

# $\Lambda_c$ rapidity distributions and “beam drag”

---

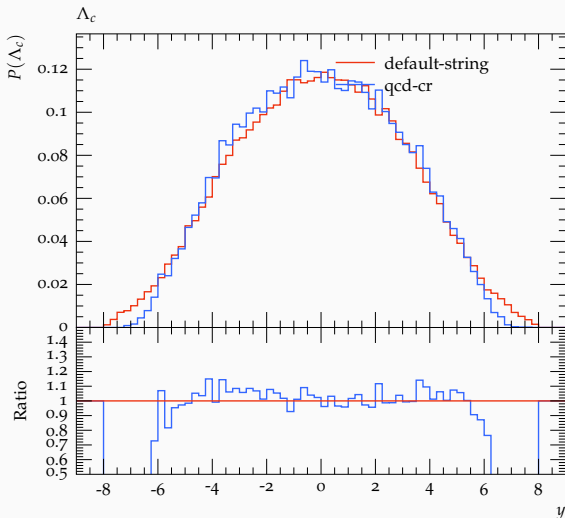
Christian Bierlich, [christian.bierlich@hep.lu.se](mailto:christian.bierlich@hep.lu.se)  
Lund University  
Dec 12 2022, HONEXcomb meeting



LUNDS  
UNIVERSITET

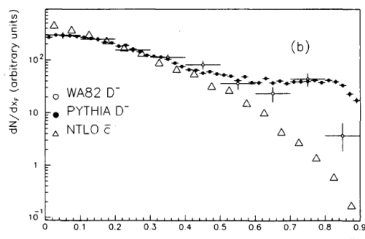
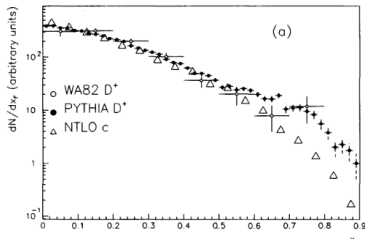
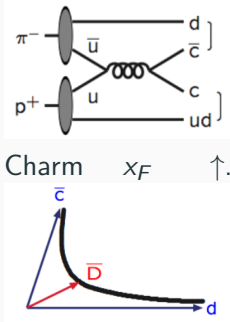
## Question: How come default CR produce weird tails?

- Here normalized rapidity distribution for  $\Lambda_c + \bar{\Lambda}_c$  in pp 7 TeV.
- QCD-CR seems more reasonable than normal string.



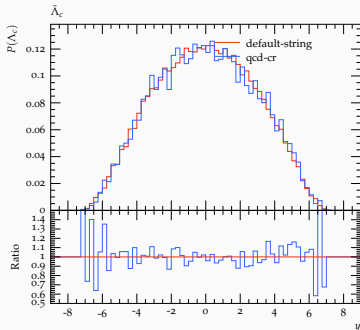
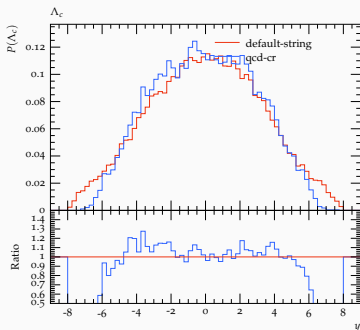
# Beam drag effects

- Colour flow connects hard scattering to beam remnants.
- Effect known since SPS days (WA82: PLB 305, 4 (1993)).
- Fixed target  $\pi^- p$ ,  
 $x_F = p_L^*/p_{L,max}^*$ , \* = in CM.



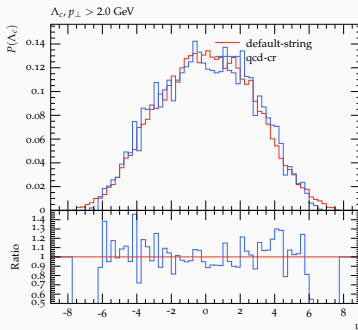
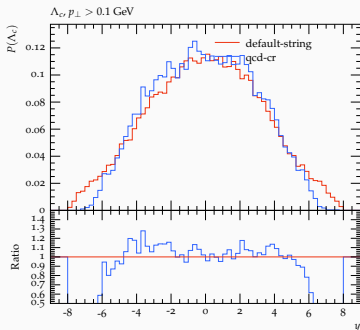
# Easiest control: $c-\bar{c}$ asymmetry?

- Can explain effect: Beam drag still present in QCD-CR, but overwhelmed but large amount of junction produced  $\Lambda_c$ .
- No effect for  $\bar{\Lambda}_c$ , and effect vanishes at higher  $p_\perp$ .



# Easiest control: $c-\bar{c}$ asymmetry?

- Can explain effect: Beam drag still present in QCD-CR, but overwhelmed but large amount of junction produced  $\Lambda_c$ .
- No effect for  $\bar{\Lambda}_c$ , and effect vanishes at higher  $p_\perp$ .

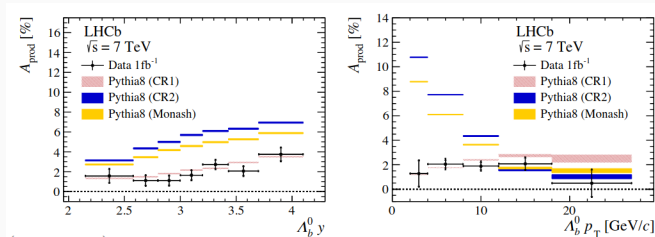


# Contrast to $\Lambda_b - \bar{\Lambda}_b$ (LHCb: 2107.09593)

- LHCb measured asymmetry in B sector:

$$A(y), A(p_{\perp}) = \frac{\sigma(\Lambda_b^0) - \sigma(\bar{\Lambda}_b^0)}{\sigma(\Lambda_b^0) + \sigma(\bar{\Lambda}_b^0)}$$

- Default string: large asymmetry at large  $y$  & small  $p_{\perp}$ .



- QCD-CR better for same reasons, effect not gone.
- Potential for a dedicated measurement for  $\Lambda_c$ ?