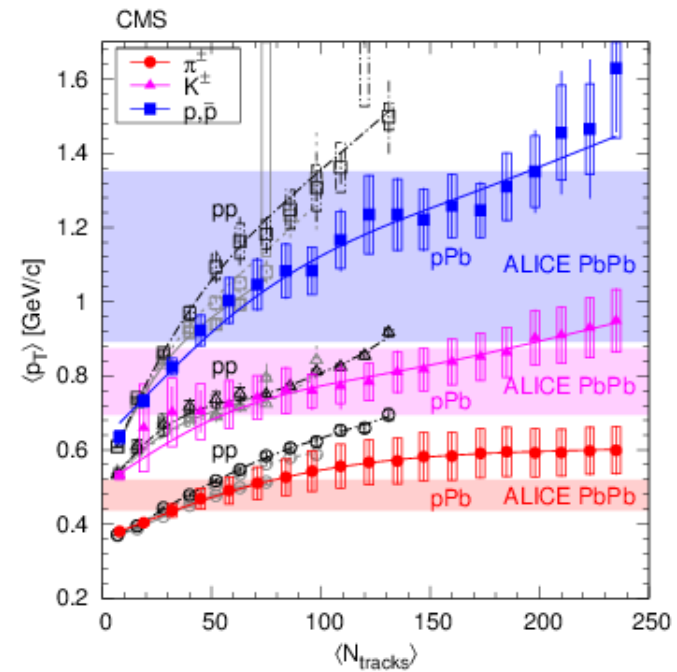
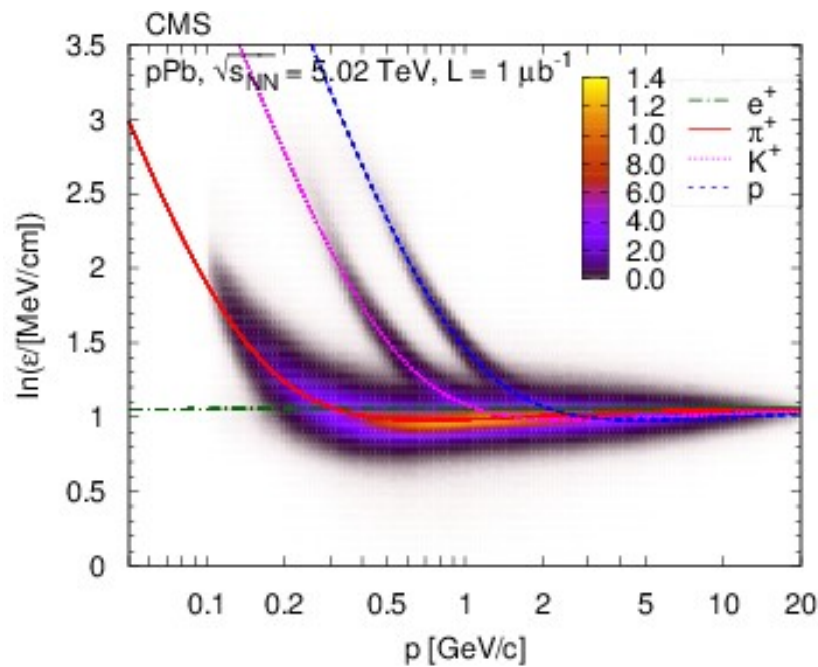


CMS OTKA  
QCD, Heavy ions

# Analyses

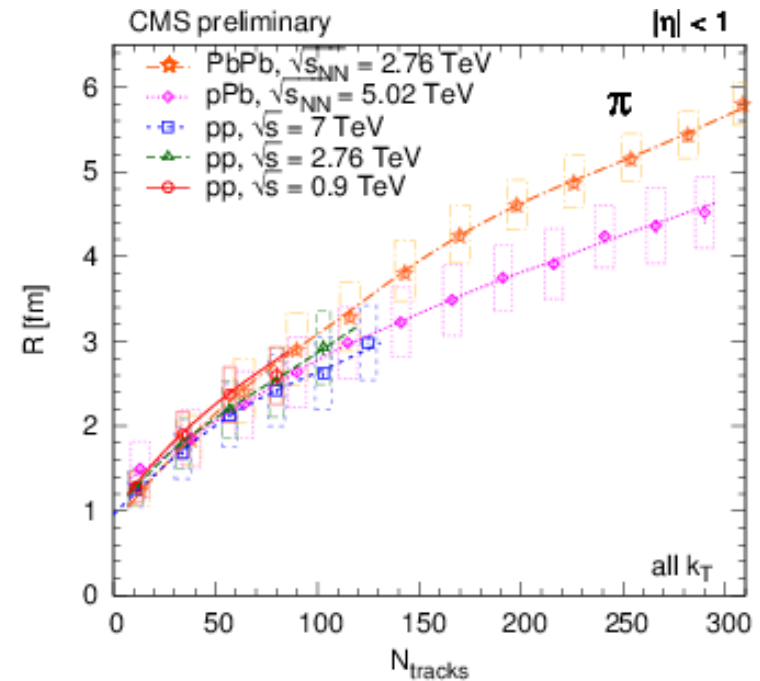
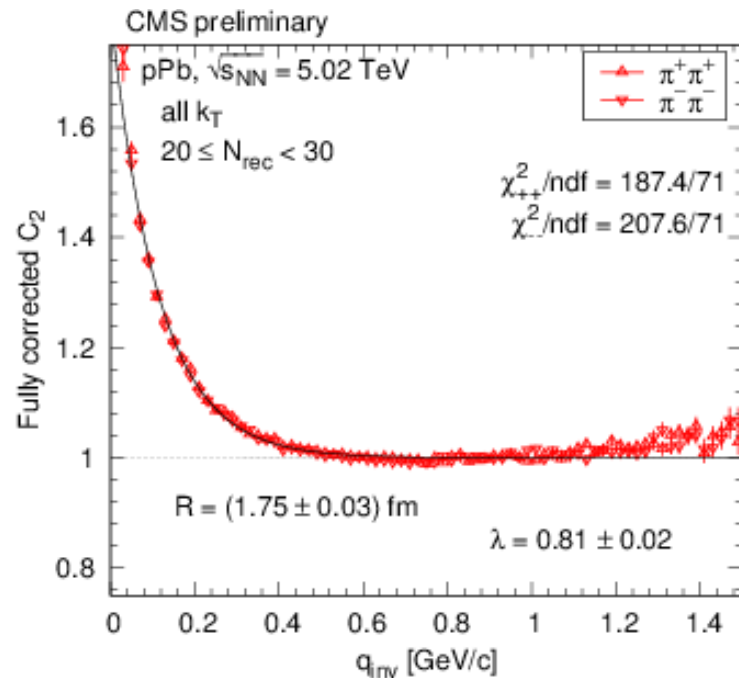
- HIN-12-016 - Study of the production of charged pions, kaons, and protons in pPb collisions at 5.02 TeV
- HIN-14-013 - Femtoscopy with identified charged hadrons in pp, pPb, and peripheral PbPb collisions at LHC energies
- Long range correlation of identified hadrons in pPb collisions
- HIN-12-017 - Nuclear effects on the transverse momentum spectra of charged particles in pPb collisions at 5.02 TeV
- HIN-13-001 - Studies of dijet transverse momentum balance and pseudorapidity distributions in pPb collisions at 5.02 TeV
- HIN-13-004 - Study of Z production in PbPb and pp collisions at 2.76 TeV in the dimuon and dielectron decay channels
- HIN-14-003 - Study of Z boson production in the muon decay channel in pPb collisions at 5.02 TeV
- Centrality in pPb collisions

# Spectra of identified particles in pPb collisions



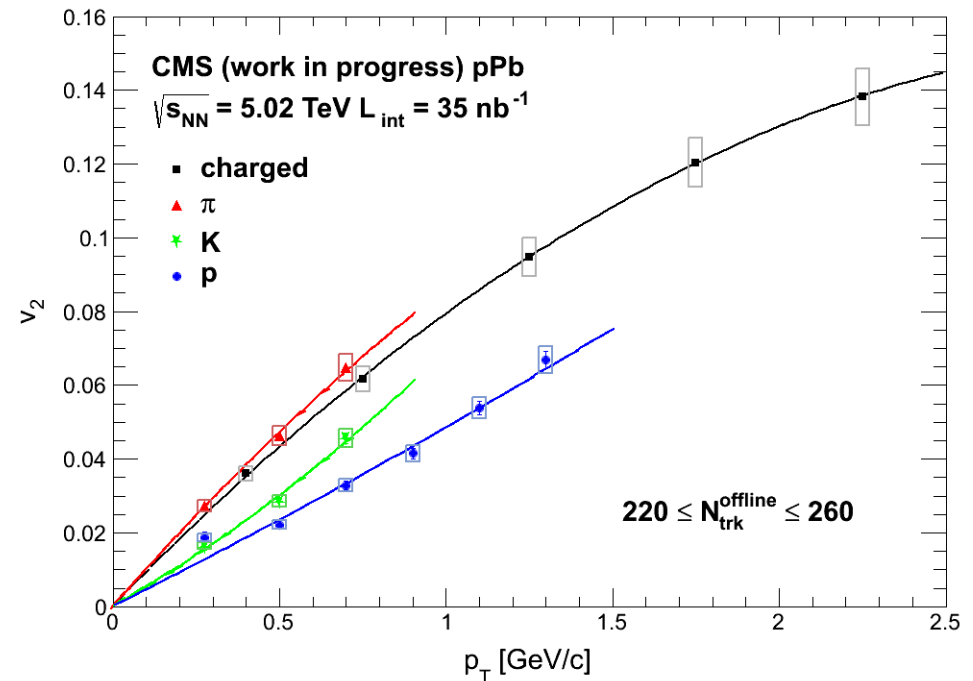
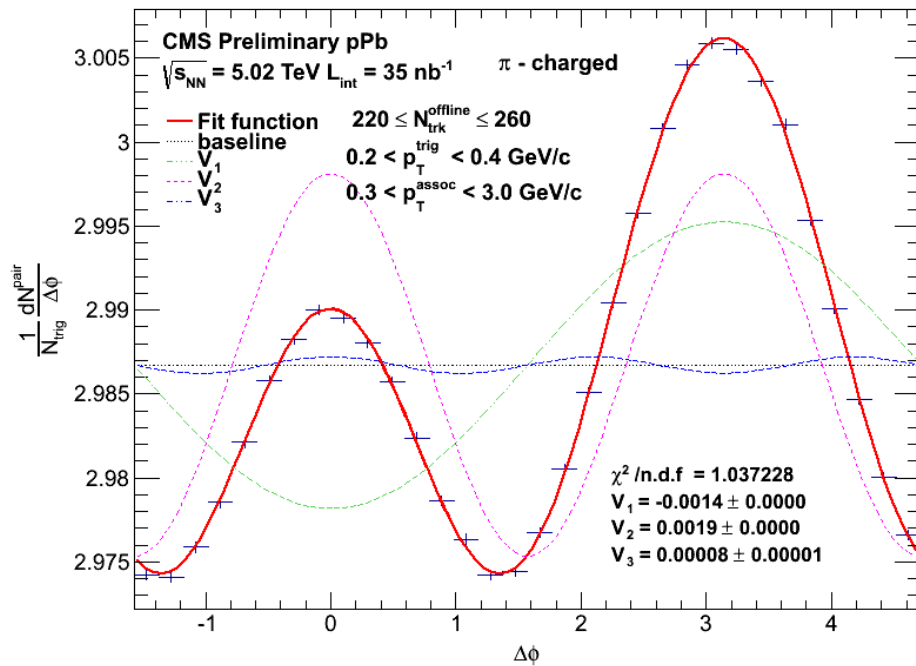
- *Published in Eur. Phys. J. C 74 (2014) 2847*
- Particle production is strongly correlated with event multiplicity in both pp and pPb collisions
- The characteristics are constrained by the amount of initial parton energy that is available in any given collision

# Short range correlations in different systems



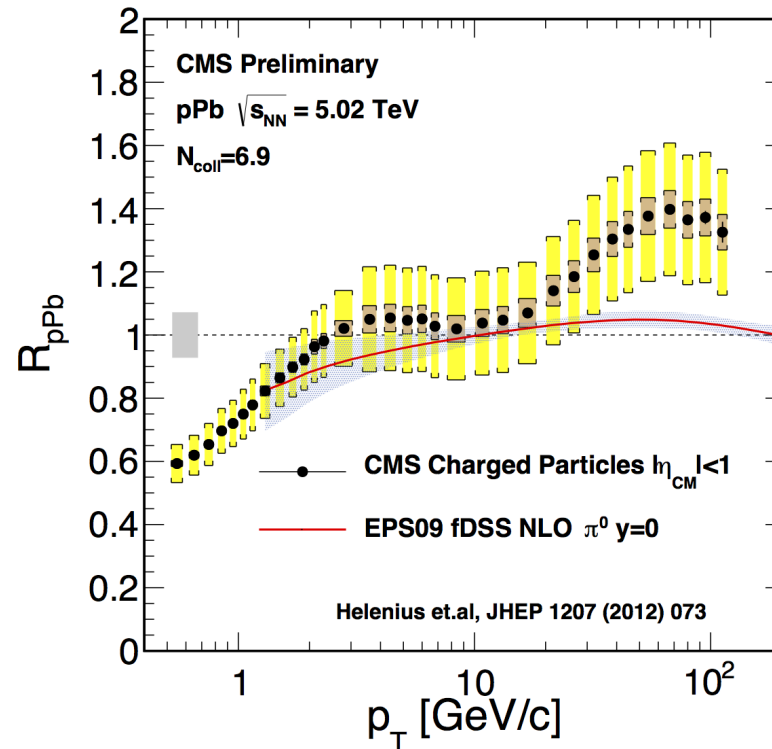
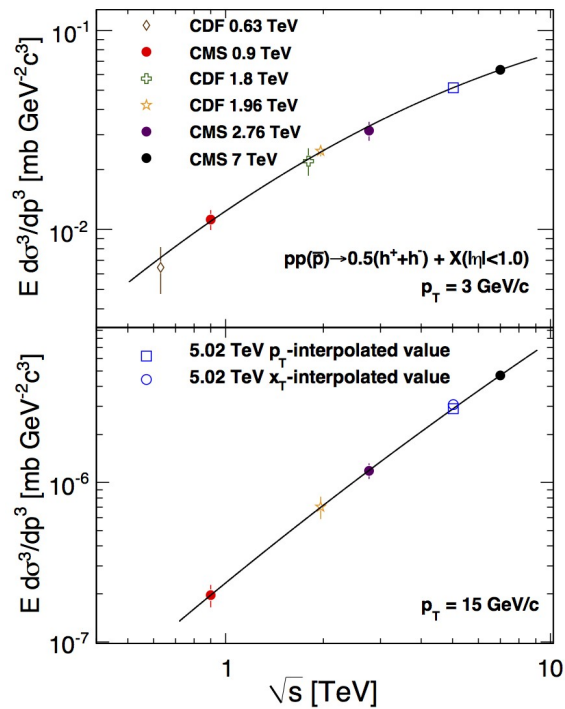
- *PAS HIN-14-013 public for Quark Matter 2014 (joined publication with FSQ analysis in preparation)*
- Radii are in the range 1–5 fm and a large system exists also in high multiplicity pPb (and corresponding PbPb)
- Scaling observed with  $N_{\text{tracks}}$  and  $k_{\text{T}}$  that is largely independent of system and center-of-mass energy

# Long range correlations of identified hadrons



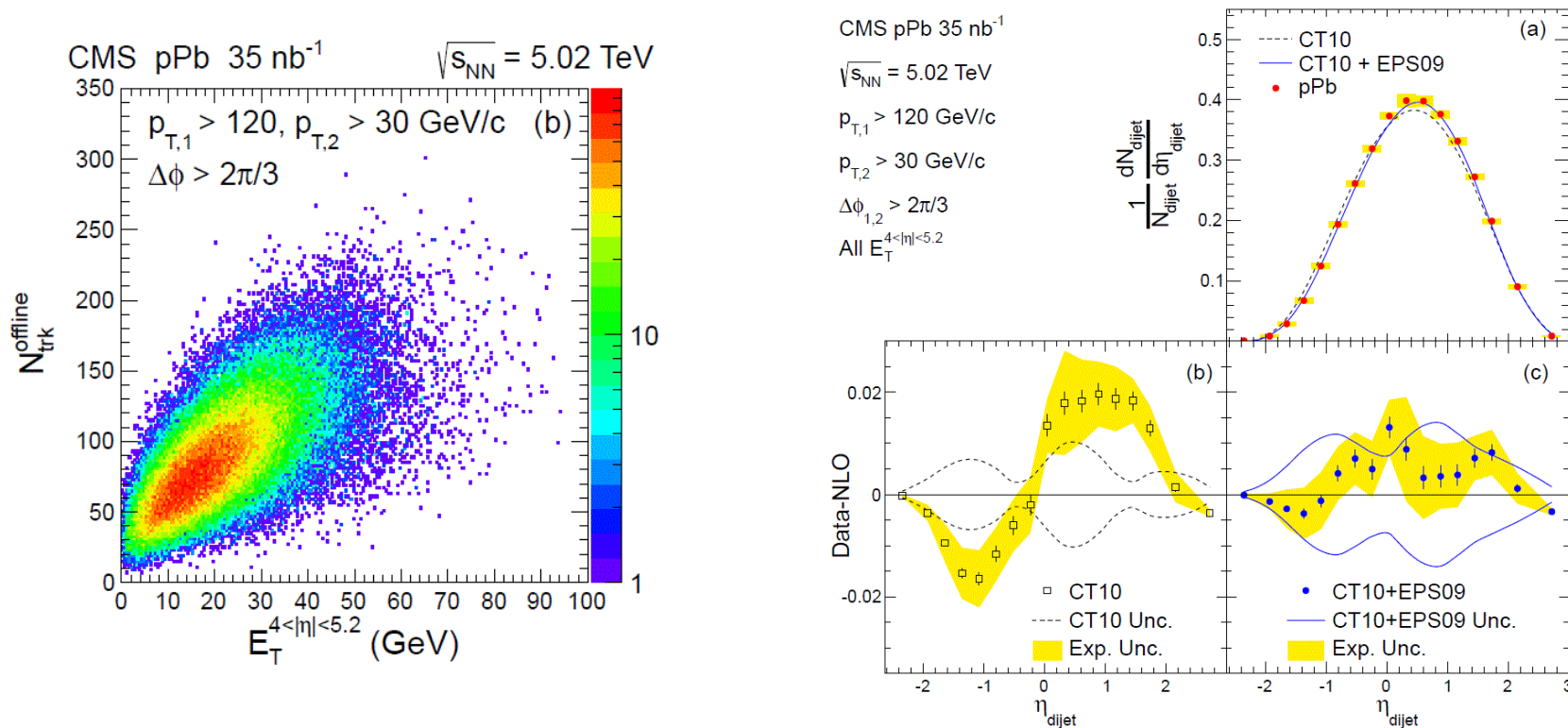
- *TDK dolgozat*
- Mass ordering (attributed to be a hydrodynamic effect) of  $v_2$  is also present in pPb collisions
- This strongly favours that there is strongly interacting matter created in pPb collisions besides the much larger collision system of heavy ions

# Nuclear modification factor in pPb collisions



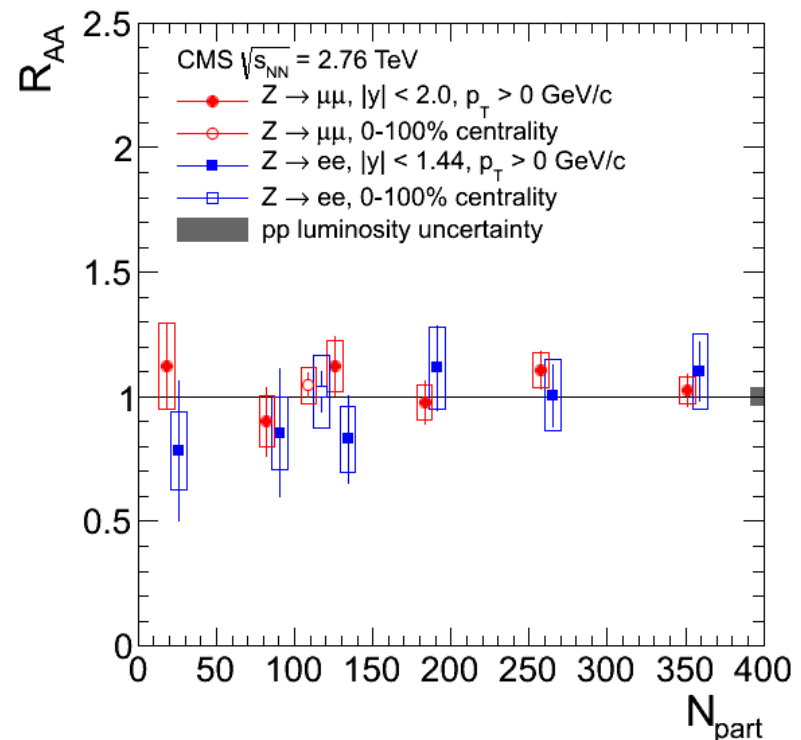
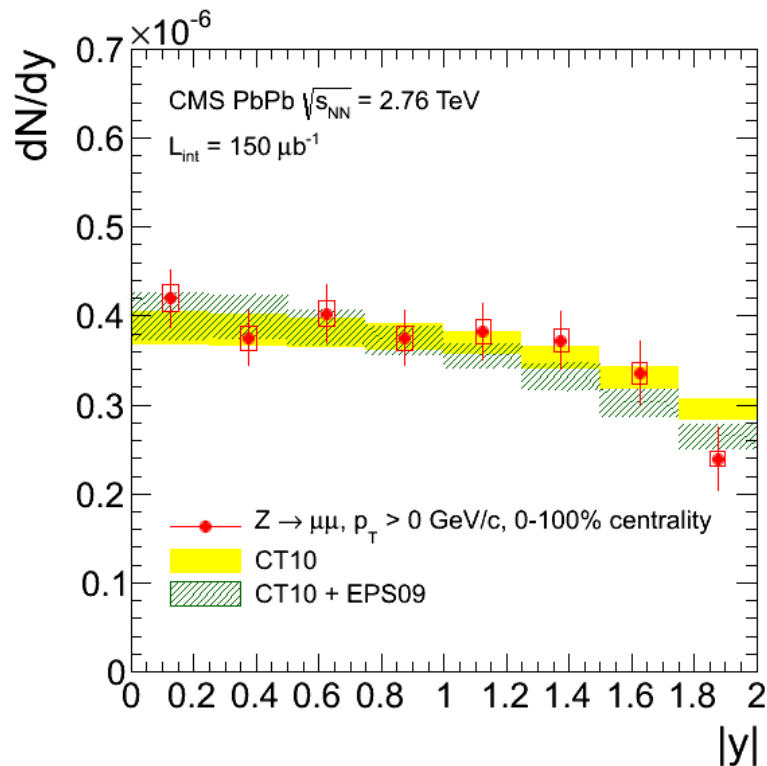
- *PAS HIN-12-017 public (paper draft in final reading)*
- Performed interpolation for 5 TeV pp reference spectrum
- Rise of nuclear modification factor at high  $p_T$  is not described by current knowledge of nPDFs

# Dijets in pPb collisions



- *Published in Eur. Phys. J. C74 (2014) 2951*
- Developed common event selection for all pPb analyses
- No indication of jet quenching in pPb collisions
- Pseudorapidity shift consistent with EPS09 nPDF set

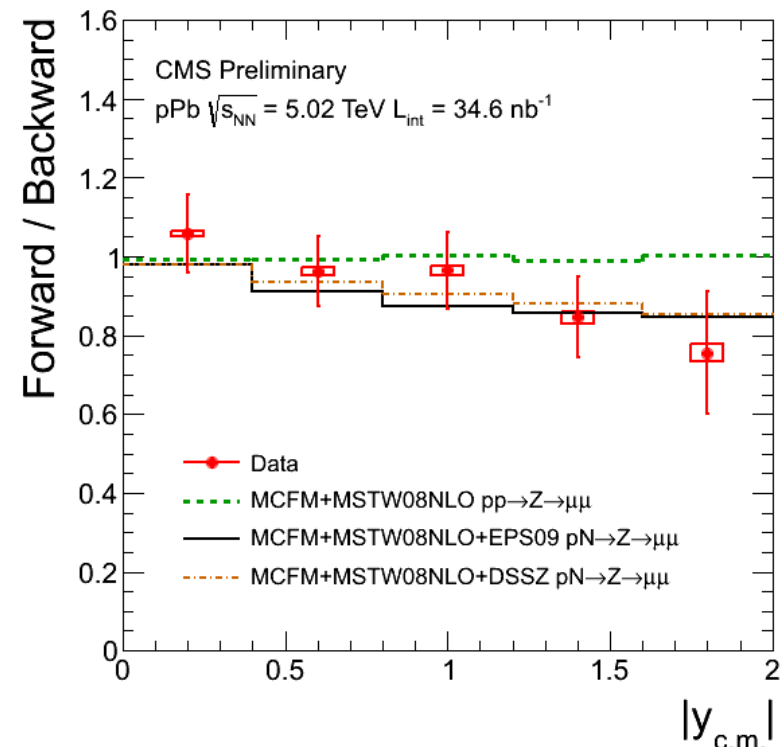
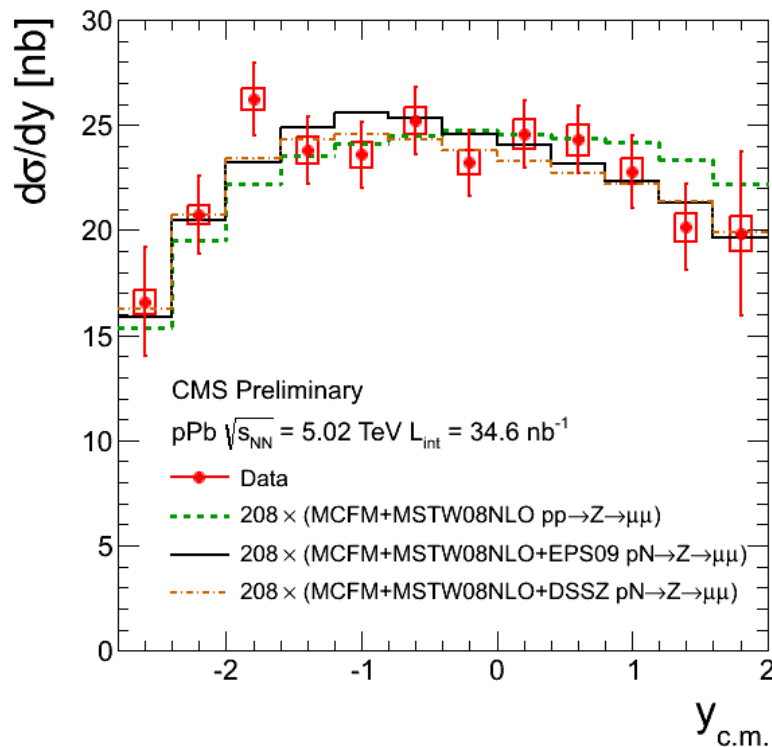
# Z bosons in PbPb and pp collisions



- *Submitted to JHEP, arXiv:1410.4825*
- Finalized publication of combined muon and electron channel results of Z bosons in PbPb and pp collisions
- As expected, Z bosons are not modified by the hot and dense QCD medium

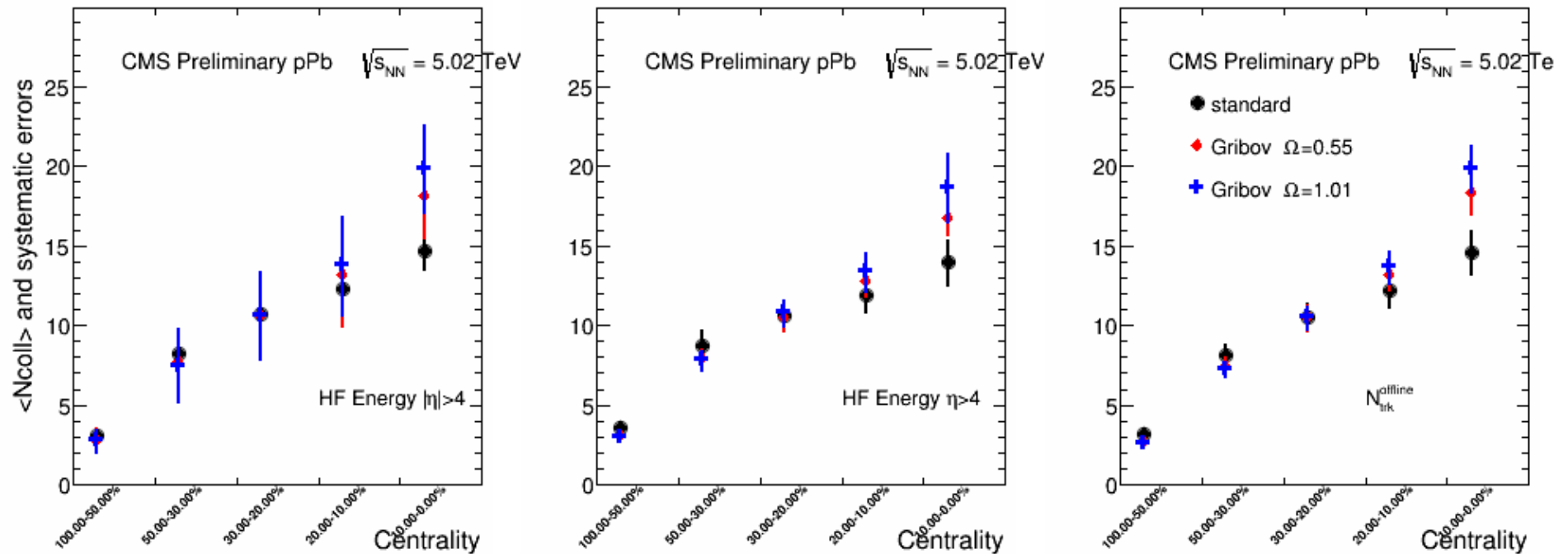


# Z bosons in pPb collisions



- *PAS HIN-14-003 public for Quark Matter 2014*
- Z boson inclusive cross section measured in the muon decay channel is consistent with binary collision scaling
- Differential cross section and forward-backward ratio shows hints of nuclear effects and can constrain nPDFs

# Centrality in pPb collisions



- *Analysis Note 2013/060, Detector performance notes 2013/034, 2014/009*
- Determined average number of binary collisions with different Glauber(+Gribov) models for different event activity measures with NBD fitting method