

# B meson production in PbPb collisions with the CMS detector

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## References:

- B<sup>+</sup> production in pp, PbPb and pPb: CMS-PAS-HIN-16-011
- Charged particle  $R_{AA}$ : CMS-PAS-HIN-15-015
- D meson  $R_{AA}$ : CMS-PAS-HIN-16-001
- non prompt  $J/\psi$ : arXiv:1610.00613

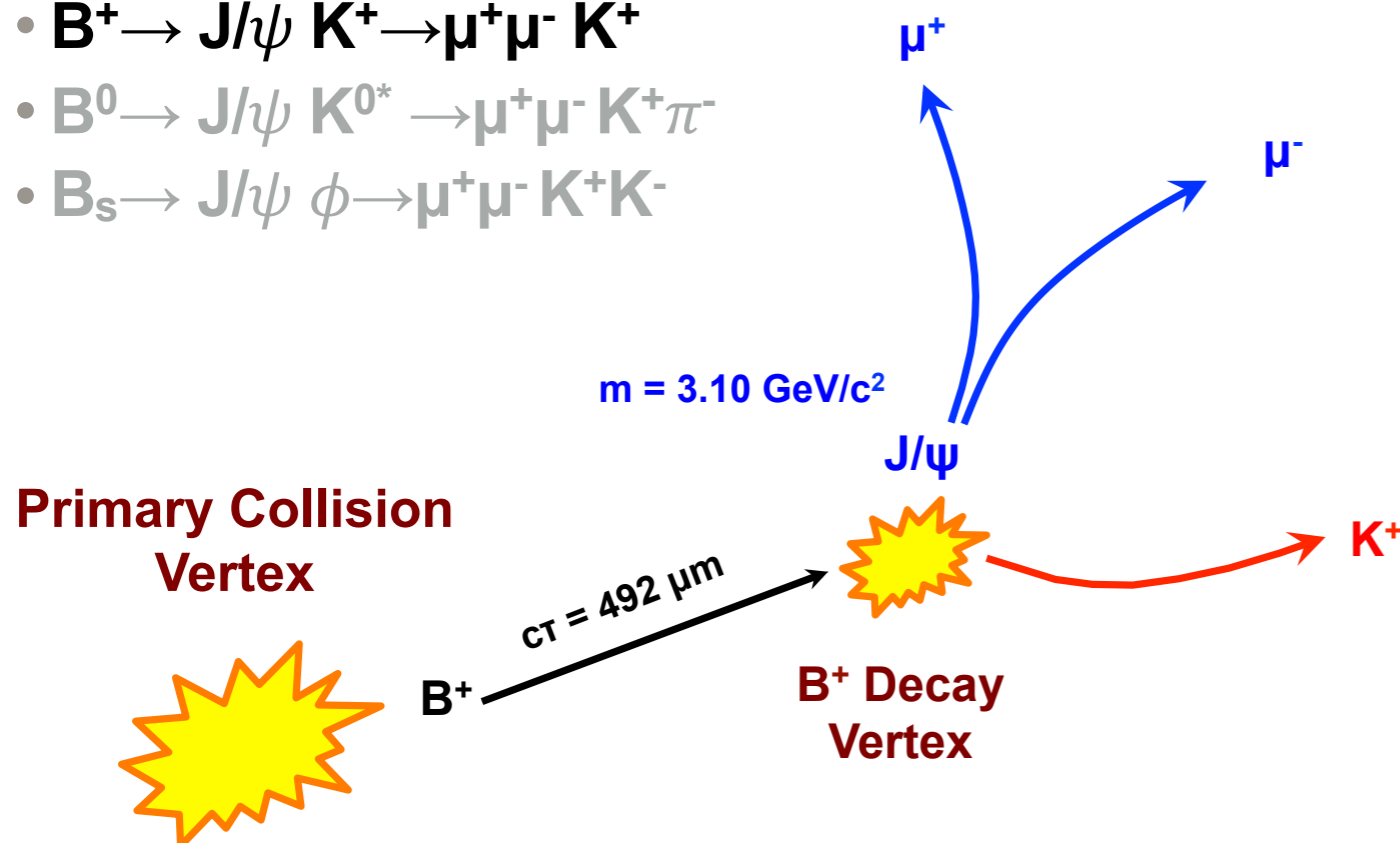
heavy flavours are probes for studying in-medium energy loss mechanisms:  
 → allow one to study flavour dependence of energy loss

$$\Delta E_g > \Delta E_{u,d,s} > \Delta E_c > \Delta E_b$$

- Hints of flavour dependence at low  $p_T$   $R_{AA}(\text{non-prompt } J/\psi) > R_{AA}(\text{D mesons})$
- No flavour dependence observed at high  $p_T$

**Exclusive B mesons can span the full range and get close to the parton kinematic!**

- $B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+$
- $B^0 \rightarrow J/\psi K^{0*} \rightarrow \mu^+ \mu^- K^+ \pi^-$
- $B_s \rightarrow J/\psi \phi \rightarrow \mu^+ \mu^- K^+ K^-$



**How do we reconstruct B mesons in CMS?**

→ Clean and high statistics sample collected by triggering on muons!

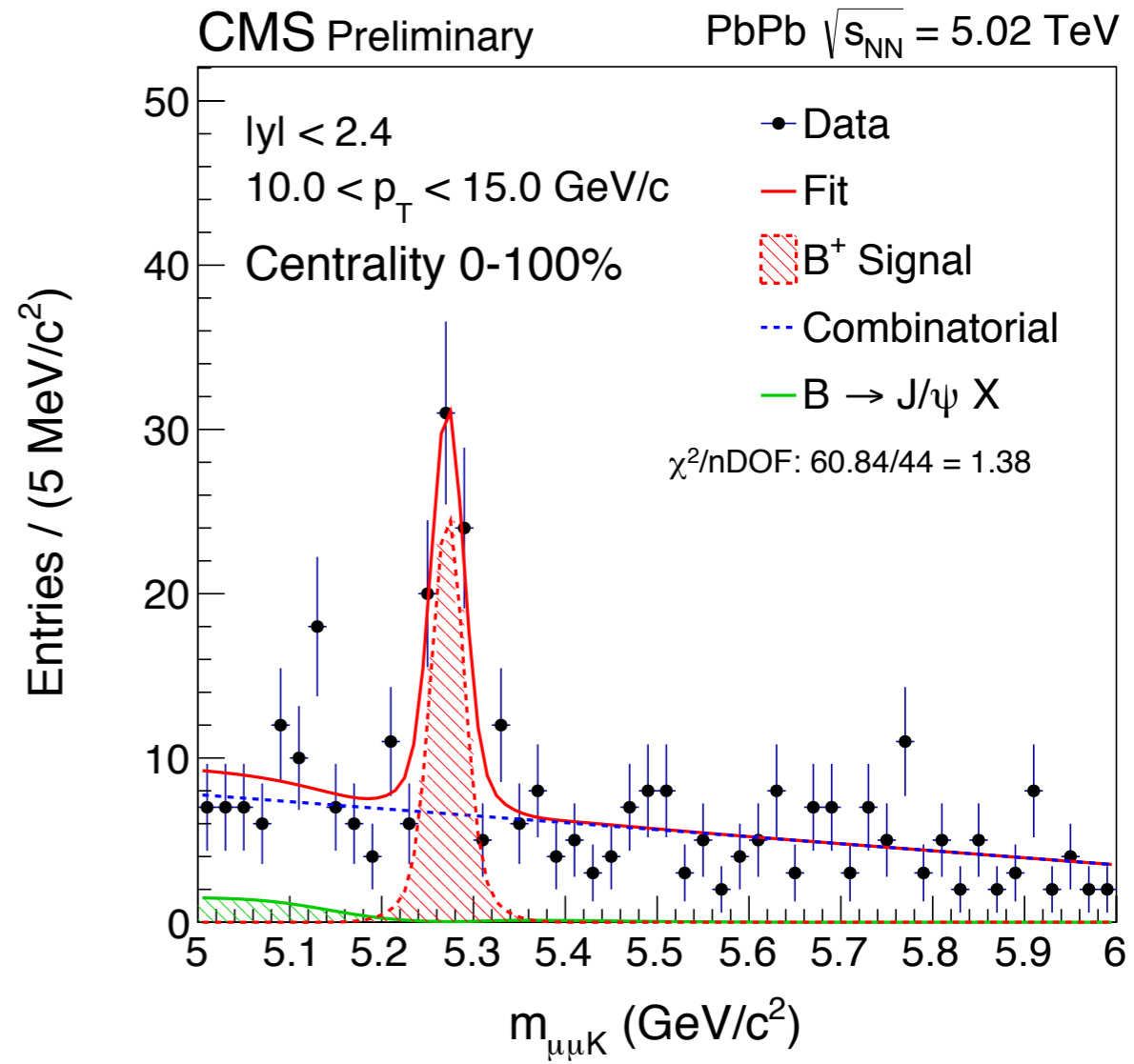
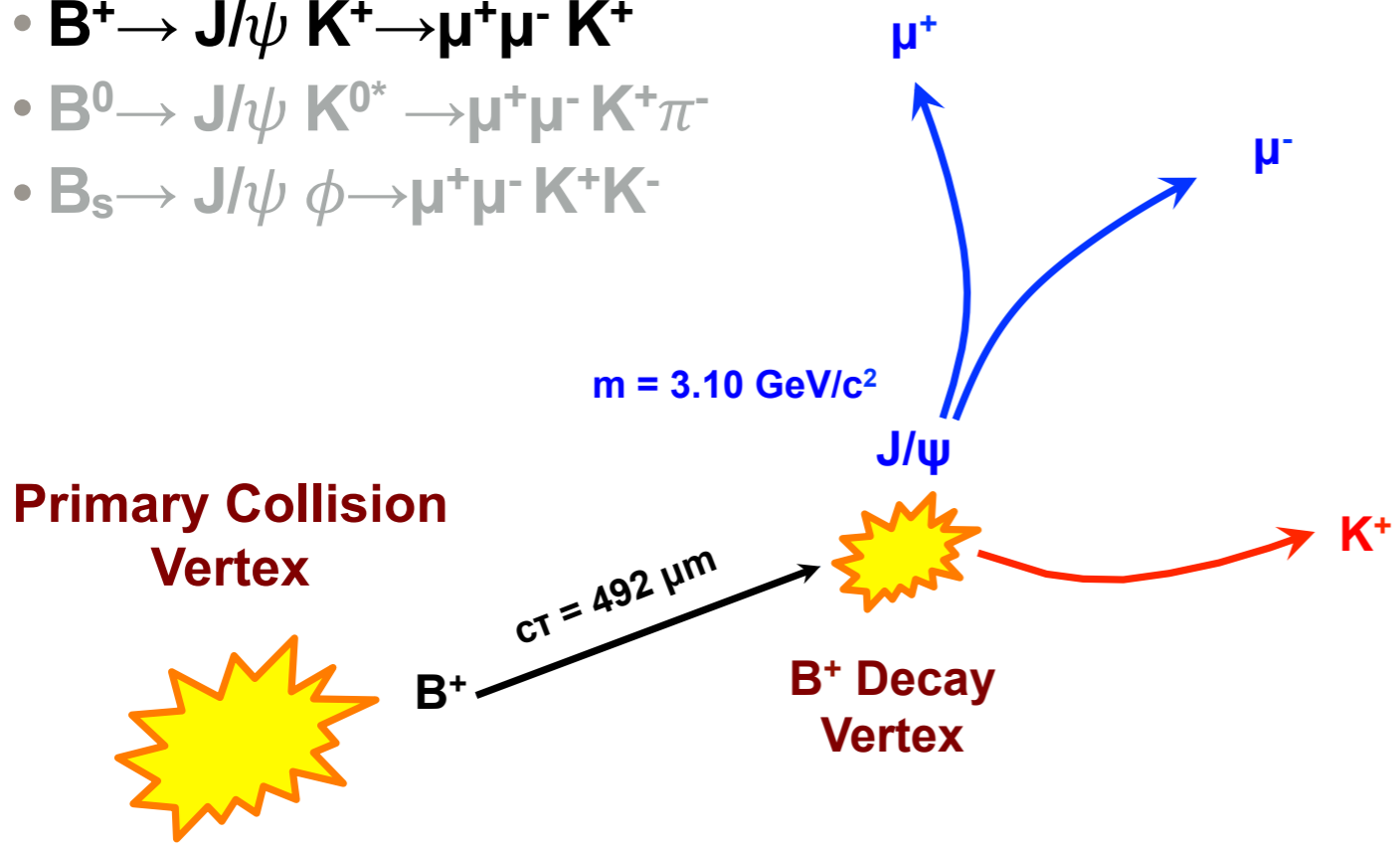
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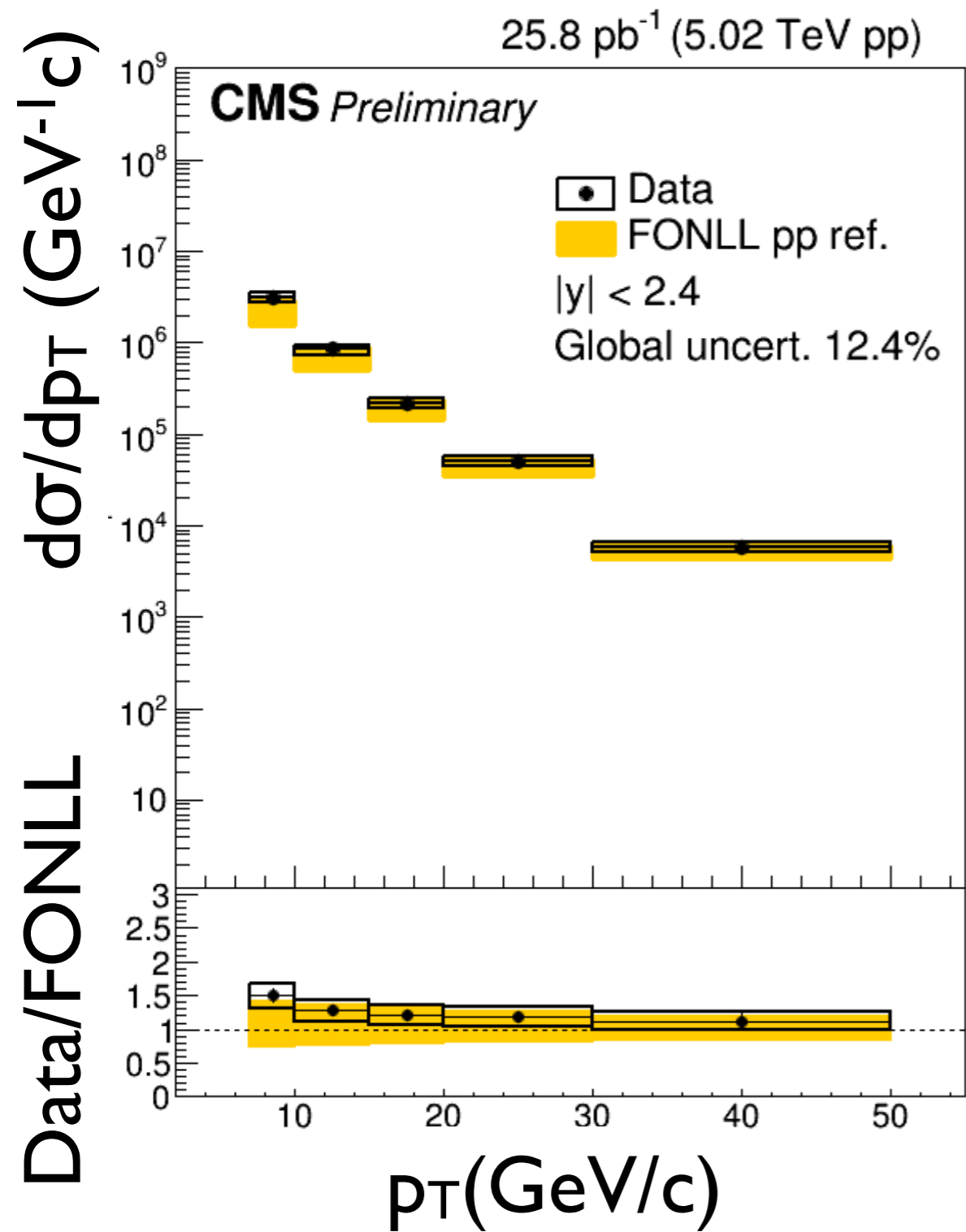
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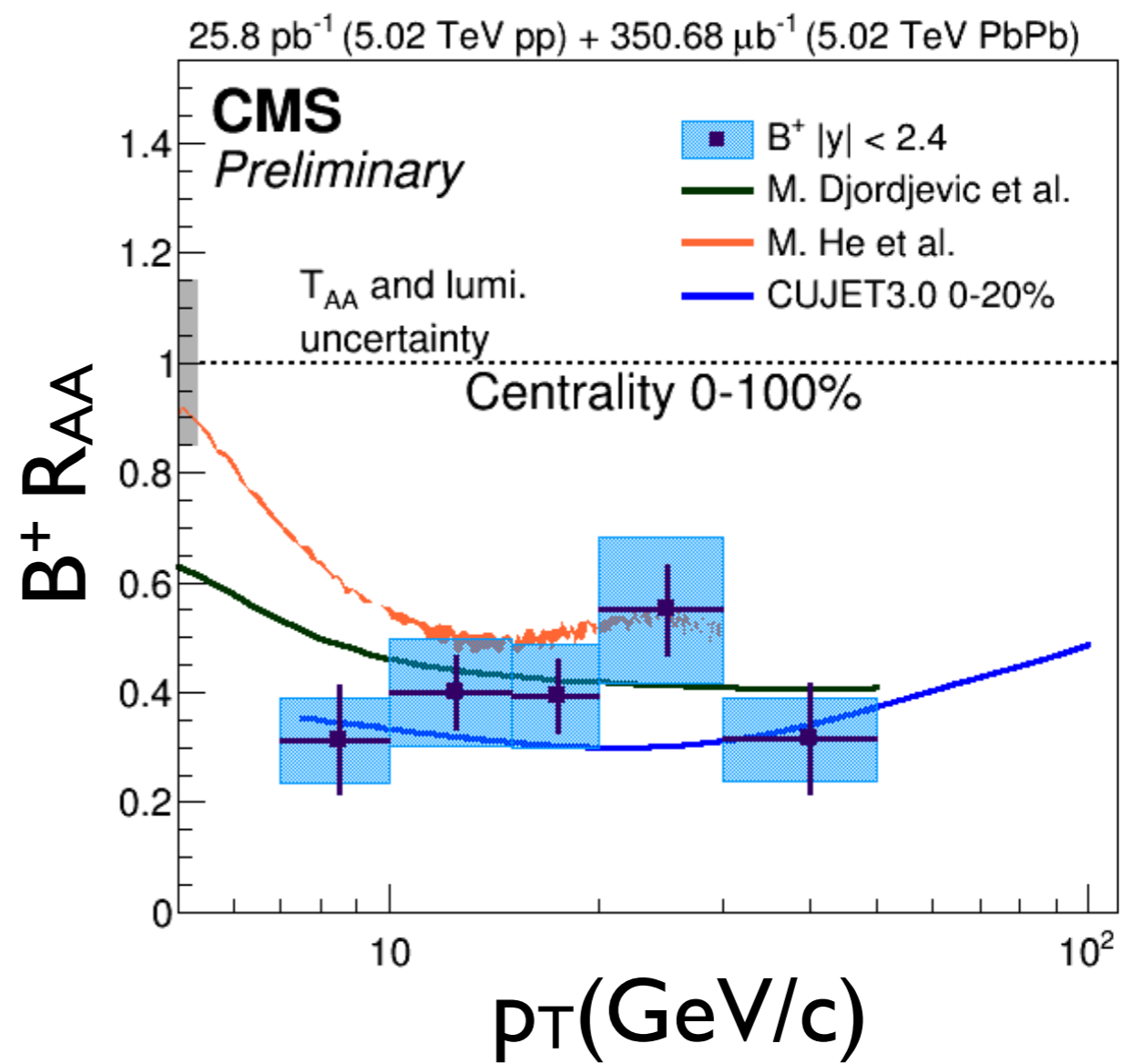
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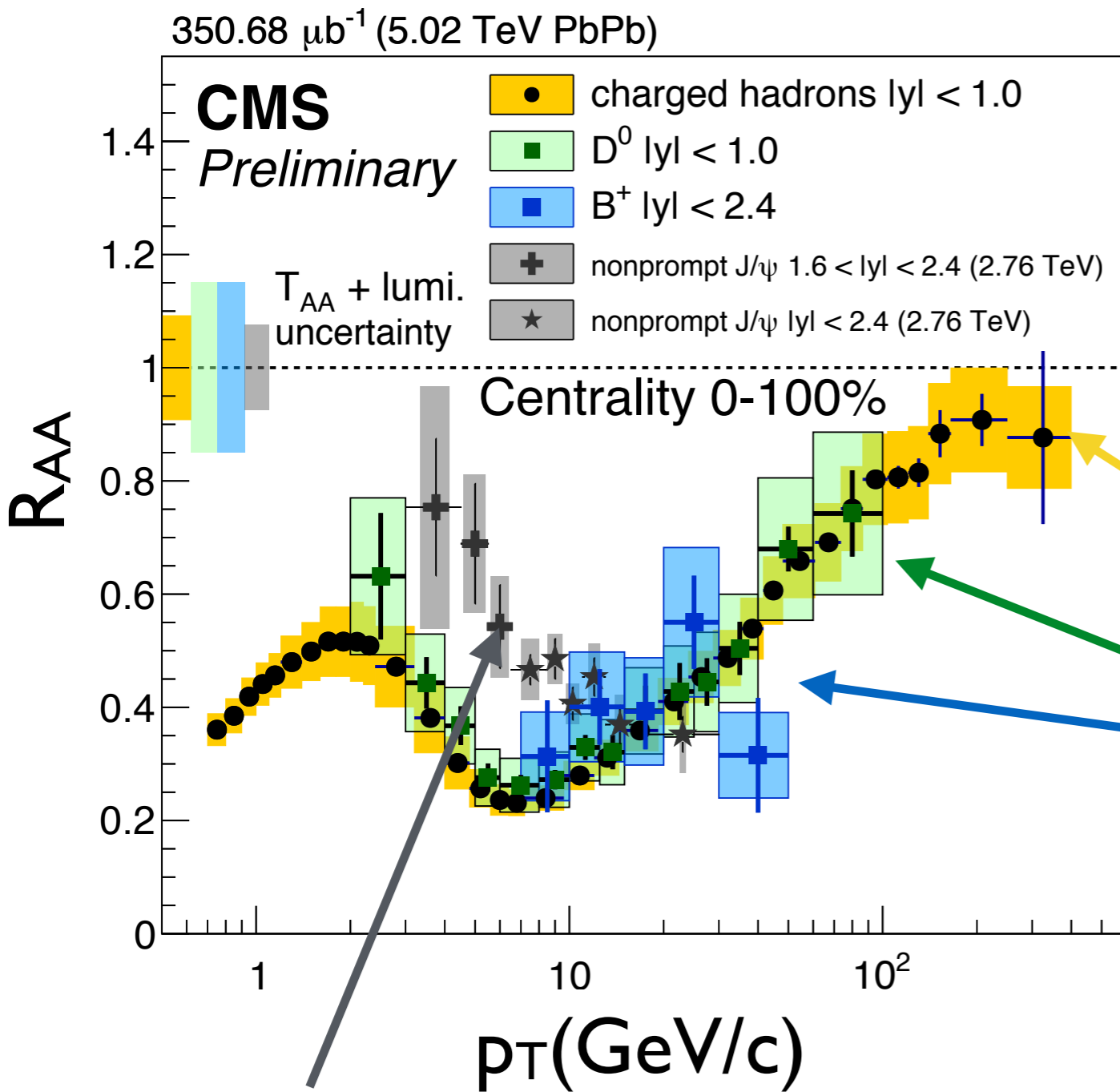




Validation of FONLL down to low  $p_T$  with very good accuracy



Strong suppression observed in PbPb collisions:  
→ no dependence on  $p_T$   
→ more statistics will help discriminating between models



**Charged particle, D meson, B meson**  $R_{AA}$  are consistent within uncertainties!

**Charged particle**  
**D meson**  
**B meson**

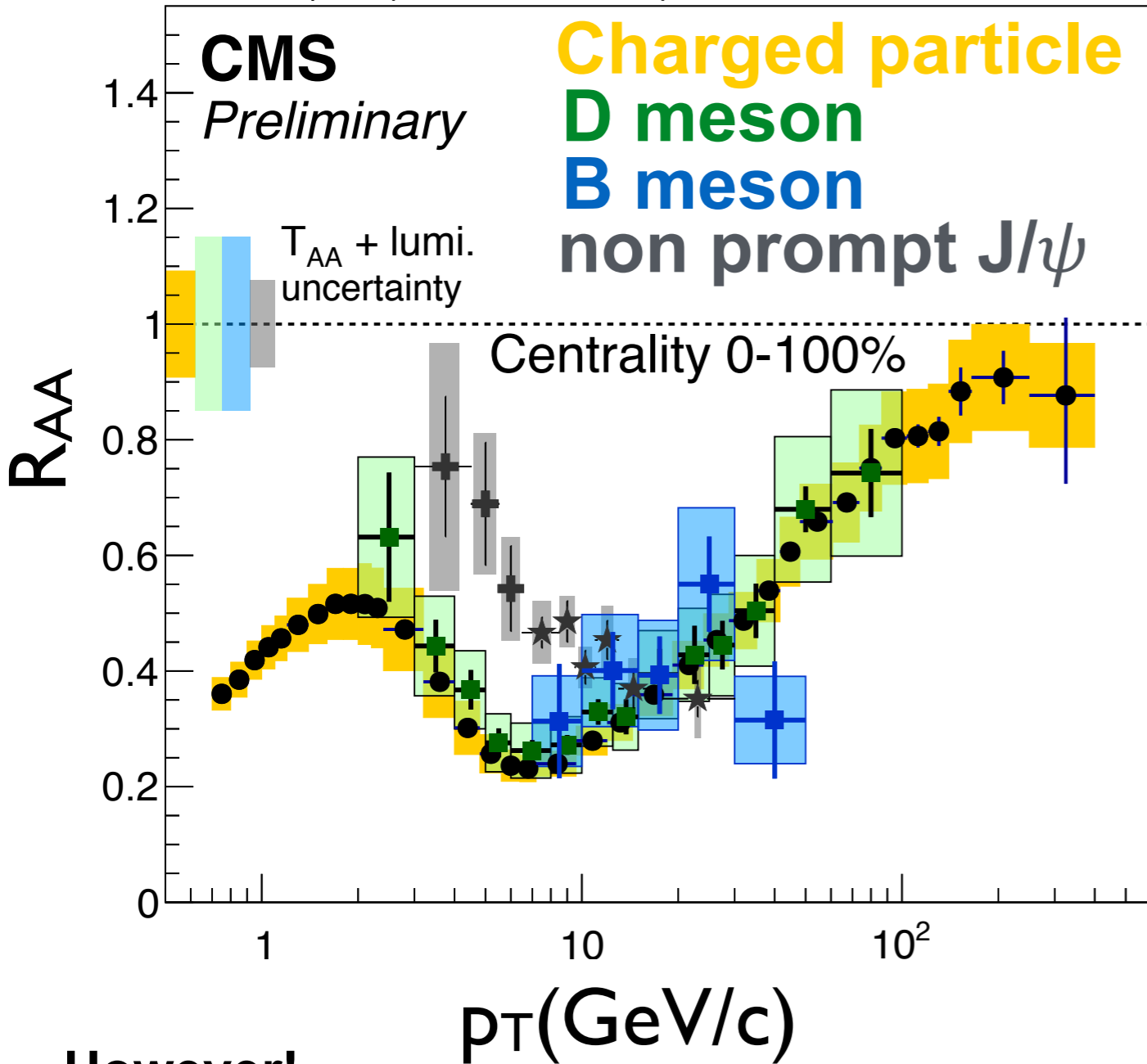
non prompt  $J/\psi$  at 2.76



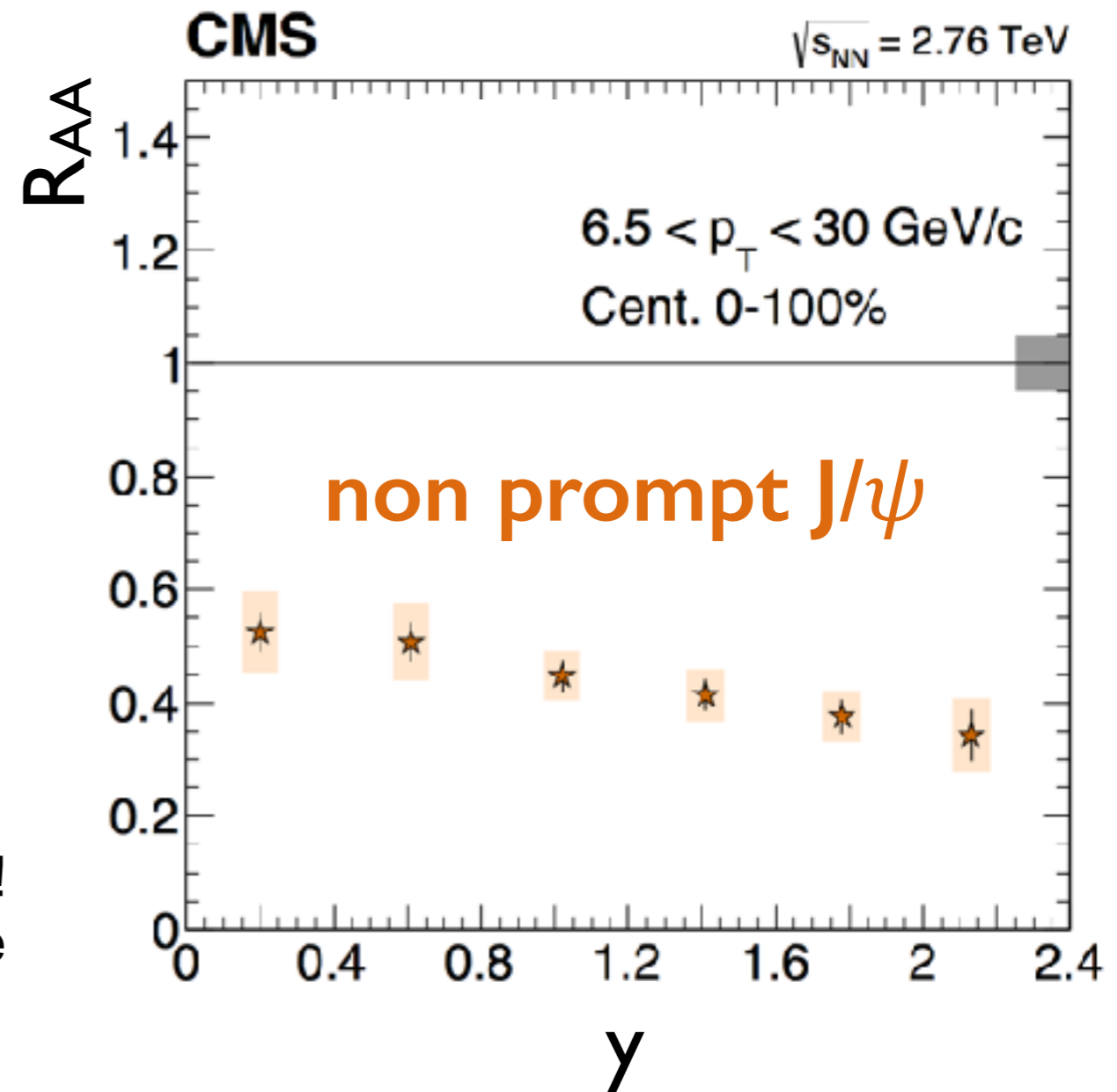
# What have we learnt on flavour hierarchy?



350.68  $\mu\text{b}^{-1}$  (5.02 TeV PbPb)

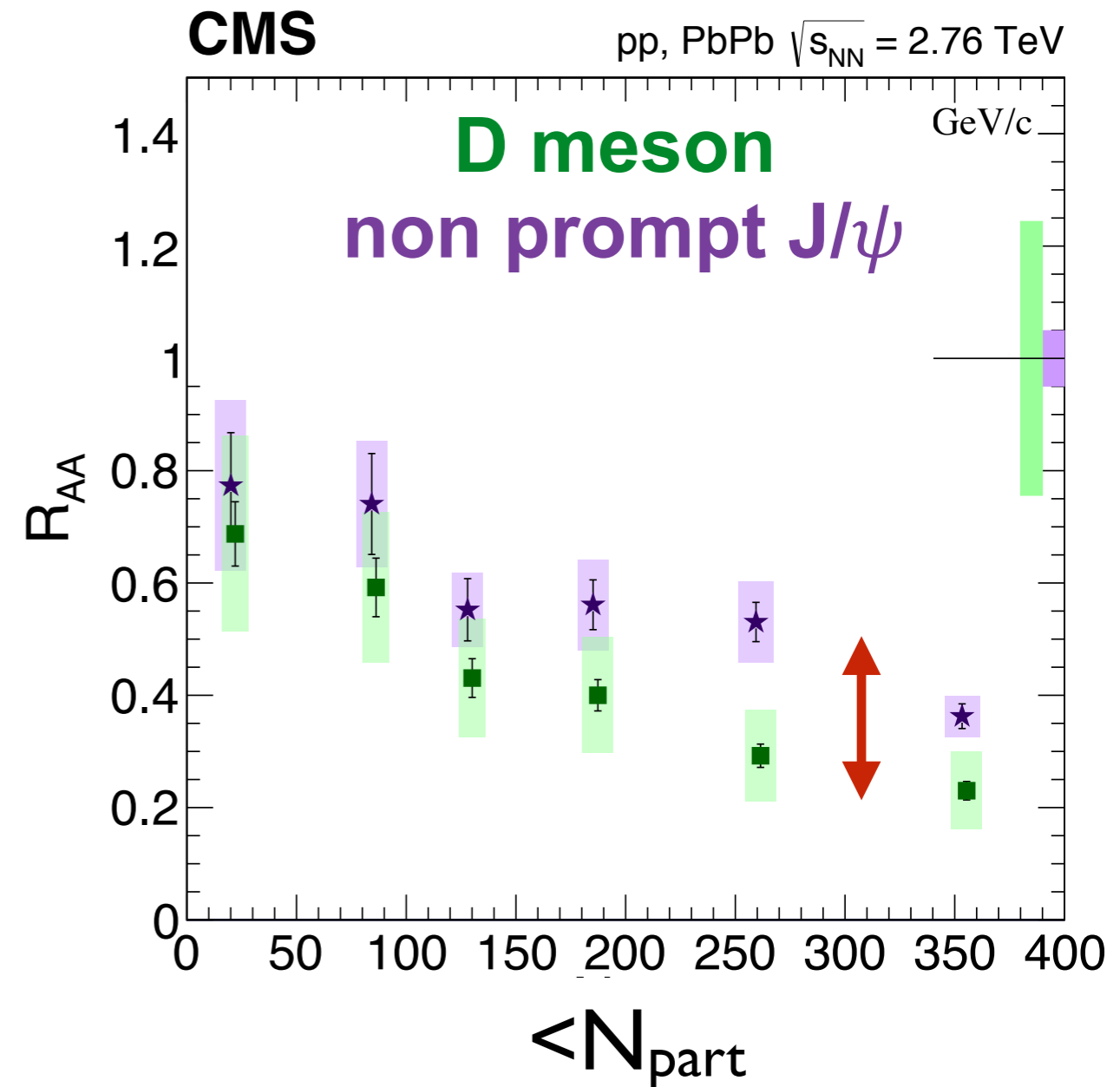
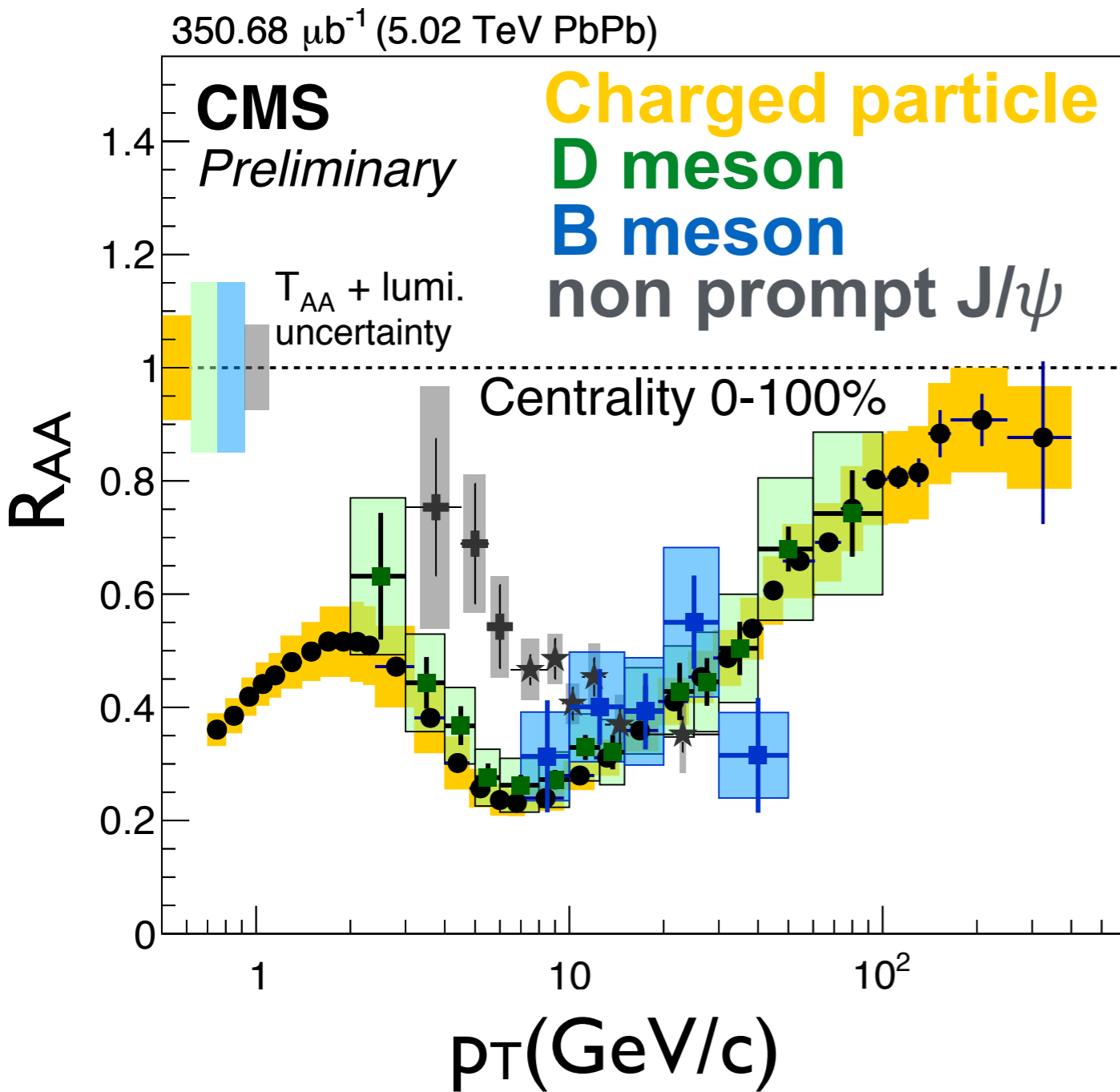


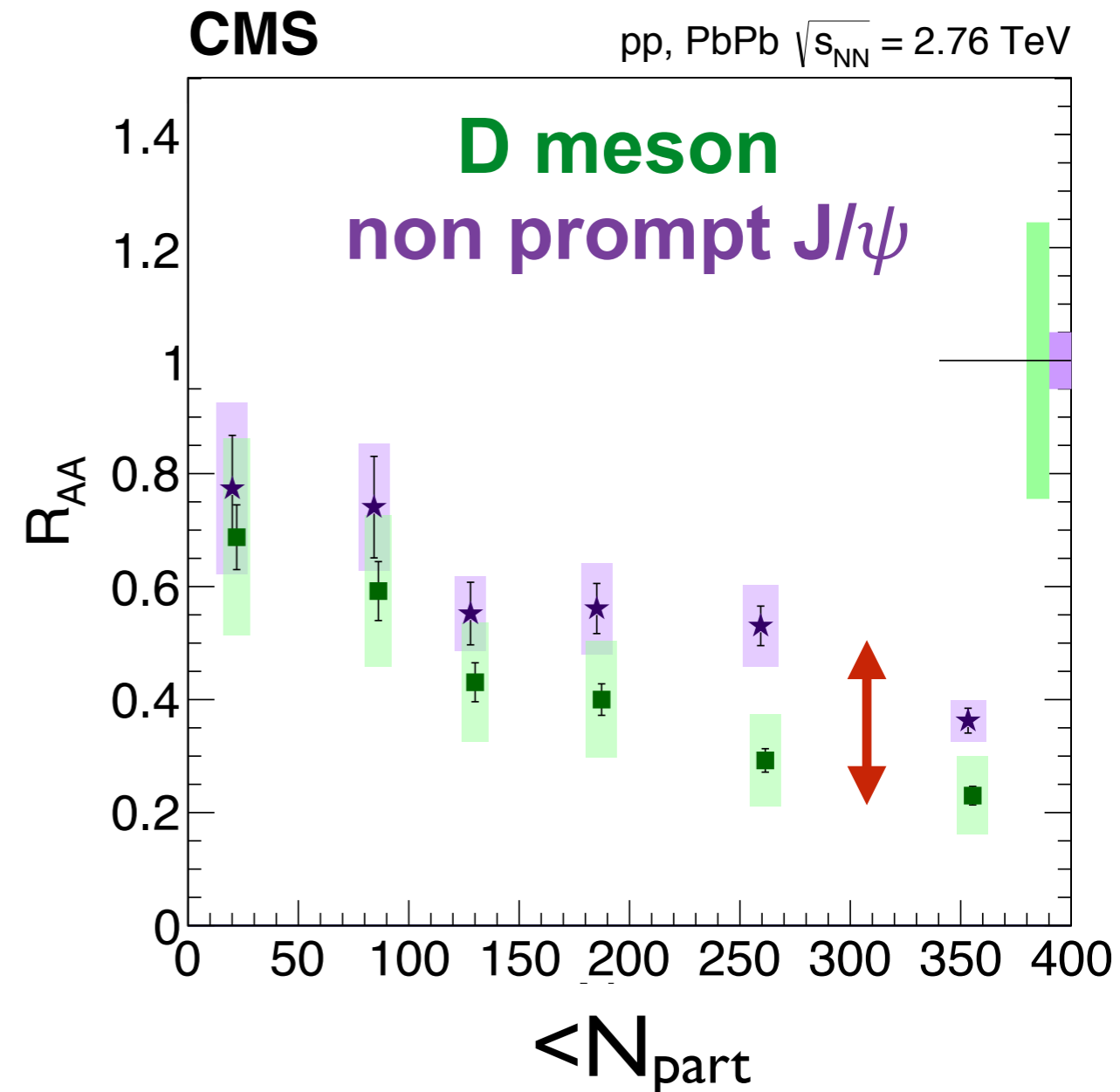
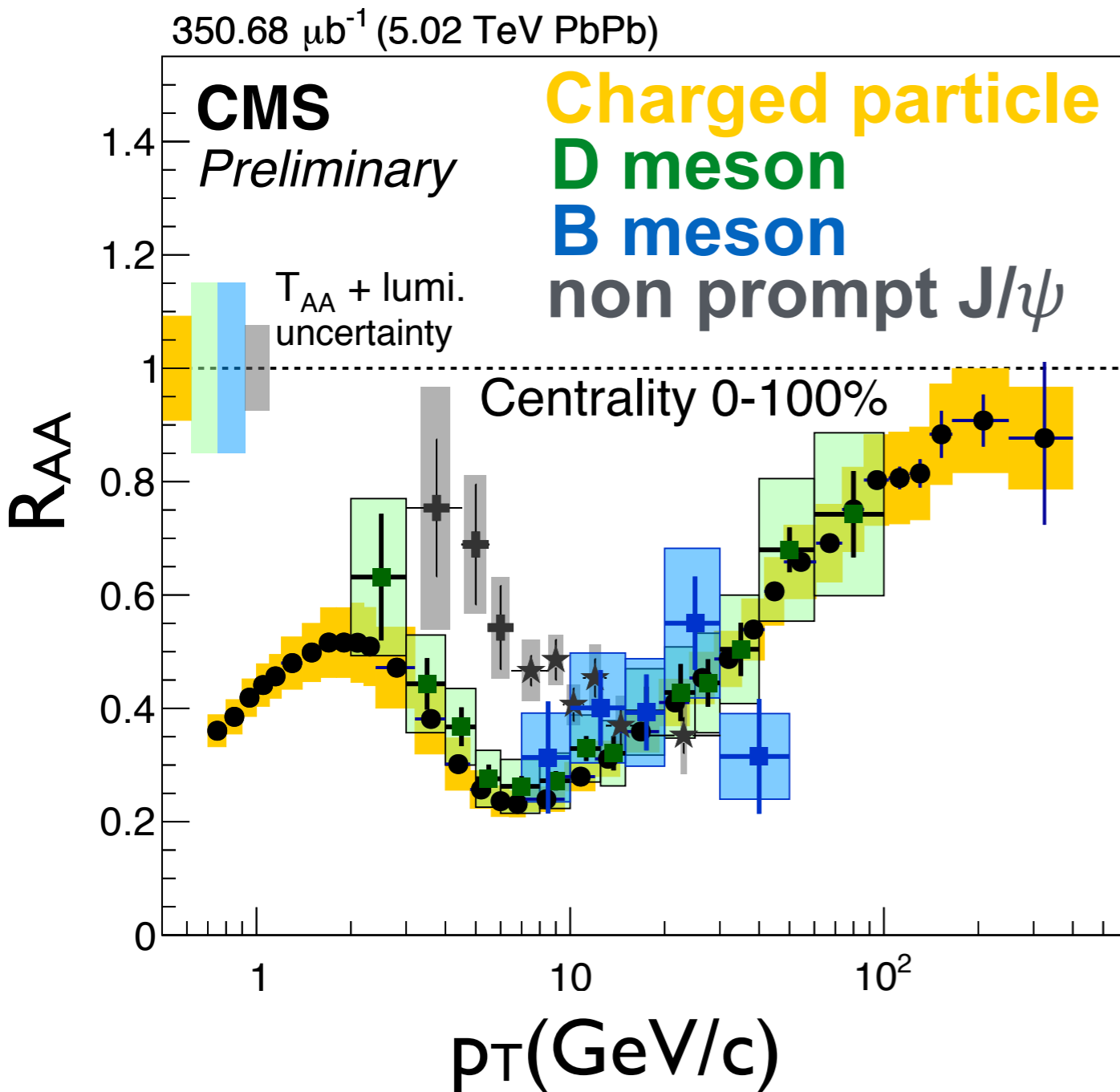
Charged particle, D meson, B meson  $R_{AA}$  are consistent within uncertainties!



**However!**

- B  $R_{AA}$  and D  $R_{AA}$  measured in different rapidities!
- measurements in the same rapidity with more statistics needed to draw a firm conclusions
- non prompt  $J/\psi$  to be measured at 5 TeV





- **2018 high statistics run will help reducing the uncertainties on this measurement**
- With Run2 and Run3 data, new measurements will be feasible (B meson  $v_n$  measurements, Hf correlations) will provide further insights on the mechanisms of energy loss.