Contribution ID: **154**   Type: **Parallel Session Talk**

Enhanced production of Λ_c in proton-proton collisions at the LHC

Thursday 11 April 2019 09:20 (25 minutes)

We calculate the cross section for the production of D mesons and Λ_c baryons in pp collisions at the LHC. The cross section for production of $c\bar{c}$ pairs is calculated within the k_T-factorization approach. We show that our approach well describes the D^0, D^+, and D_s experimental data. We try to understand recent ALICE and LHCb data for Λ_c production with the $c \rightarrow \Lambda_c$ independent parton fragmentation approach. Although one can agree with the ALICE data using the standard estimation of model uncertainties, one cannot describe simultaneously the ALICE and the LHCb data with the same set of parameters. The fraction $f_{c\rightarrow\Lambda_c}$ necessary to describe the ALICE data is much larger than the average value obtained from e^+e^- or ep experiments. No drastic modification of the shape of the fragmentation function is allowed by the new ALICE and LHCb data for Λ_c production. We also discuss a possible dependence of the Λ_c/D^0 baryon-to-meson ratio on rapidity and transverse momentum as recent observations by the ALICE and LHCb collaborations seem to suggest. Three different effects are considered: the value of the ε_c^Λ parameter in the Peterson fragmentation function for $c \rightarrow \Lambda_c$, a kinematical effect related to the hadronization prescription, and a possible feed-down from higher charmed-baryon excitations. It seems very difficult, if not impossible, to understand the ALICE data within the considered independent parton fragmentation scheme.

[1] R. Maciuła and A. Szczurek, Phys. Rev. D98, no. 1, 014016 (2018).

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Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours