

Summary of WG5: high multiplicities

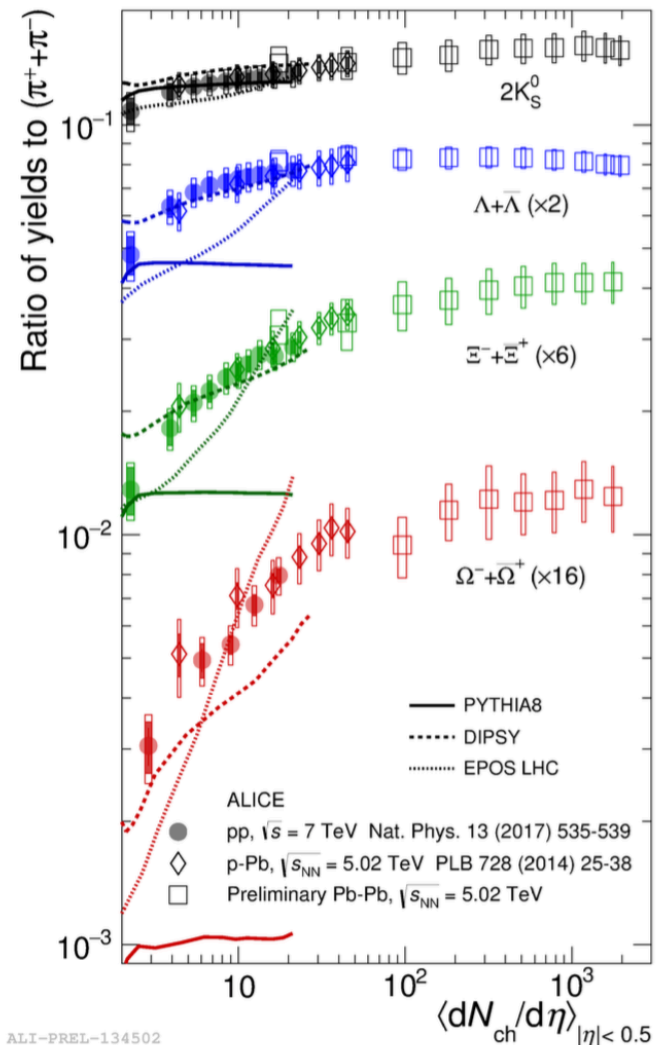
Klaus Werner, Antonio Ortiz

Strangeness enhancement in pp collisions (ALICE)

- ALICE has observed an **enhancement of (multi)strange hadron production from low to high multiplicity pp** (and p-Pb) collisions. This phenomenon is well known in heavy-ion collisions

QUESTIONS

- Can we describe pp, p-Pb and Pb-Pb in a common “framework”?
- Does strangeness keep increasing with multiplicity or saturate?



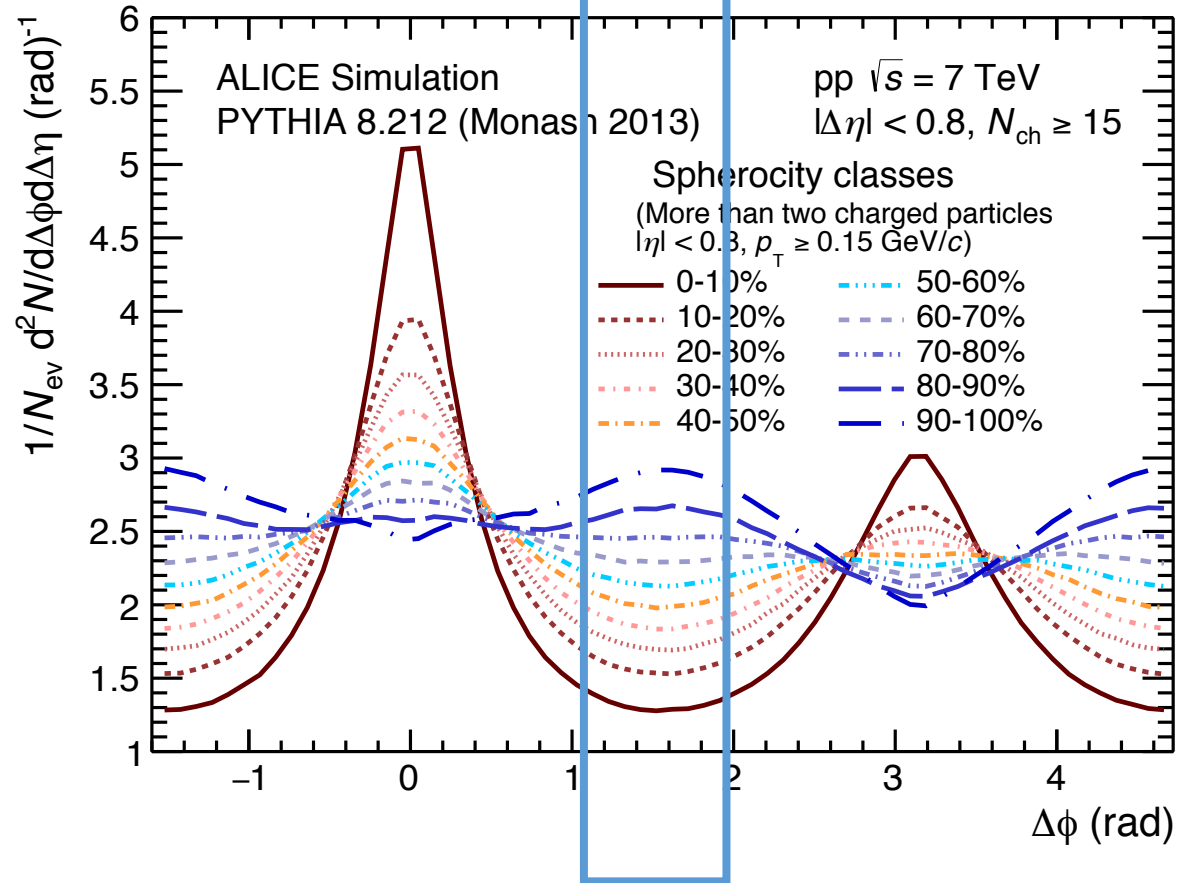
New tools to study MPI: transverse sphericity

Transverse Sphericity

- Small sphericity: jetty-like events (UE suppressed)
- Large sphericity: large number of MPI (UE enhanced)
 - Bridge between heavy-ion physics and pp?

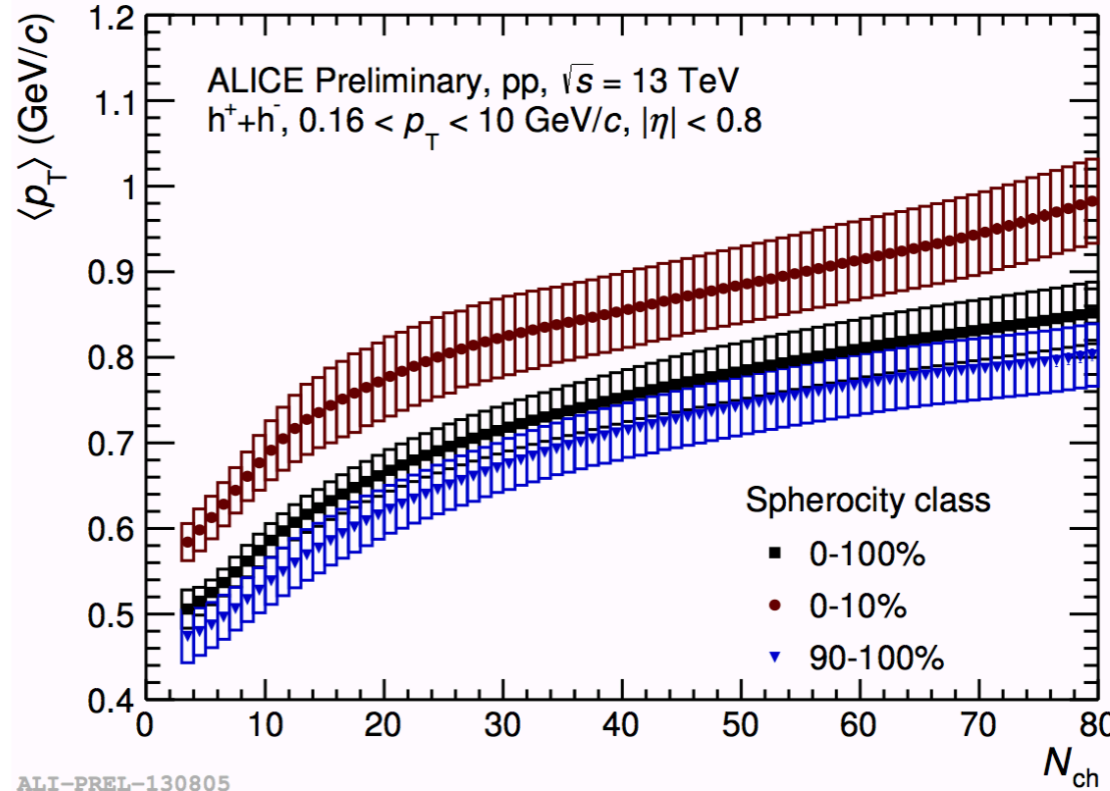
First studies using event shapes were already published:

ALICE, EPJC 72 (2012) 2124



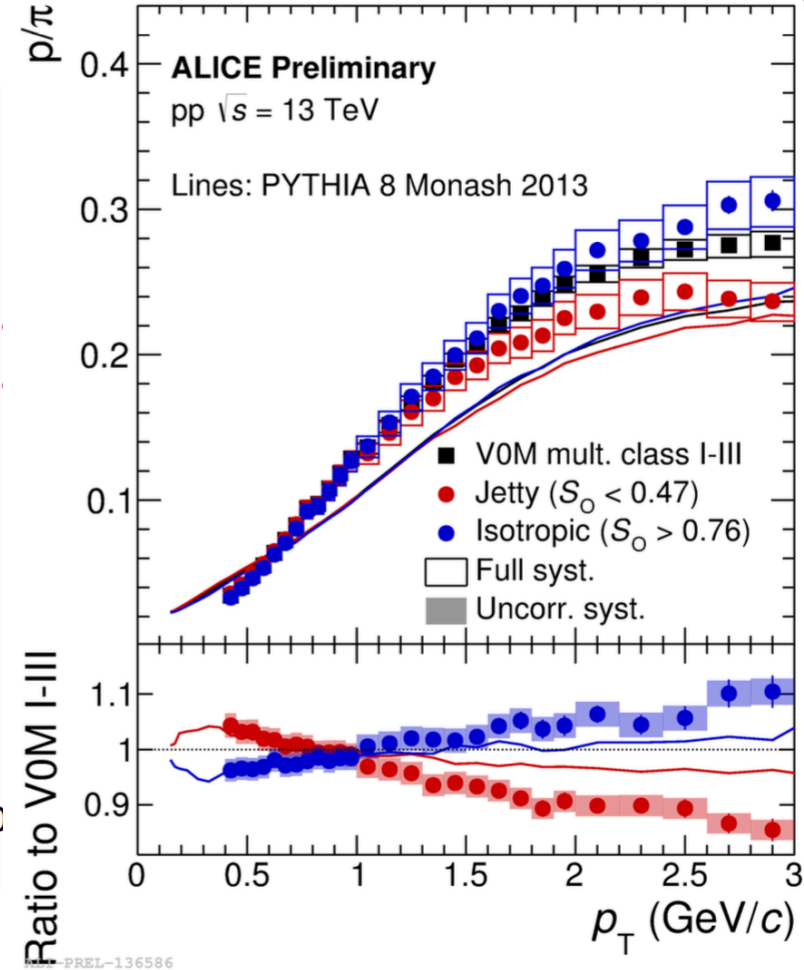
Average p_T vs multiplicity for **jetty-like** and **isotropic** events (high MPI)

□ Important input for MC tuning. Data will be available soon in rivet



Particle ratios

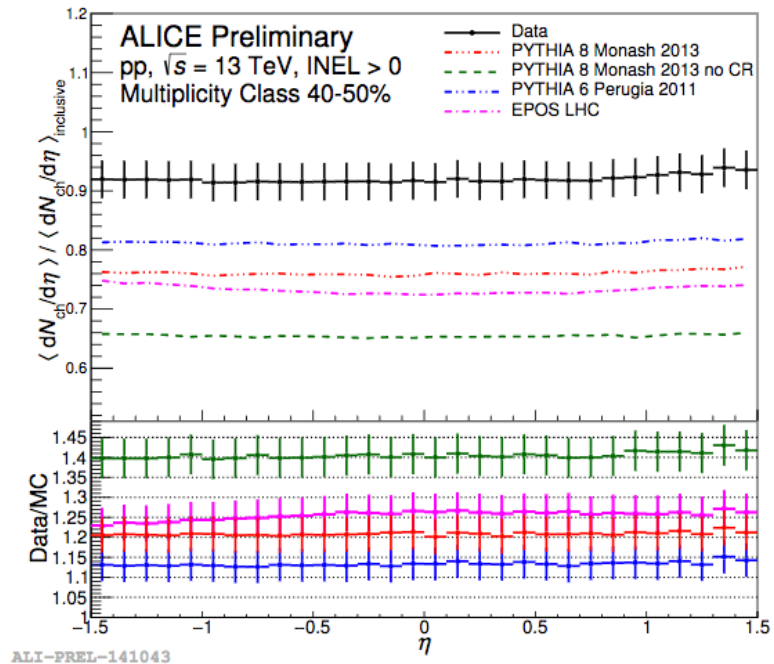
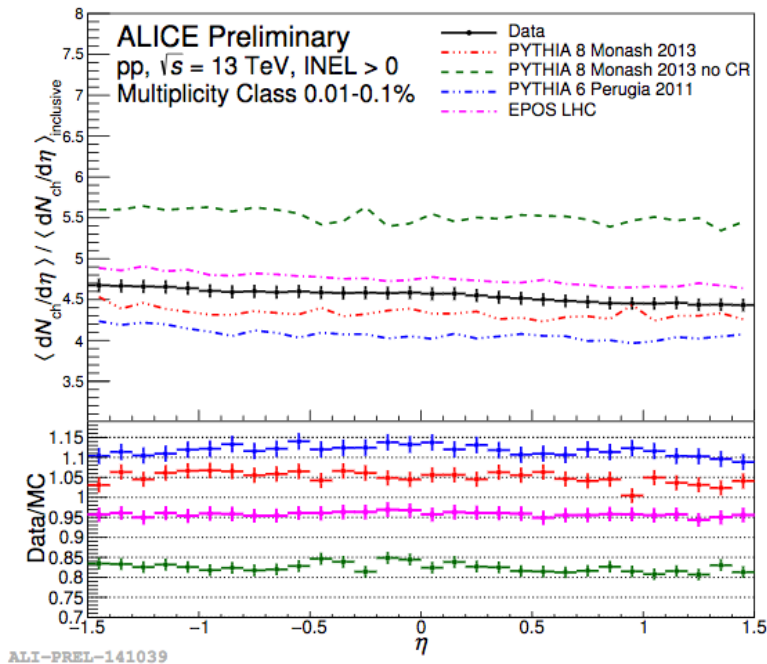
□ Enhancement of radial flow-like effects in isotropic pp collisions?



Recent review on event shapes at hadron colliders: [arXiv:1705.02056](https://arxiv.org/abs/1705.02056)

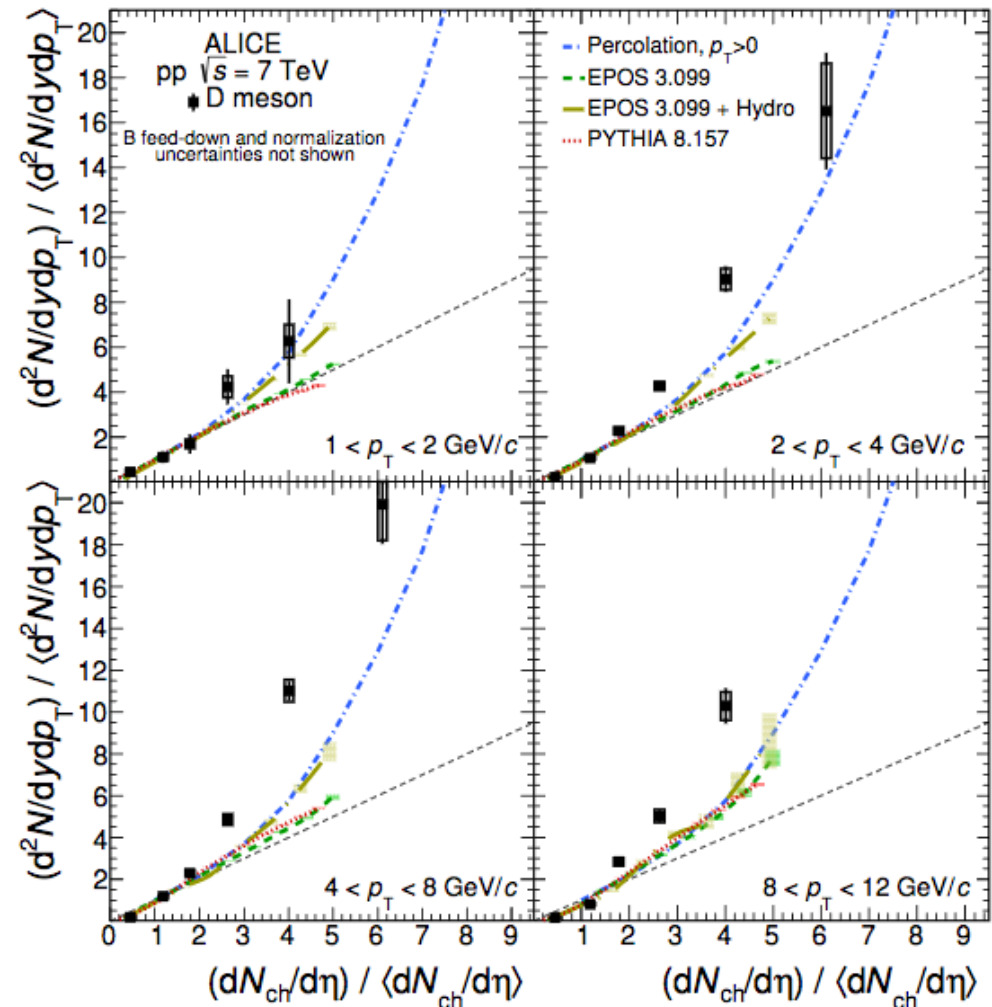
Multiplicity dependence of $dN_{ch}/d\eta$ in pp collisions

- Normalized results at 5.02 and 13 TeV shows, up to 5 and 5.5 times more average charged particle production in highest multiplicity class respectively
- Models generally agree within 20% with data except the PYTHIA8 with no CR

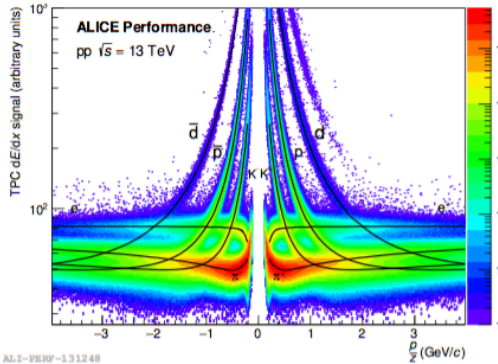


Open heavy-flavour production in pp at the LHC

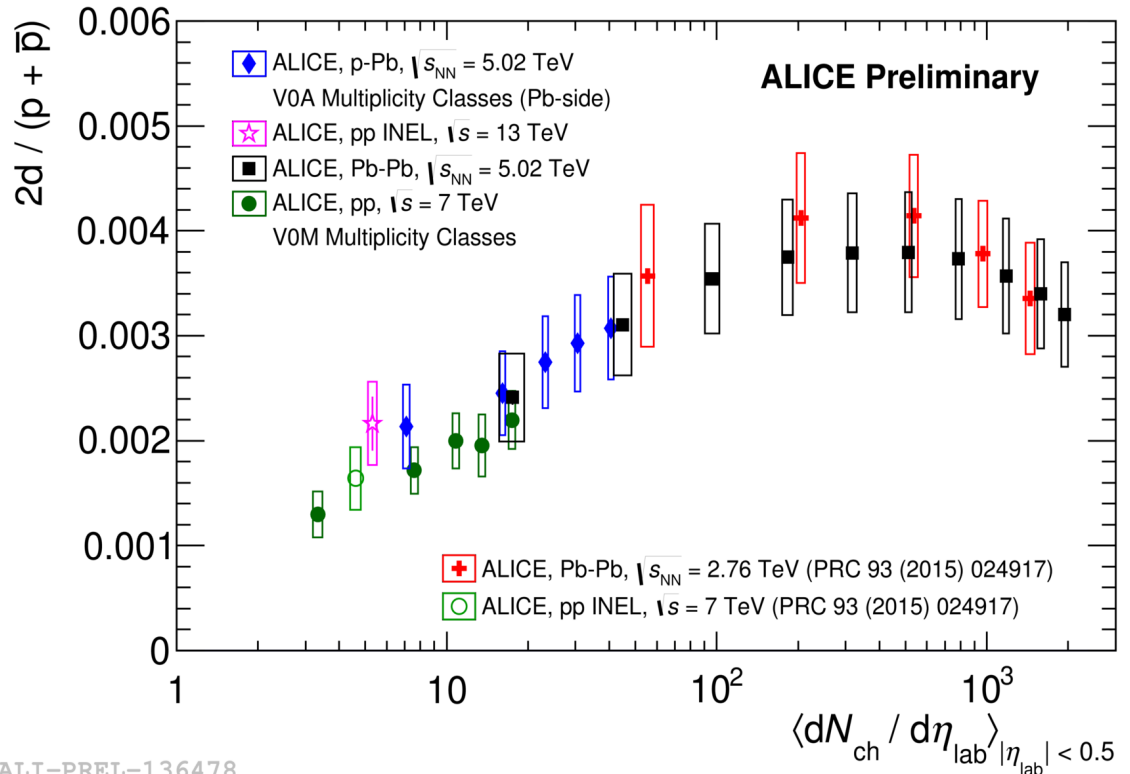
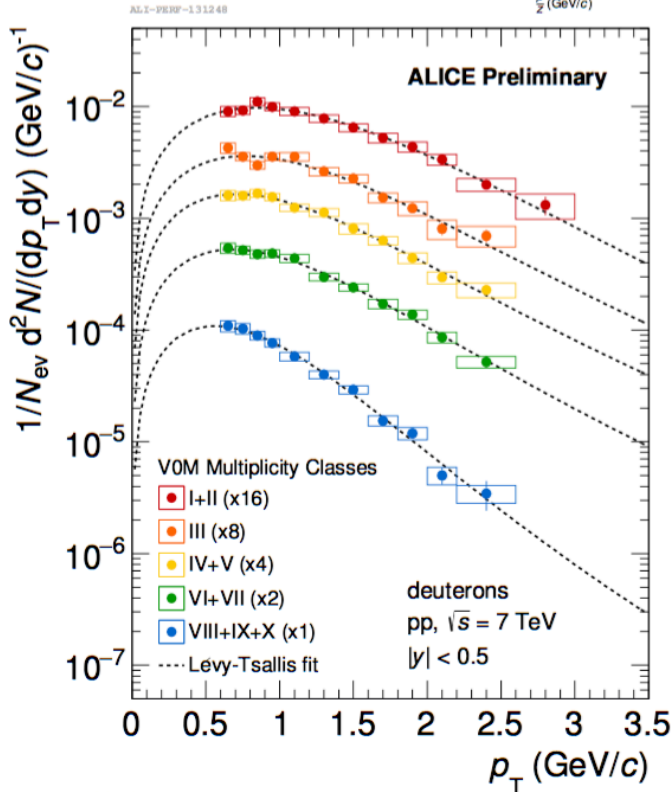
- pp collisions: for D mesons the increase is faster than linear at high multiplicity
- Models fail to explain the data at high p_T
- Important to provide the p_T spectra vs multiplicity



(Anti-)nuclei production in pp collisions



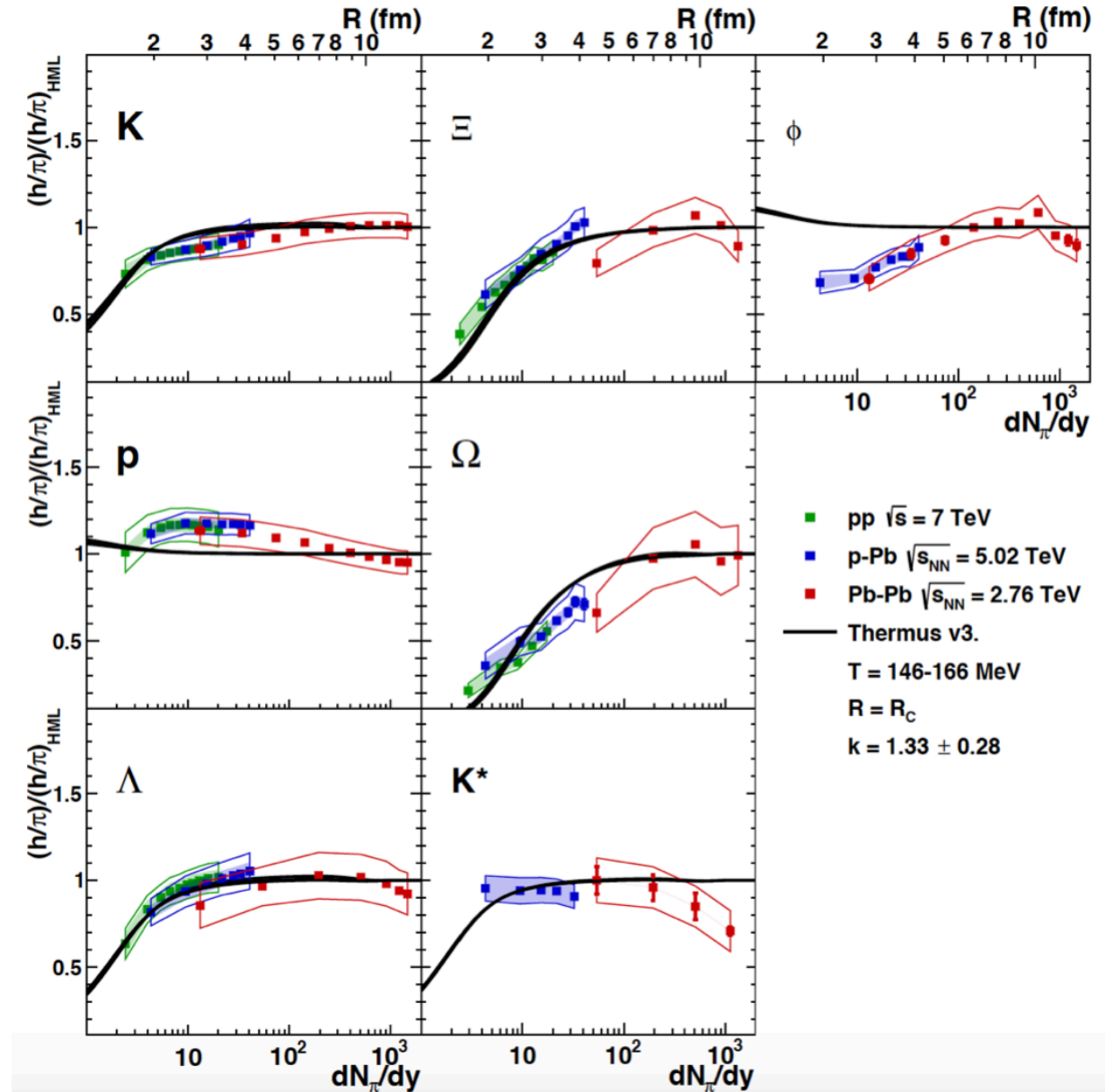
Deuterons are identified in ALICE and their production as a function of multiplicity can be studied in pp collisions.



Results (3)

→ Good description for the production of all light flavour hadrons is found except for the phi meson!

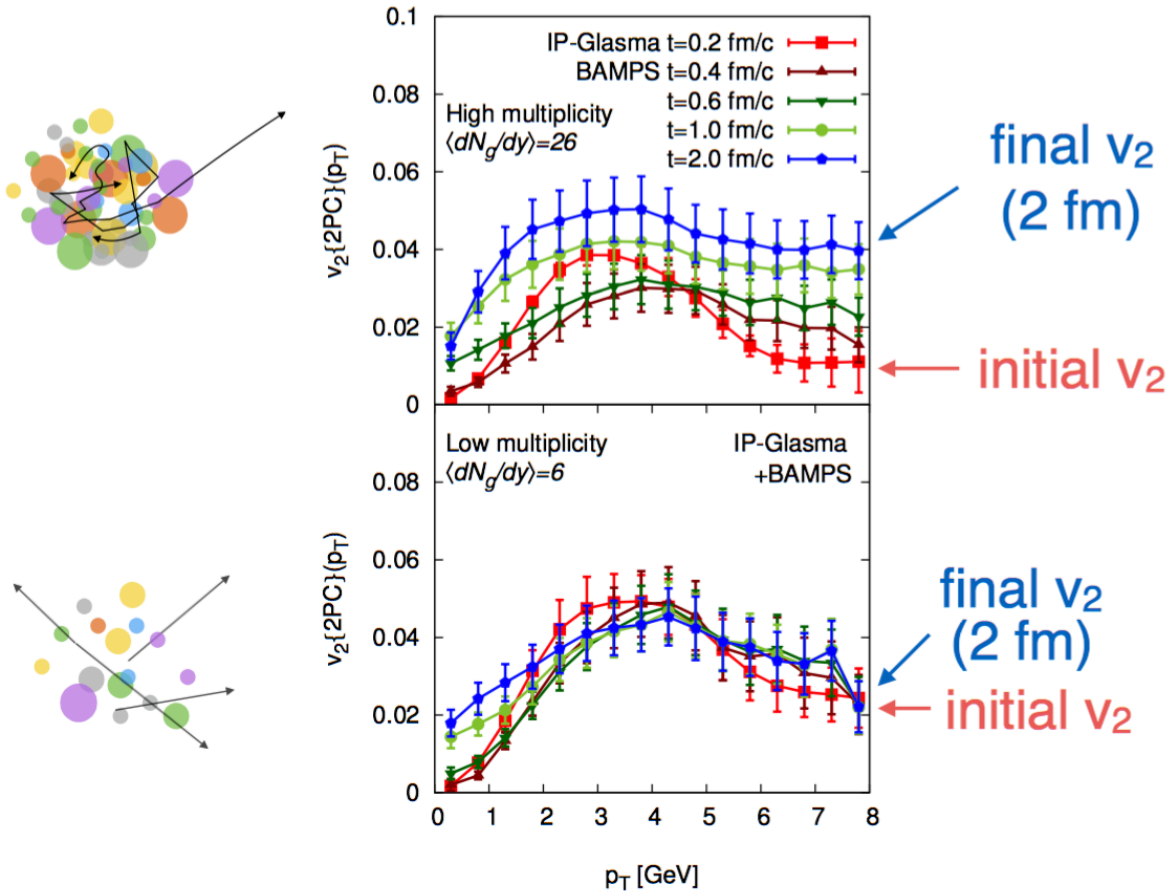
→ Total correlation window for strangeness production seems to extend over 1.33 ± 0.28 units in rapidity.



Combined approach

IP-Glasma (CGC)+Boltzmann Approach to Multiparton Scatterings (BAMPS)

Greif, Greiner, Schenke, Schlichting, Xu 1708.02076



Initial state dominate :
low mult & high p_T

Final state dominate :
high mult & low p_T