Production of π/K/p in pp and PbPb collisions measured with ALICE

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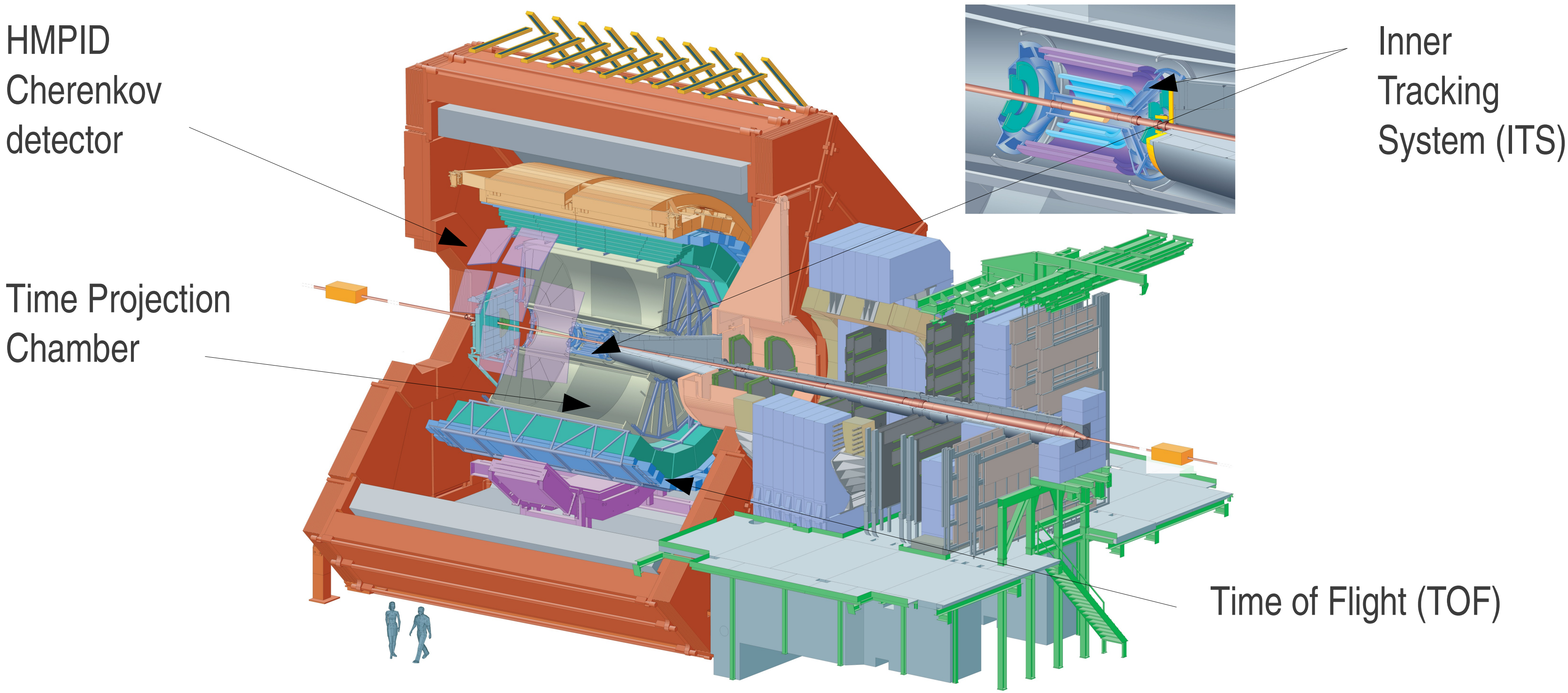
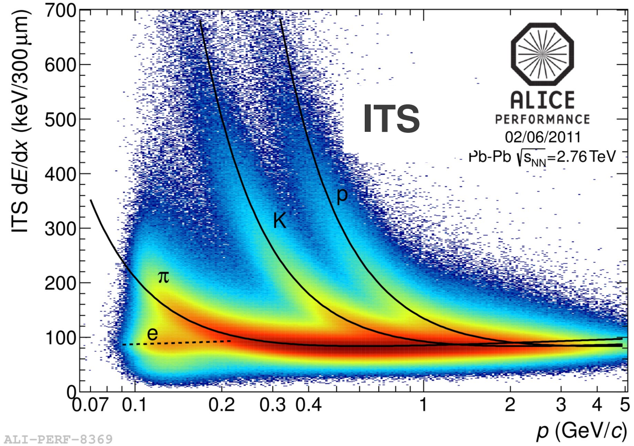
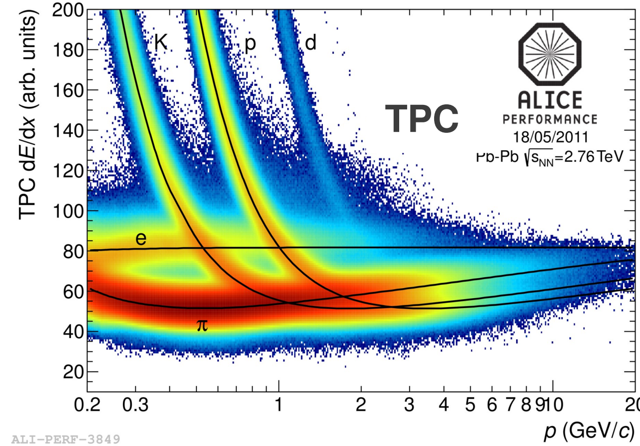
for the ALICE Collaboration

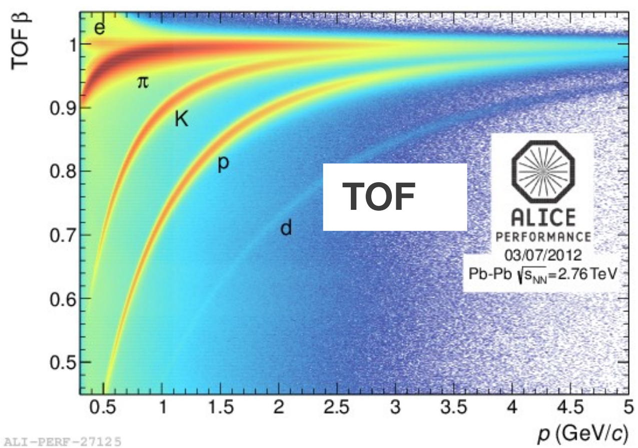
ALICE Detector

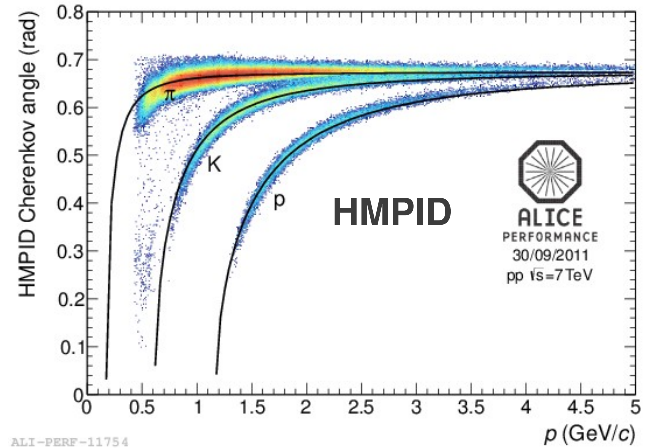


PID Performance

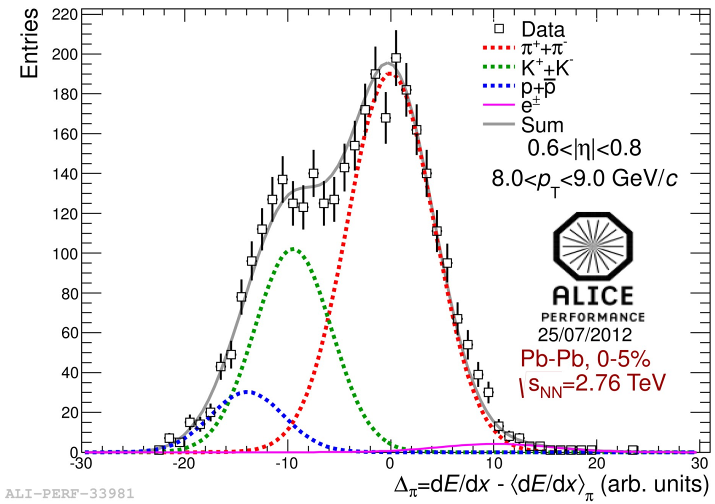


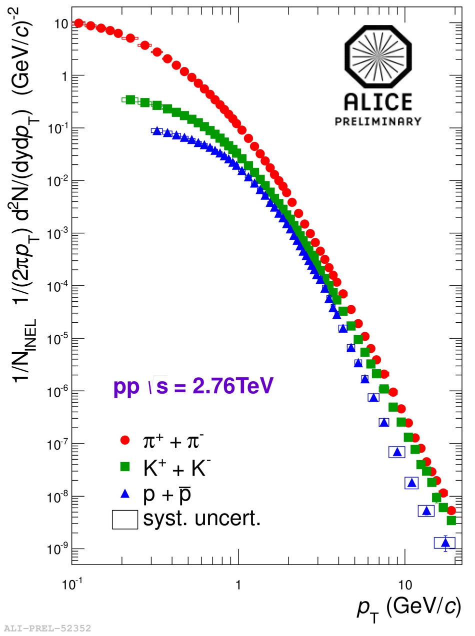






PID methods

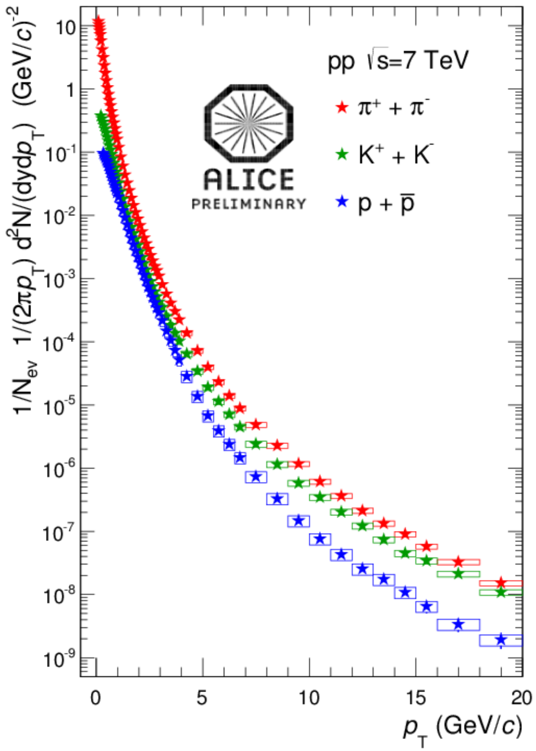


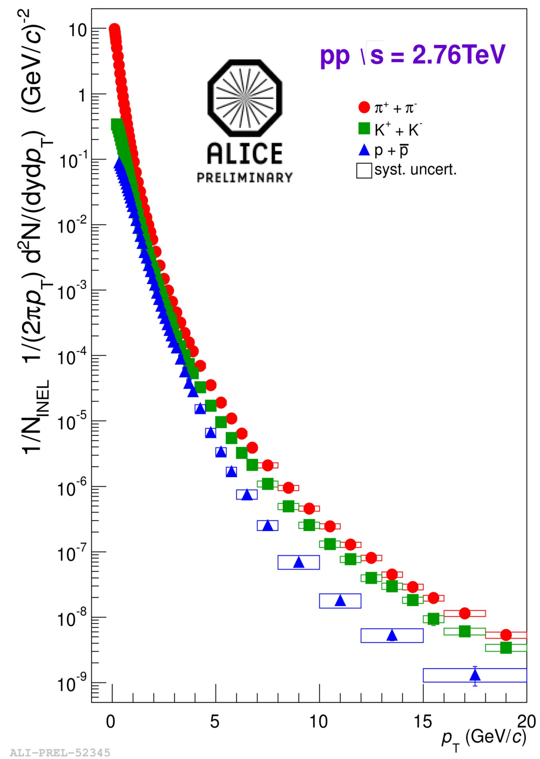


Particle identification is made:
➔by selecting reconstructed tracks which have a PID signal close to expected value
➔fitting empirical functions to PID signal distributions

Final spectra are combinations of spectra measured using different particle identification (PID) methods and detectors.

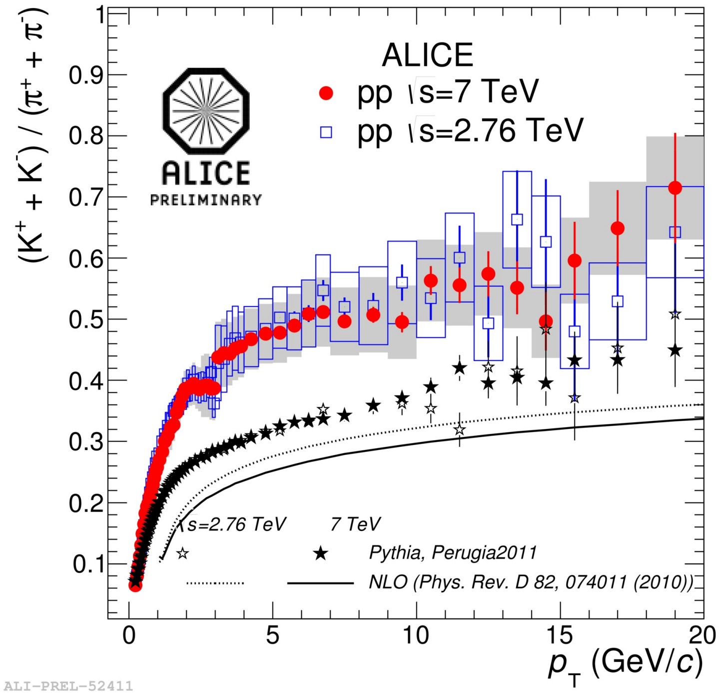
pp results

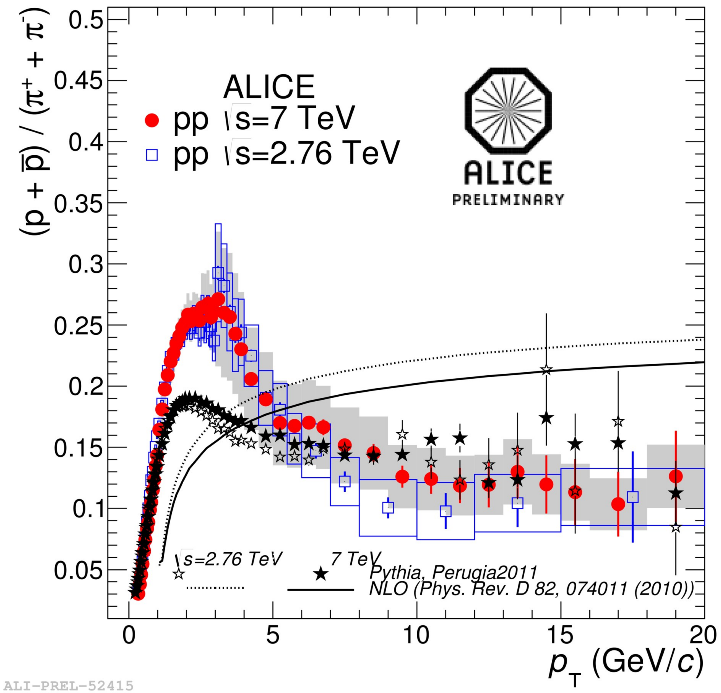




- ➔ Spectra are measured from 100 MeV/*c* to 20 GeV/*c* in p_T
- ➔ Spectra are normalized to the number of inelastic events

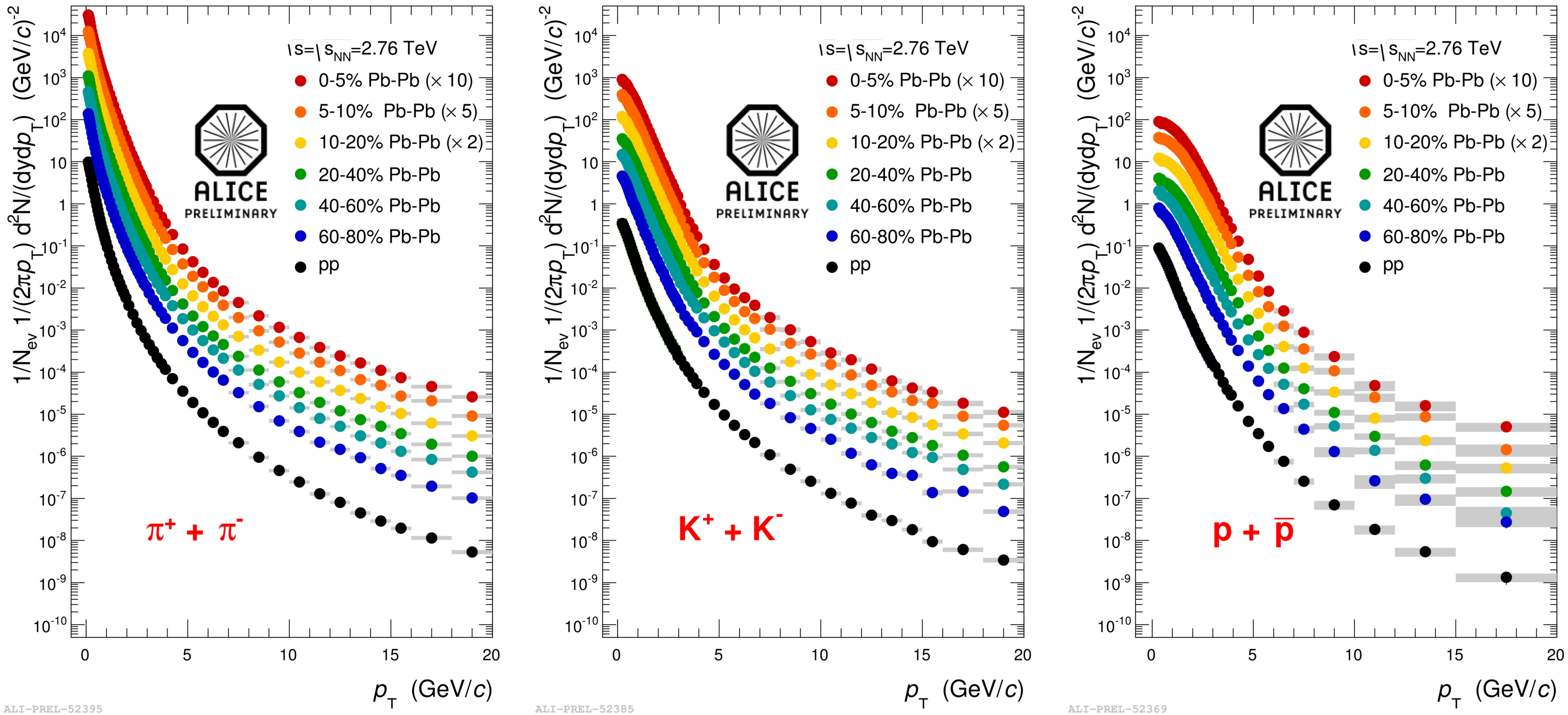
pp results vs. theory





- ➔Ratios are similar at 7 TeV and 2.76 TeV and they are not reproduced by theory
- ➔Color reconnection improves a description of ratio by PYTHIA [arXiv:1303.6326]
- ➔More on color reconnection in pp=> Jonas Anielski “Identified spectra in p-Pb”

Pb-Pb



p_T < 3 GeV/*c* flow and bulk properties

3 < p_T < 7 GeV/*c* anomalous baryon enhancement and coalescence?

p_T >7 GeV/*c* search for medium modification of fragmentation functions

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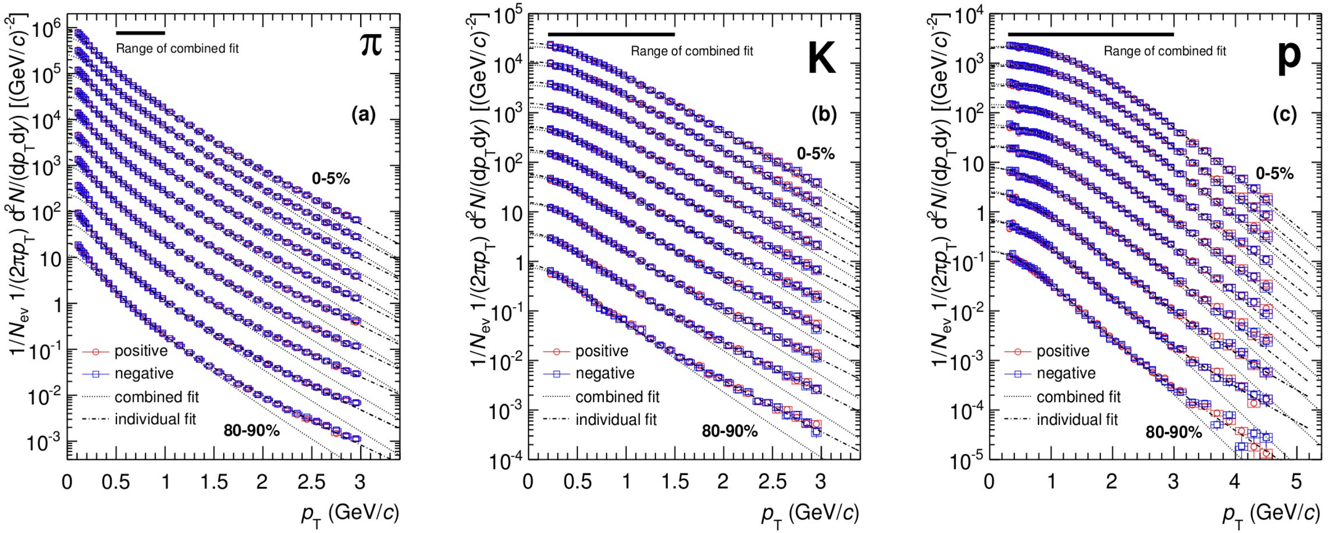
centre for particle physics Discovery

Spectra in Blast-Wave Model



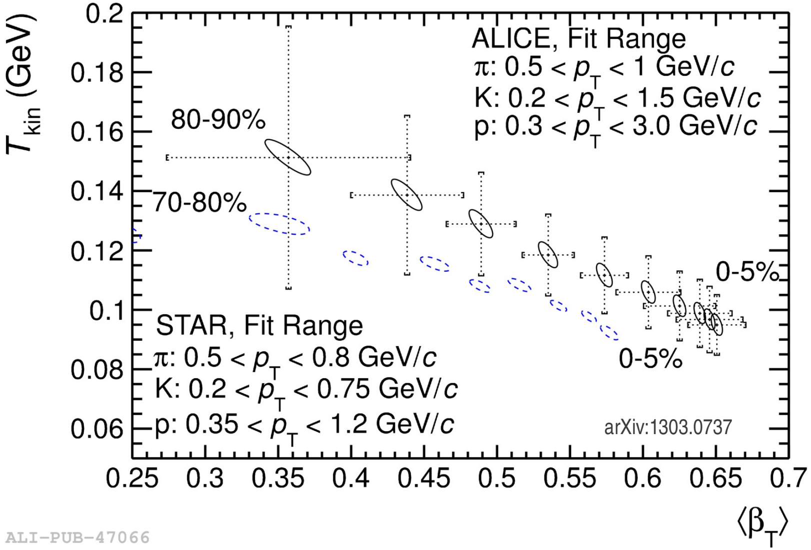
arXiv:1303.0737

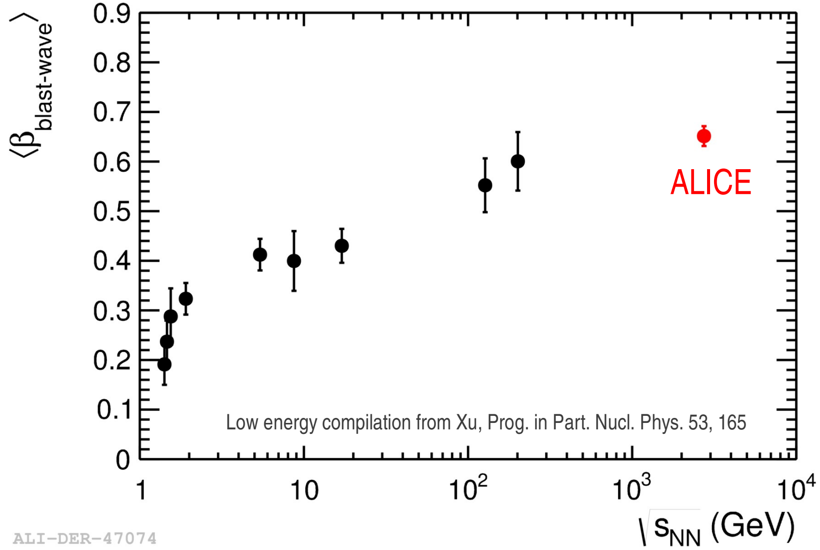
➔Good description of the spectra in combined fit ranges especially for central events

➔The individual fits can describe spectra over the full measured range

➔Useful tool for comparison with previous results

Results of the BW

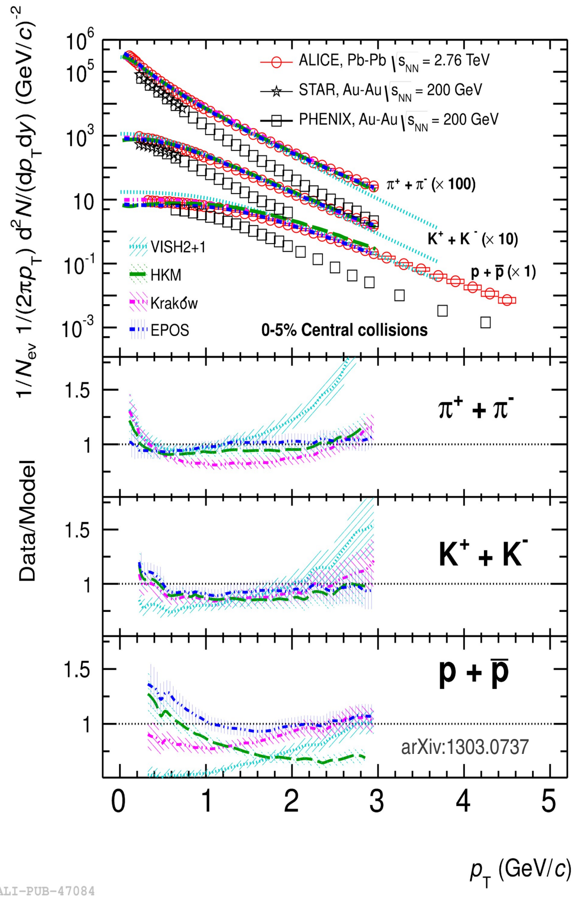




➔Centrality dependence of the T_{kin}, <β_T> similar to RHIC

➔More rapid expansion with increasing centrality

Spectra in hydro models



Hydro models:

VISH2+1: viscous hydrodynamics without description of hadronic phase, using thermal yields at T_{ch}=165 MeV
(Shen et al., PRC 84, 044903 (2011))

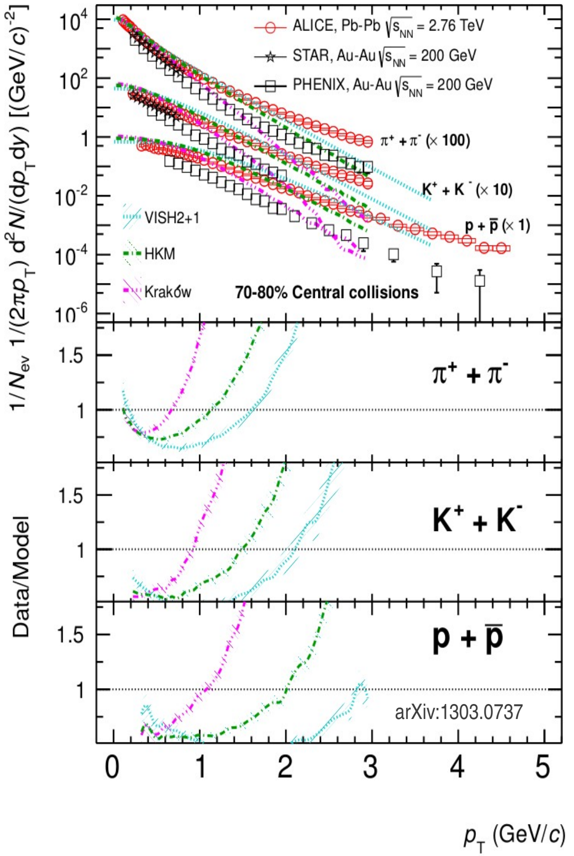
HKM: hydro+UrQMD, additional radial flow built by hadronic phase which also affects particle ratios as a result of inelastic interactions
(Karpenko et al., arXiv:1204.5351)

Kraków: introduces non equilibrium corrections due to the bulk viscosity at the transition from the hydrodynamic description to particles which changes the effective T_{ch}
(Bożek, PRC 85, 034901 (2012))

EPOS: uses breakup of the flux tubes created by initial hard scatterings to described the spectra shapes for all p_T
(Werner et al., Phys. Rev. C 85, 064907 (2012))

Hydro models provide a reasonable description of the measured spectra at p_T lower than 3 GeV/*c*.

Spectra in hydro models



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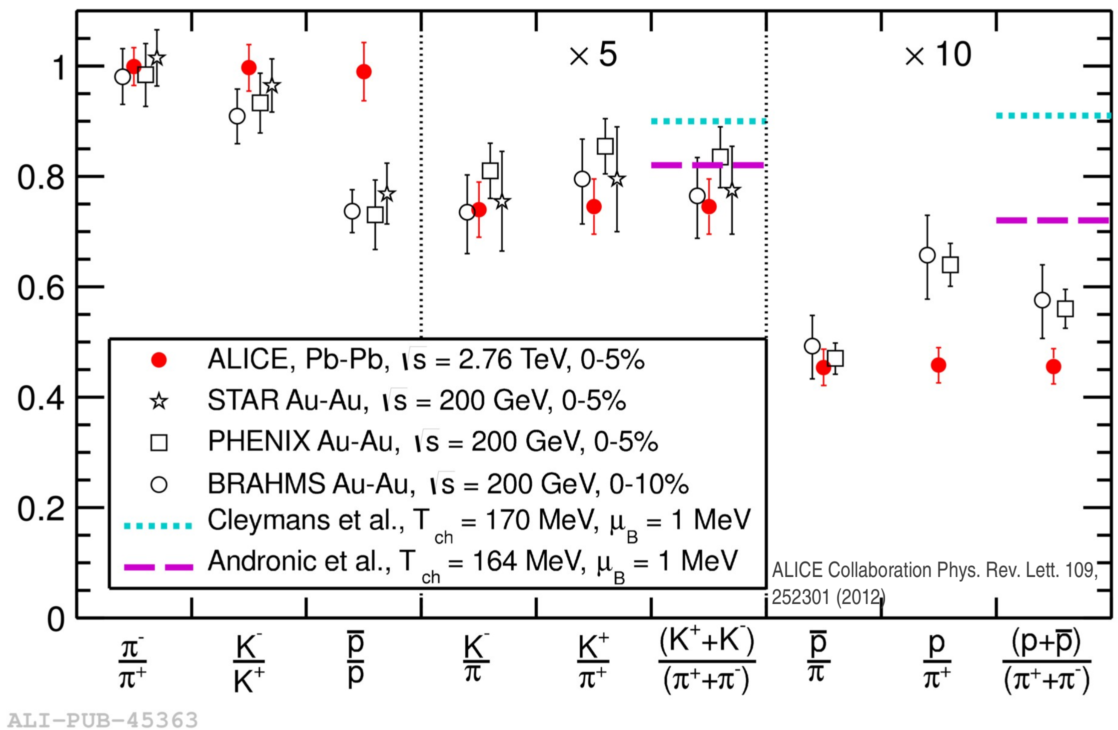
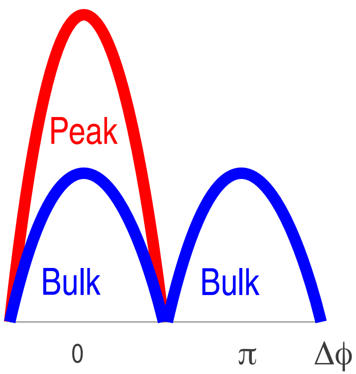
They fail in peripheral collisions.

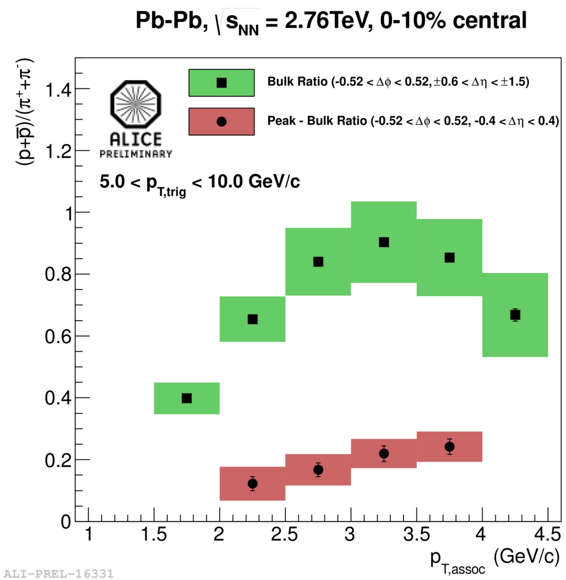
Global particle production

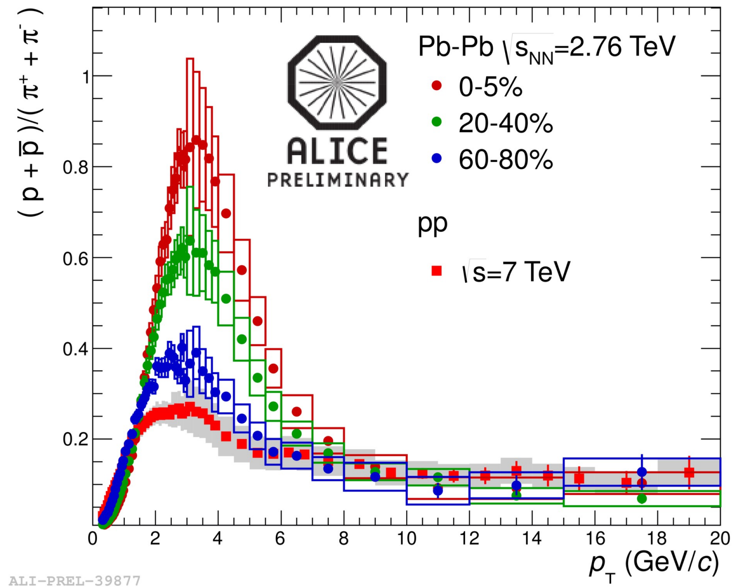


- T_{ch} =164 MeV from lower energies extrapolation: does not reproduce the data, overestimates proton yield
- Baryon annihilation (Becattini et al., arXiv:1212.2431)
- Non-equilibrium SHM (Petran, Rafelski et al., arXiv:1303.2098)
- Flavor hierarchy in QCD phase transition (Ratti et al., PRD 85, 014004 (2012))
- Higher mass resonance states

Intermediate p_T

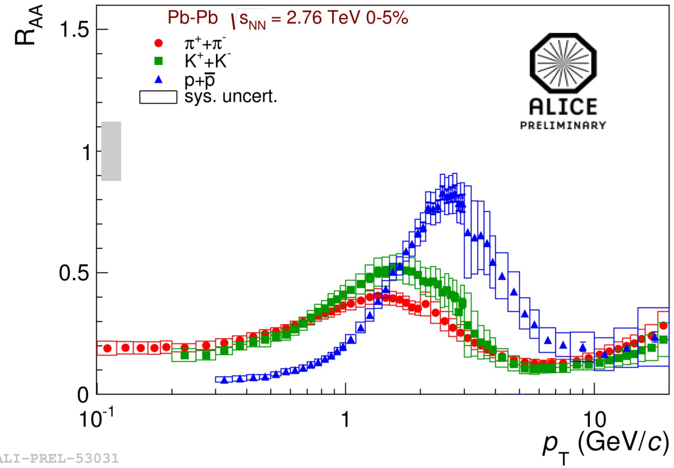


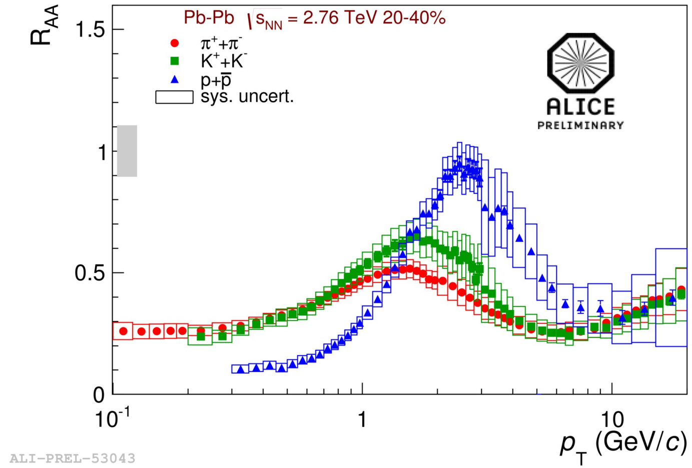


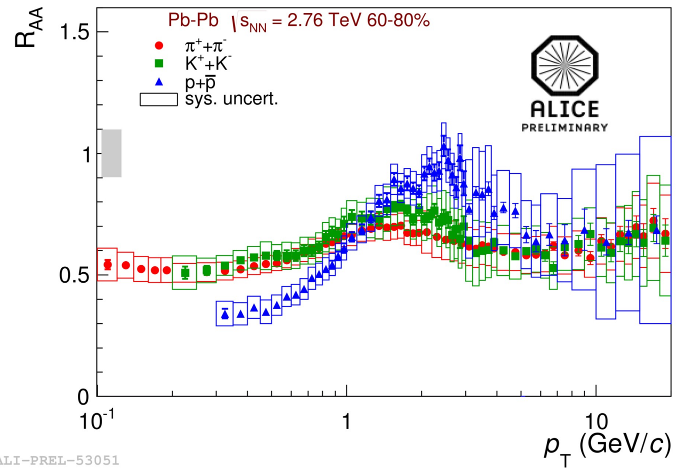


- ➔p/π in the bulk and in the peak
- ➔p/π in the peak agrees with pp results
- ➔enhancement of the baryon-to-meson ratio driven by bulk properties
- ➔more on the baryon-to-meson ratio in talk by Luke Hanratty on Thursday

High p_T







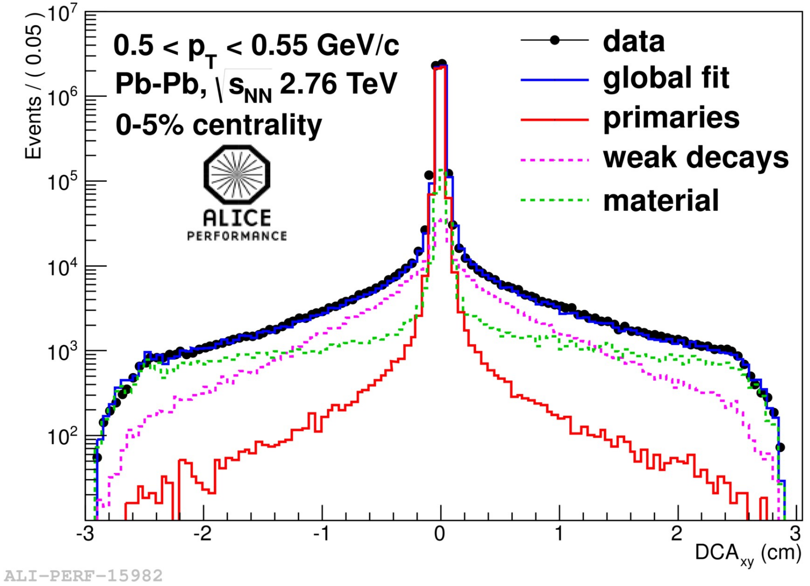
- ➔At p_T>10 GeV/*c* all R_{AA}s converge
- ➔No difference in energy loss for π/K/p ?

Resonances R_{AA} talk by Anders Garritt Knospe, multi-strange R_{AA} talk by Domenico Colella, both on Thursday.

Conclusions

- Hydro pictures give good description of p_T distributions at LHC energies
- Lower p/π than equilibrium thermal model expectations
- At intermediate p_T the bulk effects dominate
- R_{AA} for π/K/p are comparable at high p_T, suggests that medium does not significantly affect fragmentation
- **What about p-Pb? => Talk by Jonas Anielski on Friday**

Backup



The secondary particles are subtracted using a data driven method