

# Outline



#### **Open heavy-flavours at ALICE**



#### 1/10/2019

#### **HF production cross-sections at mid-rapidity**



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#### **D** meson ratios

**Cross-section ratios** 



ALICE



☑ D mesons are studied at the LHC at different collision energies (2.76, 5.02, 7, 8 and 13 TeV)

☑ Cross-section ratios do not show significant  $p_T$  dependence → not large difference between fragmentation to pseudoscalar (D<sup>0</sup>, D<sup>+</sup> and D<sub>s</sub>) and vector (D<sup>\*+</sup>) mesons, nor to strange and non-strange mesons

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#### **D** meson ratios



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#### **Central to forward ratio**



ALICE Coll, JHEP 1909 (2019) 008



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p\_ [GeV/c]

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#### **Beauty via non-prompt D<sup>0</sup>**



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### $\Lambda_c$ production in pp, p-Pb



### $\Lambda_c$ production in pp, p-Pb



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### $\Lambda_c$ production in pp, p-Pb



### $\Xi_c$ production in pp



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#### Going back to the total cross-section



### D tagged jets @ 5.02 TeV



### D tagged jets @ 13 TeV



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#### **D-meson production: p-Pb @ 5.02 TeV**



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### **D-meson** R<sub>pA</sub>



#### **D-meson** R<sub>pA</sub>



#### **D-meson ratios: pp vs p-Pb**



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#### Elliptic flow v<sub>2</sub> as a measure of collectivity



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p<sub>T</sub> [GeV/c]

### **Heavy-flavour collectivity in p-Pb?**



### **HF-decay leptons flow in p-Pb**



### **Collectivity in the D-meson sector?**



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### **Observable:** RAA



**Solution** Production of hard probes in AA expected to scale with the number of nucleon-nucleon collisions  $N_{coll}$  (binary scaling)

Observable: Nuclear Modification Factor

$$R_{AA}^{D}(p_{T}) = \frac{dN_{AA}^{D}/dp_{T}}{\langle T_{AA} \rangle \times d\sigma_{pp}^{D}/dp_{T}} = \frac{QCD \ Medium}{QCD \ vacuum}$$

**What are the possibilities**?

- If no nuclear effects present:  $R_{AA} = 1$
- Effects of the hot and dense medium produced in the collision breakup binary scaling:  $R_{AA} \neq 1$  $R_{AA}(c,b,s) < R_{AA}(c) < R_{AA}(b)$



several caveat to take into account!!

Solution But also cold nuclear matter effects may lead to  $R_{AA} \neq 1$  (needs solid pA reference)

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p\_ [GeV/c

#### **R<sub>AA</sub> measurements**



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### **R**<sub>AA</sub> measurements



### **Double ratio:** $(D_s/D^0)_{Pb-Pb}/(D_s/D^0)_{pp}$



#### **Non-strange D-meson ratios**



### What about baryon-to-meson ratio?



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### What about baryon-to-meson ratio?



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# **Beauty production**



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#### **Alessandro Grelli**

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# Summary





### **Centrality in p-Pb collisions (ALICE)**

#### Centrality in p-Pb collisions: Phys. Rev. C 91 (2015) 064905

biases in the determination of  $\langle N_{coll} \rangle$ 

- multiplicity fluctuations, jet-veto bias, geometrical bias
- Lose correlations between N<sub>part</sub>, multiplicity and impact parameter b
- bias depends on estimator used for multiplicity determination

#### Experimentally:

**V0A:** <N<sub>coll</sub>> determined by Glauber fit of V0 amplitude **ZNA:** <N<sub>coll</sub>> obtained with a "Hybrid method"

- slice events in ZN energy (Pb going side)
- <N<sub>coll</sub>> in ZN energy class obtained by scaling the minimum bias value with the ratio between the average charged-particle multiplicity at mid rapidity in the same class and that measured in the minimum bias sample

$$Q_{\rm pPb} = \frac{({\rm d}N^{\rm D}/{\rm d}p_{\rm T})_{\rm pPb}}{\langle T_{\rm pPb} \rangle \times ({\rm d}\sigma^{\rm D}/{\rm d}p_{\rm T})_{\rm pp}} \qquad \langle T_{\rm pPb} \rangle = \frac{\langle N_{\rm coll} \rangle_i}{\sigma_{\rm NN}}$$

investigate charm production in p-Pb collisions w.r.t. pp collisions: possible multiplicity dependent modification of the  $p_T$  spectra in p-Pb?



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### D mesons production vs rapidity at mid-rapidita



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### **Open-beauty with ALICE**



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## **D** tagged jets R<sub>pPb</sub>

NW



## **D** mesons prompt fraction

