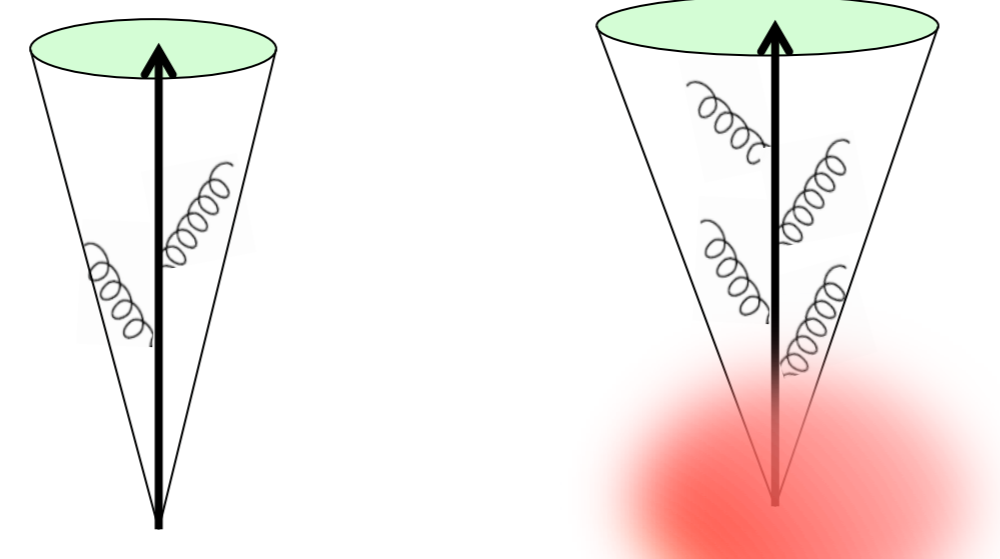


Objective

Understand how jets interact with the QGP medium through jet shape measurements

Vacuum (pp reference) Jets in Medium (jet broadening)

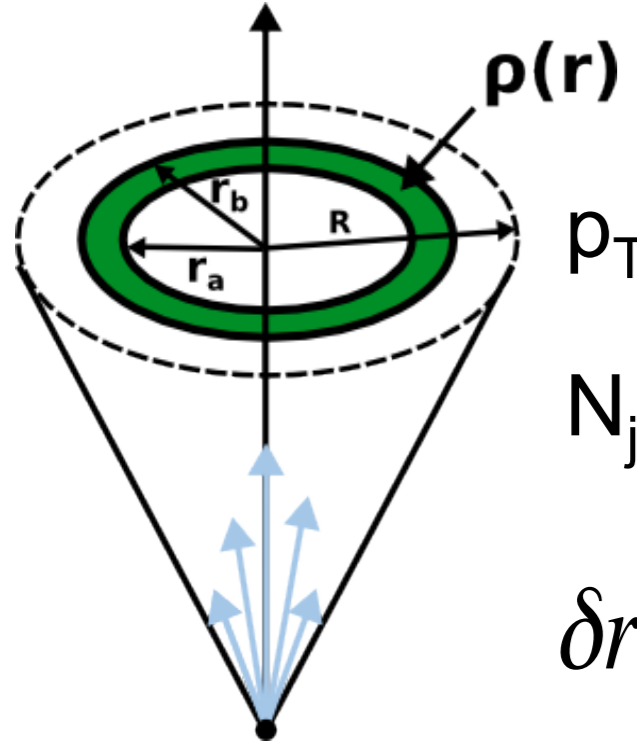


Shape definition

Average fraction of the jet transverse momentum within within (η, ϕ) at radius $r = \sqrt{(\Delta\eta)^2 + (\Delta\phi)^2}$ from jet axis

1. differential jet shape:

$$\rho(r) = \frac{1}{f_{ch}} \frac{1}{\delta r} \frac{1}{N_{jet}} \sum_{jets} \frac{p_T(r - \delta r / 2, r + \delta r / 2)}{p_T^{jet}}$$

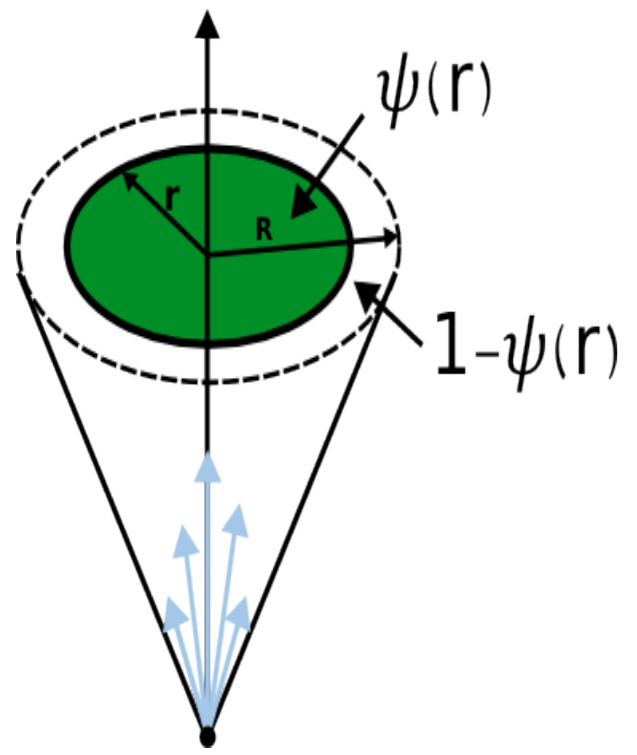


$\rho(r)$ p_T fraction carried by charged particles
 N_{jet} total number of selected jets
 $\delta r = 0.05$

$$f_{ch} = \frac{1}{N_{jet}} \sum_{jets} \frac{p_T(0, R)}{p_T^{jet}}$$

2. integrated jet shape:

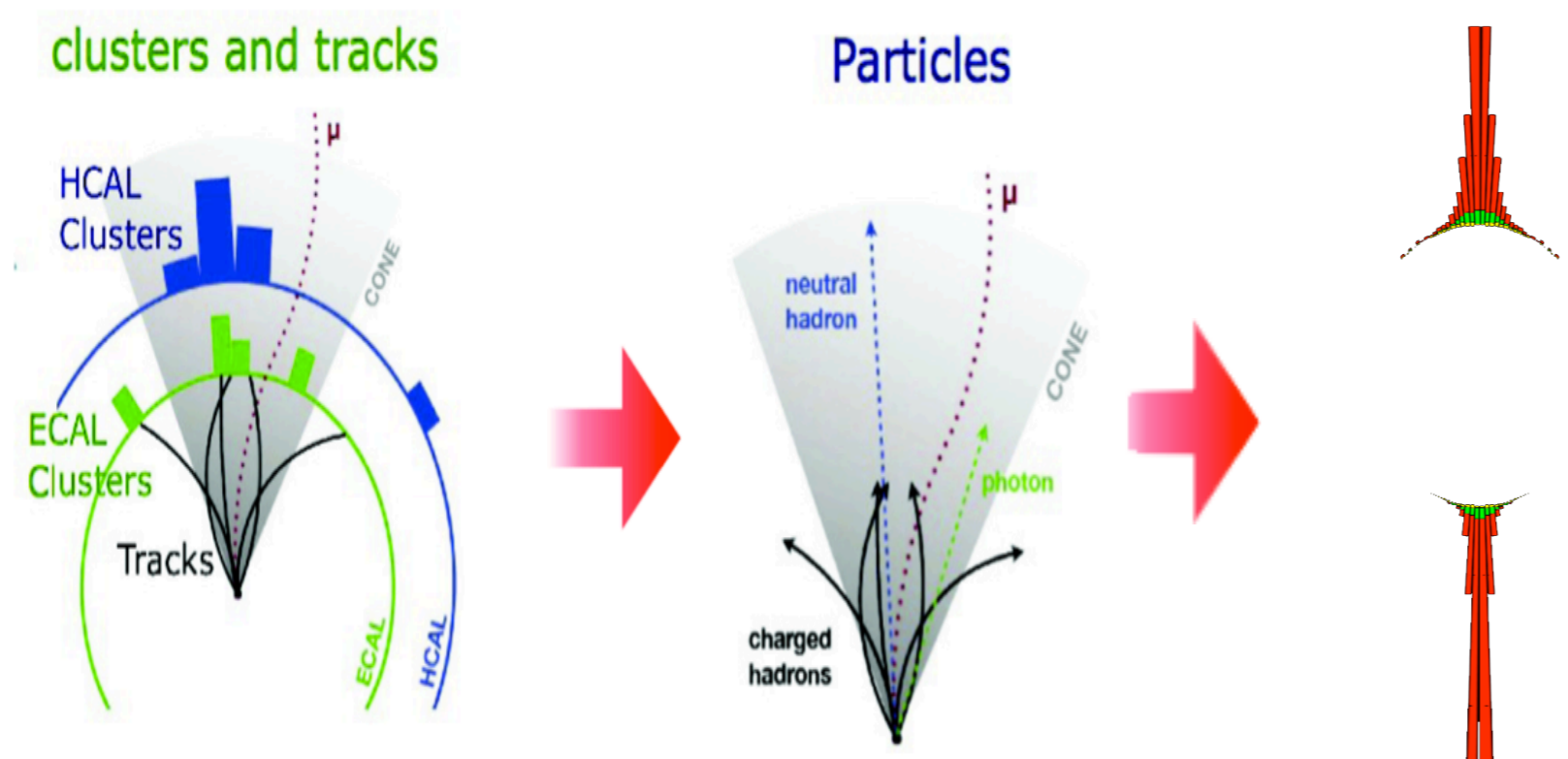
$$\psi(r) \equiv \int \rho(r) dr = \frac{1}{f_{ch}} \frac{1}{N_{jets}} \sum_{jets} \frac{p_T(0, r)}{p_T^{jet}}$$



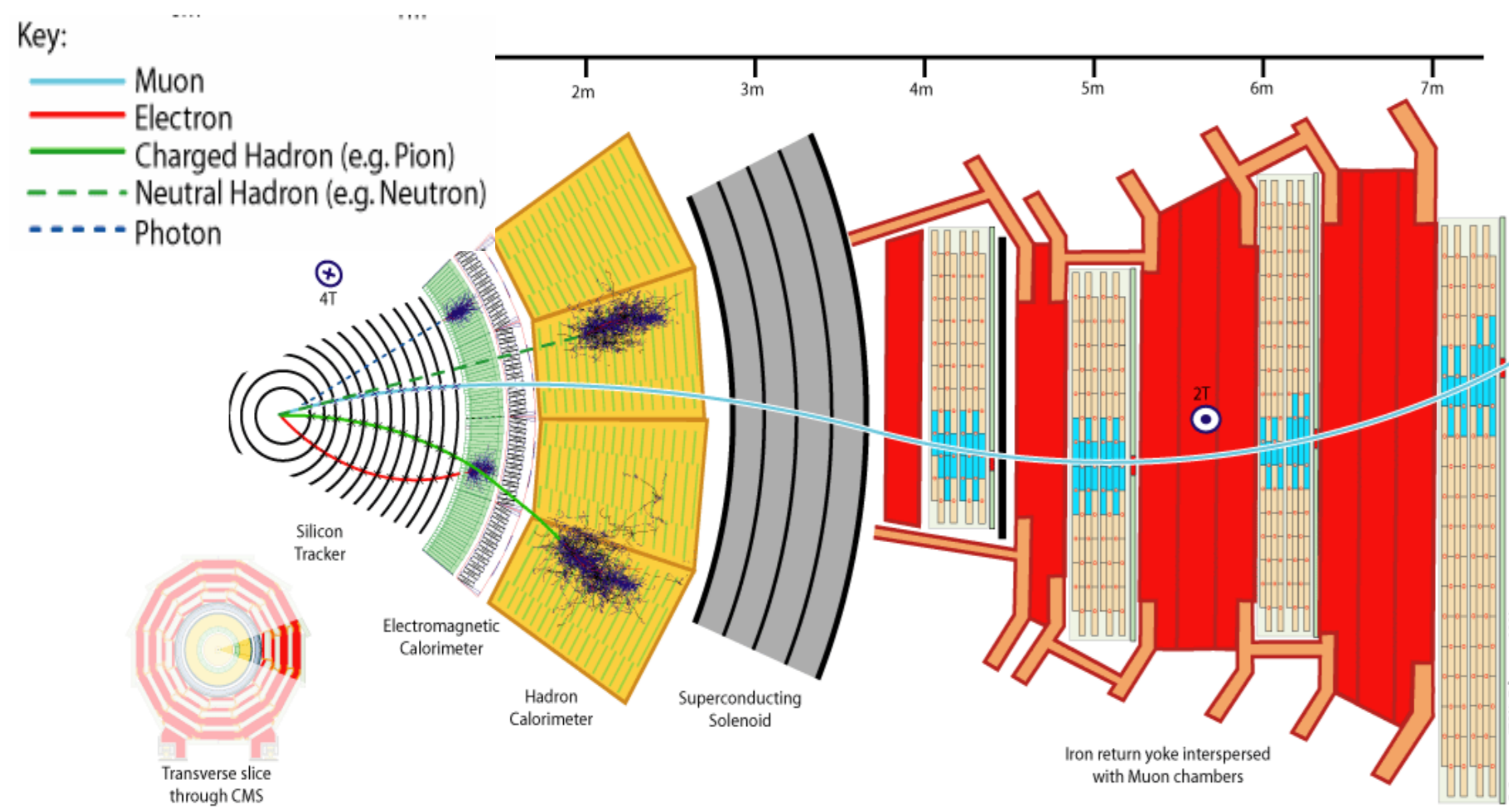
$\Sigma p_T(0, r)$: sum of p_T of charged particles within (η, ϕ) at radius r from jet axis.

Analysis strategy

1. Anti- k_T particle flow jet finding algorithm: $R = 0.3$, $|\eta| < 2.0$, $p_T^{jet} > 100$ GeV/c



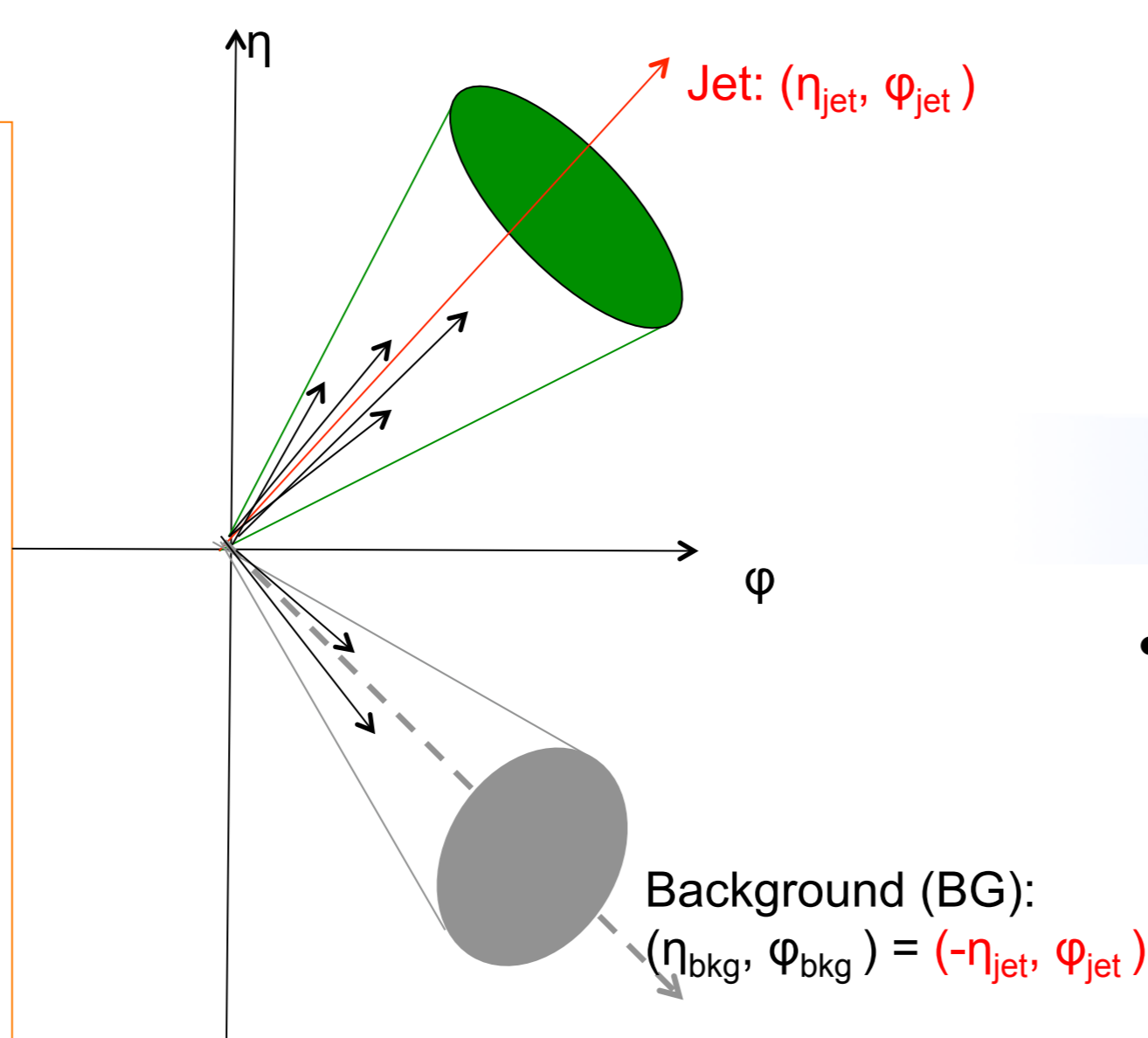
2. Charged particle reconstruction: $|\eta| < 2.4$, $p_T > 1$ GeV/c



3. Jet shape construction; background evaluation using η reflected cone : $R = 0.3$, $0.3 < |\eta| < 2.0$

Analysis cuts:

- PF Anti- k_T jet: $R = 0.3$
- $p_T^{jet} > 100$ GeV/c
- $0.3 < |\eta|_{jet} < 2.0$
- Track $p_T > 1$ GeV/c
- BG subtraction: η reflected cone



4. Compare the background subtracted jet shape with pp reference

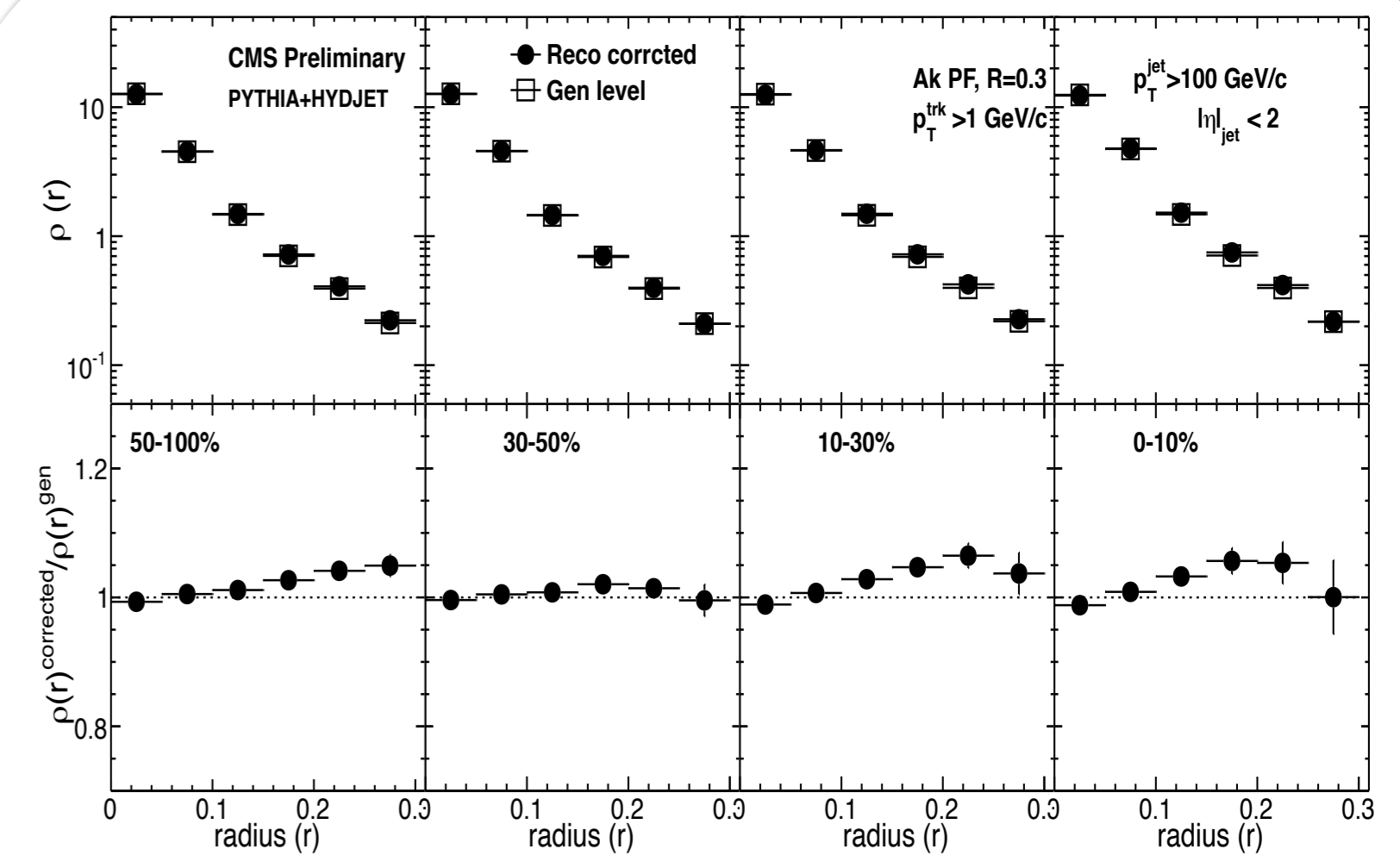
Corrections and Uncertainties

Corrections:

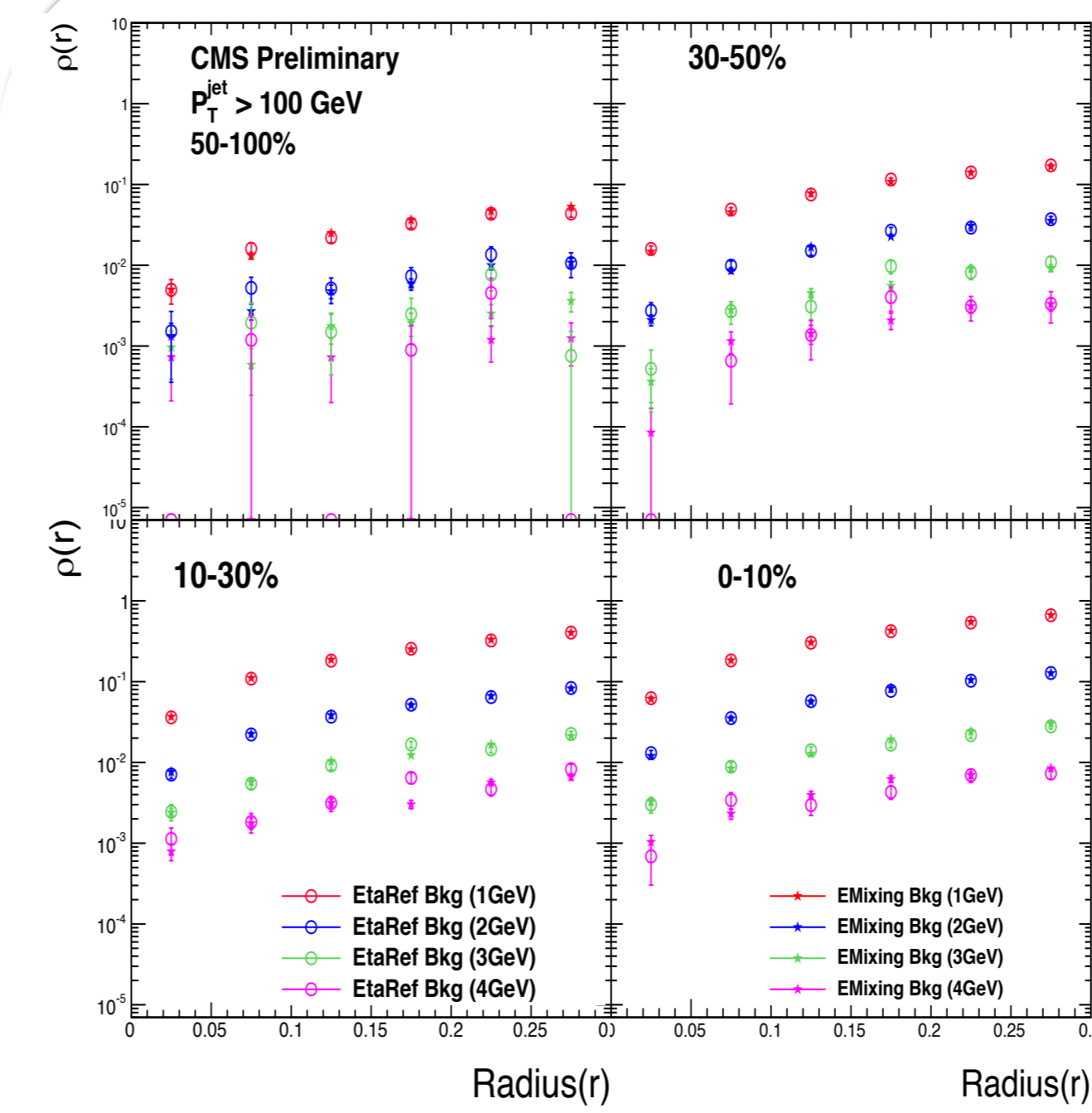
- p_T dependent tracking efficiency
- pp jet energy resolution (smearing)

Uncertainties:

- background subtraction
- radius dependent tracking efficiency
- jet energy resolution and scaling



Differential jet shapes after tracking efficiency corrections and compared to the generator level jet shapes

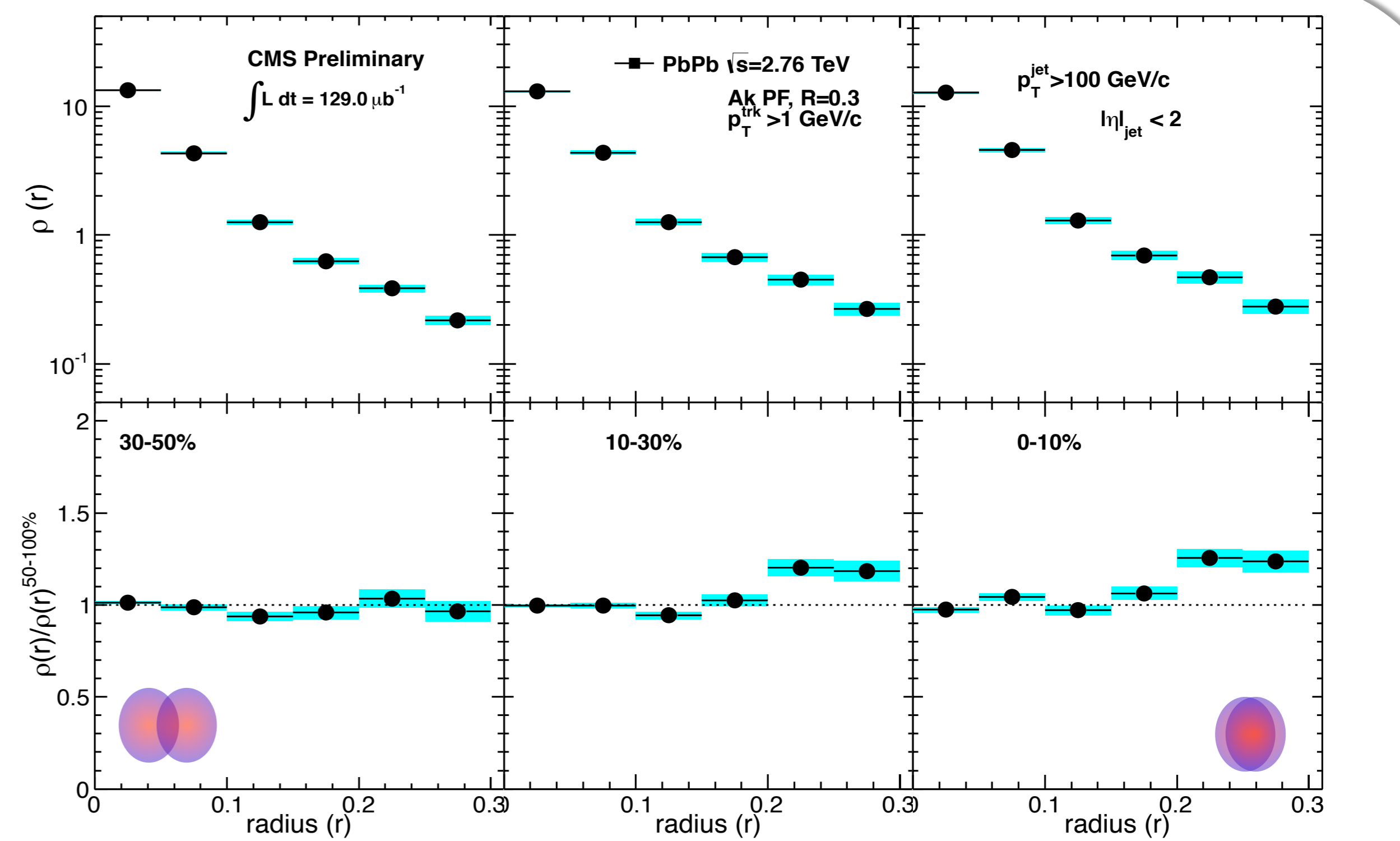


Background estimation from η reflected cone method and event mixing technique

Total uncertainties on the results

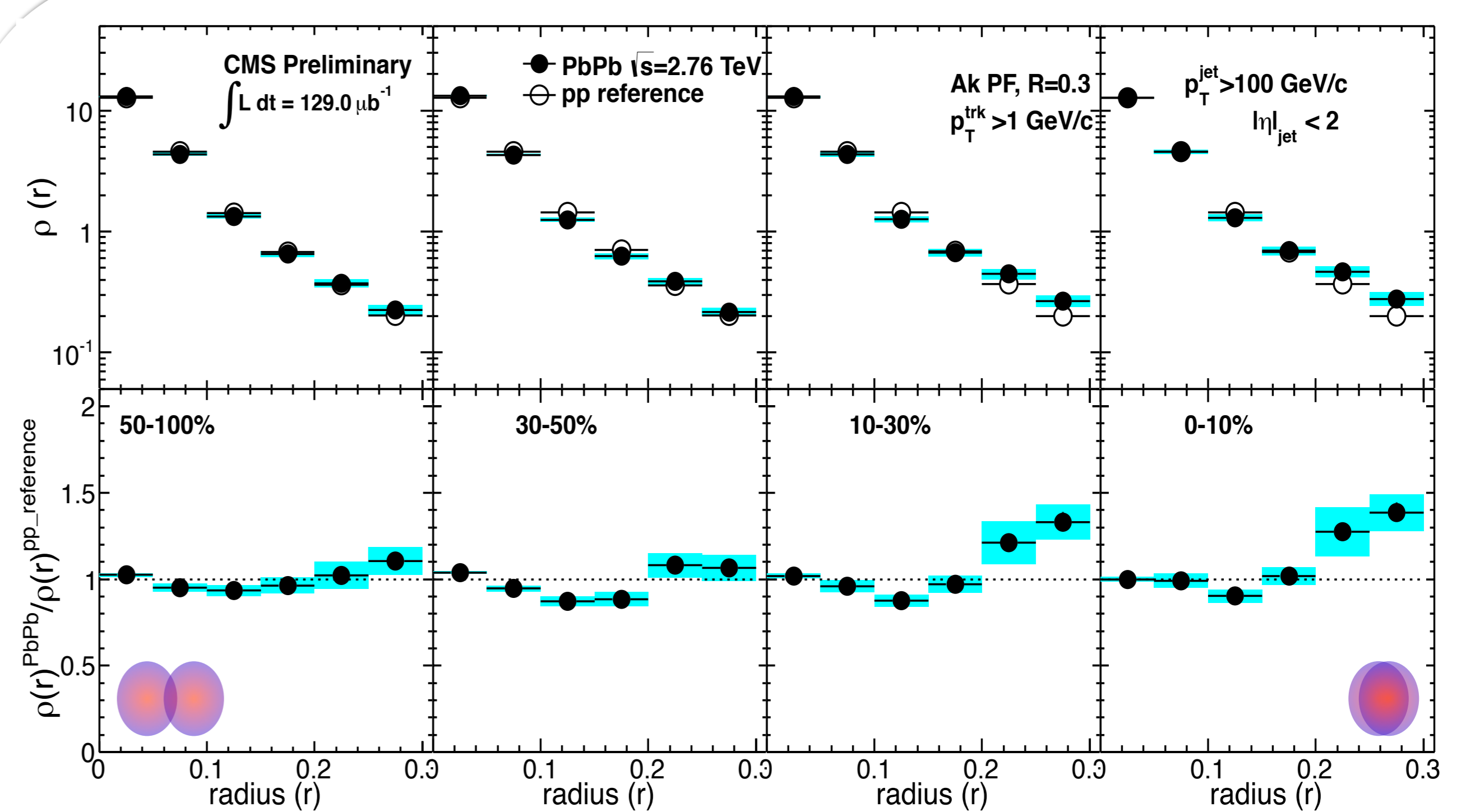
	$r \leq 0.1$ JS spectra / ratio	$r \geq 0.2$ JS spectra / ratio
BG subtraction	1% / 1%	8% / 8%
tracking efficiency	3% / 4%	10% / 7%
JER & JES	1% / <1%	7% / 2%
total	4% / 5%	15% / 10%

RESULTS



Differential jet shape for different centrality bins for jet $p_T^{jet} > 100$ GeV/c with track $p_T > 1$ GeV/c in PbPb collisions

peripheral \rightarrow central



Evolution of the differential jet shapes with centrality in PbPb collisions compared to the jet shapes from pp reference

CONCLUSIONS

- The jet shapes in PbPb collisions at $\sqrt{s} = 2.76$ TeV have been measured and compared to the shapes in pp collisions at the same center-of-mass energy:
- For semi-peripheral (30-50%) and peripheral collisions (50-100%) the shape is similar to the shape in pp reference;
- For central collisions (0-30%) the results indicate a moderate, but significant broadening of the jet structure.