Jet shape variables: sensitive to energy loss fluctuations fluctuations?

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Inclusive/average vs jet-by-jet

- Intra-jet distributions (‘fragmentation functions’, radial profile) measure **averages over a sample of jets**
- Jet shape variables (mass, angularities, z_g etc): jet-by-jet quantity, in principle sensitive to fluctuations

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- intrinsic fluctuations: E-loss is a stochastic process
  - Already for a single parton
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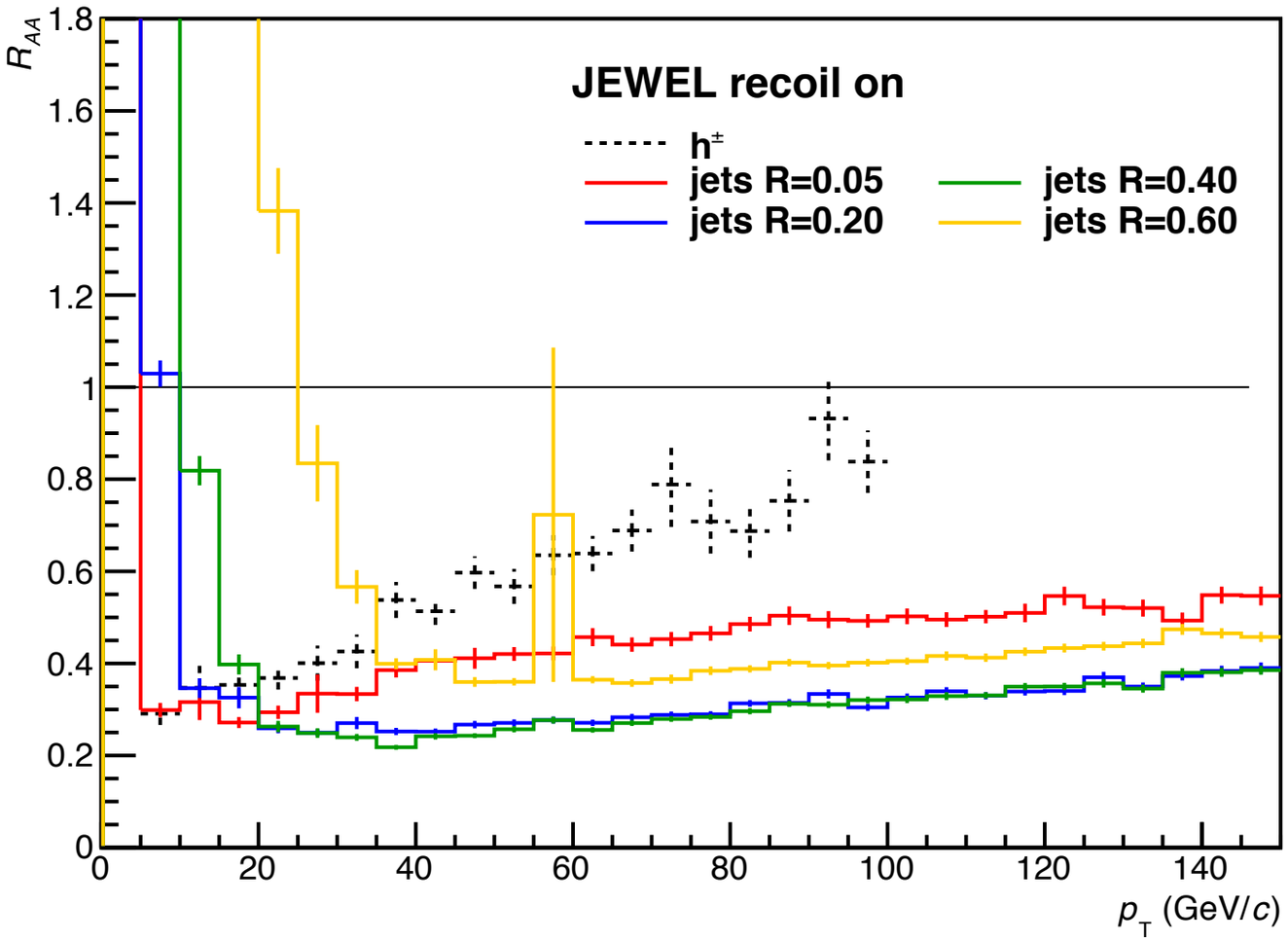
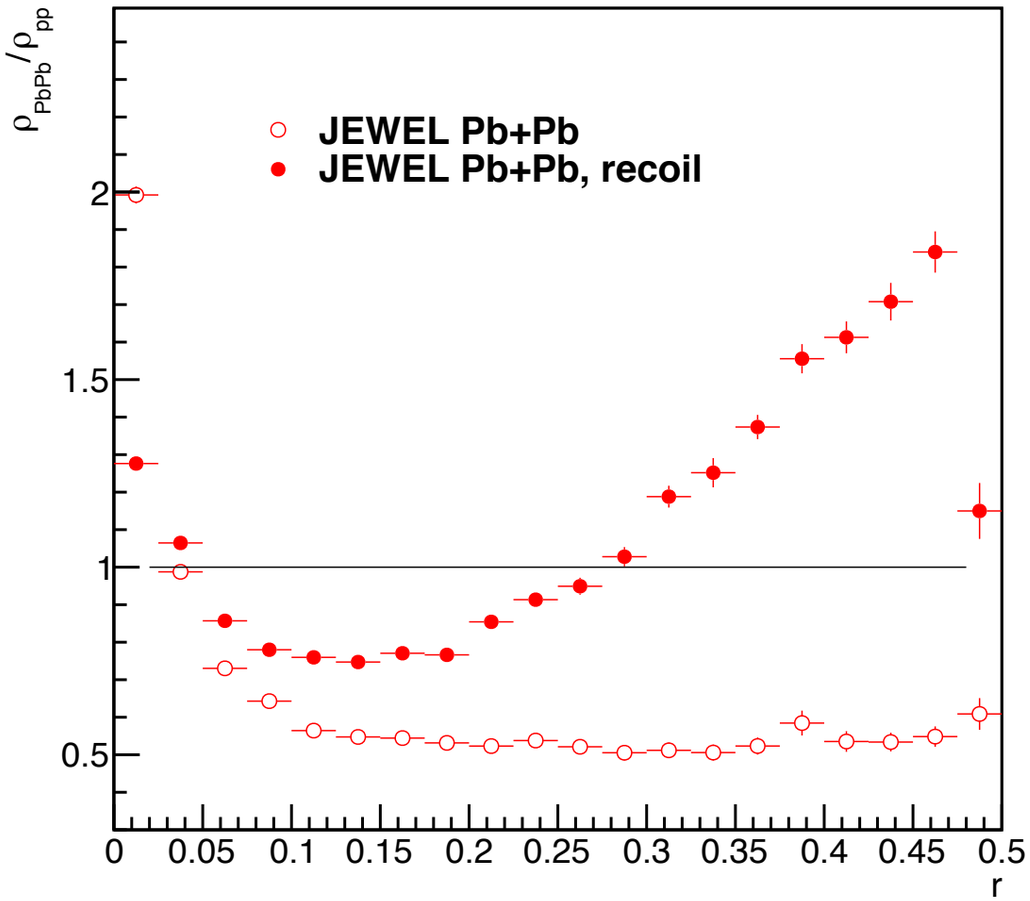
Measuring fluctuations constrains these aspects of models !

Relation radial profile and R_{AA} vs R





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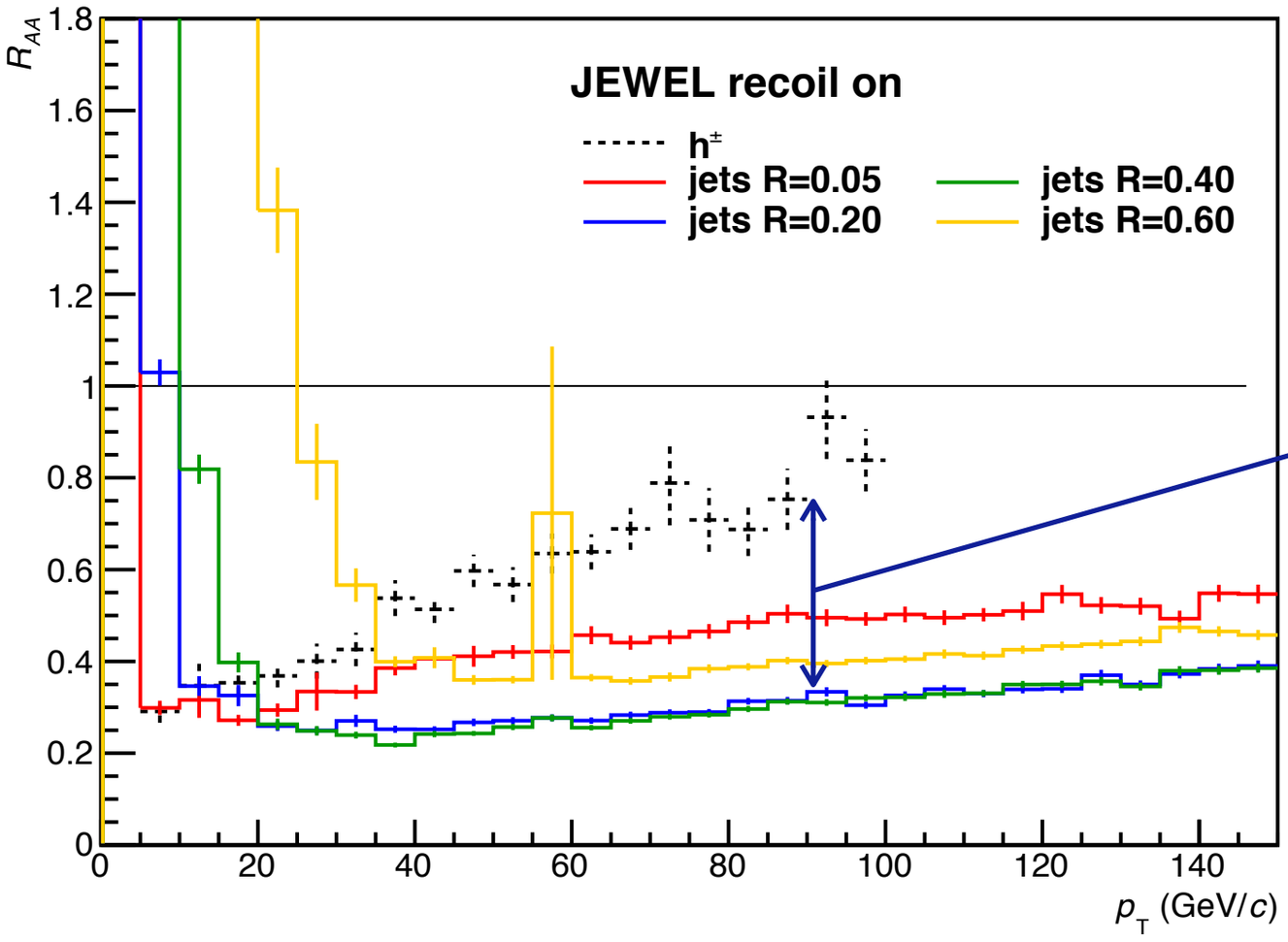

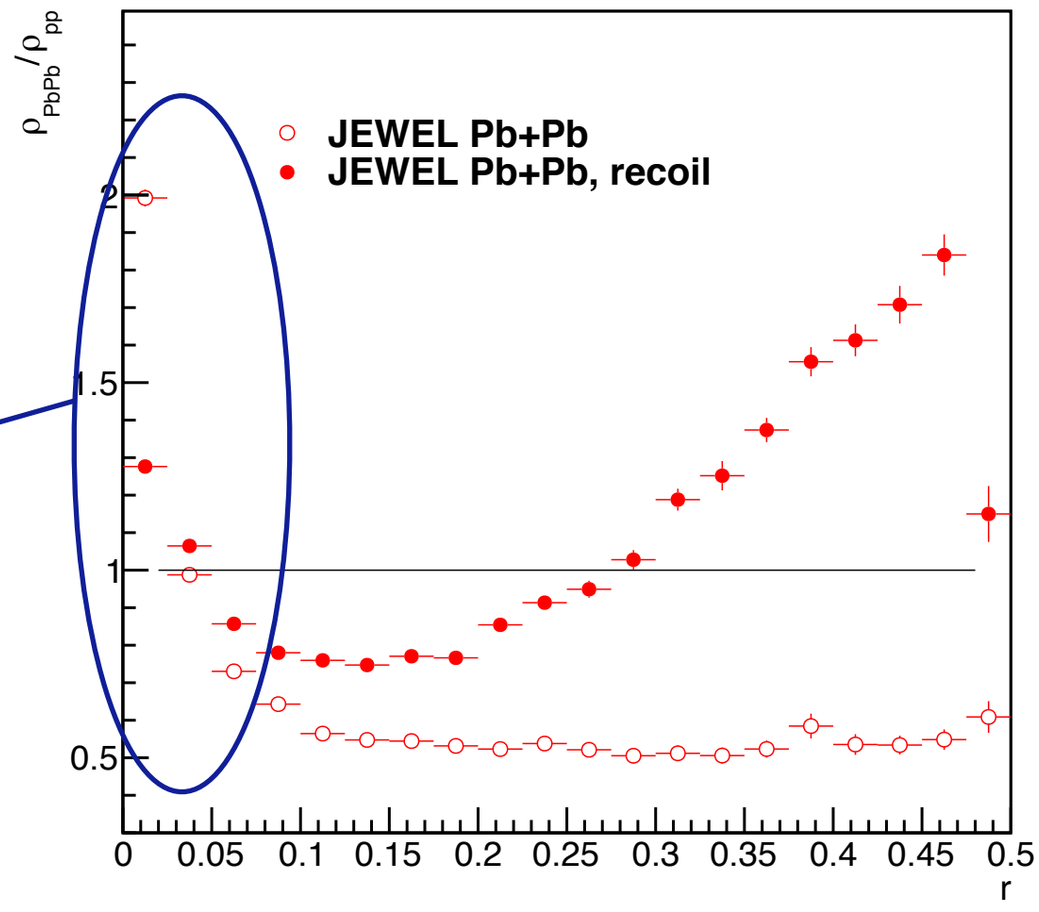

Stronger peak at small r ⇒ decrease of R_{AA} with R for R < 0.2

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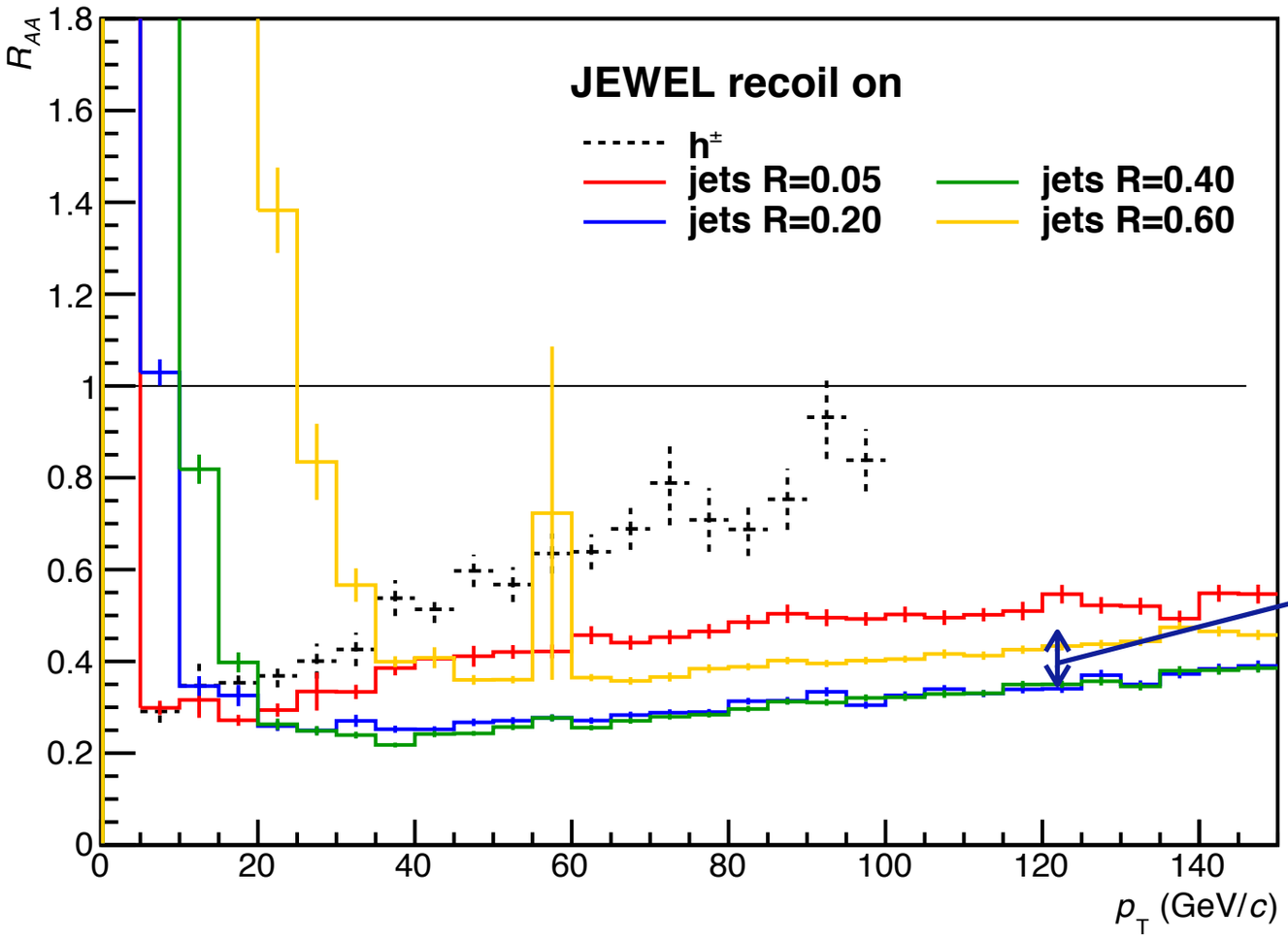
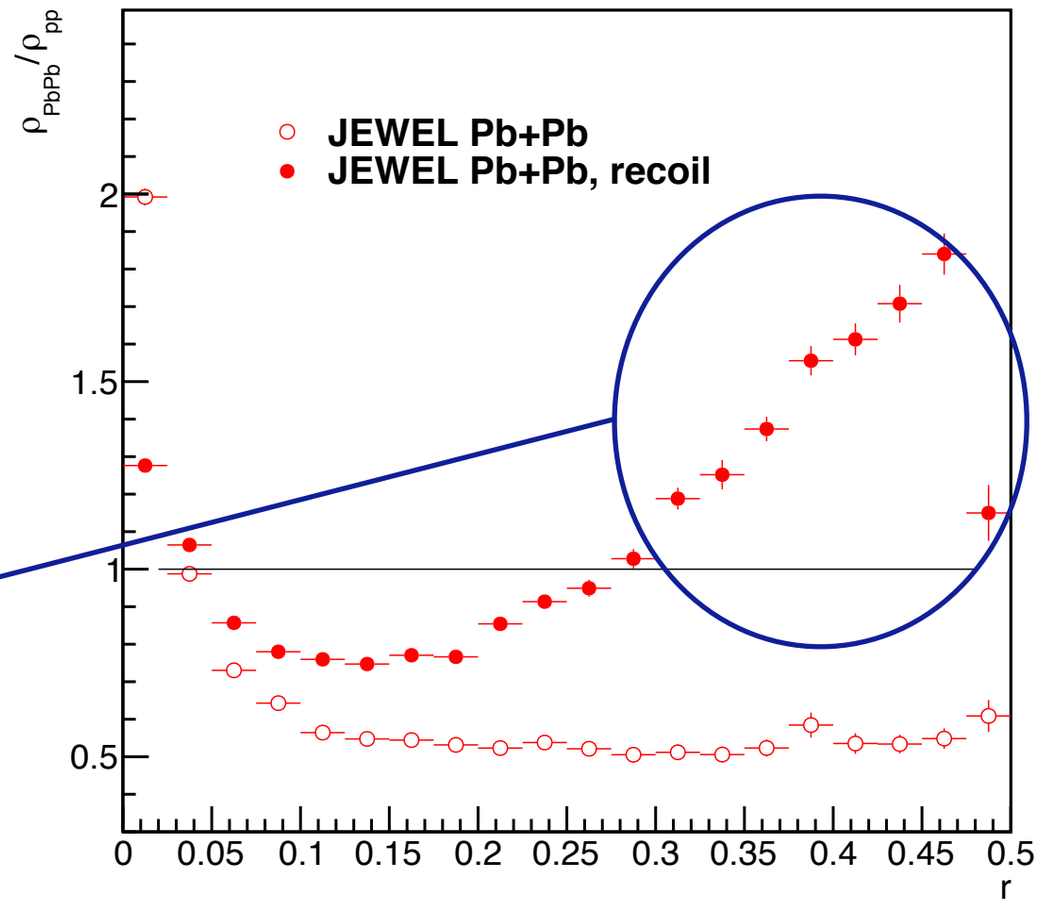
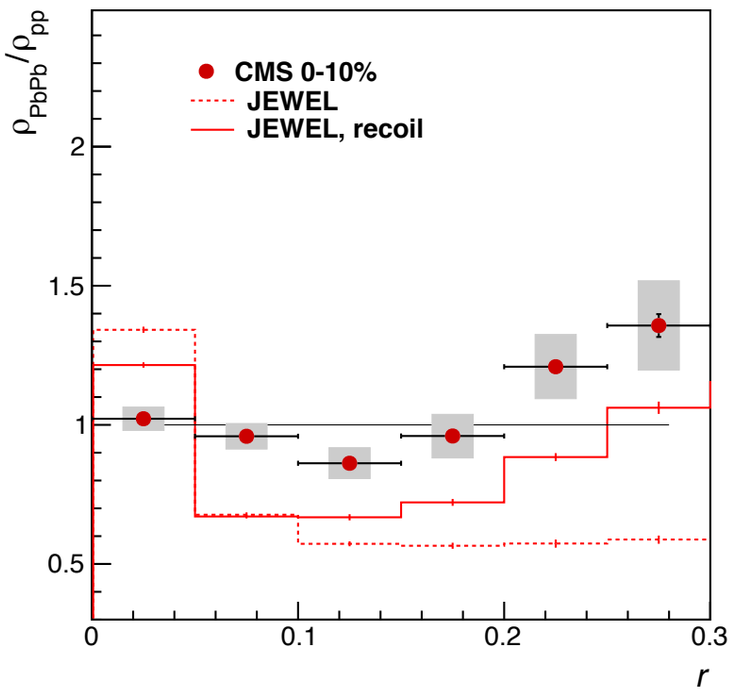




Stronger peak at small r ⇒ decrease of R_{AA} with R for $R < 0.2$

Increase of ratio at large r (only with recoil): increase of R_{AA} for $R > 0.4$
(small effect because total momentum flow is small at large R)

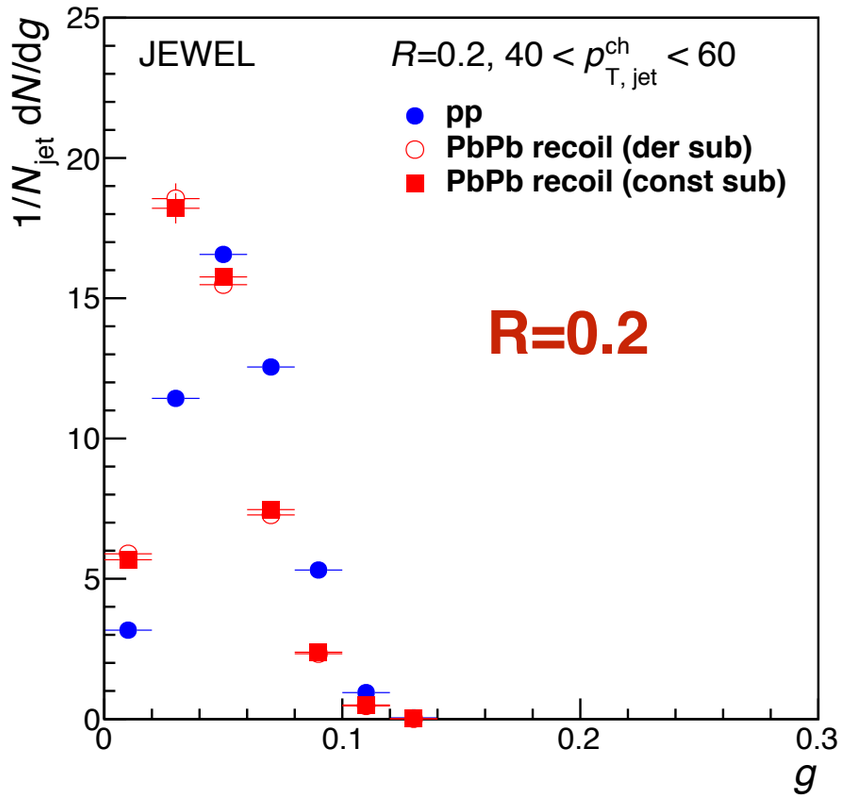
Example: girth, radial profiles



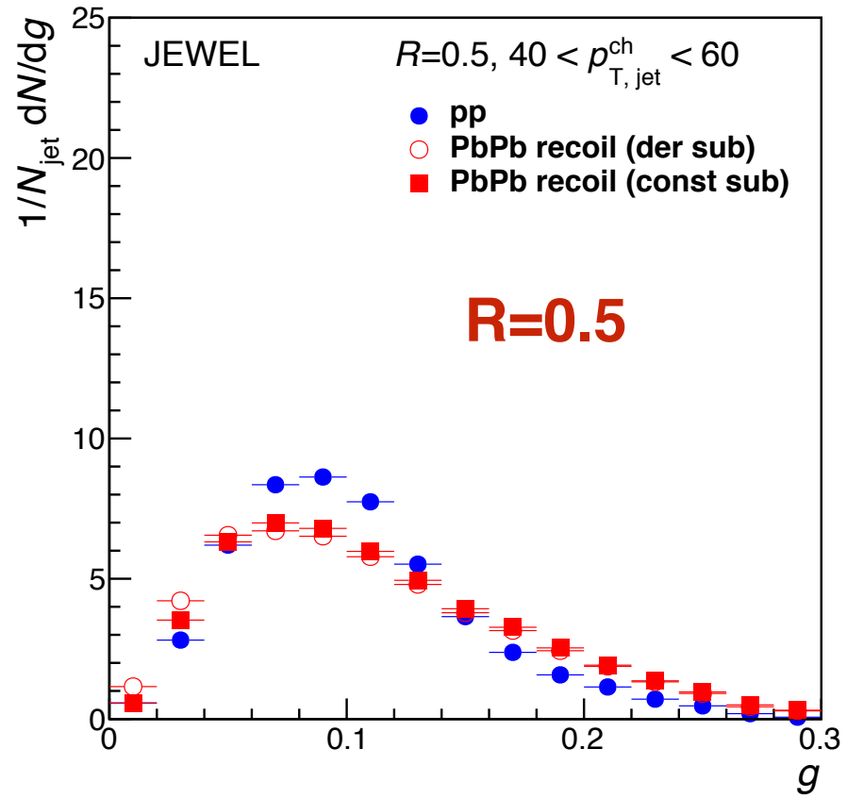
Radial profiles
('CMS jet shape')

Average over events

girth: First moment of radial profile $g = \frac{1}{p_{\perp}^{\text{jet}}} \sum_{k \in J} p_{\perp}^{(k)} \Delta R_{kJ}$



Small jet R: narrowing
mean *g* decreases



Large jet *R*: broadening
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***g* is measured jet by jet**
Mean g corresponds to the profile measurement,
width of distribution contains new information