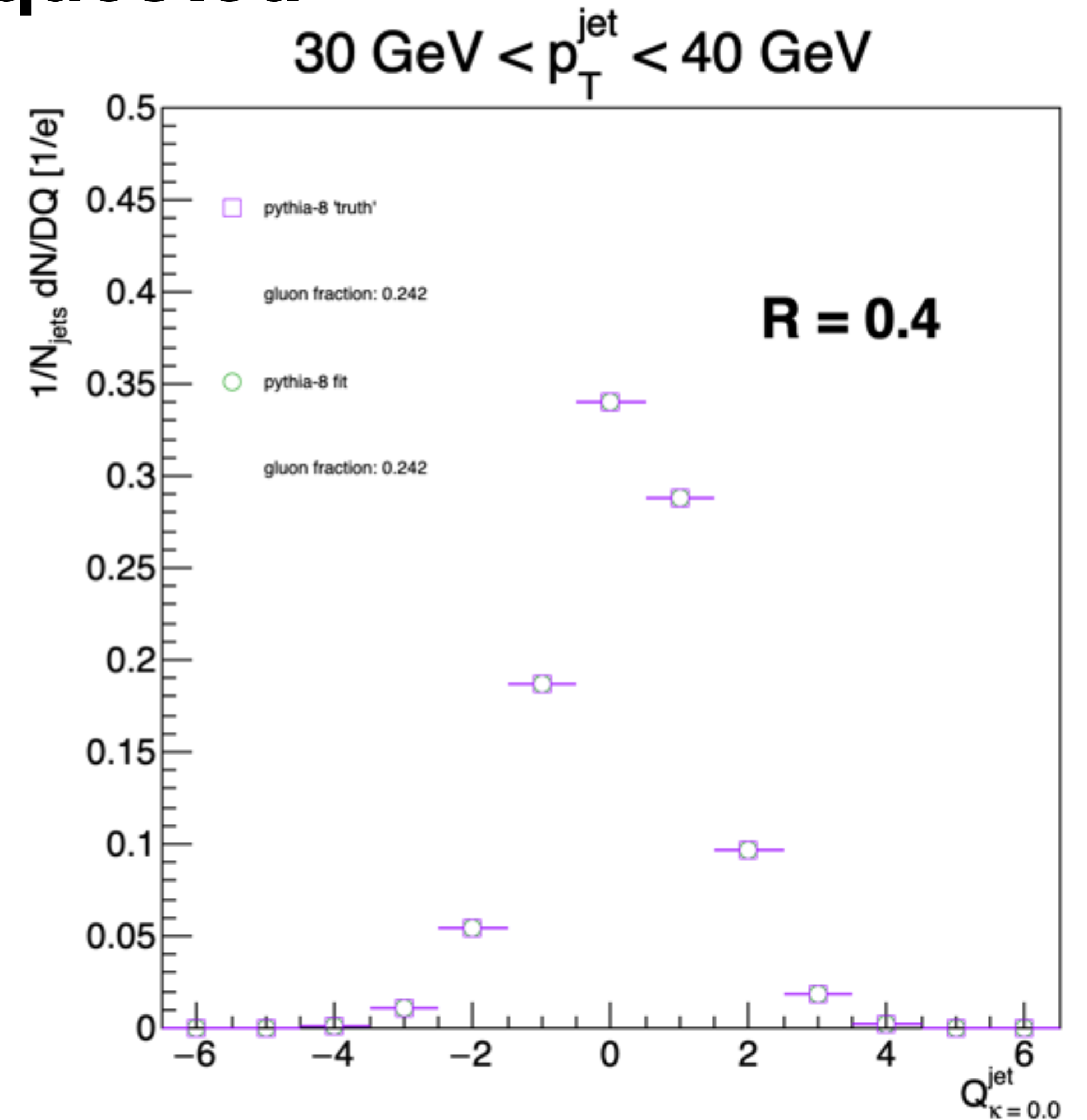


- Good agreement with PYTHIA-6
- Comparison to PYTHIA-8 to come
- Mean shifts to $+Q$, indicating more quark dominated jets as expected

Template Fitting

In Progress – no Preliminary figures requested

- Parton flavor information not yet available for PYTHIA-6
- PYTHIA-8 parton flavor templates able to fit to PYTHIA-8 distribution with proper fractions



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- Unable to fit to data, PYTHIA-6 using PYTHIA-8 templates
 - Fit does not converge
- Cannot confidently report values for flavor fractions
 - Quark fractions are not proper

Ongoing

