Underlying event characterization in 200 GeV Au+Au collisions for jet measurements with the sPHENIX detector

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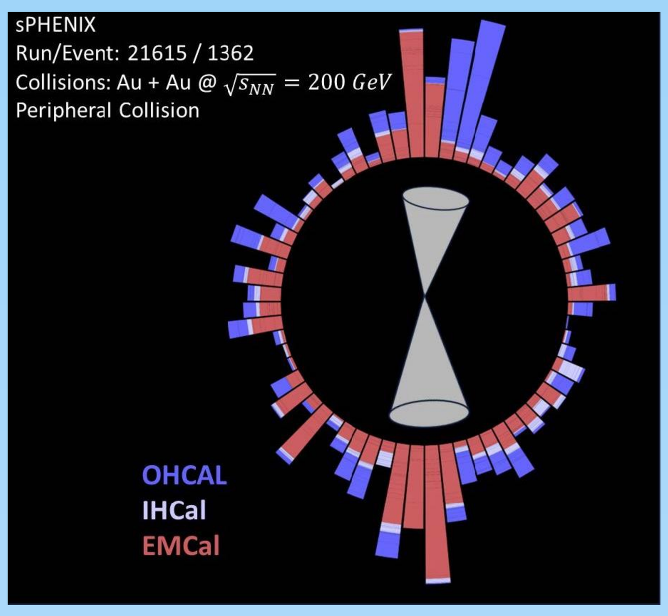
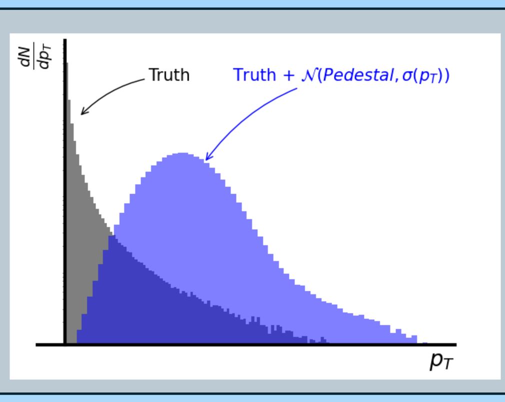
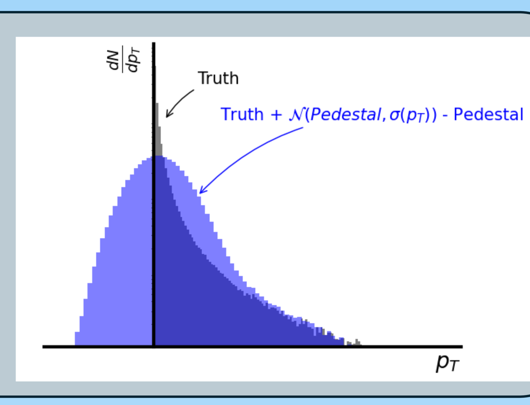
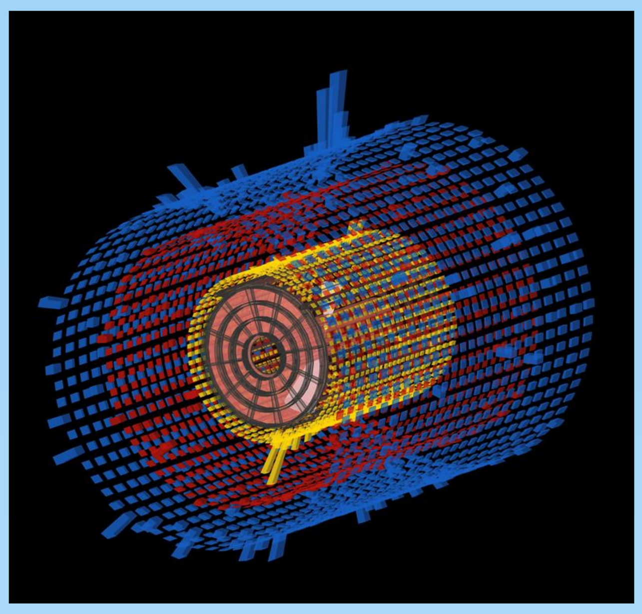




Jets measurements must be corrected for soft ***fluctuating*** UE
Pedestal is easily subtractable
fluctuations must be unfolded





Determination of UE subtraction done with three methods

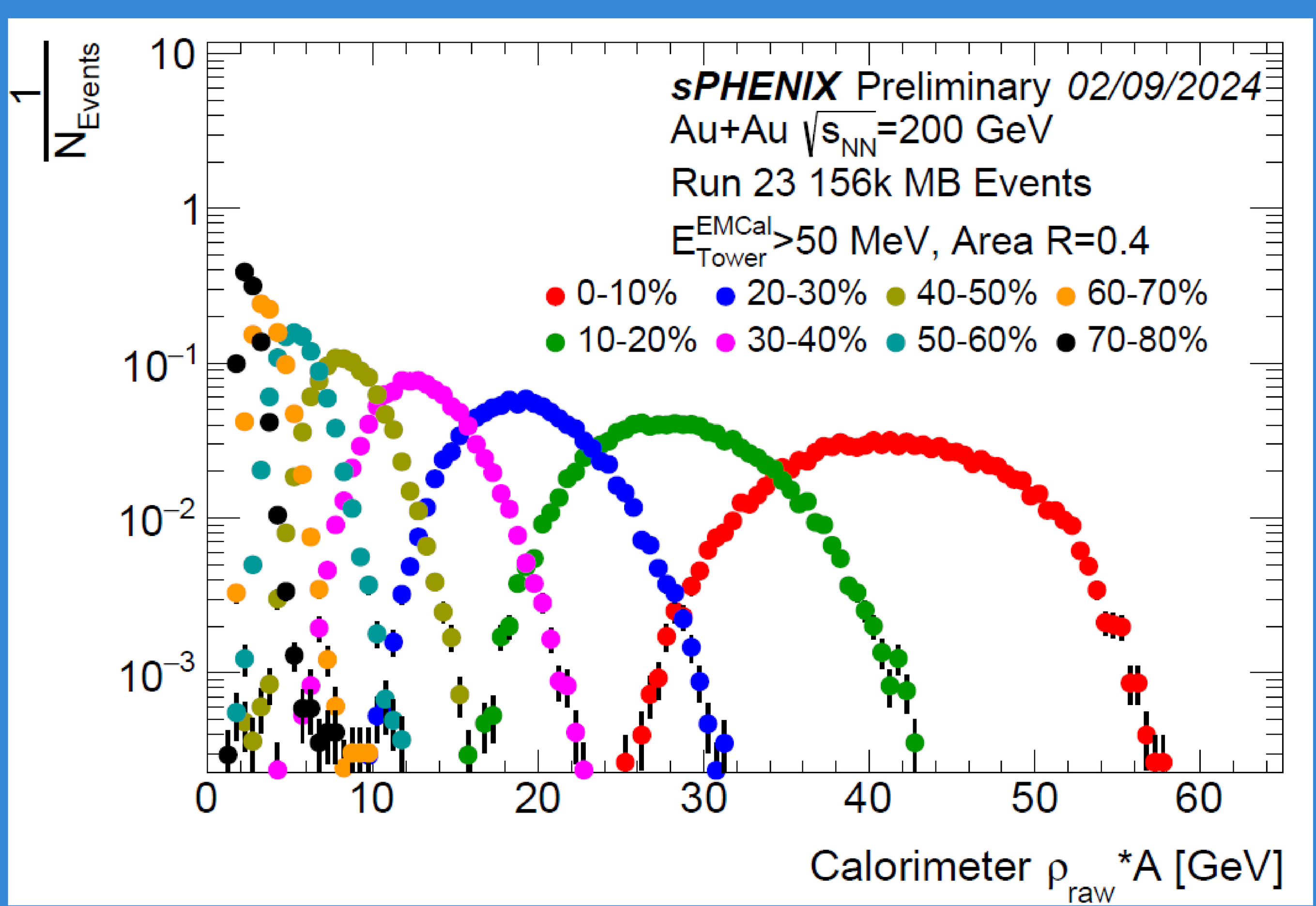
- Area based method (STAR, ALICE) Phys.Lett.B 659 (2008) 119-126
- Multiplicity method (New!) Phys. Rev. C 108, L021901
- Iterative subtraction (ATLAS) Phys. Rev. C 86, 024908

Comparisons of UE characterizations using different methods which each include additional effects

- Calorimeter windows
- Random cones
- Embed probes/full jets

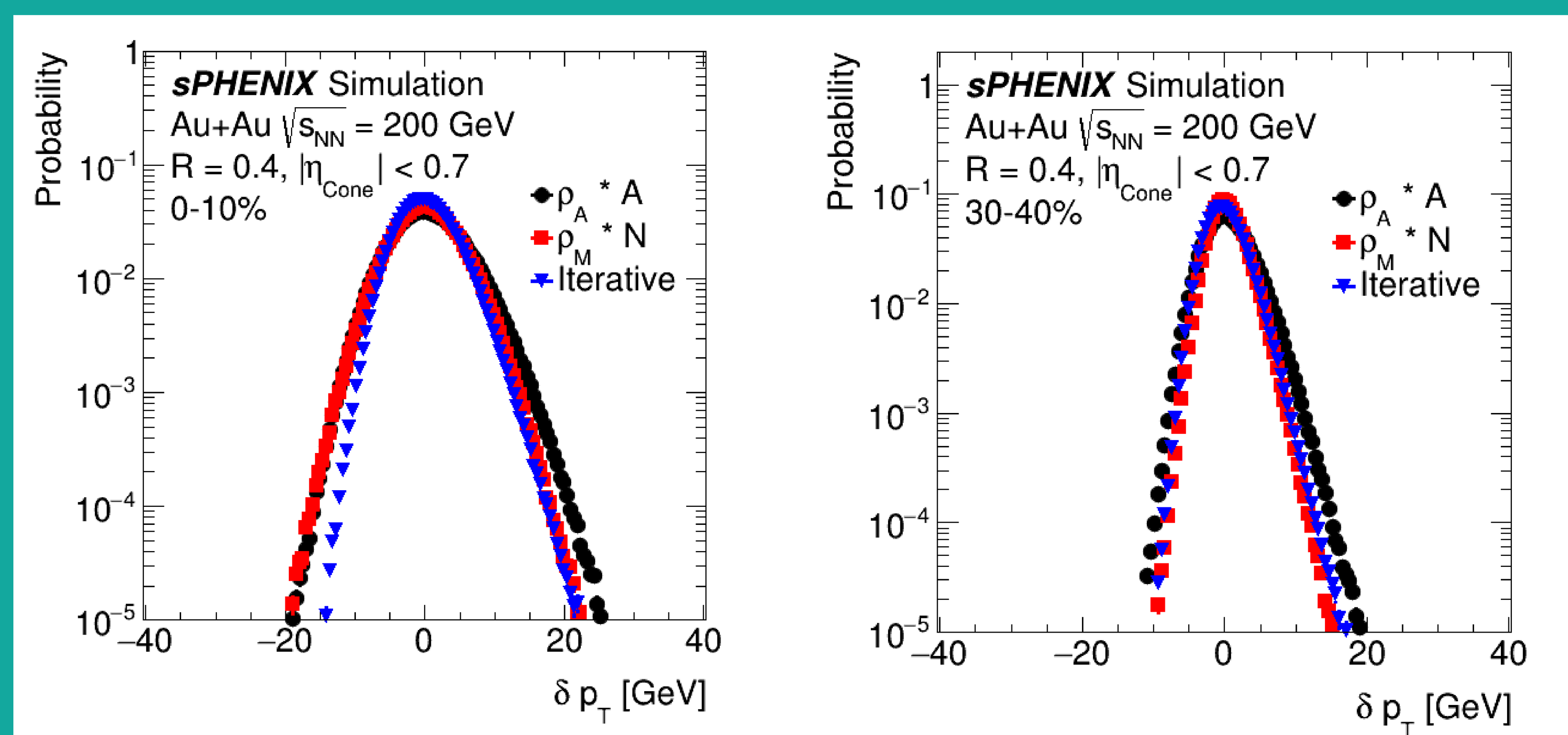
Area Method

- Median UE in all k_T jets in event
- Symmetric in central events → asymmetric in peripheral events
- Follows trends seen in other experiments



Random Cones

- Draw cone in random direction
- Sum towers within cone radii
- Compare width of fluctuations after pedestal subtraction

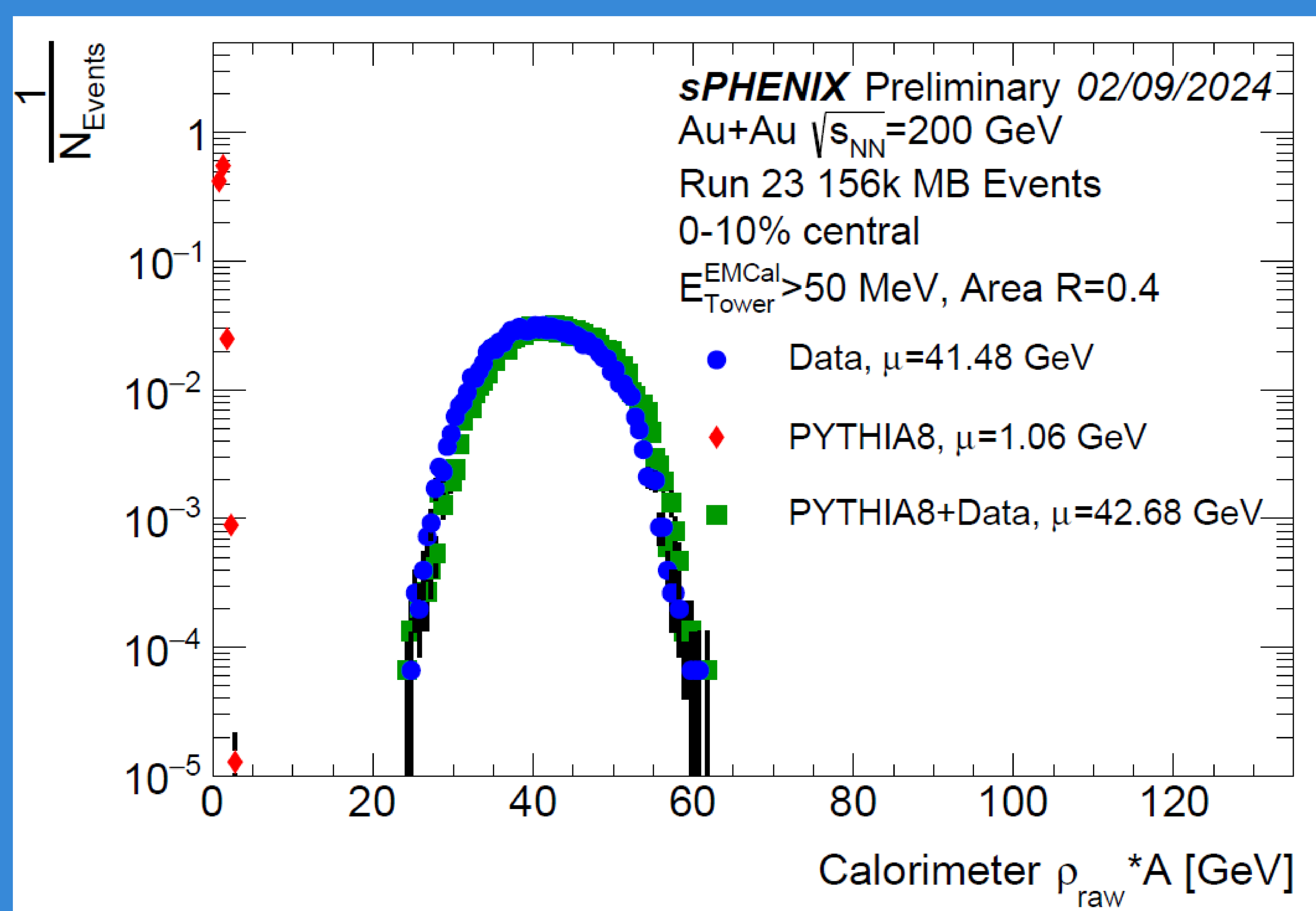


Multiplicity Method

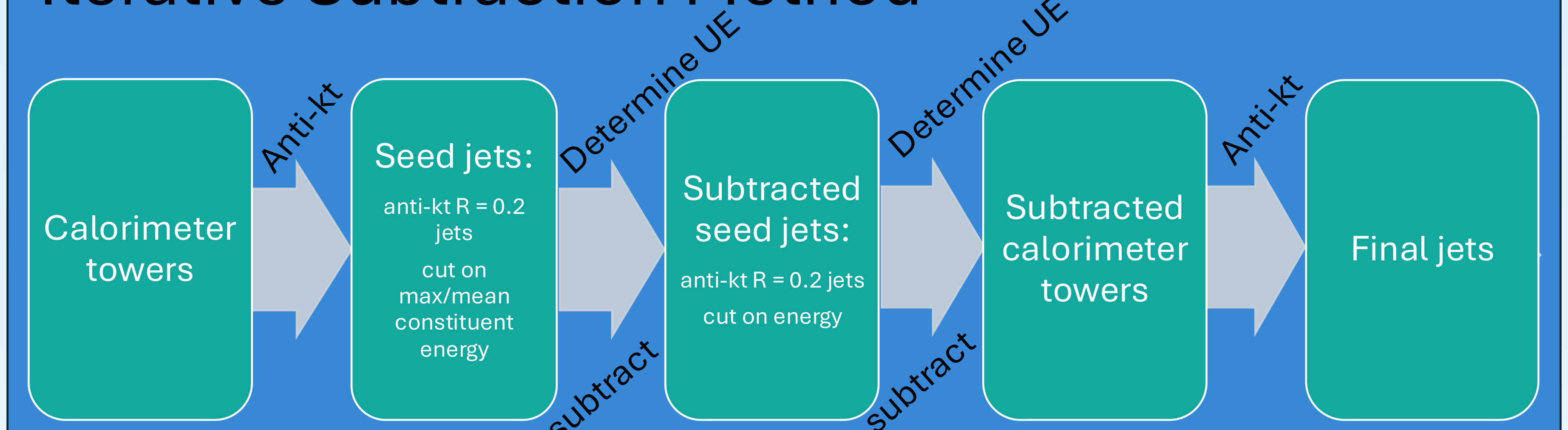
- Calculate median energy per constituent
- Estimate number of signal constituents per jet with models
- $p_{T,Jet}^{Corr,N} = p_{T,Jet}^{total} - \rho_{Mult}(N_{total} - N_{signal})$

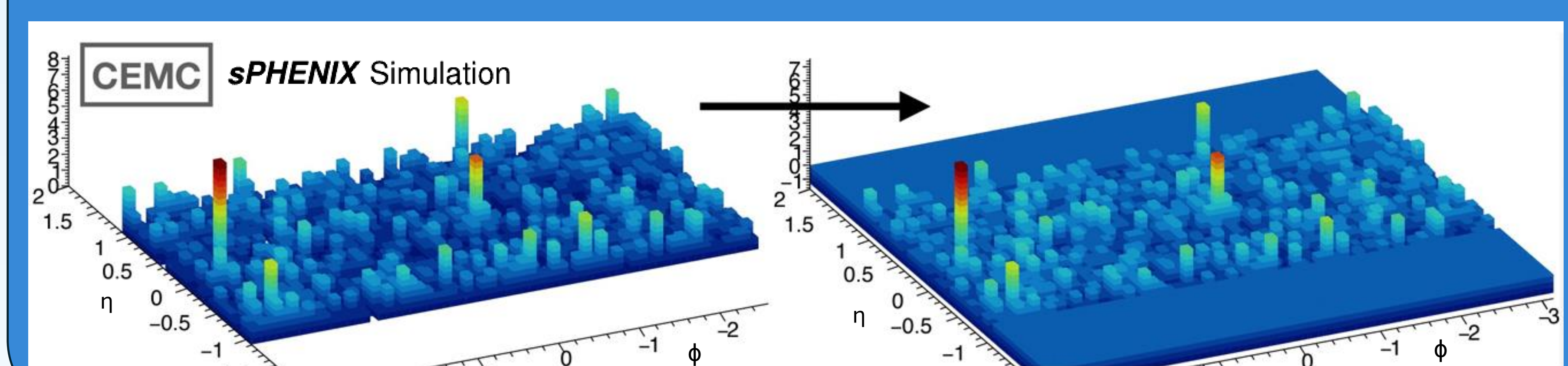
Full Jet Embedding

- Generate jets with PYTHIA8 and run through full GEANT4 model of sPHENIX detector
- Add GEANT4 calorimeter tower energies to those from Au+Au data
- UE in PYTHIA8+Data same as UE from PYTHIA8 + UE from data (factorizes)



Iterative Subtraction Method





Conclusions

Various jet subtraction methods performing well and trends agree with previous measurements
Different UE characterization methods provide information on fluctuations and constrain systematic uncertainties
More results including direct comparisons of UE subtraction methods and fluctuation characterization methods coming soon after end of Run 2024