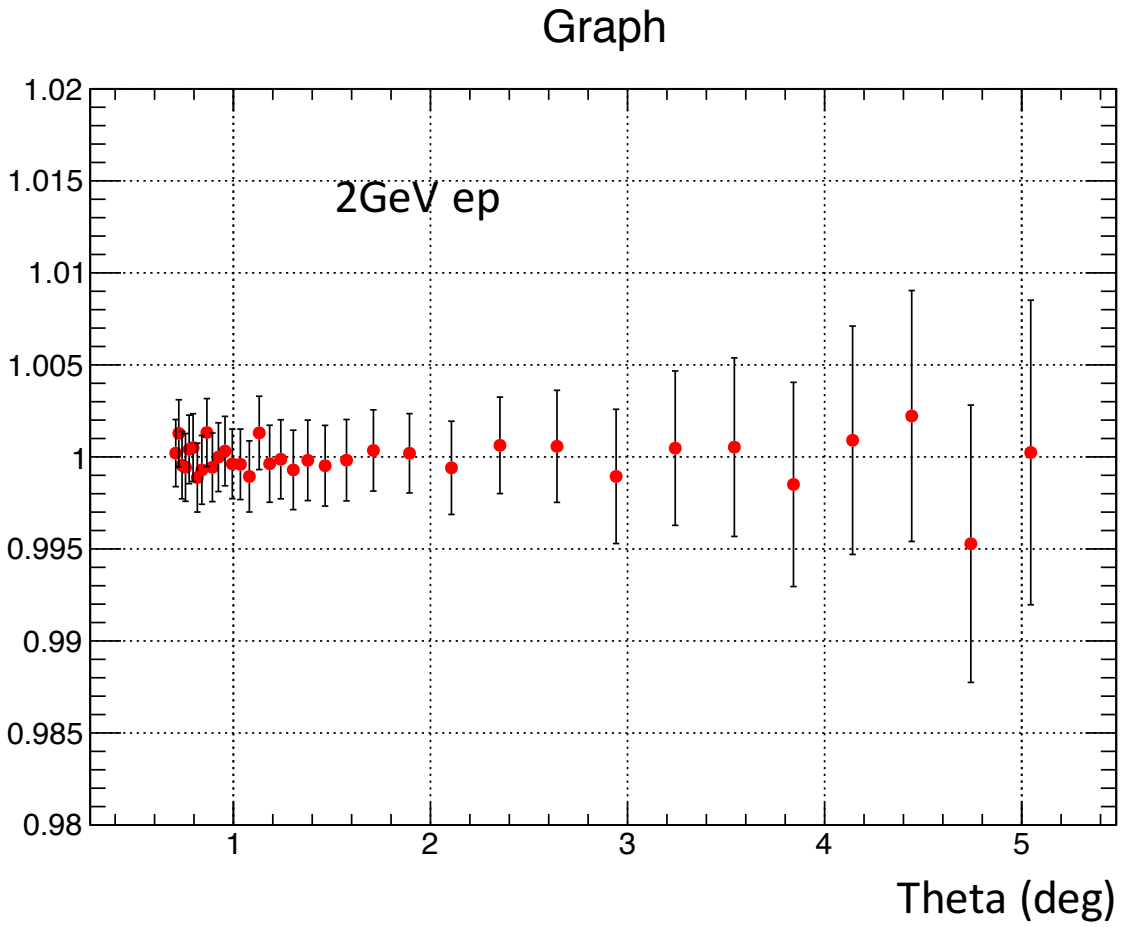
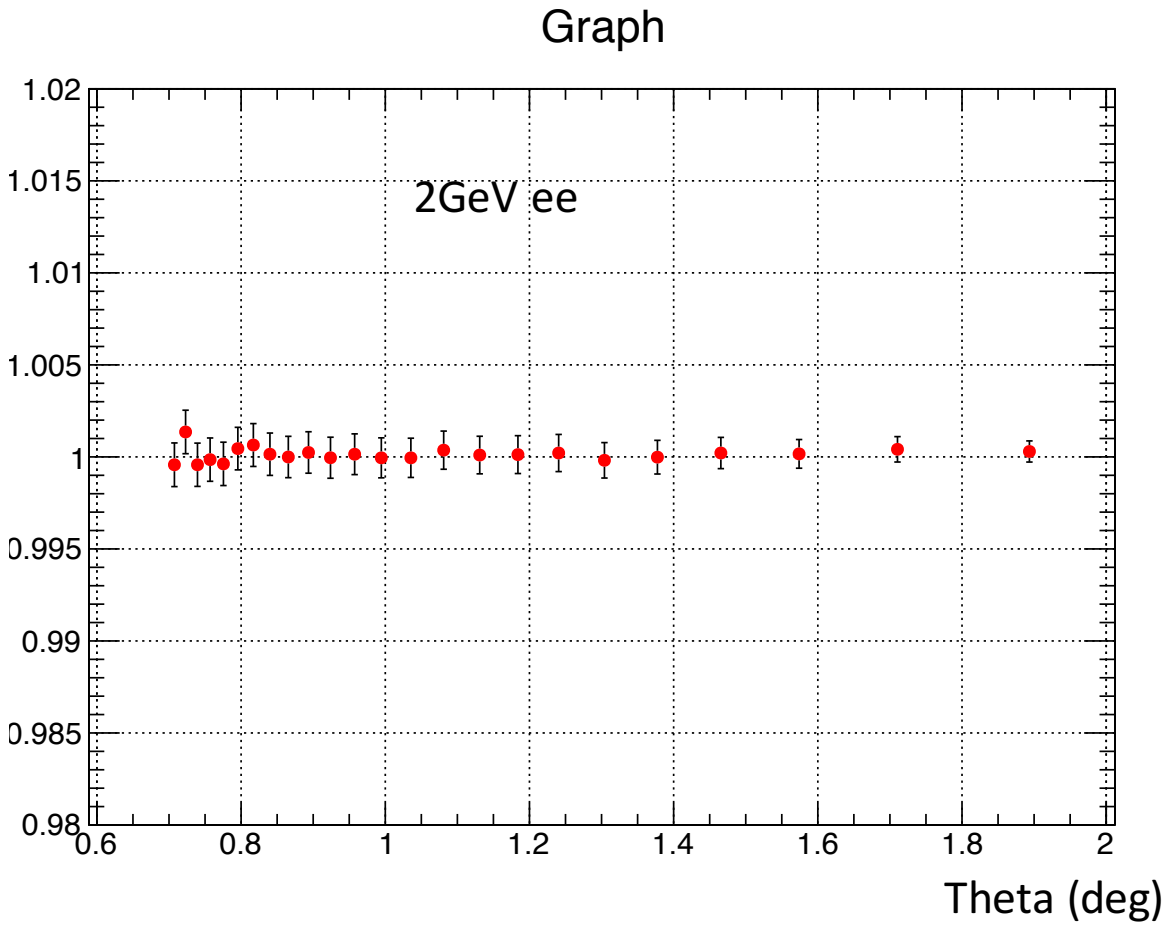
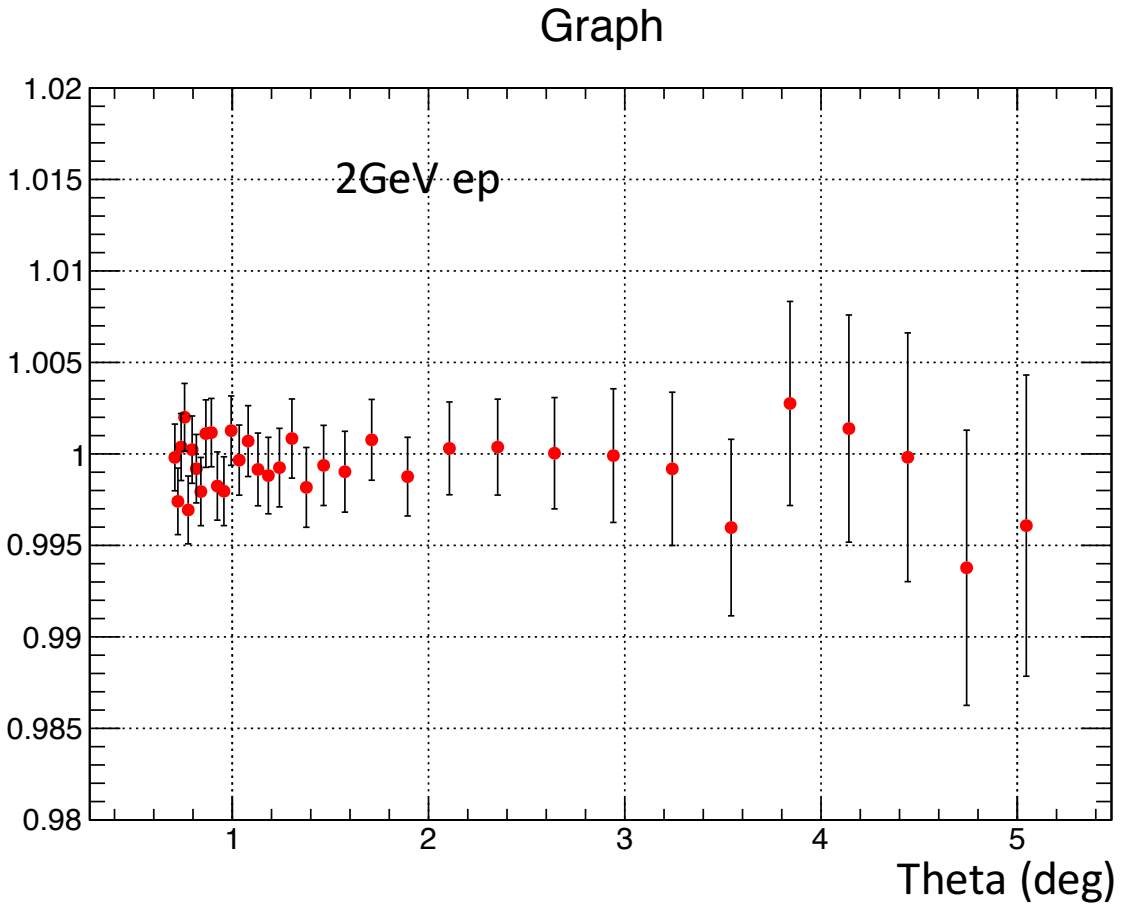
Target profile: delta function at 0 cm vs delta functions at +/- 2cm

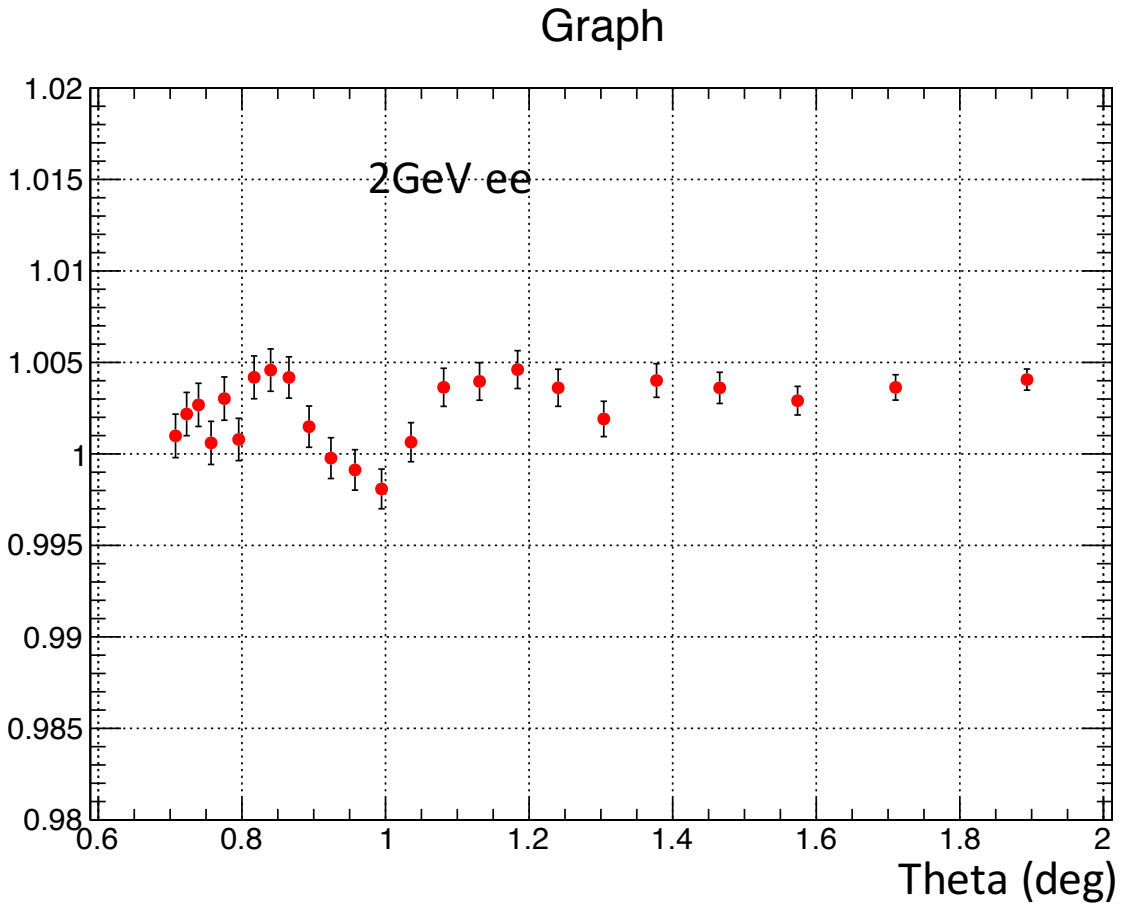
Extended target effect should be negligibly small



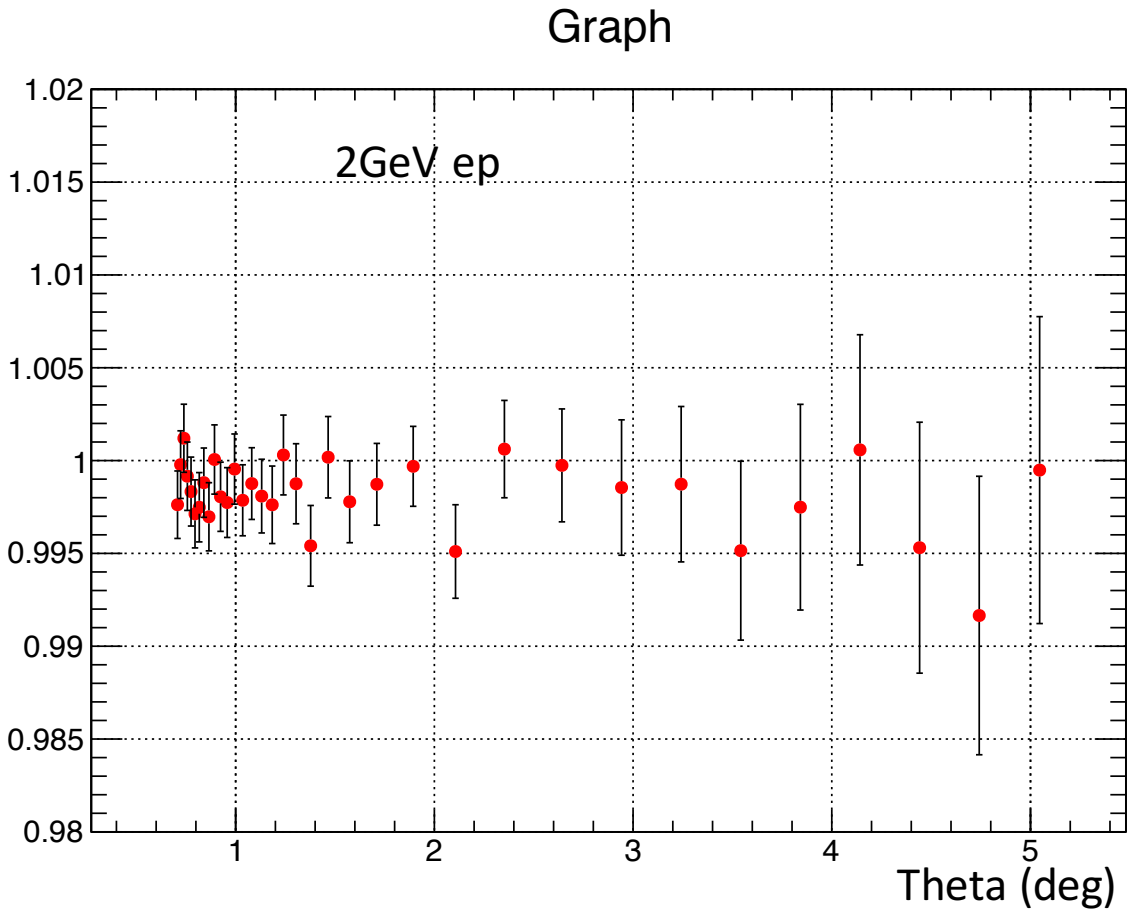


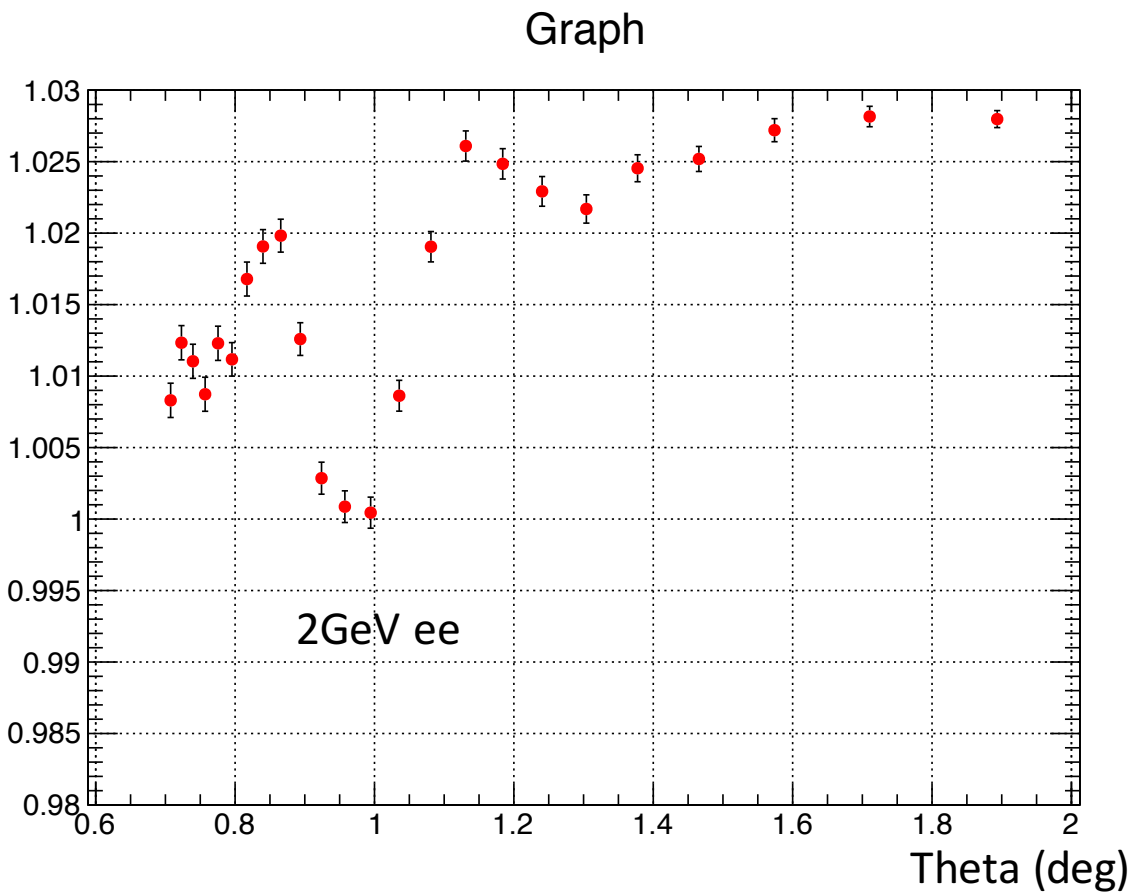
Target profile: delta function at 0 cm vs delta functions at +/- 10cm





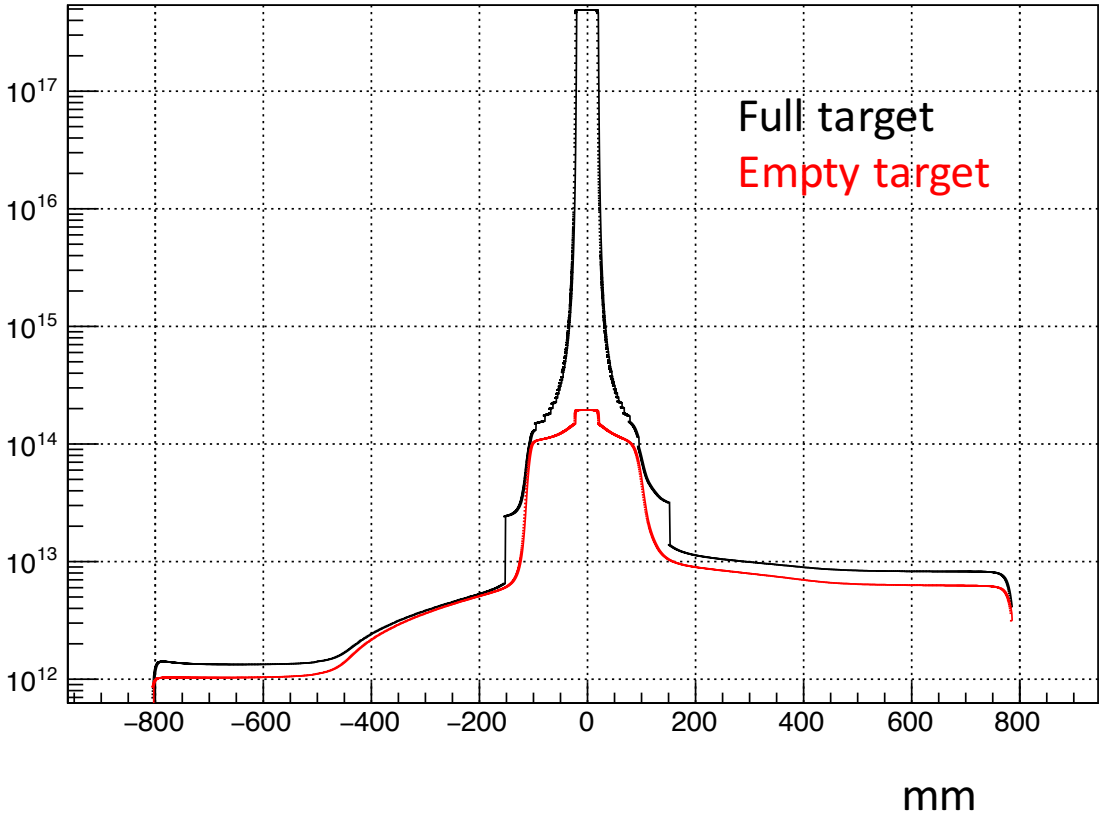
Target profile: delta function at 0 cm vs delta functions at +/- 20cm



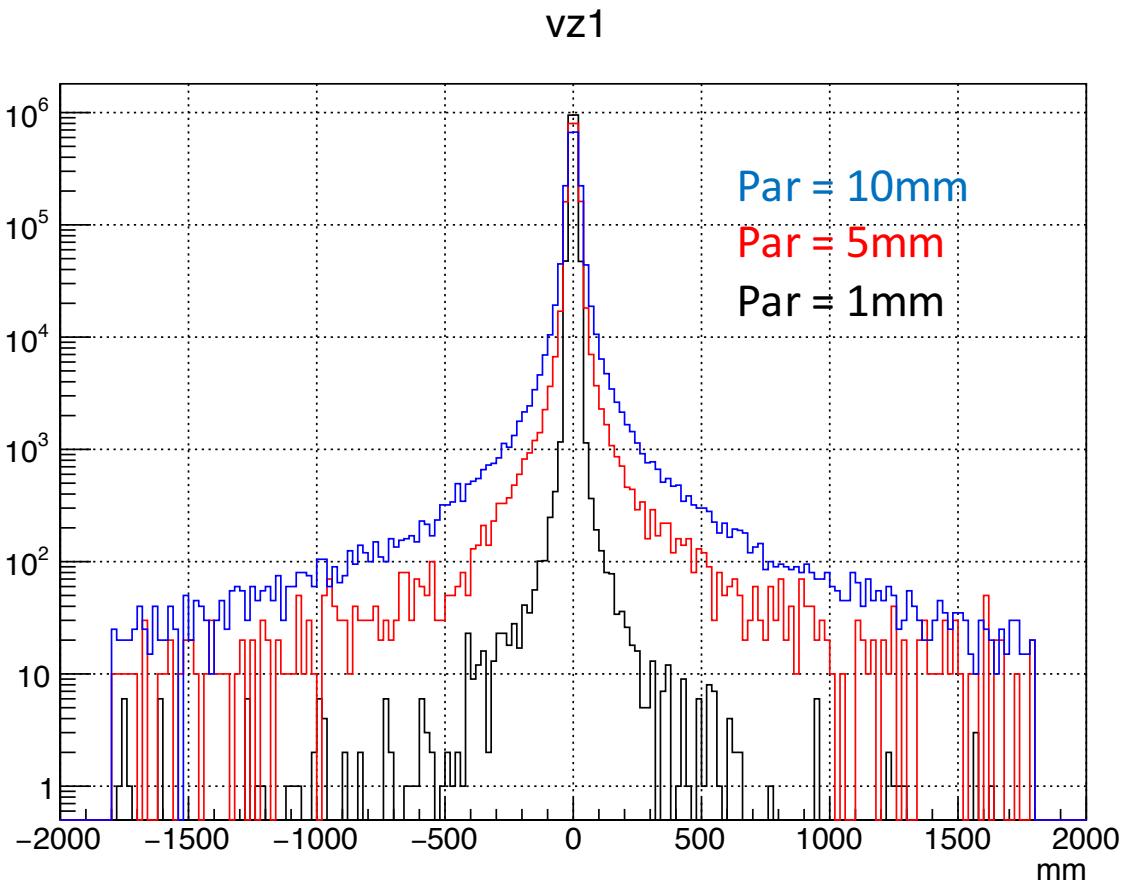


Target profile

From Yang's COMSOL simulation



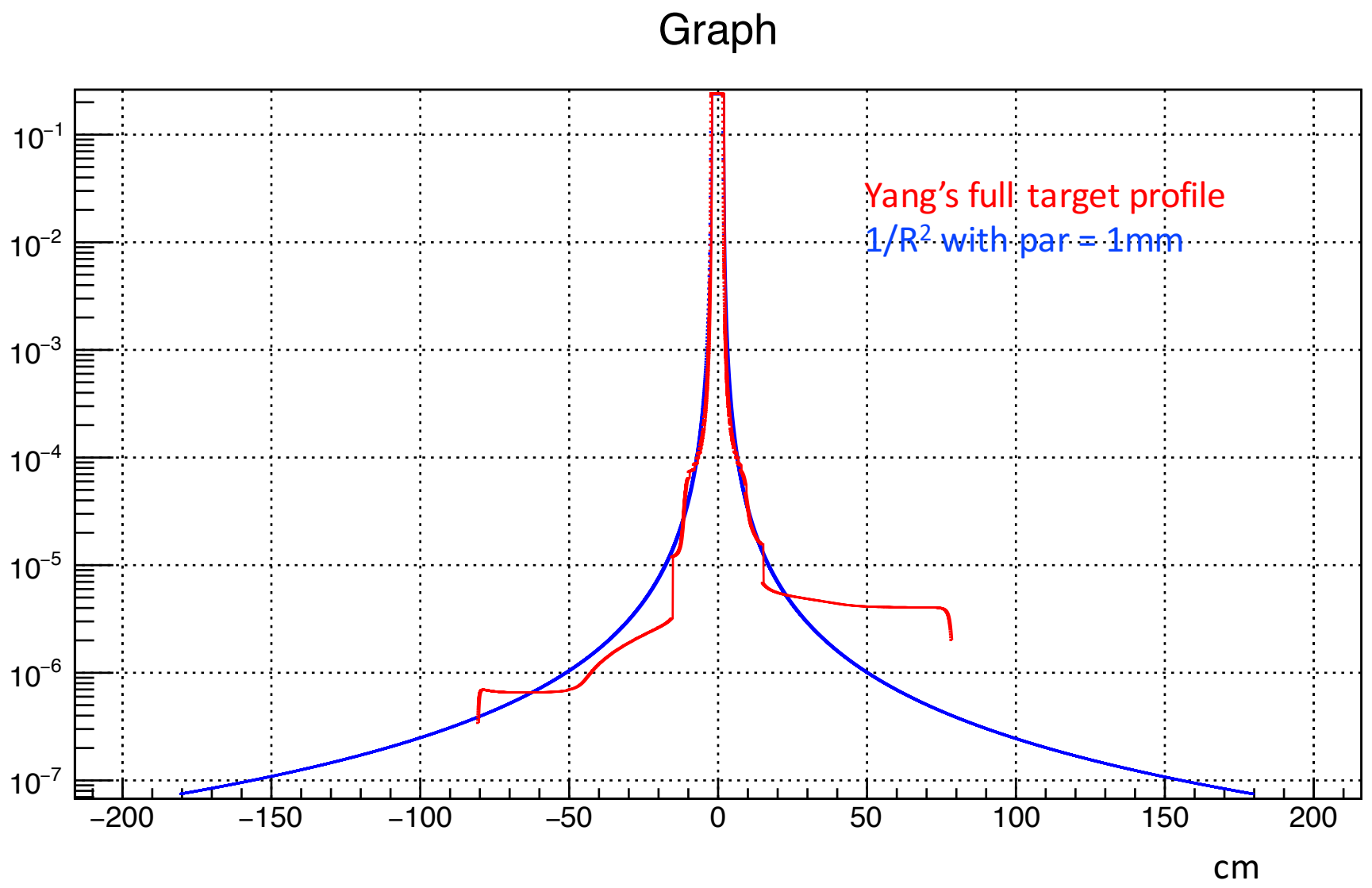
Assume uniform distribution inside target, tail decay as $1/(R + par)^2$



If using Yang's profile, the residual gas almost has no effect, compared to uniform +/- 2 cm profile

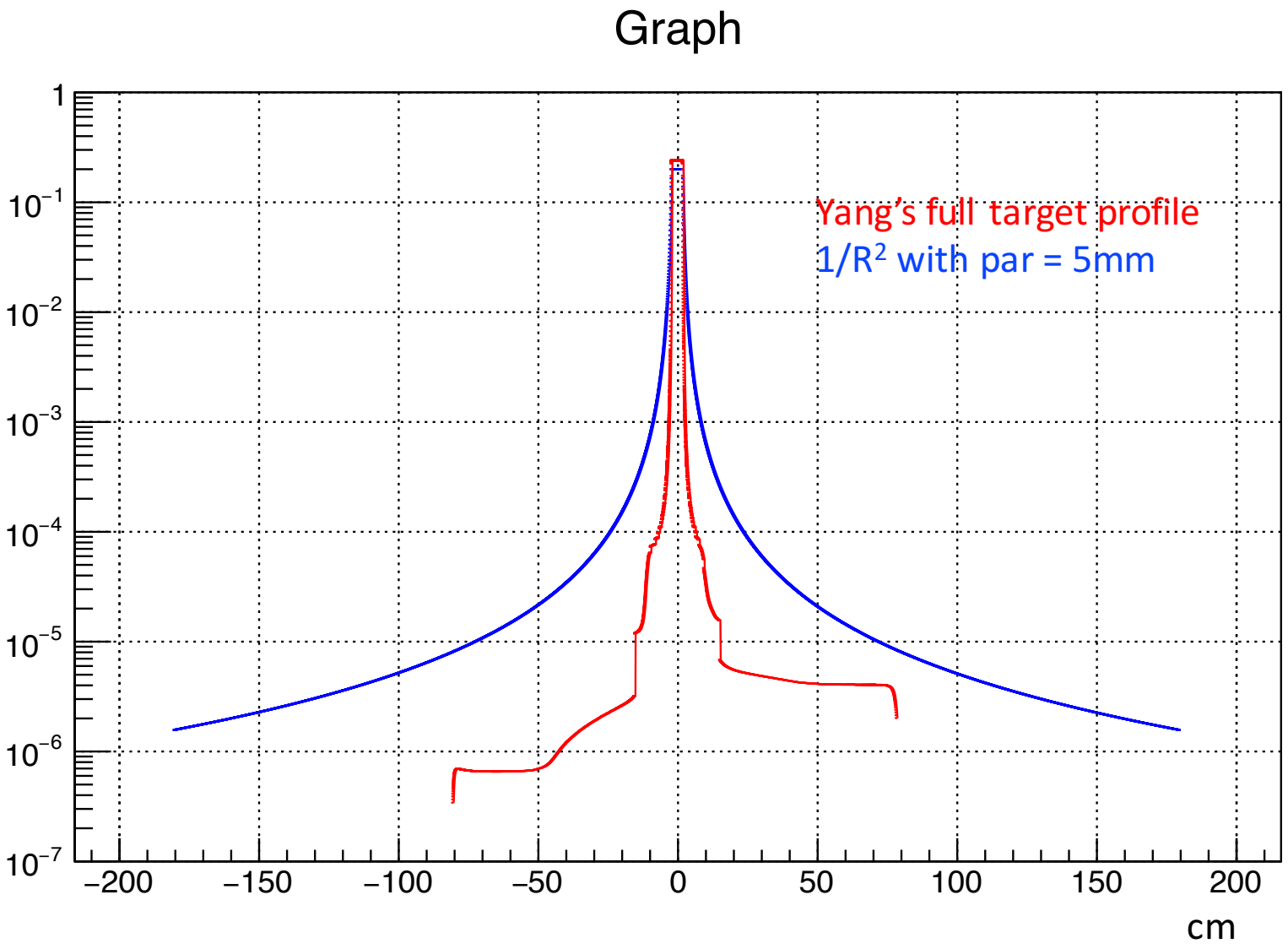
Target profile comparison

Profiles normalized by integrals from -75 cm to 75 cm



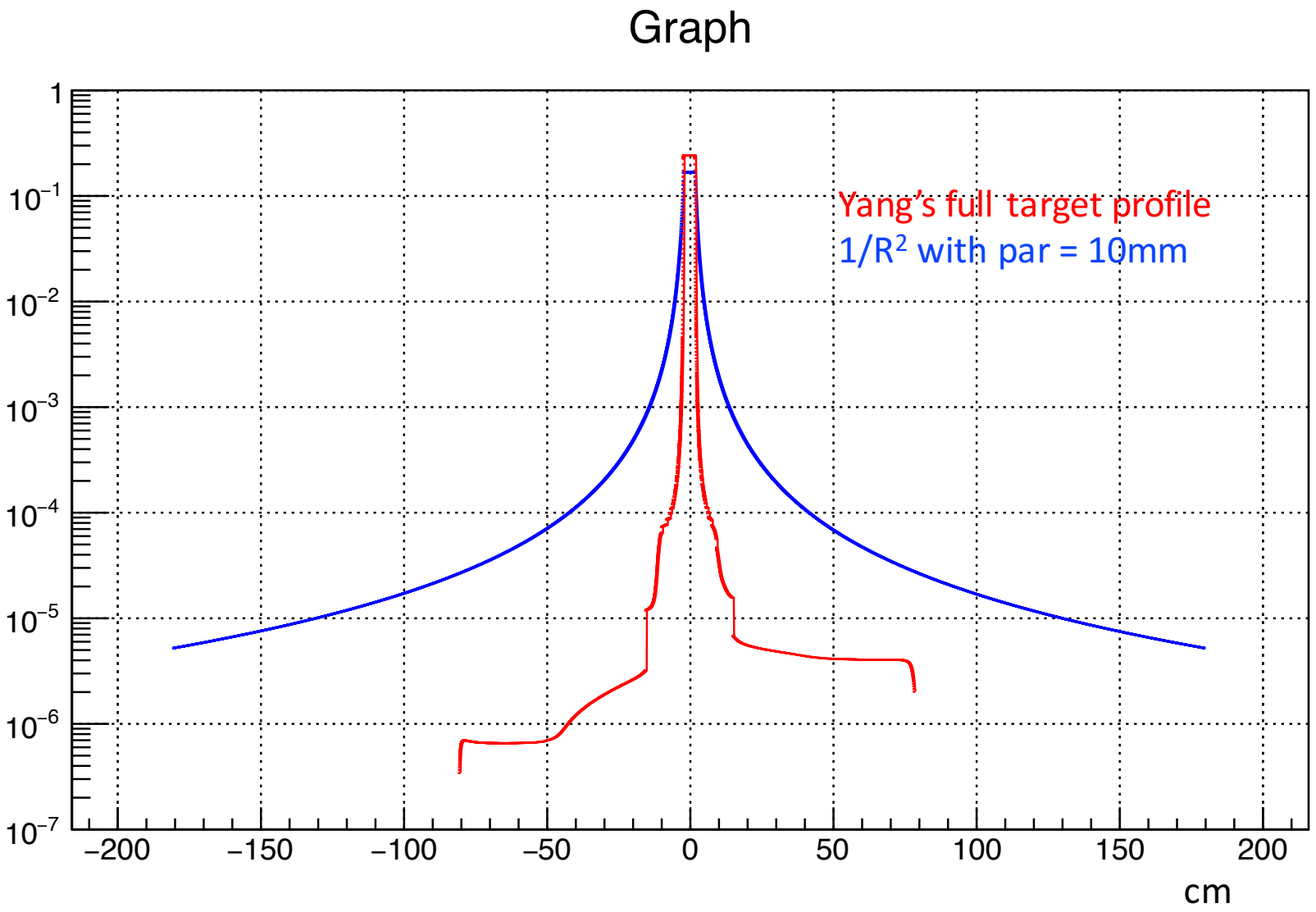
Target profile comparison

Profiles normalized by integrals from -75 cm to 75 cm



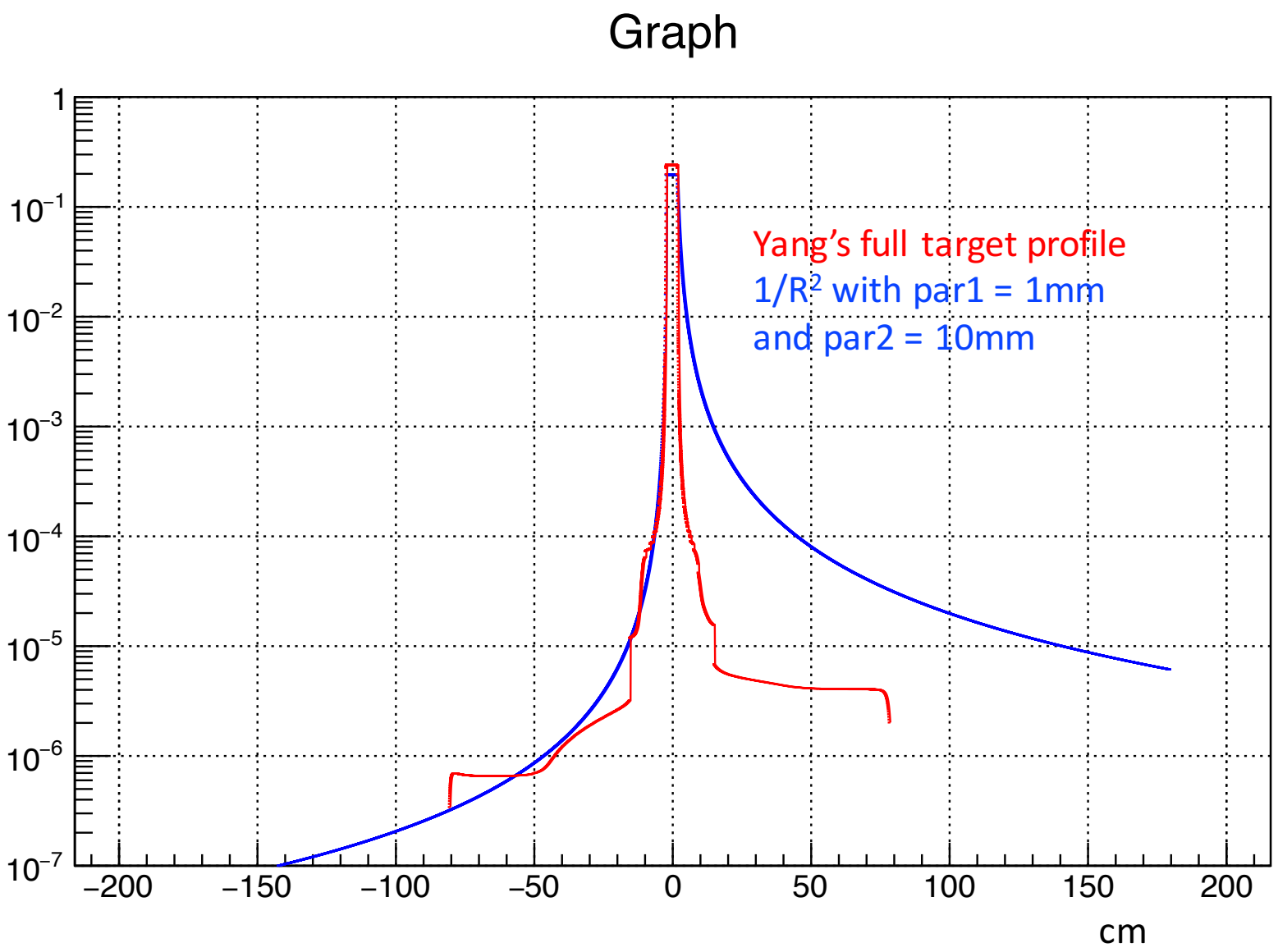
Target profile comparison

Profiles normalized by integrals from -75 cm to 75 cm



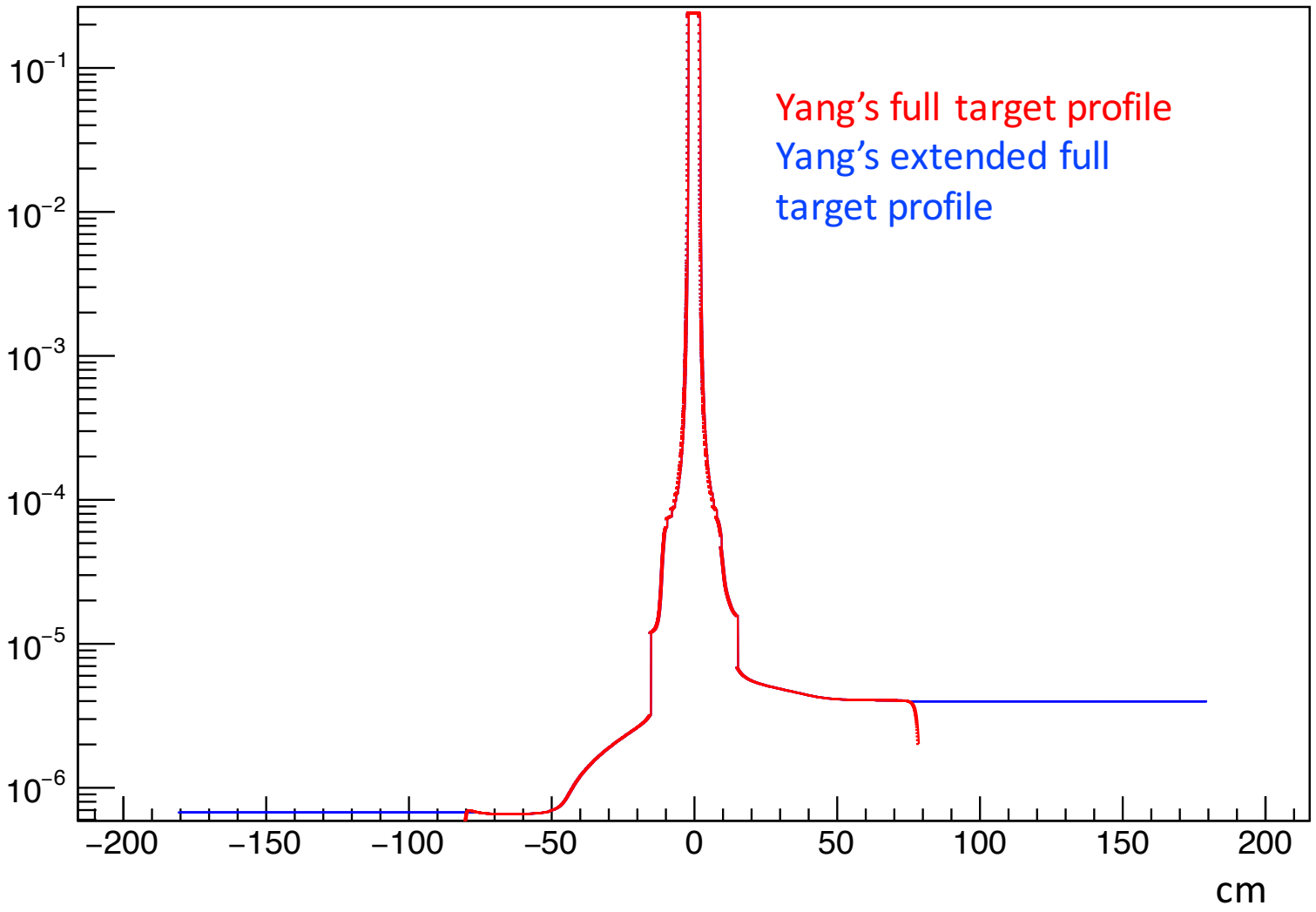
Target profile comparison

Profiles normalized by integrals from -75 cm to 75 cm



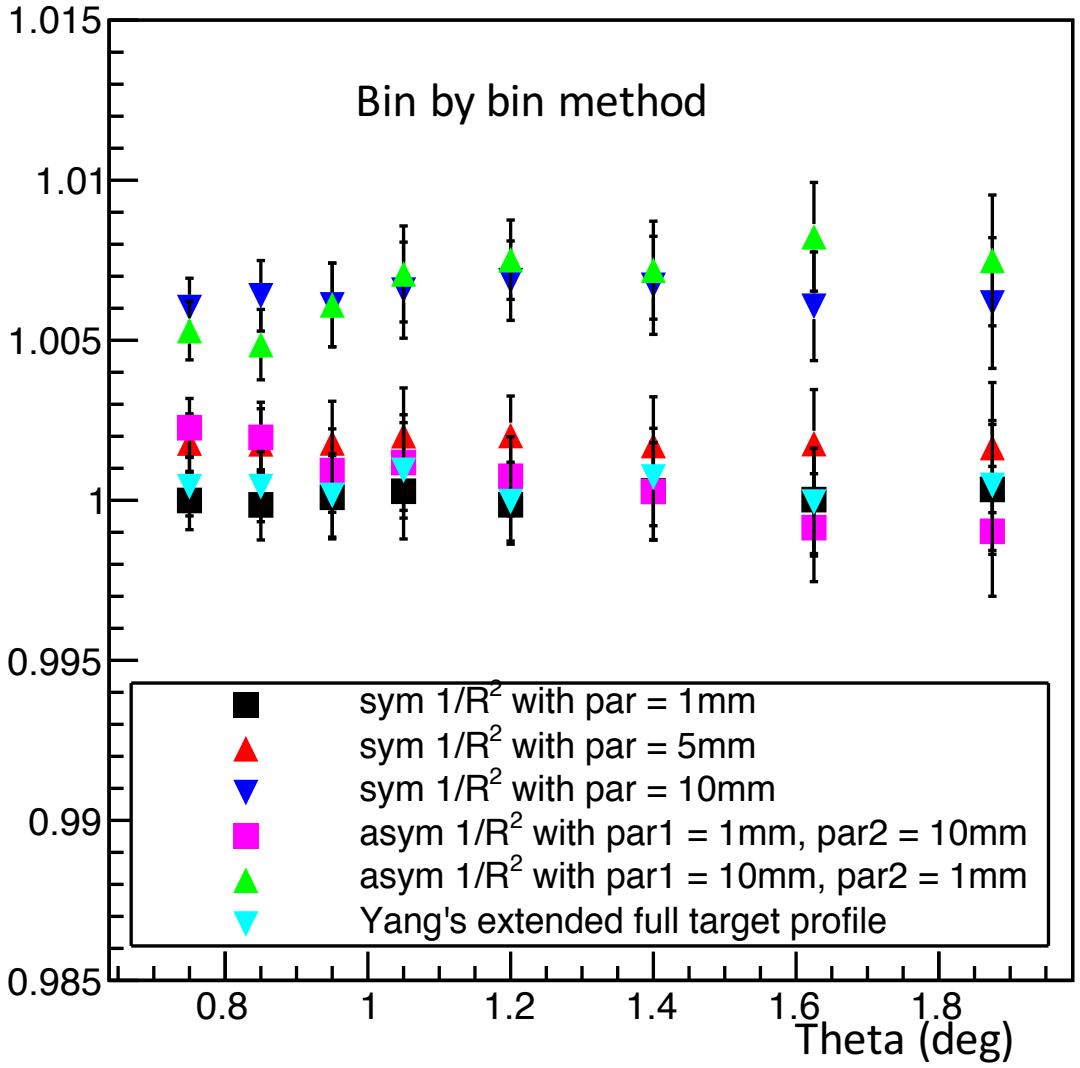
Target profile comparison

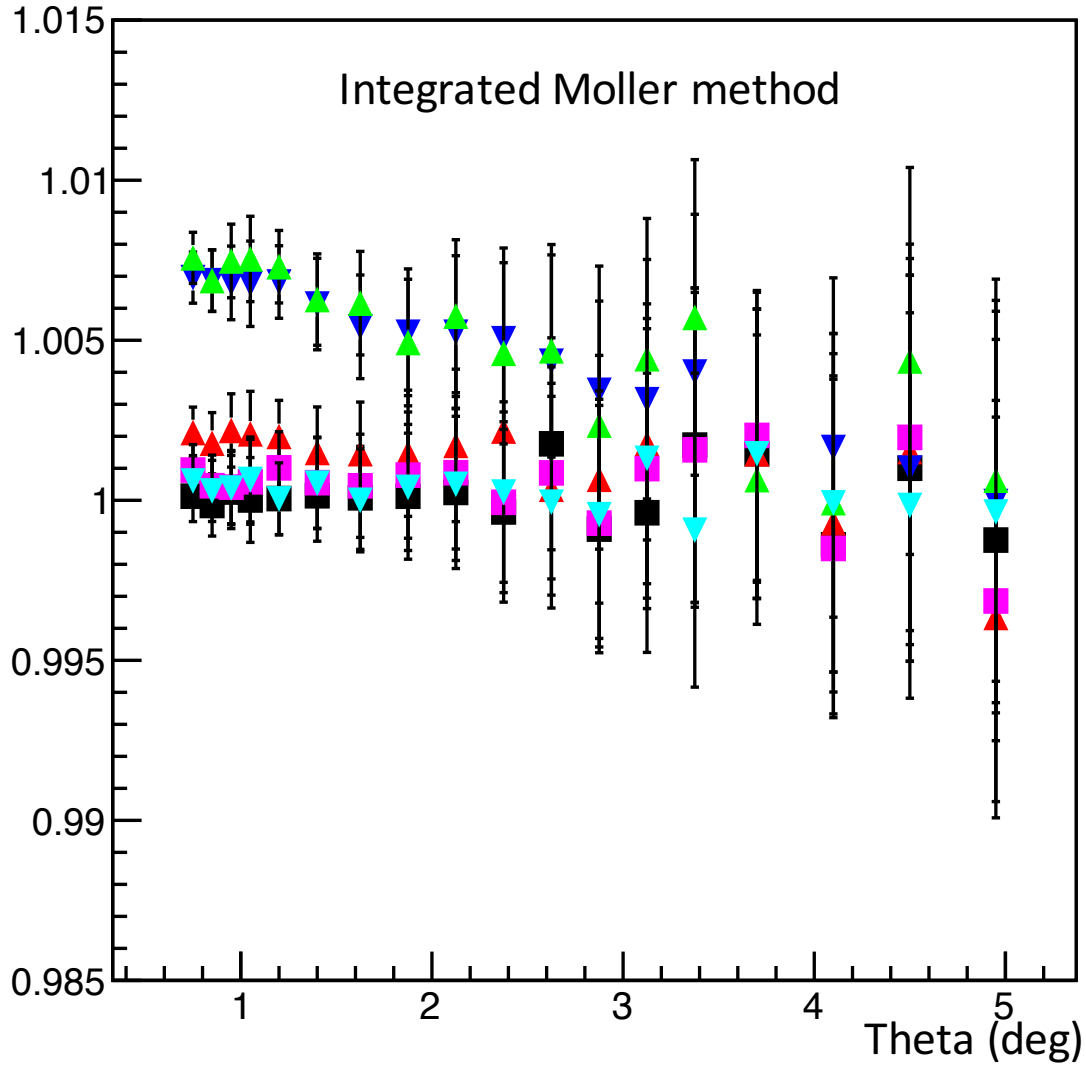
Profiles normalized by integrals from -75 cm to 75 cm



ep/ee ratio from different profile

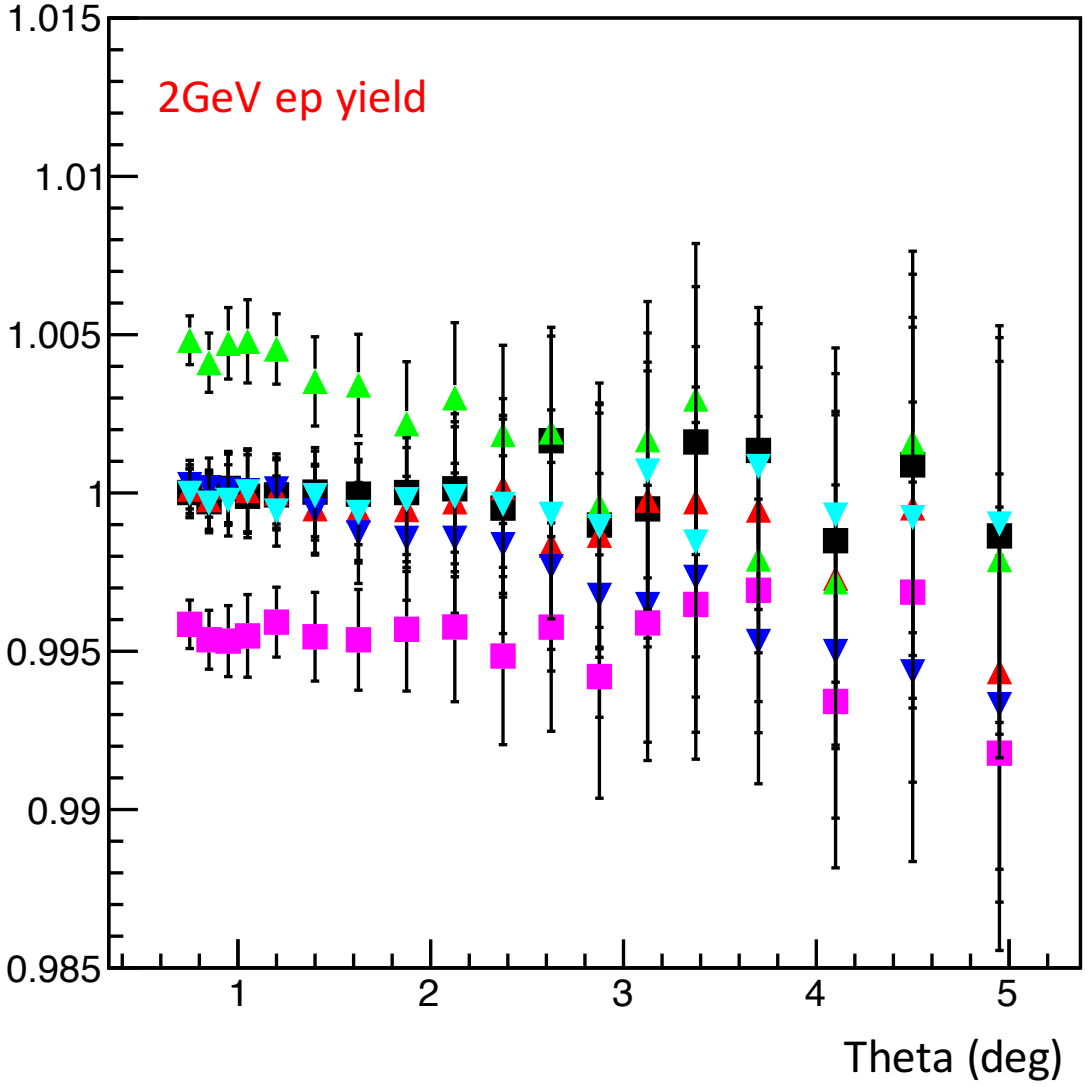
Ratios normalized to the case with uniform +/- 2cm within the target cell

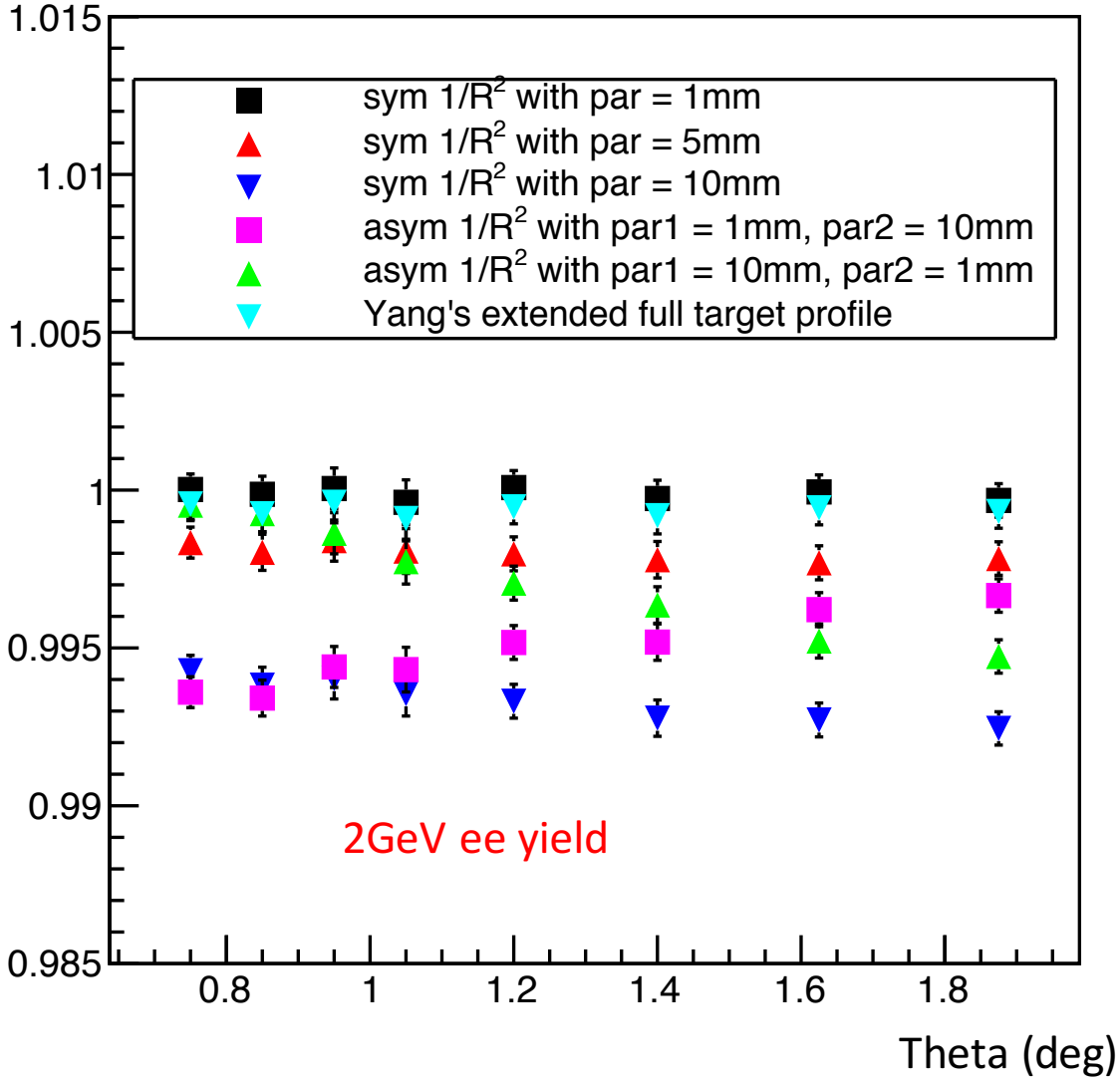




Yields from different profile

Yields normalized to the case with uniform +/- 2cm within the target cell



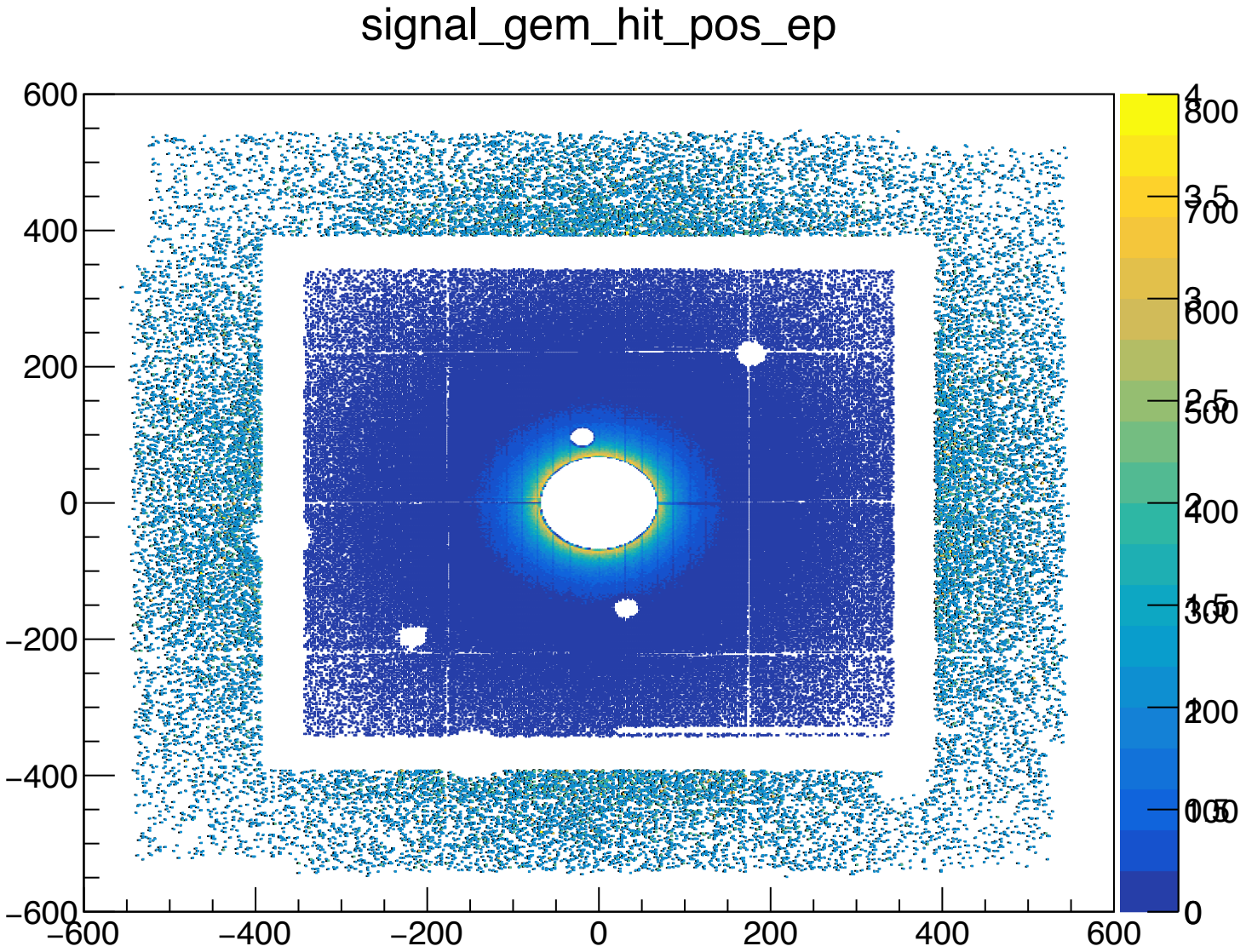


Conclusion

- +/- 2cm Extended target effect can be neglected
- With difference profiles, the effect on large angle (>3.5 deg) is very small, so our discrepancy at large angle seem unlikely comes from residual gas effect
- With uniform +/- 2cm, we actually get the minimum ep/ee ratio
- The discrepancy at small angle is that the ep/ee from simulation (using uniform +/- 2cm) is larger than ep/ee ratio from data
- So the discrepancy at small angle cannot not be explain by residual gas effect alone

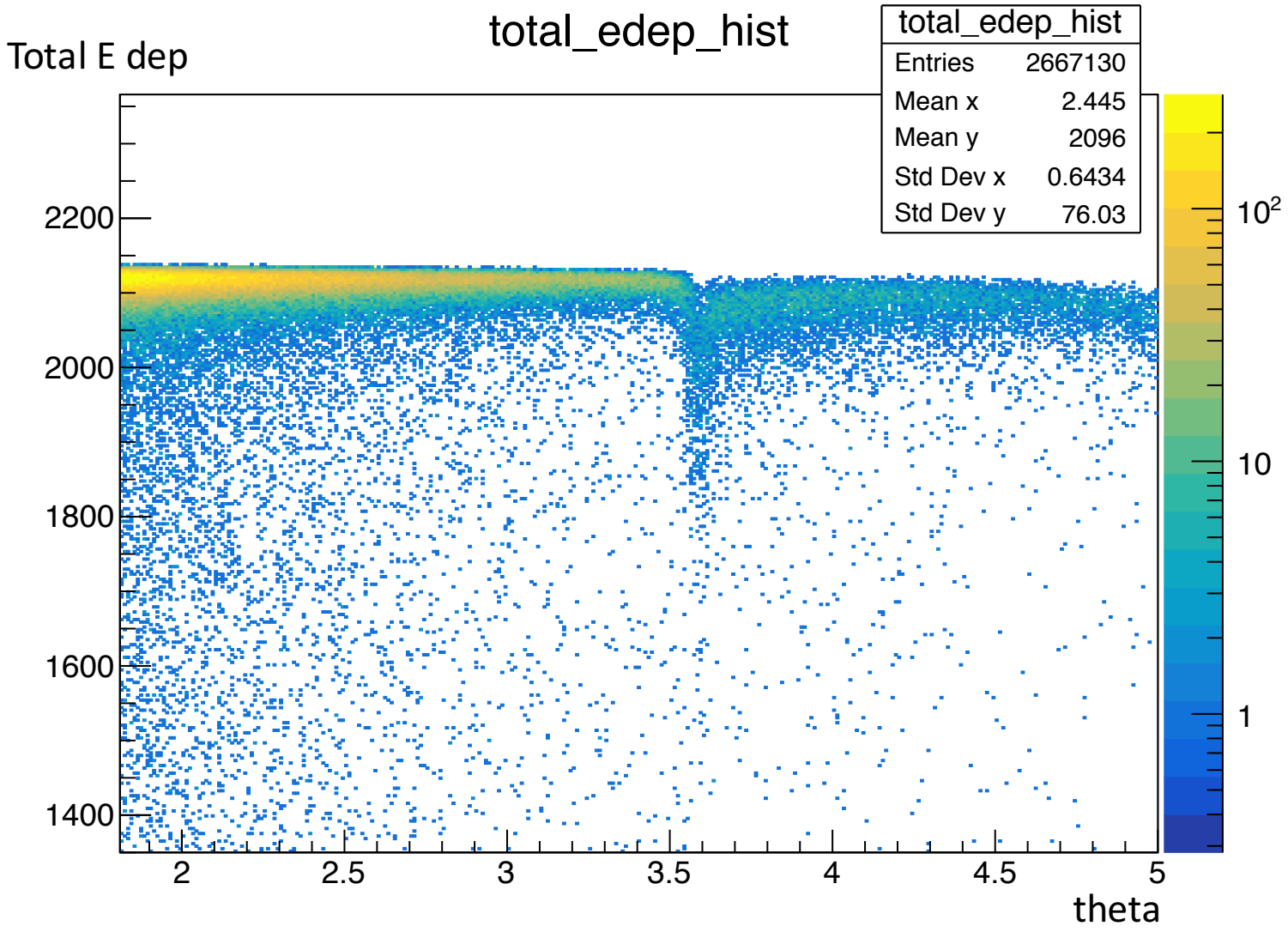
Separation of PWO and LG

- Separate HyCal into two regions, PWO only and LG only
- Check the consistency in the phi overlap region between these two regions

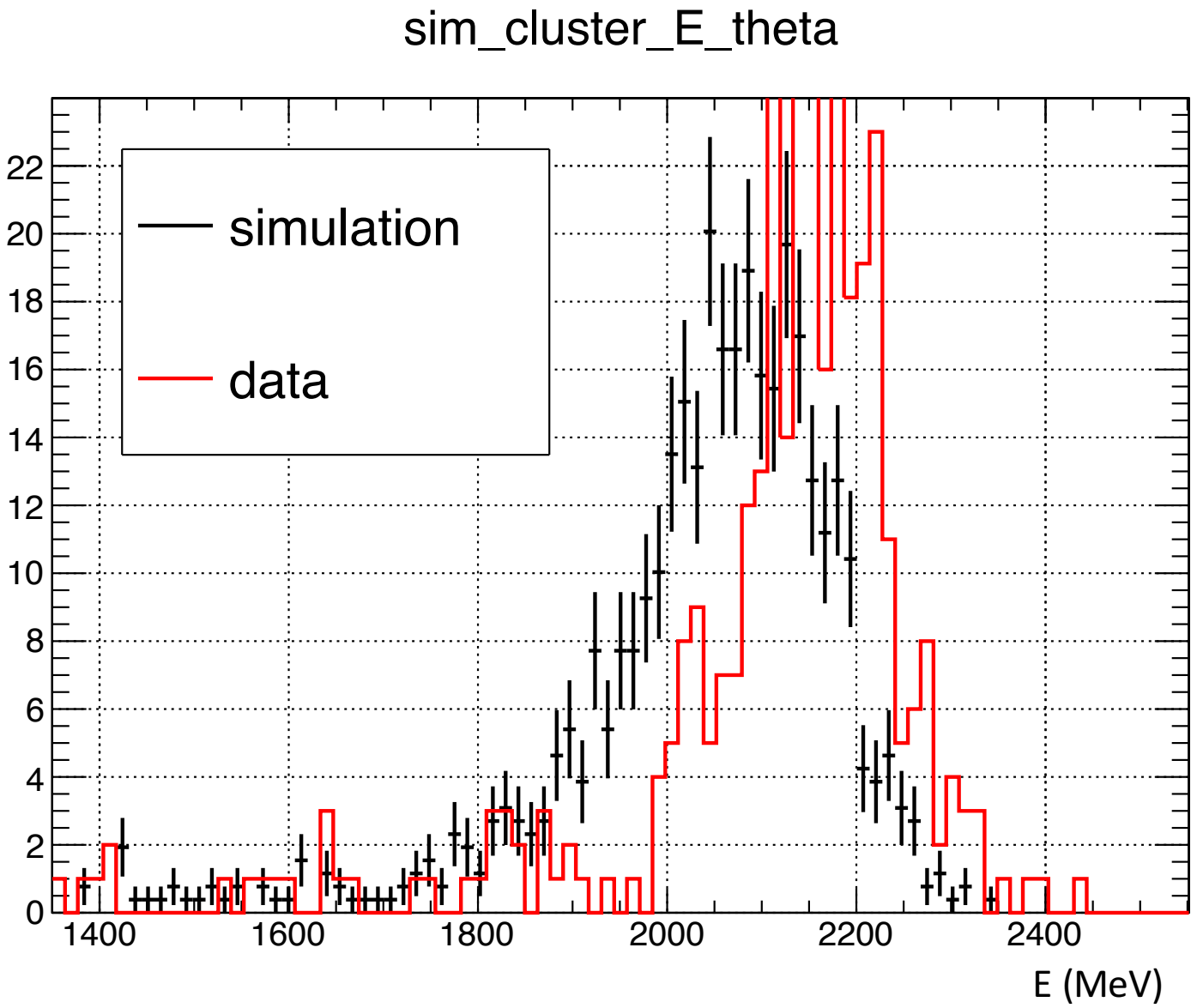


Still a small energy leak tail near transition

- Total E dep is the total energy deposition of a ep event on HyCal, recorded by Geant4, so not going through digitization and reconstruction
- Energy still seem to leak more compared to the data
- -20 < x < 20 mm

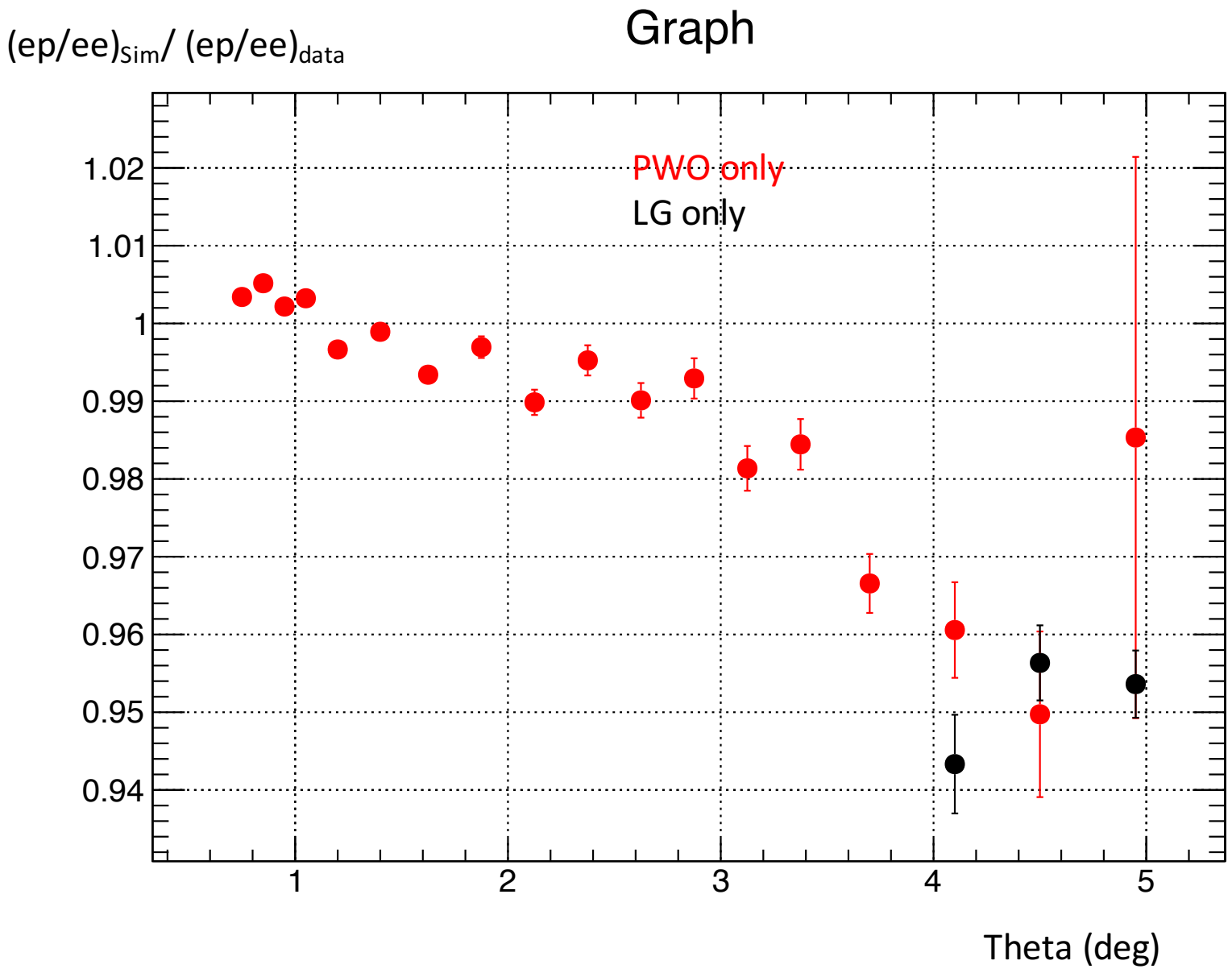


Reconstructed ep cluster energy at 3.55 < theta < 3.6 deg

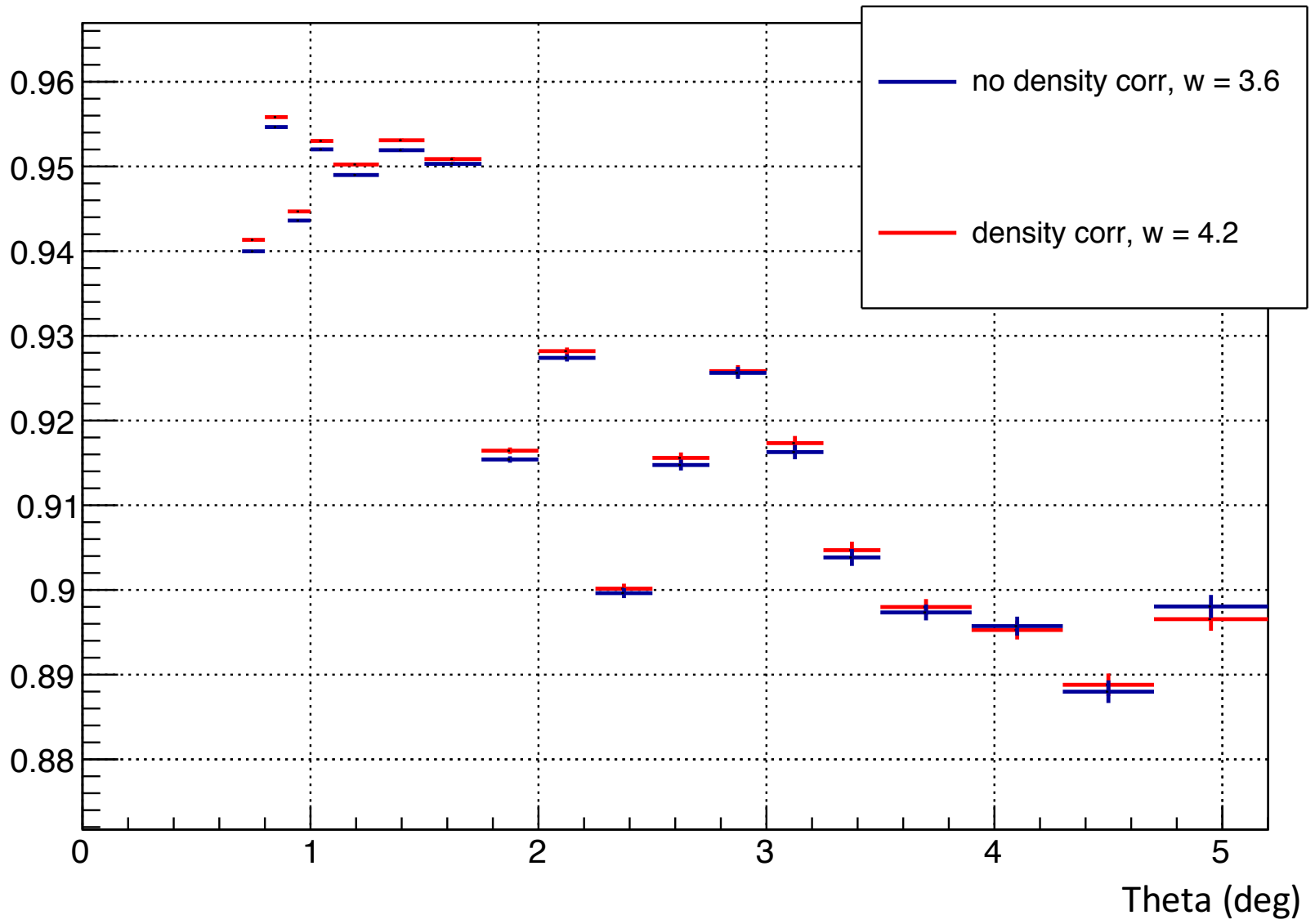


ep/ee super ratio

- Using the integrated Moller method
- GEM efficiency calculated for each region separately
- LG result seems consistent with the PWO result

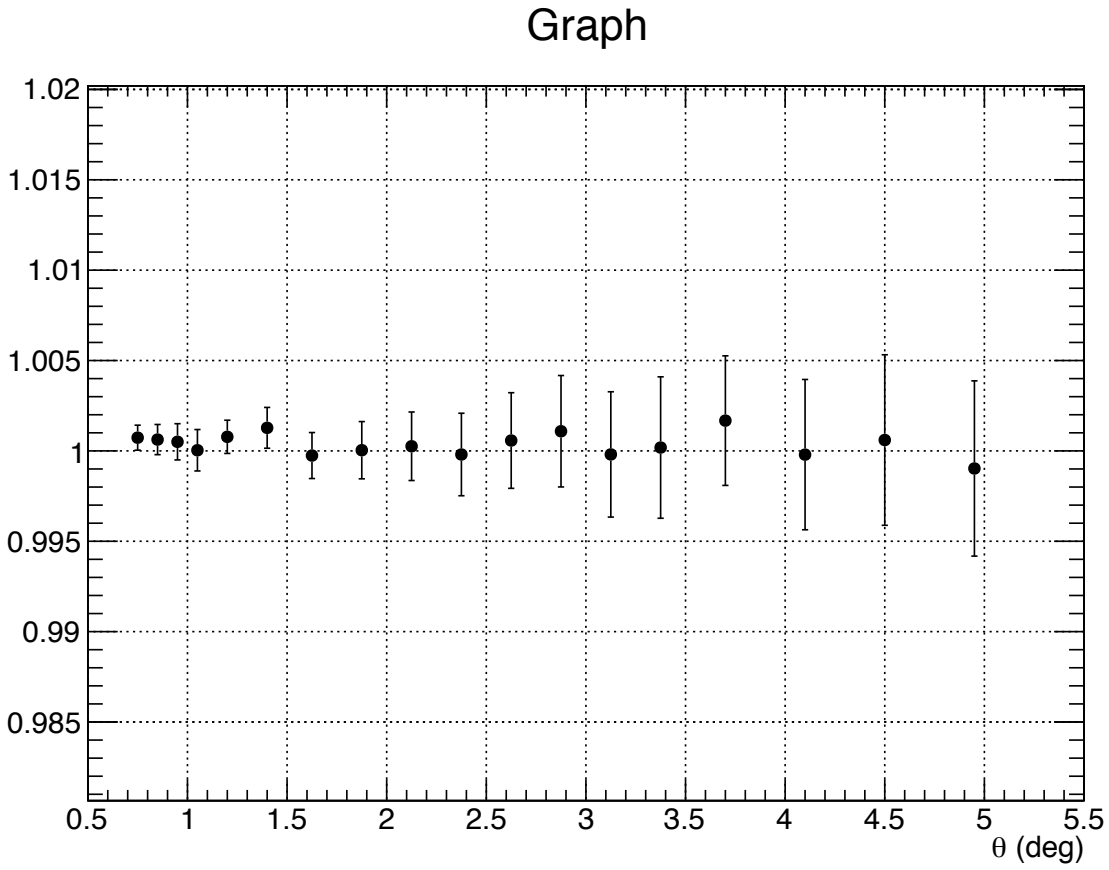


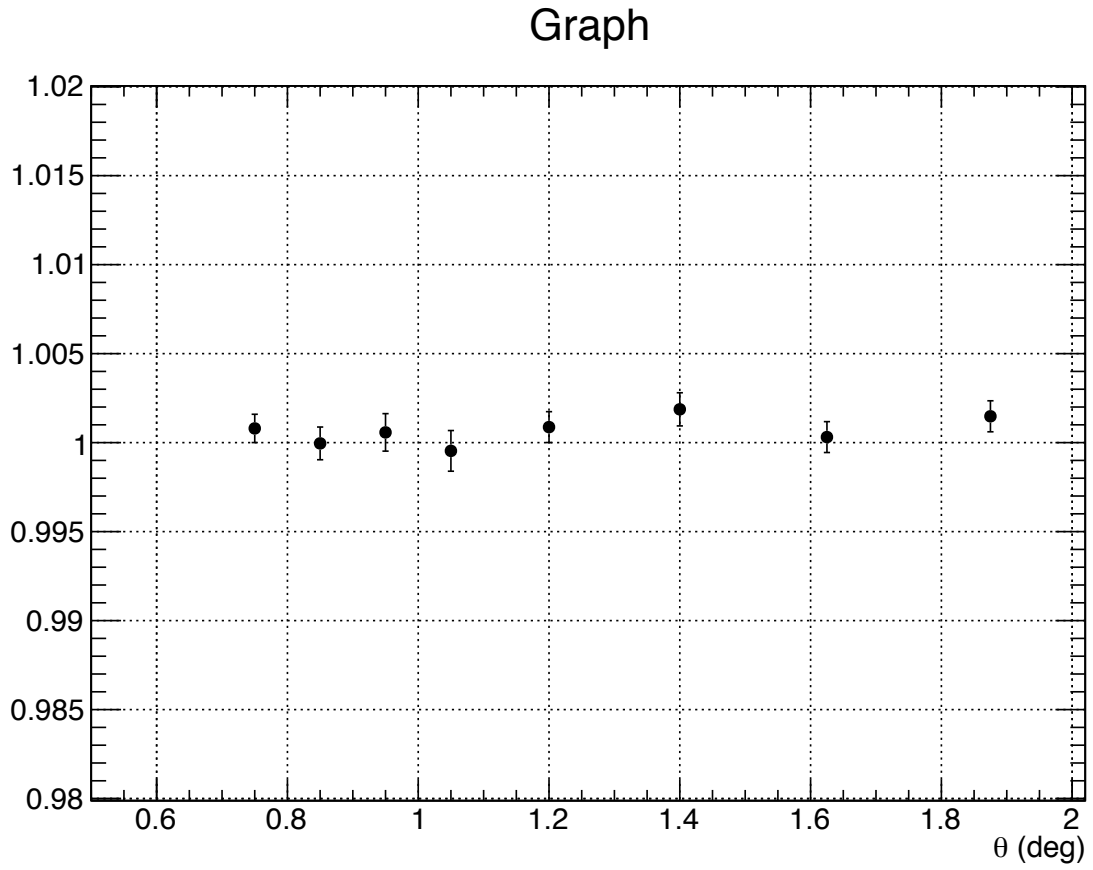
Density correction



Relative ep and ee yield

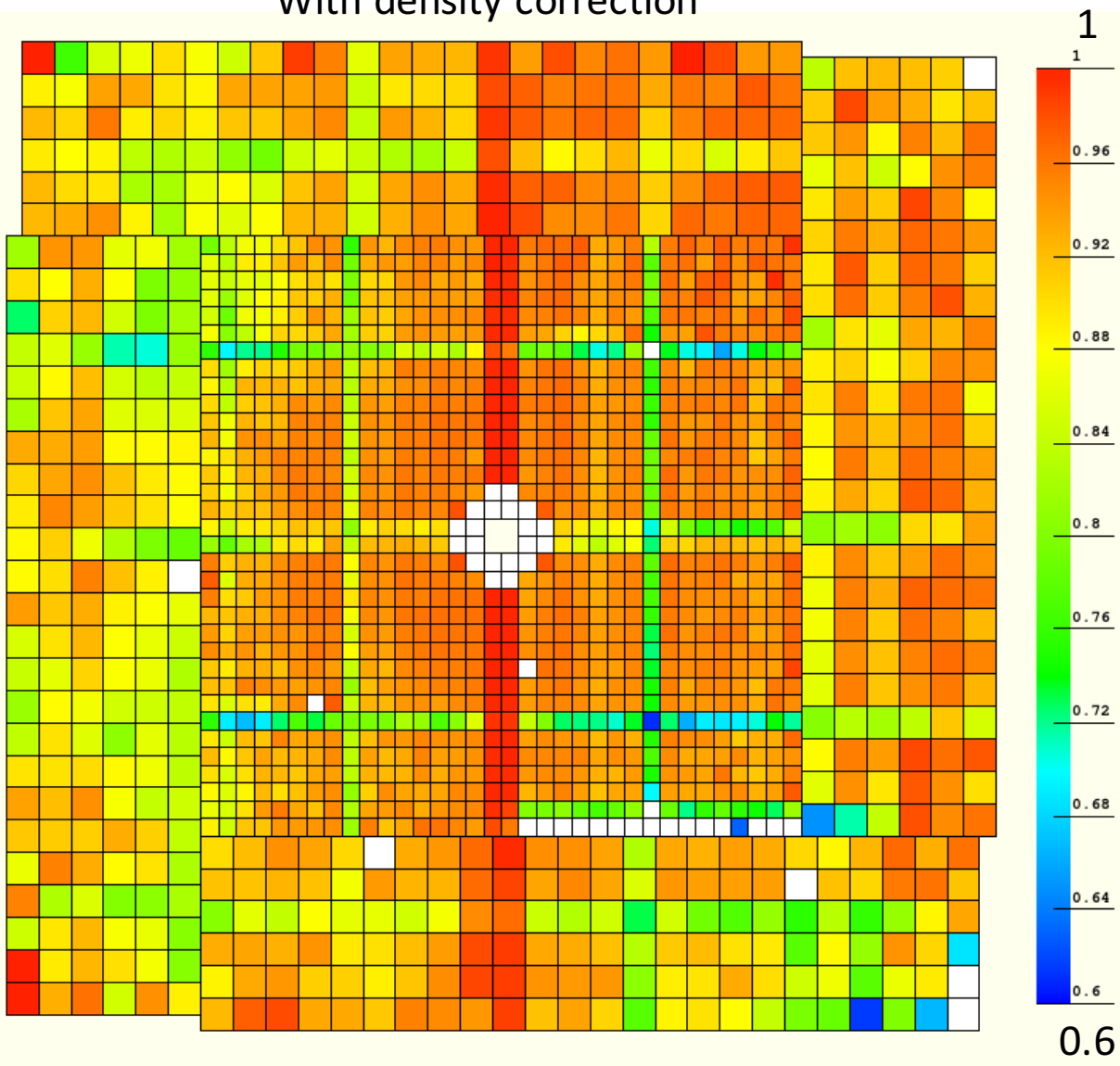
Yield with density correction over yield without density correction, GEM efficiencies applyed



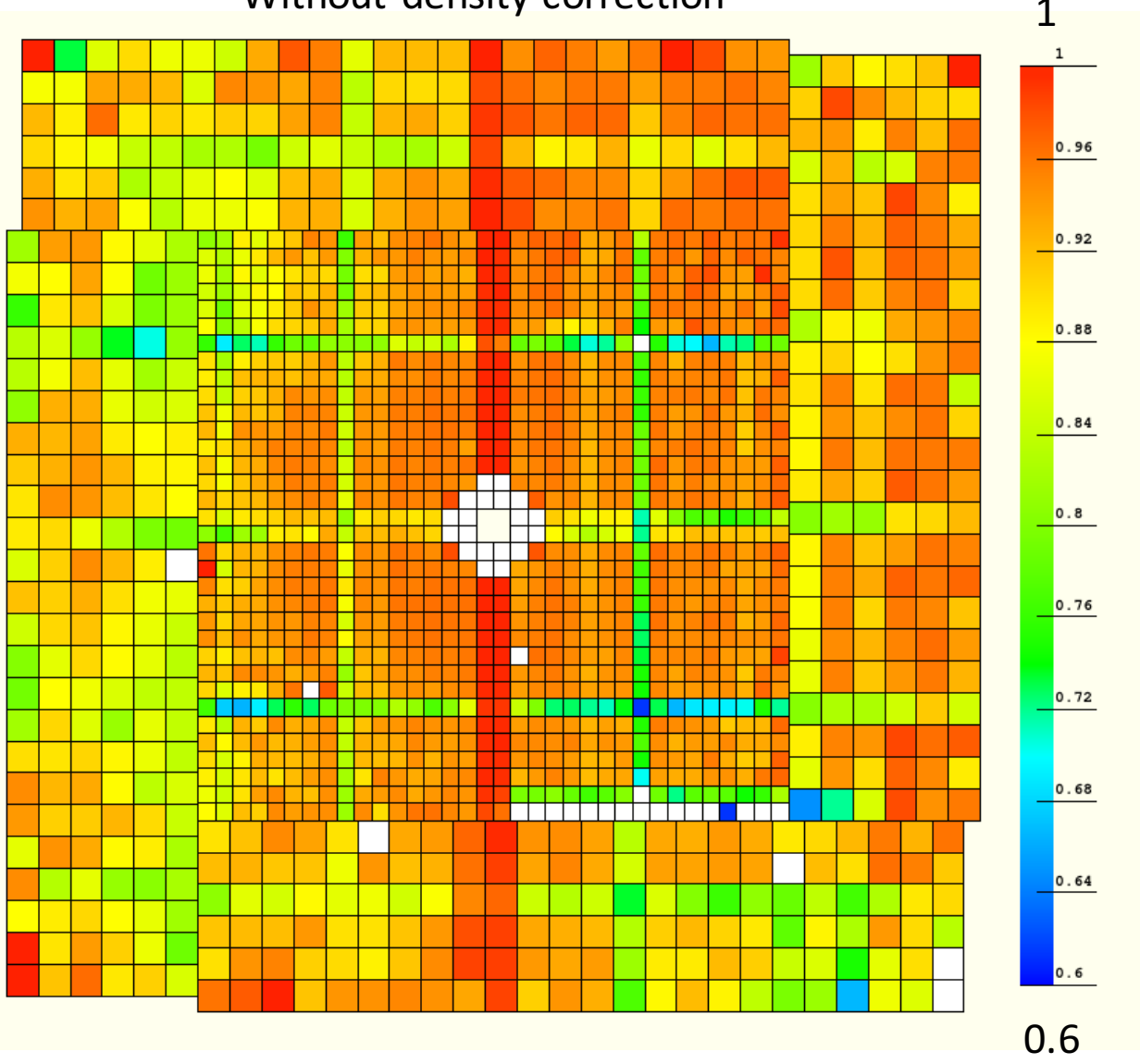


GEM efficiency in 2D bins

With density correction



Without density correction



Threshold dependency of GEM efficiency