Probing the fluctuations of energy flow within jets

A NEW JET SHAPE OBSERVABLE TO STUDY THE JET ENERGY LOSS EFFECTS DEPENDENCE ON JET RADIUS

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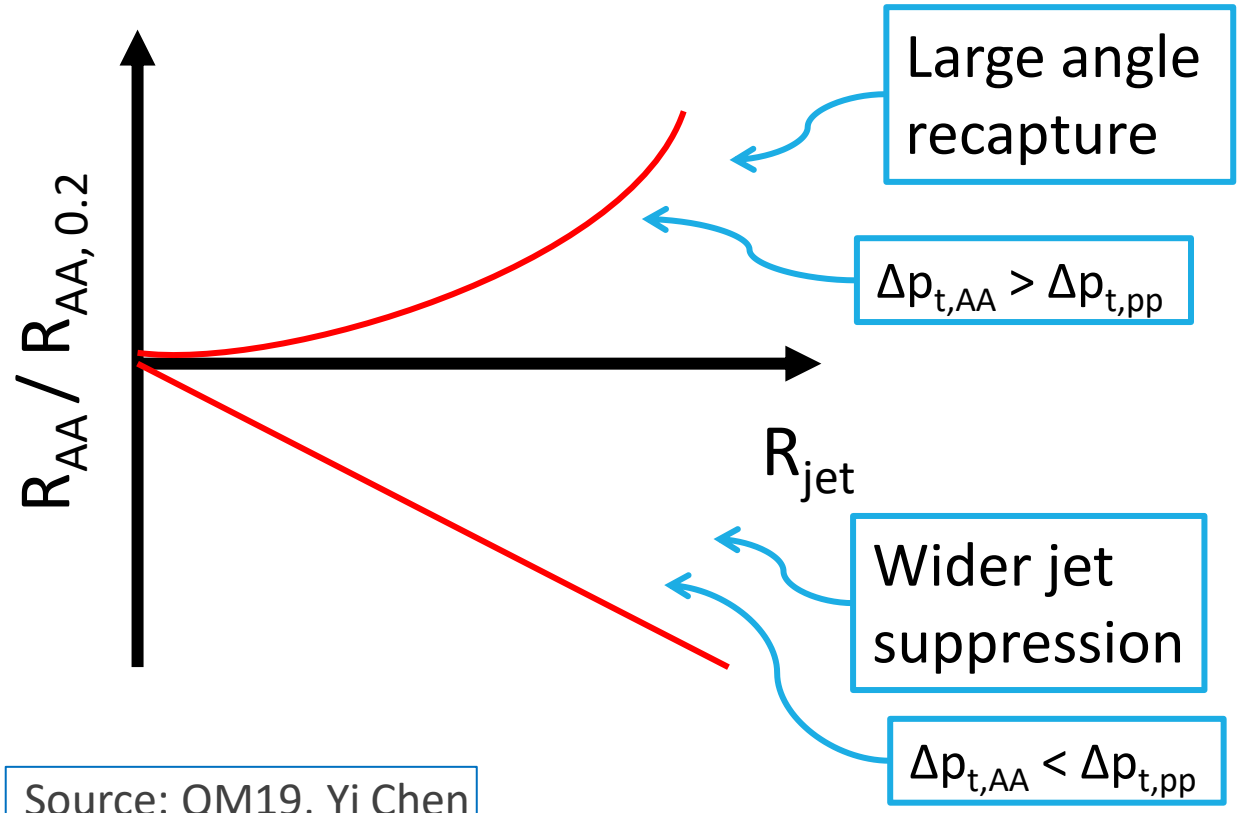
What and why?

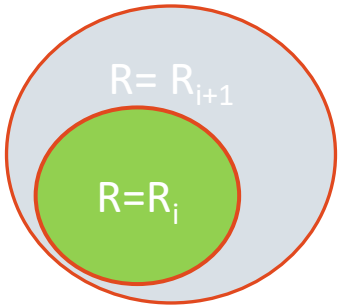
*See talk by J. Mulligan: Jet angularity and fragmentation measurements in heavy-ion collisions with ALICE on Wed 06/04



Source: QM19, Yi Chen

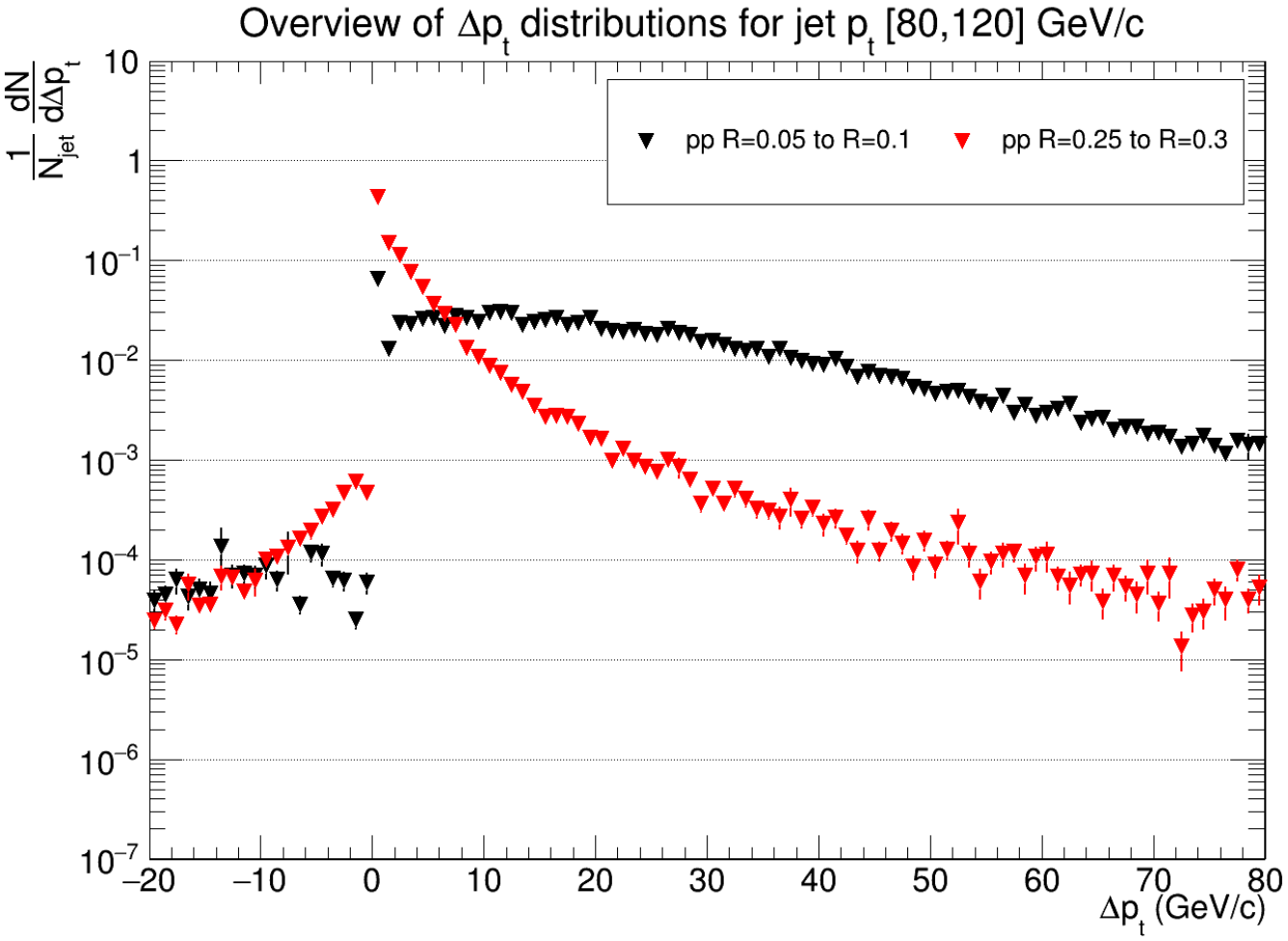
Energy flow definition:

$\Delta p_t = p_t\,(R_{i+1}) - p_t\,(R_i)$



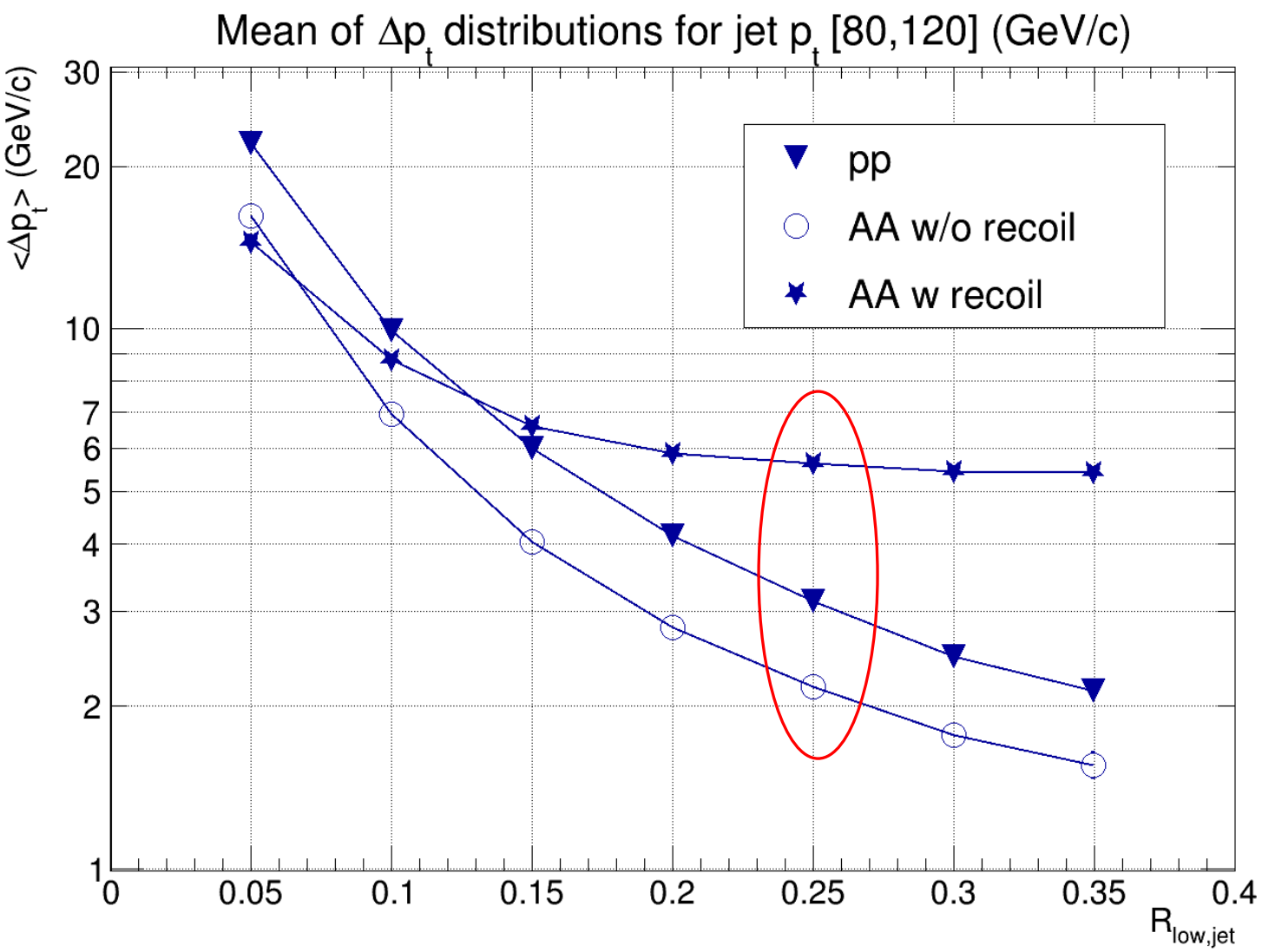
Using a measurement in pp as baseline, study the effect of the energy loss mechanisms present in PbPb

Jet energy flow distribution



- Distributions peaked at Δp_t=0 and fall off as Δp_t increases
  - Strong R_{jet} dependence.
  - Distribution falls off steeper for large R_{jet}
- Small population of $\Delta p_t < 0$ → Peculiar topologies or incorrect matching on the η-ϕ plane.
- AA without recoil: Narrowing of the jet profile.
- AA with recoil: Evident contributions at large R_{jet}.

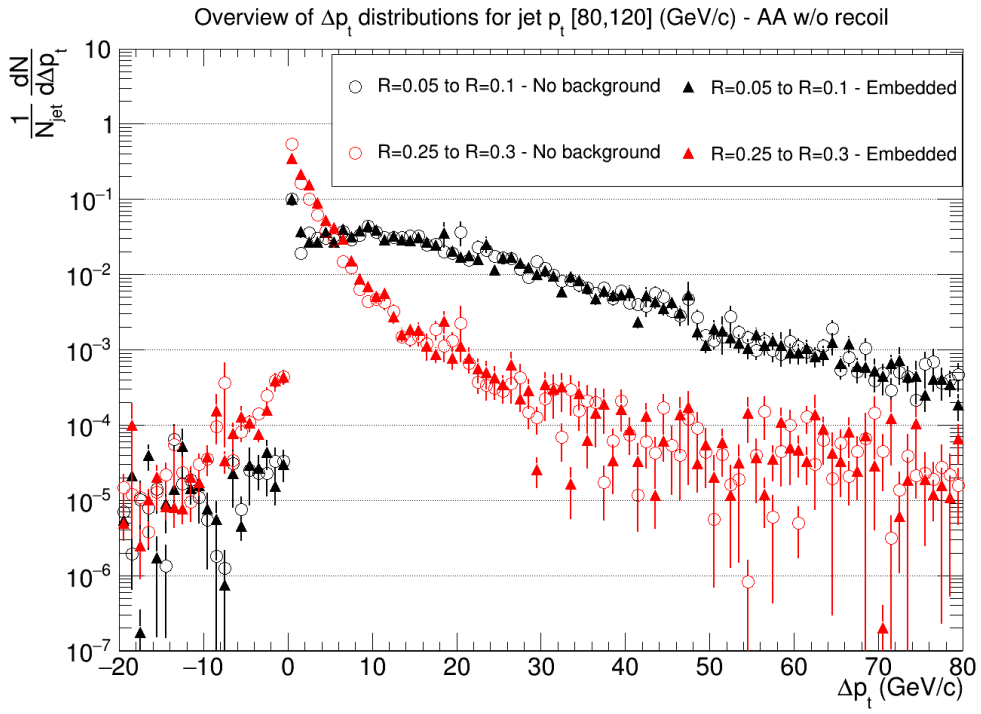
Mean Δp_t

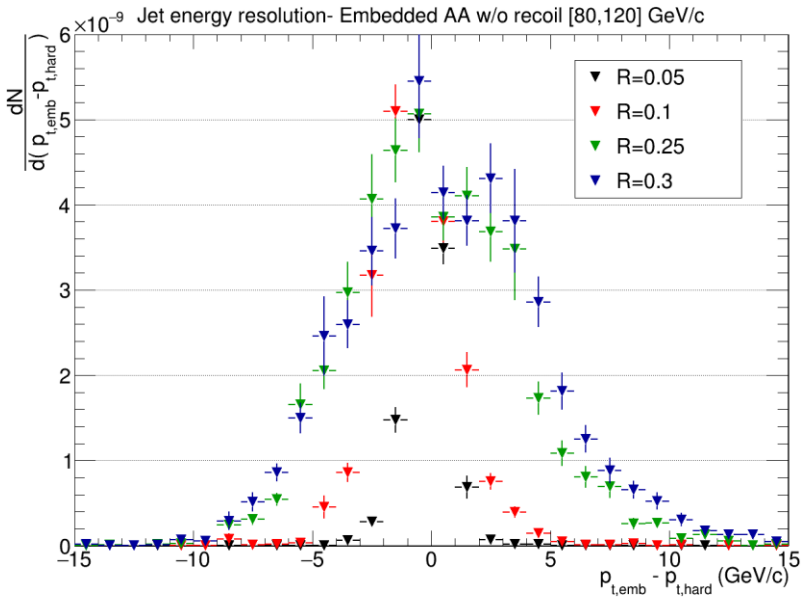


- Narrowing in AA evident at small R_{jet} for both recoil options.
- Large effect of recoil at large R_{jet} as expected.
- Observable is clearly sensitive to effects of jet energy loss.

Sensitivity to thermal background

- Simulate the effect of HI environment by embedding and retrieving the signal from thermal background.
- The smearing effect on this observable originates from the uncorrelated background fluctuations.





In conclusion

- Introduced new infrared and collinear safe jet shape observable.
- Observable is sensitive to jet energy loss effects like narrowing and medium recoil.
- Effect of smearing by background fluctuations is mild.
- Next steps:
  - Perform measurement with ALICE pp and PbPb data.
  - Study the effect of e.g. coherence.