Unified Flow performances in ATLAS

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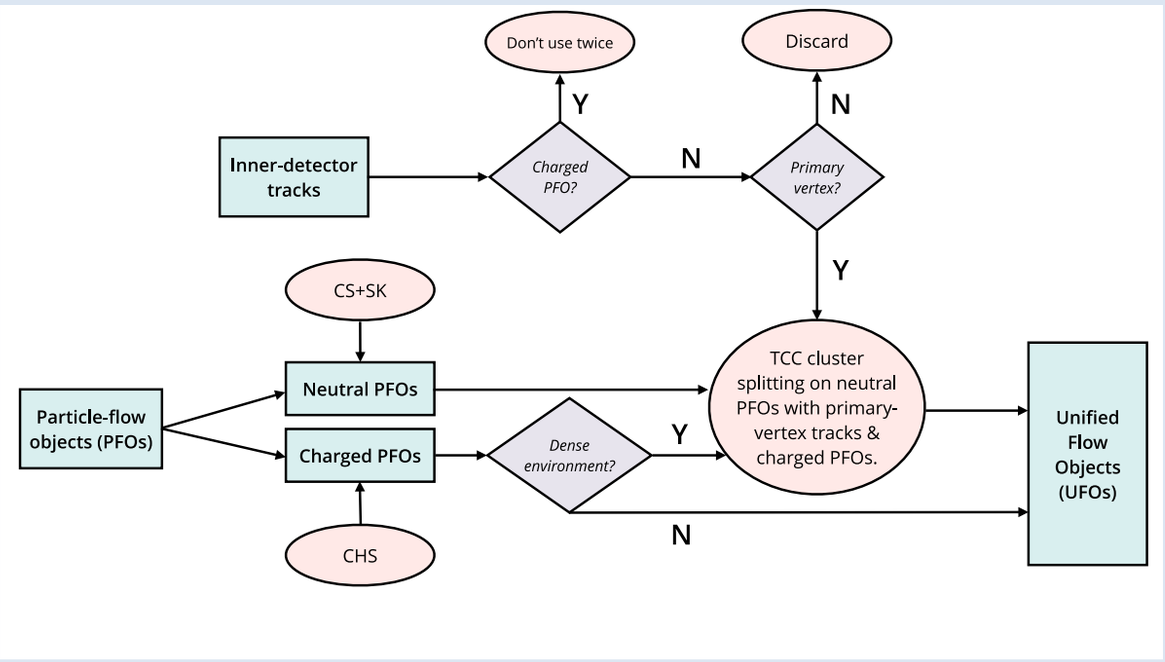
The Unified Flow Objects:

- Inner detector tracks and calorimeter clusters have complementary performance.
- ATLAS combined them in two algorithms: Particle Flow [1] (PFlow) and Track-CaloClusters [2] (TCC).

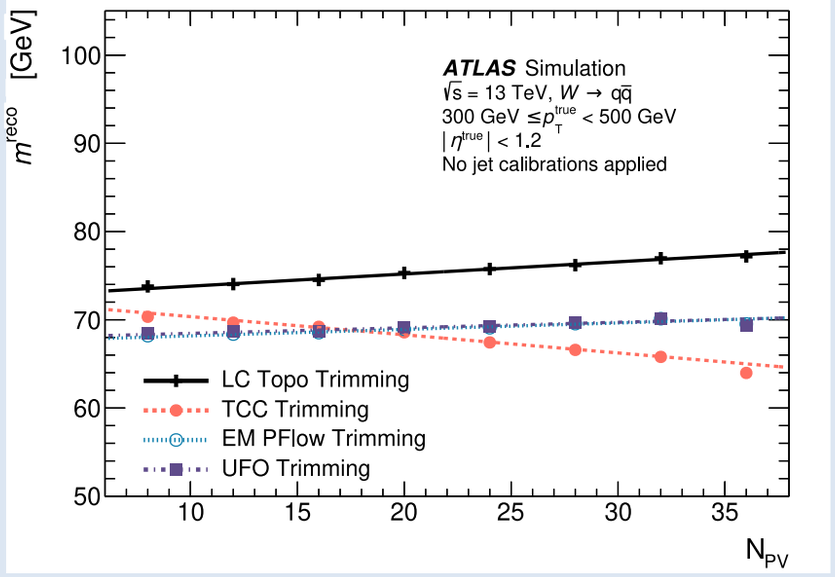
- Their performance are complementary: PFlow perform better at low p_T while TCC perform better at high p_T.
- Combine both into Unified Flow Objects [3] (UFOs), with optimal performances at low and high p_T .
- Pile-up mitigation algorithms can be applied before jet reconstruction. Study Charged Hadron Subtraction (CHS), Constituent Subtraction (CS) and SoftKiller (SK).
- Grooming algorithms can be used to remove undesirable radiation after jet reconstruction. Study trimming, soft-drop, bottom-up soft-drop and recursive soft-drop.
- Compare UFOs in combination with pile-up mitigation and grooming algorithms for large-radius and small-radius jets.



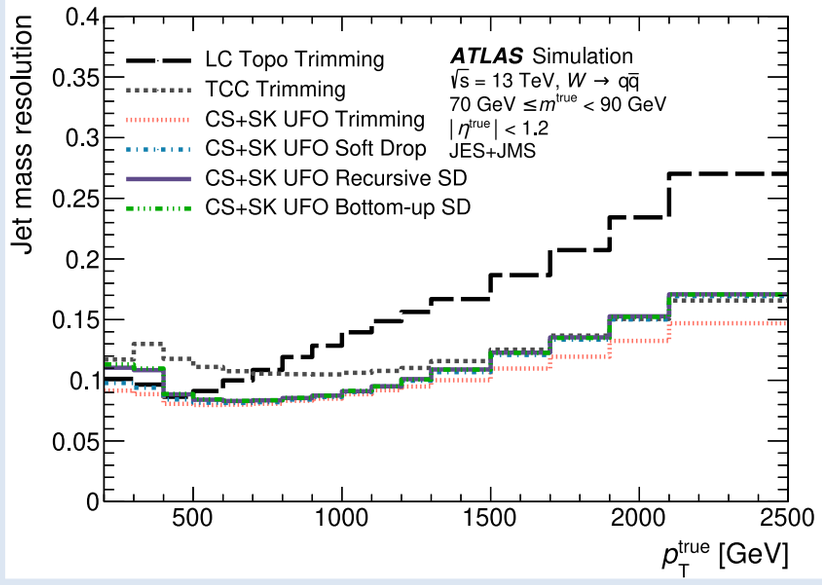
Large-radius jets [3]:

- Compare with the baseline for Run 1 and 2: Anti-k_t R=1.0 LC topo-clusters (i.e. topo-clusters calibrated with LCW) jets with trimming.

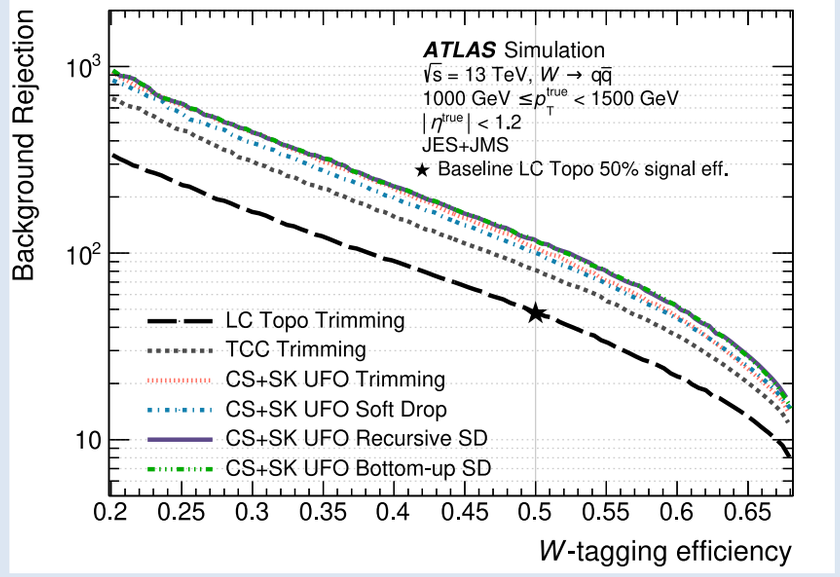
- Pile-up stability:



- Mass resolution:



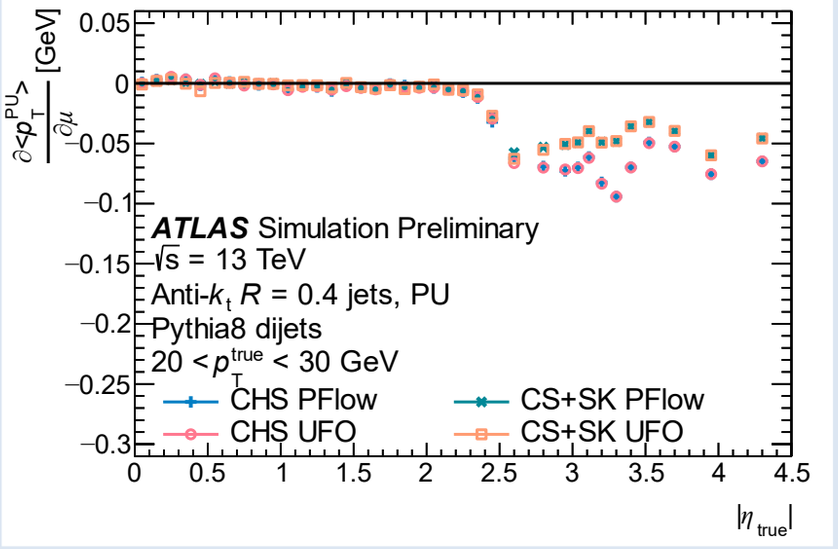
- W-tagging:



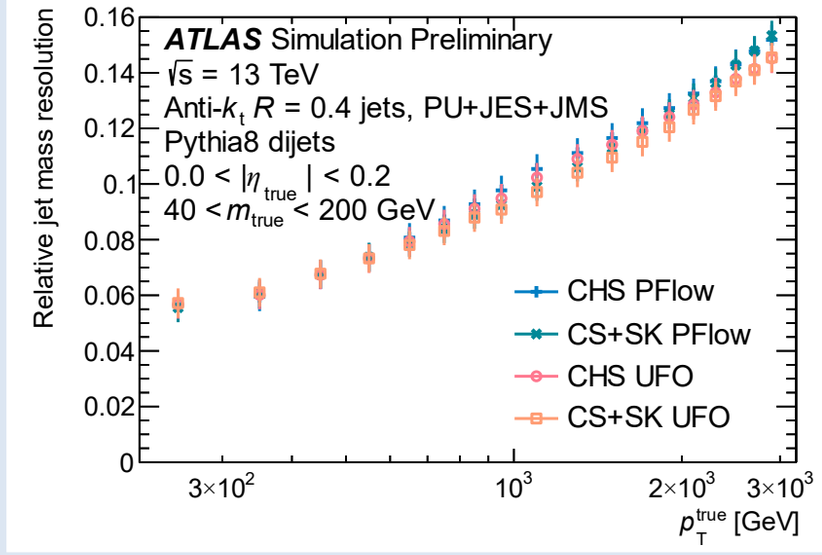
Small-radius jets [4]:

- Compare with the current baseline: Anti-k_t R=0.4 PFlow jets with CHS.

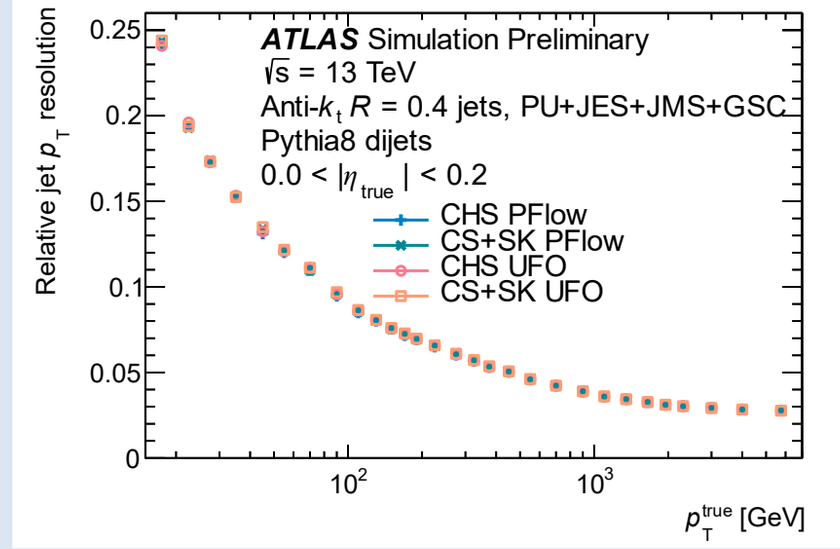
- Pile-up stability:



- Mass resolution:



- p_T resolution:



Conclusion:

- UFOs lead to improvements for both large and small-radius jets!
- UFOs are now used as baseline for large-radius jets.
- CS+SK UFOs R=0.4 jet performance matches or exceeds that of PFlow R=0.4 jets!

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Results from: [1] ATLAS Collaboration ***Eur. Phys. J. C 77 (2017) 466***, [2] ATLAS Collaboration ***ATL-PHYS-PUB-2017-015***, [3] ATLAS Collaboration ***Eur. Phys. J. C 81 (2021) 334***, [4] ATLAS Collaboration ***ATL-PHYS-PUB-2022-038***