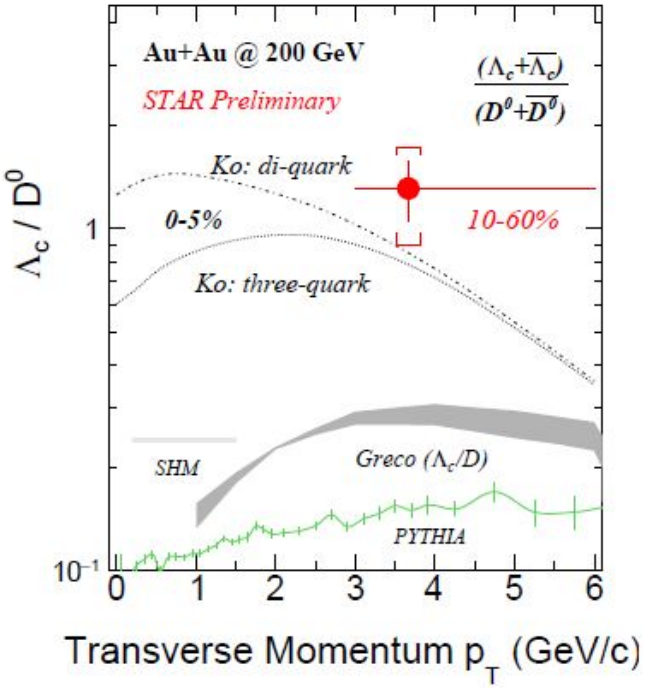
Hard-probe session: discussion

Discussion points

1- Recombination mechanism in the QGP (Prino, Bruna, Schukraft)
Differences/complementarities from investigating recombination of heavy with light (or heavy) quarks (Ds, Lc, Xi_c,..) as opposed to recombination among light quarks (Lambda, Xi,...)

- Λc: Sensitive probe of hadronization mechanism and of diquarks in the QGP
  - See, e.g. Oh et al., PRC79 (2009) 044905, Lee et al., PRL100 (2008) 222301
  - Crucial measurement for total charm cross section and D-meson R_{AA} interpretation
- Does it bring additional information on recombination and diquarks as compared to Λ/K^0 ratio?



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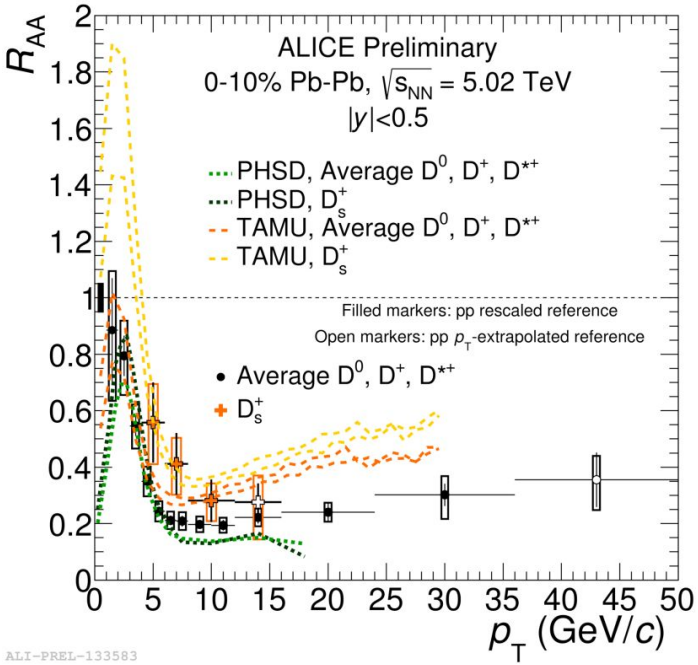
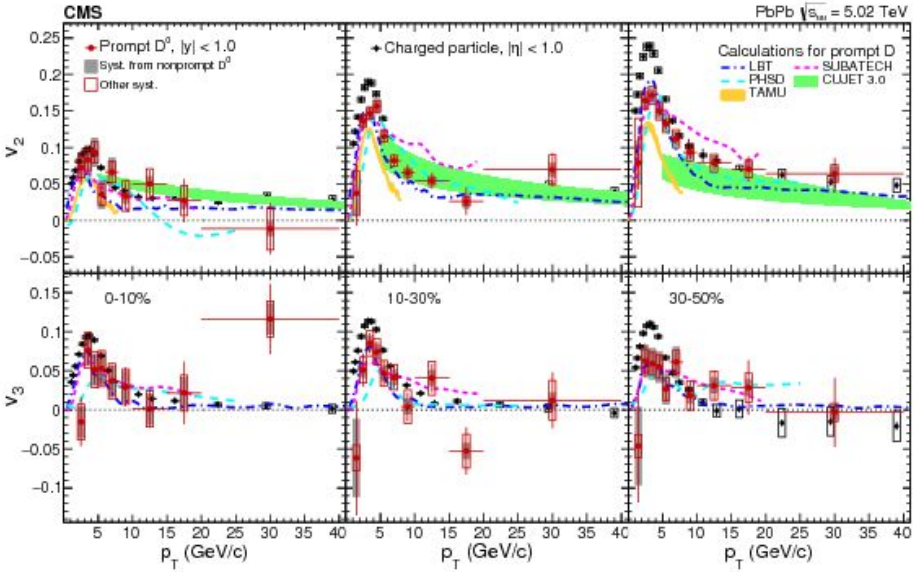
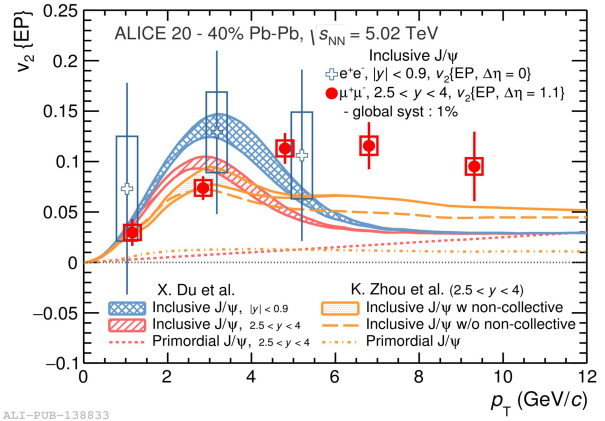
- Models incorporating hadronisation via coalescence for HQ obtain a significant enhancement of Ds production
  - Ds enhancement larger than the measured increase of K/pi?
  - What's the reason? Should we expect a similar effect? Is this related to the fact that s quarks (-> K) are in chemical equilibrium with the medium while charm quarks not?

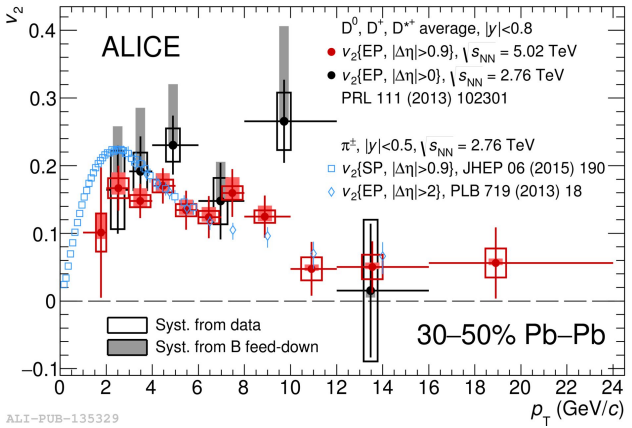


Discussion points

2- Recent measurements of the azimuthal anisotropy in the momentum distribution of open and hidden charm hadrons suggest that the charm quark participate in the expanding dynamics of the hot medium created in heavy-ion collisions.

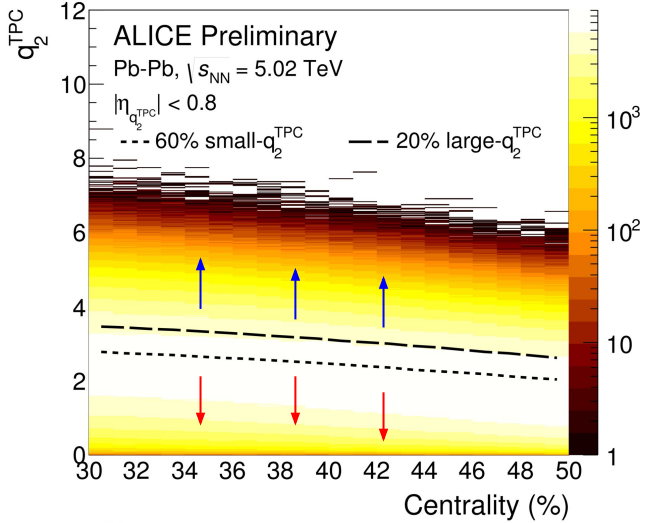






Discussion points

However, some key points are still open, such as to which extent charm quarks couple with the underlying medium of light quarks and how much are they sensitive to event-by-event fluctuation in the initial state. It would be interesting to discuss these open questions and understand what can we learn from more differential measurements, e.g. Event-Shape Engineering techniques:



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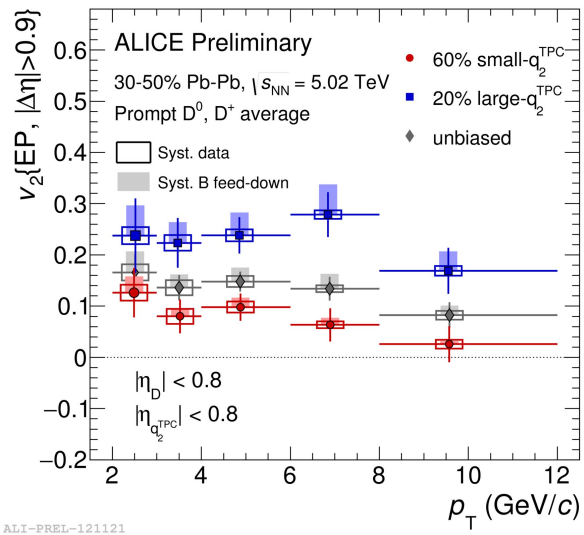

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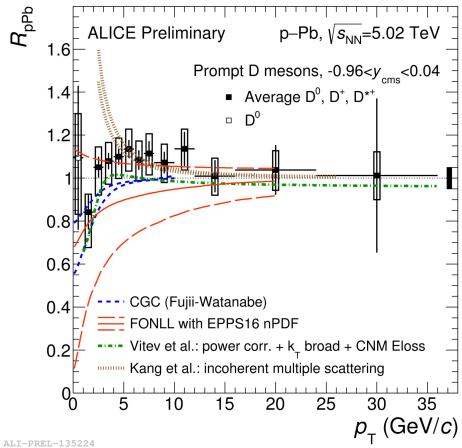
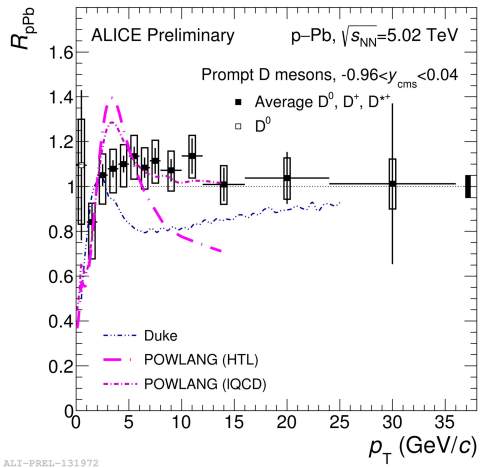
How can we compare these results to theoretical predictions? Separation power of q_2 depends on multiplicity: how can we take it into account when comparing data to models?

Discussion points

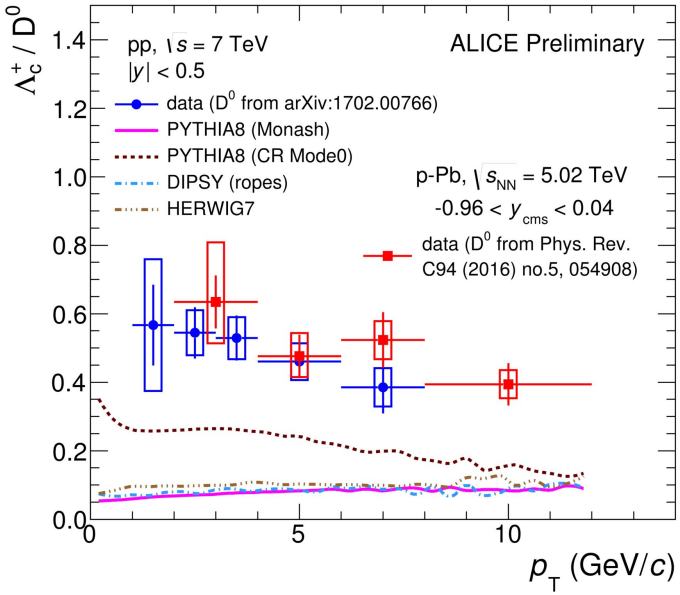
3- HF in p-Pb: in “central” p-Pb collisions we have a hint for Qcp >1, we observe D meson (and j/psi!) v2 >0 and psi’ suppression. Can these (at least the first two) observations be explained by shadowing + other initial state effects? Some models (Duke, POWLANG), assuming the formation of QGP in p-Pb, predict RpPb>1 at around 2-5 GeV/c with RpPb slightly<1 at higher pt: is the RpPb>1 induced by the suppression at higher pt (+ charm conservation) or by radial flow? Should we search for signs of energy loss? Which is the best observable? E.g. could gamma-jet correlations help?

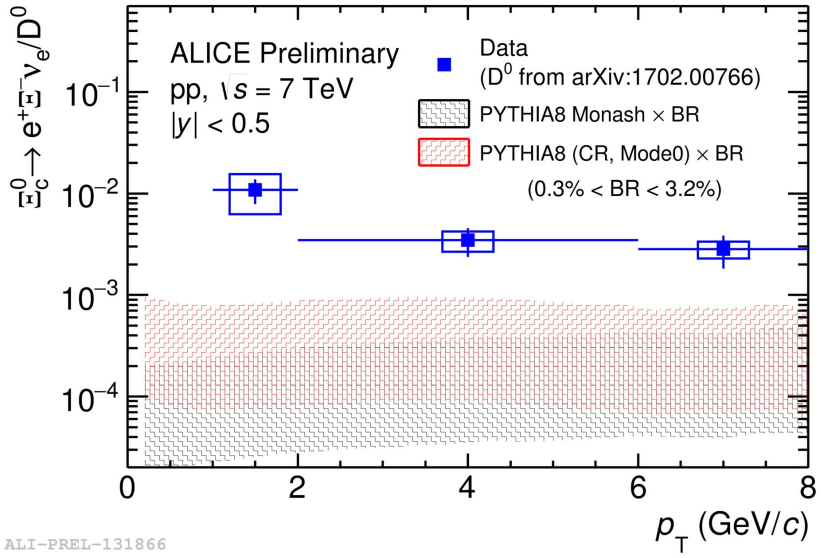




Discussion points

4- charm baryons Is there any idea to explain the observation by ALICE of a larger than expected (models, e+e- data) production of charm baryons at LHC in pp and p-Pb collisions in comparison to D meson production?





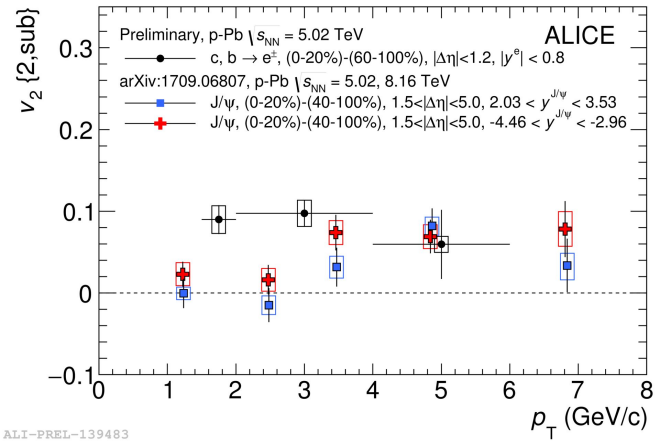
Discussion points

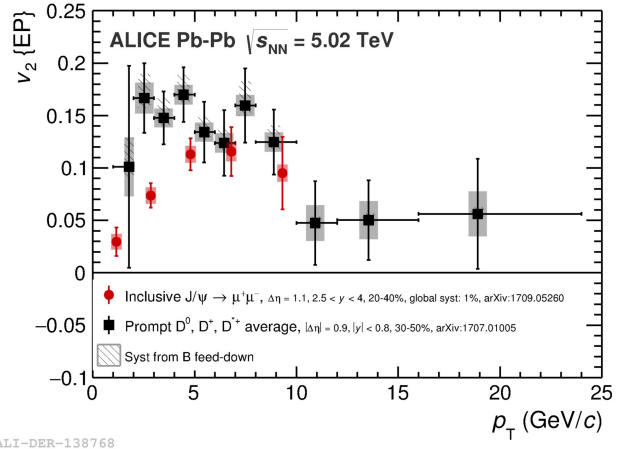
5- HF jets. Already with run 2 (CMS, ALICE, ATLAS) and especially with run 3 and run 4 HF jets will be extensively studied in Pb-Pb collisions

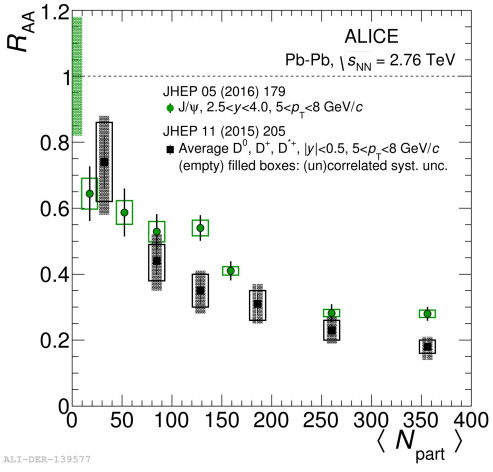
- Which complementary information to inclusive jets can HF jets provide, a part from investigating the implication of mass dependence of energy loss?
- Could they be important for studying modification of jet-shape observables?
  - D-tagged jets
- Could be thye important to address jets in general at low pt, provided that they can give access to jets at lower pt than inclusive ones?

Discussion points

6- open HF and quarkonia: what do we really learn when we compare flow, RAA as well as yield vs. mult in small systems together for open HF and quarkonia? Is there a way for making the comparison more effective? Are there models able to reproduce both observables and which information can we extract from the “combined” openHF and quarkonia data-model comparison? Could we relate recombination for open HF with J/Psi one?

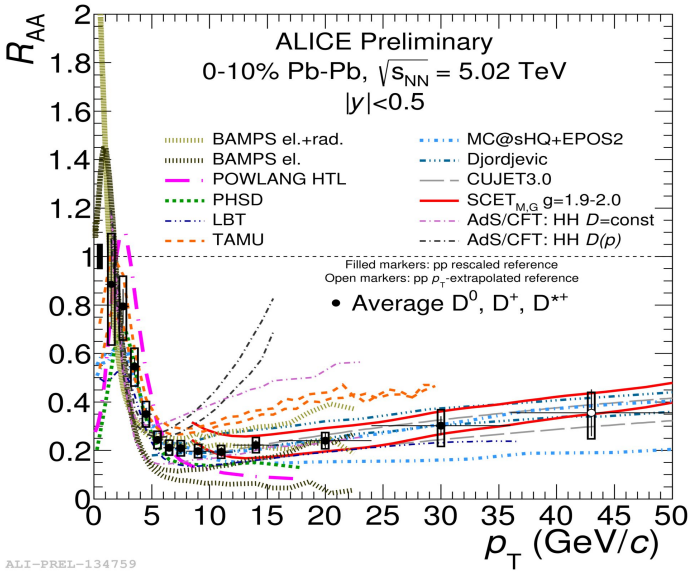


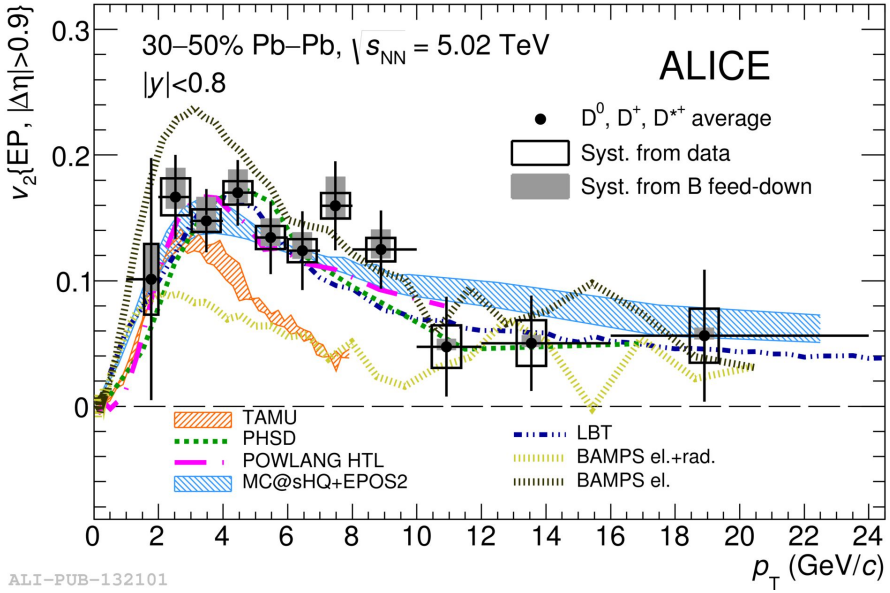




Discussion points

7- will high-precision RAA and v2 measurements be enough to obtain a microscopic description of the medium or we will be left with some “degeneracy” in the models? Which observables could help to disentangle models with a different microscopic picture but predicting similar RAA and v2?





Discussion points

8- does open HF cover a special role for studies of particle production vs. multiplicity in pp collisions or not? What do we really learn?