



Contribution ID: 193

Type: Oral presentation

Double charmed meson production at the LHC: Single- versus double-parton scattering mechanism

Tuesday 29 April 2014 16:10 (20 minutes)

We compare results of exact calculations of single-parton scattering (SPS) and double-parton scattering (DPS) for production of $c\bar{c}c\bar{c}$ and for $D - D$ meson correlations [1]. Each step of DPS is calculated within k_t -factorization approach, i.e. effectively including next-to-leading order corrections. The SPS calculations are performed in collinear approximation with exact matrix element for $gg \rightarrow c\bar{c}c\bar{c}$ subprocess. The new results are compared with results of previous calculation with approximate matrix elements in high-energy approximation. The cross section for the exact calculation is bigger only at small invariant masses and small rapidity difference between two c quarks (or two \bar{c} antiquarks). We compare correlations in rapidities of two c (or two \bar{c}) for DPS and SPS contributions. Finally we compare our predictions for DD meson pairs with recent results of the LHCb collaboration for invariant mass, rapidity distance between mesons and dimeson invariant mass. The predicted shapes are similar to the measured ones, however, some strength seems to be lacking. Possible missing contribution within the framework of DPS mechanism is suggested. Our new calculations clearly confirm the dominance of DPS in the production of events with double charm.

[1] A. van Hameren, R. Maciula and A. Szczurek, arXiv:1402.6972 [hep-ph].

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Session Classification: WG4: QCD and Hadronic Final States

Track Classification: WG4: QCD and Hadronic Final States