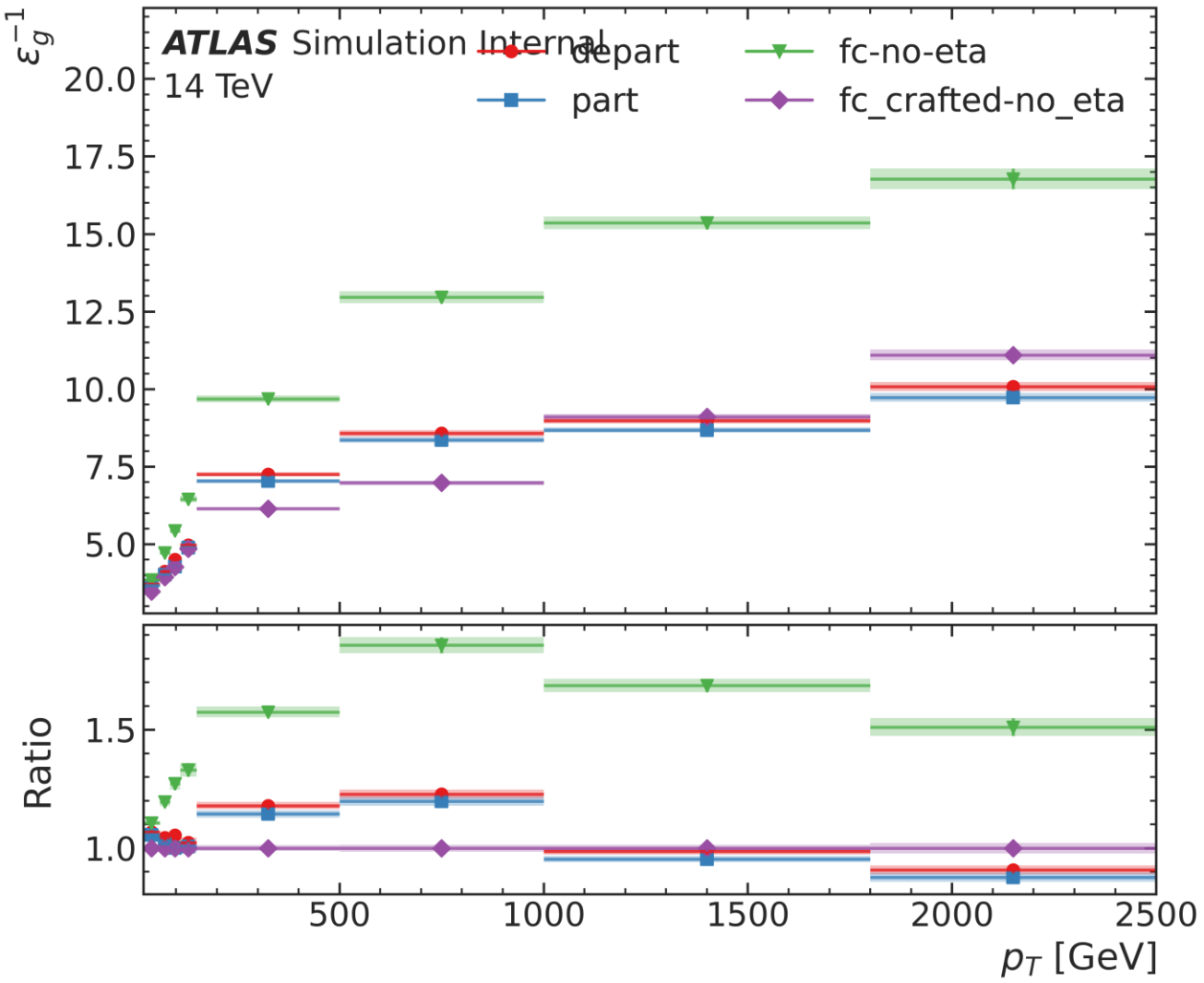
Comparison. Central Region



Bug in kT

[slides from Samuel]

Merged in my repository: [https://gitlab.cern.ch/fcastill/quarkgluontagger]

RESULTS AFTER BUG REMOVAL

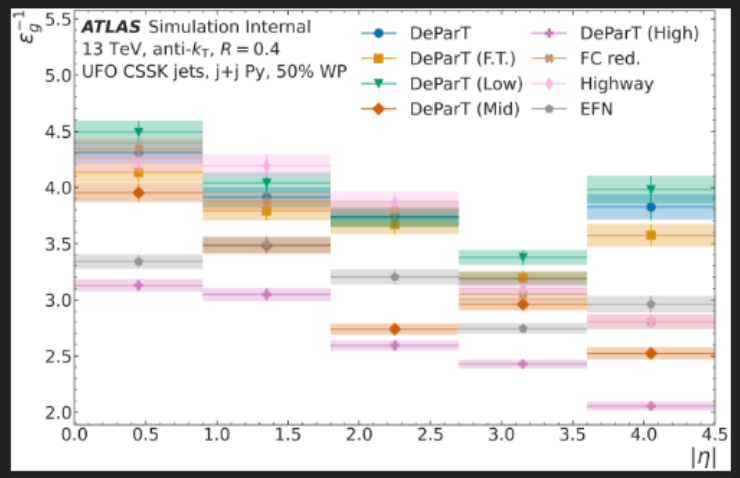
Constituent Interaction Variables

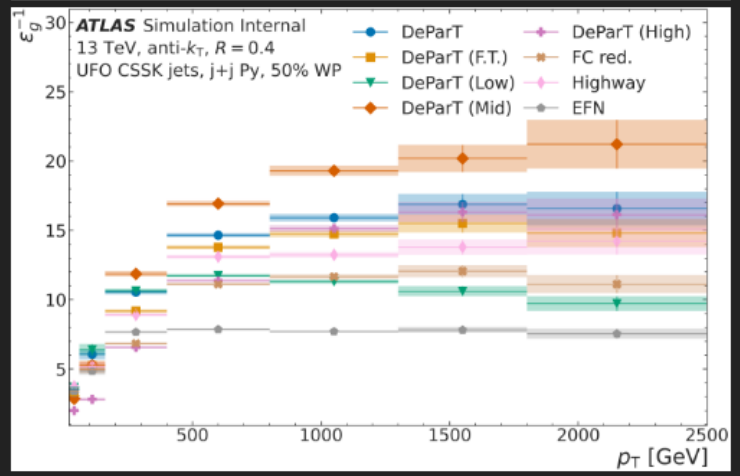
$$\log \Delta^{ab} = \log \sqrt{(\eta^a - \eta^b)^2 + (\phi^a - \phi^b)^2}$$
$$\log k_T^{ab} = \log (\min (p_T^a, p_T^b) \Delta^{ab})$$
$$z^{ab} = \min (p_T^a, p_T^b) / (p_T^a + p_T^b)$$
$$\log m^{2,ab} = \log (p^{\mu,a} + p^{\mu,b})^2$$

kT variable was built from log Delta and not pure Delta

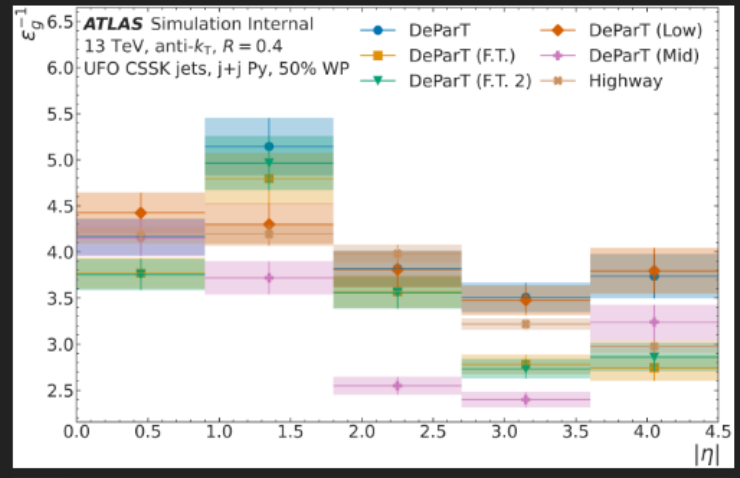
27

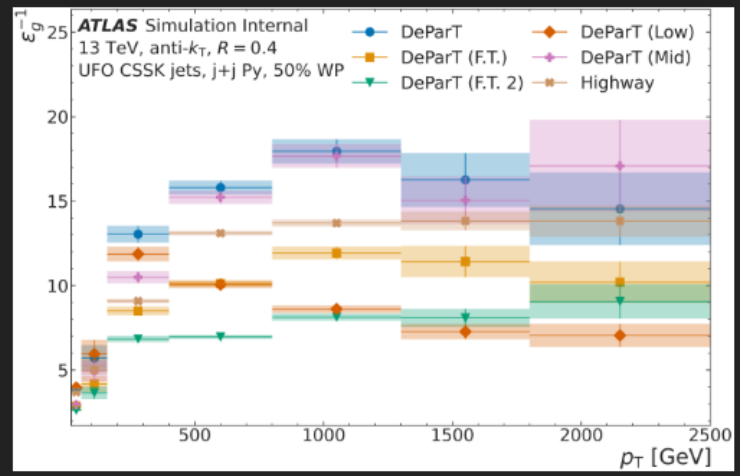
OLD





NEW



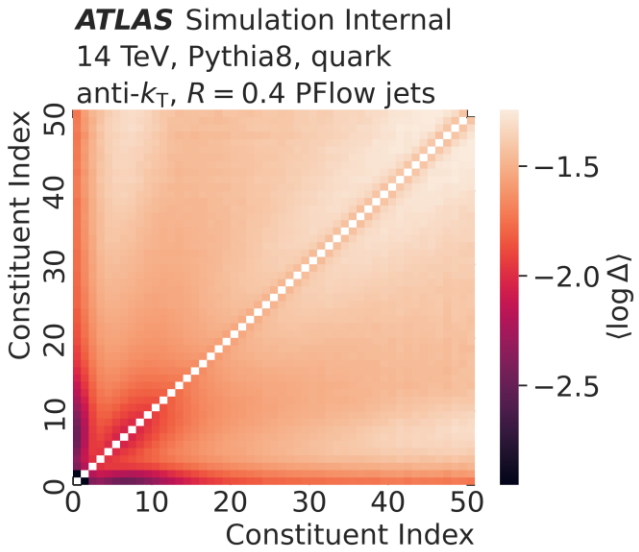


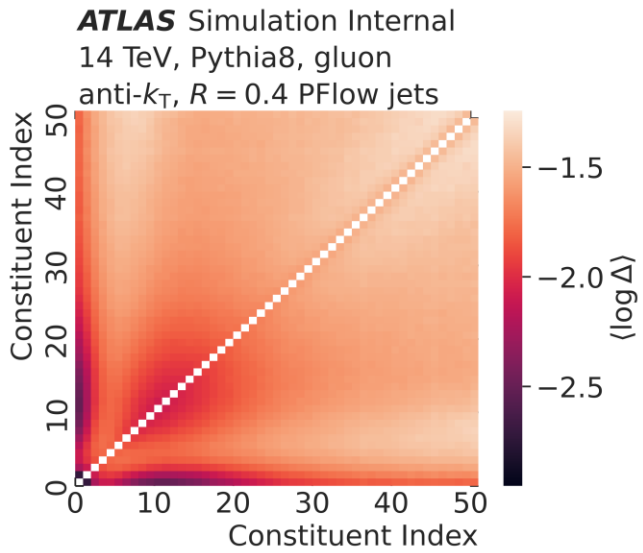
Constituent variables

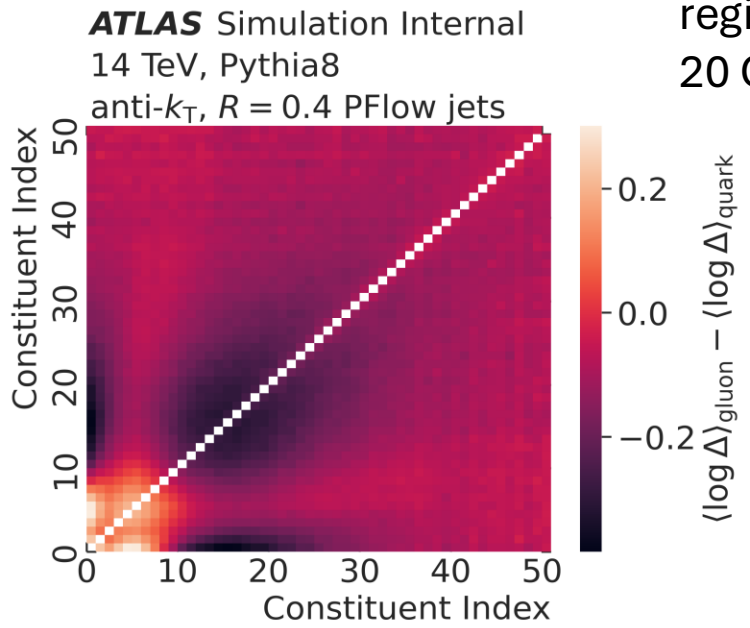
Constituent Interaction Variables

$$\log \Delta = \log \sqrt{(\eta^a - \eta^b)^2 + (\phi^a - \phi^b)^2}$$

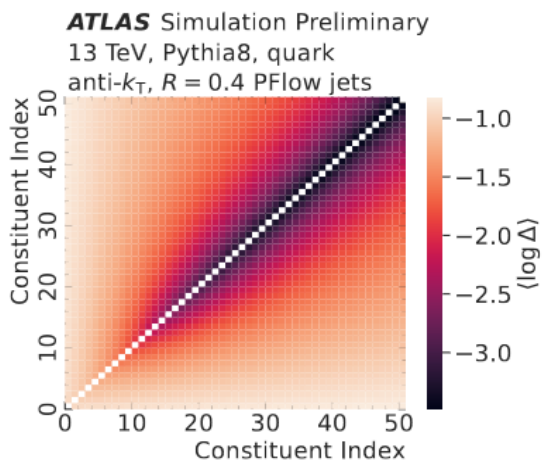
Looking to central region and pT > 20 GeV

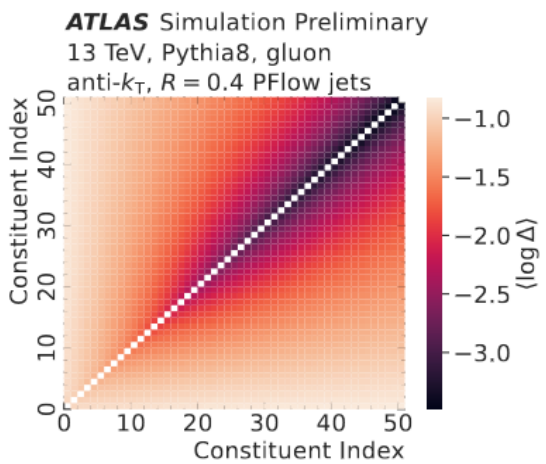


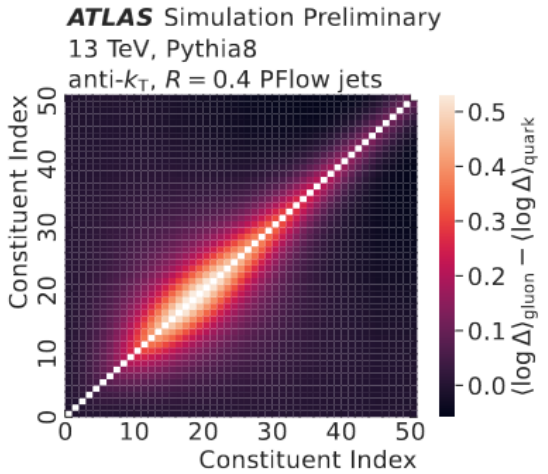




Around 20 const
Quark jets are wider?!!





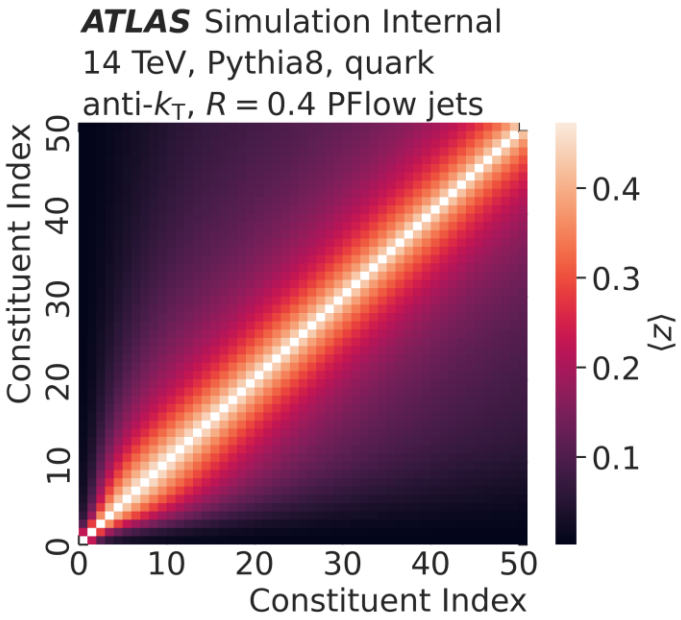


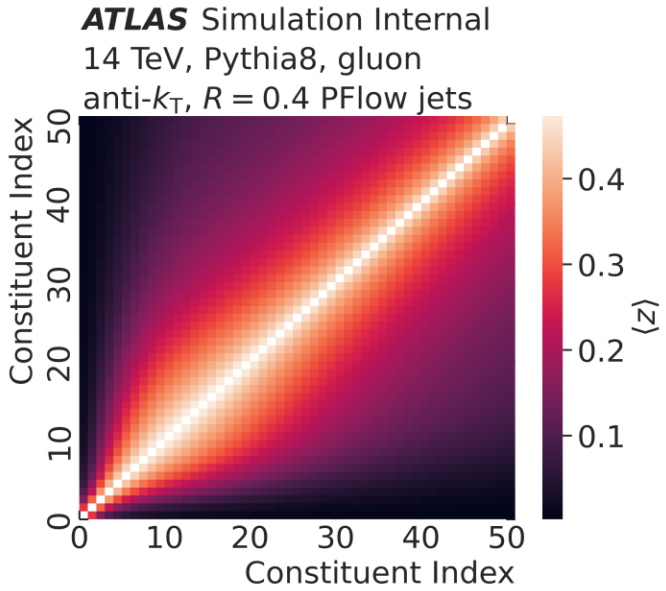
Run 2 results gluon-initiated jets are known to have higher jet wider

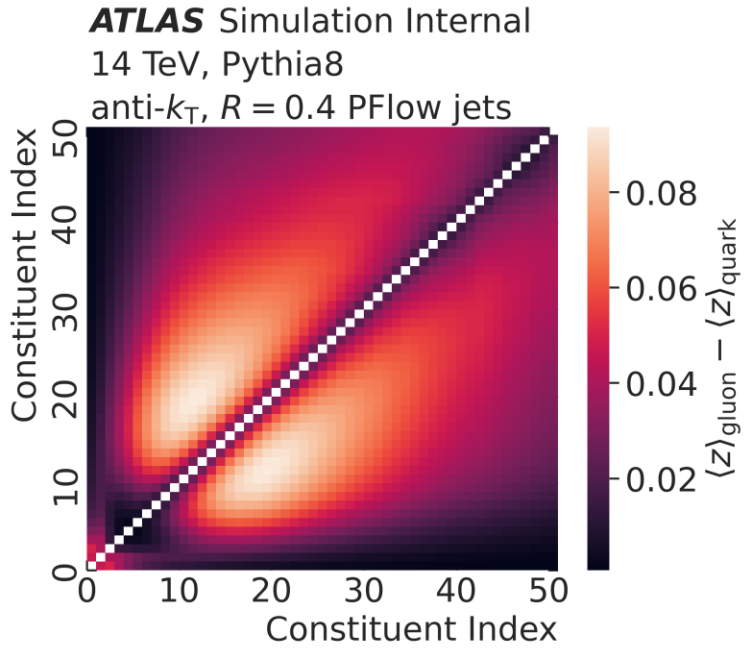
Constituent variables

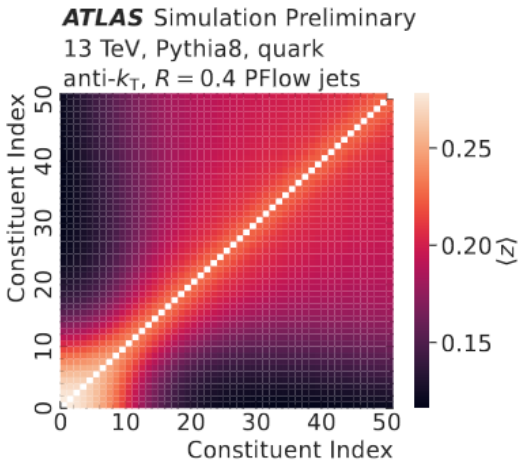
$$z = \min(p_T^a, p_T^b)/(p_T^a + p_T^b)$$

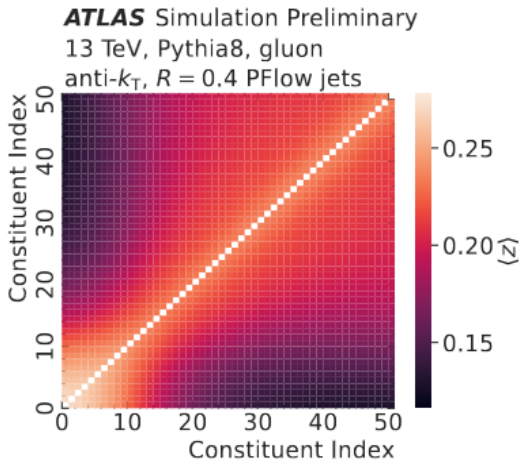
Looking to central region and pT > 20 GeV

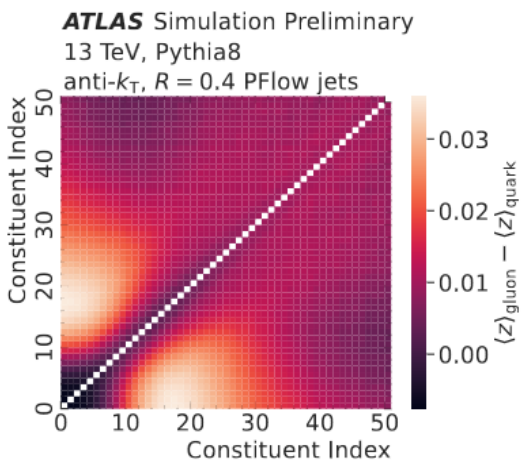












Run 2 results

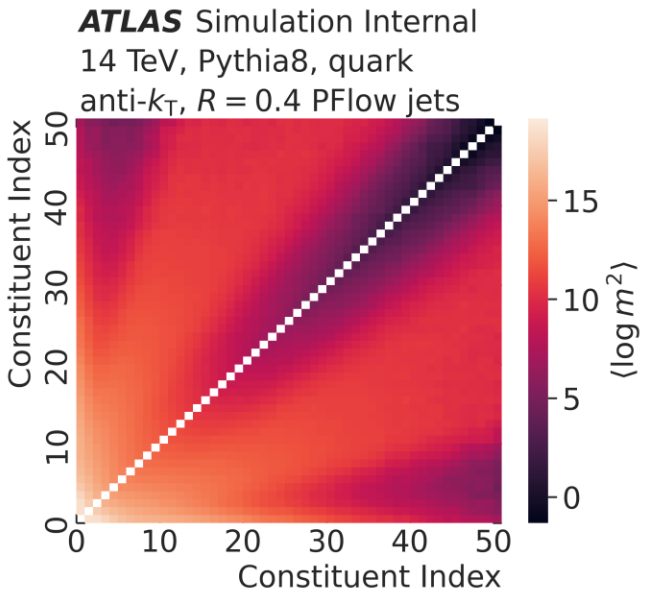
The variable z is bigger for gluon-initiated jets than for quark-initiated jets for all constituent pairs except for the few highest-pT ones.

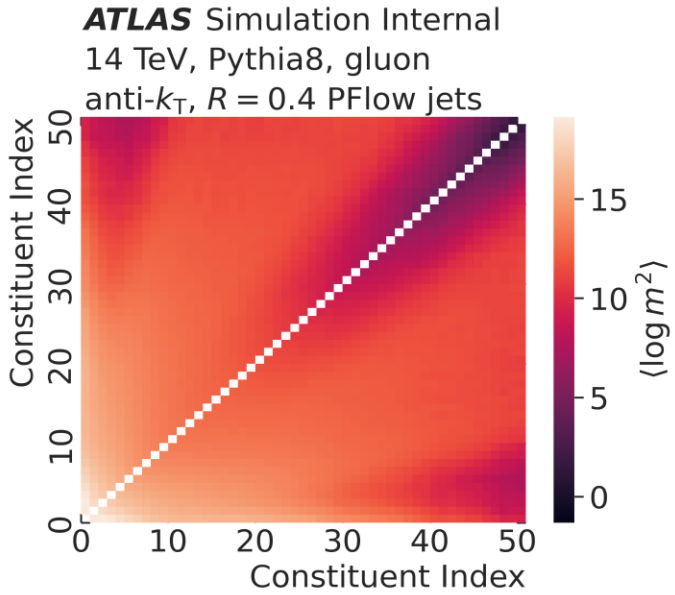
This hints at a more even splitting of the gluon-initiated jet pT between its lower-pT constituents.

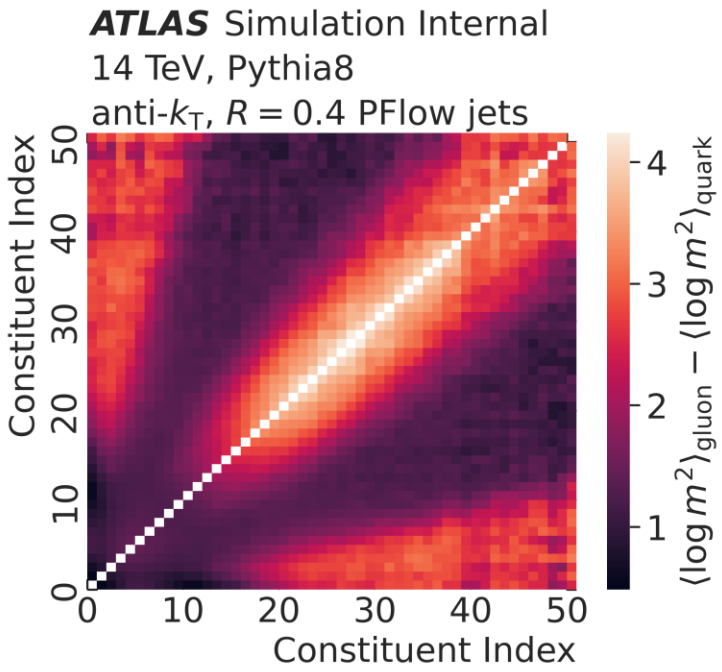
Constituent variables

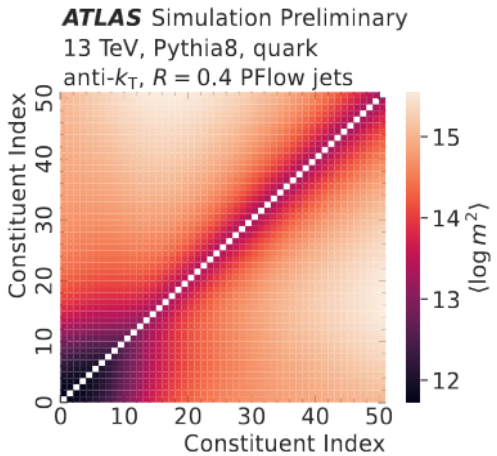
$$\log m^2 = \log\left(p^{\mu,a} + p^{\mu,b}\right)^2$$

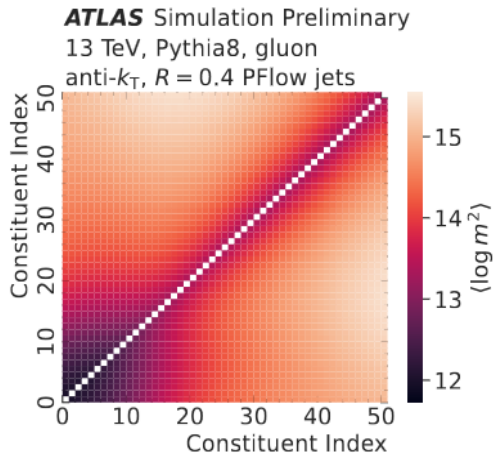
Looking to central region and pT > 20 GeV

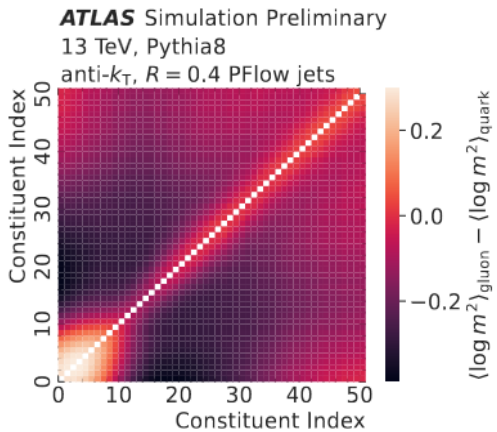








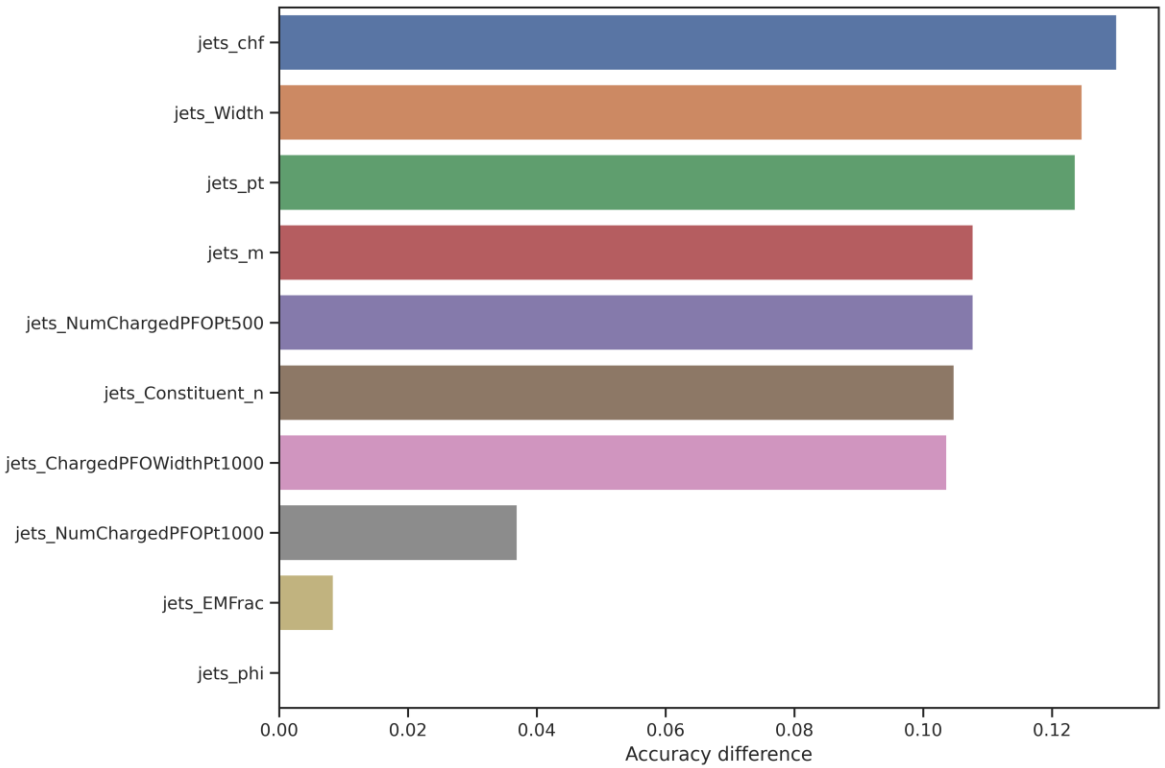




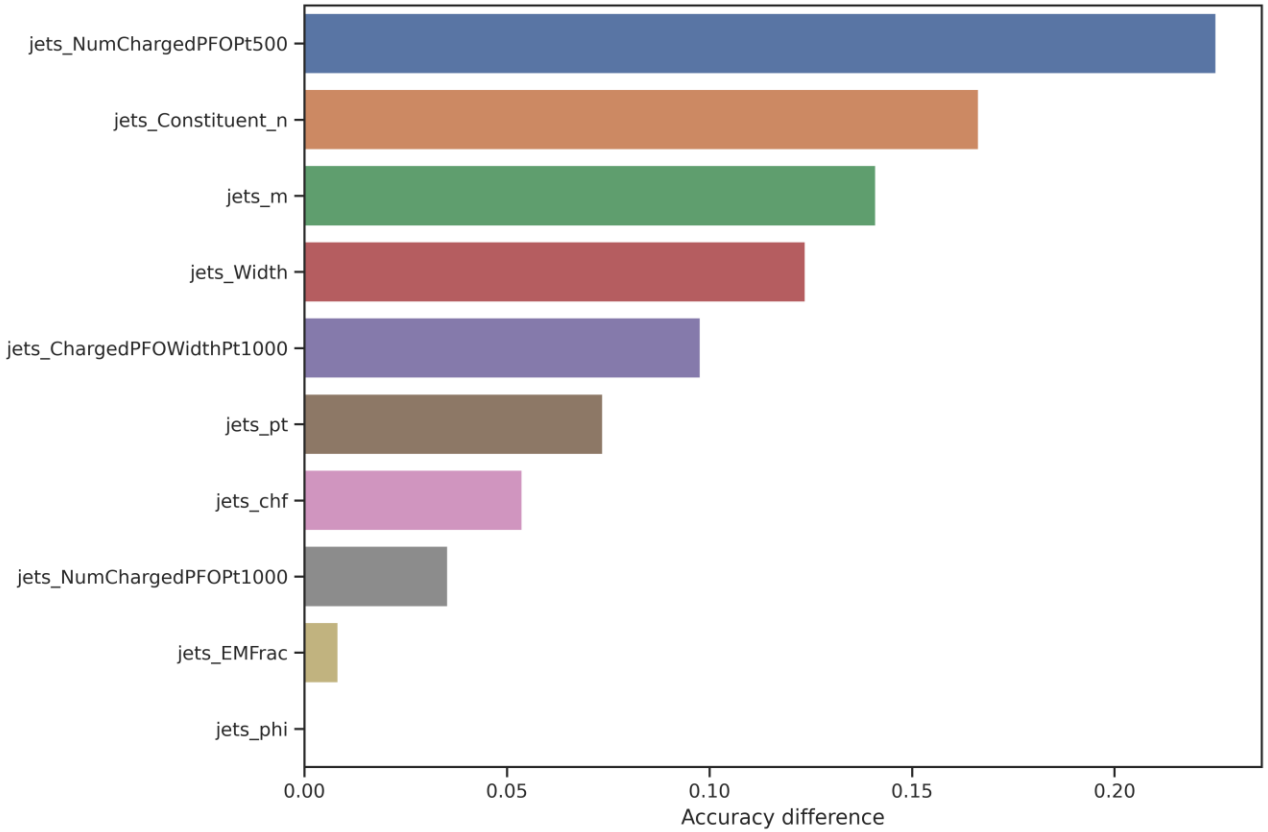
the primary discrepancy is noticeable in the region between the highest-pT constituents, i.e. the bottom left corner. In the region of pairs where at least one constituent has lower pT, the pair masses are higher in quark-initiated jets.

Feature importance. Full region.

Without Weights



With Flat Weights



the impact of different variables on model accuracy by perturbing each variable and measuring the resulting change in accuracy.

L3 Gluing error study on single muons

- Comparison using single muon samples with transverse momenta (pT) of 1, 10, and 100 GeV
  - Samples provided by Alexis
- Jira ticket: https://its.cern.ch/jira/browse/ATLITKSW-261
- Realistic positions of the Strips Barrel 3 which includes a manufacturing error resulting in Z-offset
- https://indico.cern.ch/event/1433325/

- Summary of the conclusion:
  - The reco chi^2 values are slightly affected by the L3 gluing error.
    - This change is attributed to the modifications in the detector geometry.
    - Pull distributions are slightly affected
  - Other reconstructed variables remain largely unchanged despite the geometry alterations introduced by the L3 gluing error.
    - Efficiencies and reconstructed vertex positions are not impacted by the presence of the L3 gluing error.