

Production of two $c\bar{c}$ pairs and two mesons with charm in double-parton scattering: inclusive and correlation observables.

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We discuss production of two pairs of $c\bar{c}$ in proton-proton collisions at the LHC. Both double-parton scattering (DPS) and single-parton scattering (SPS) contributions are included in the analysis. Each step of DPS is calculated within k_t -factorization approach, i.e. effectively including next-to-leading order corrections. The conditions how to identify the DPS contribution are presented. The discussed mechanism unavoidably leads to the production of pairs of mesons: $D_i D_j$ (each containing c quarks) or $\bar{D}_i \bar{D}_j$ (each containing \bar{c} antiquarks). We calculate corresponding production rates for different combinations of charmed mesons as well as some differential distribution for $(D^0 D^0 + \bar{D}^0 \bar{D}^0)$ production. Within large theoretical uncertainties the predicted DPS cross section is fairly similar to the cross section measured recently by the LHCb collaboration. The best description is obtained with the Kimber-Martin-Ryskin (KMR) unintegrated gluon distribution, which very well simulates higher-order corrections. The contribution of SPS turned out to be rather small. Finally, we emphasize significant contribution of DPS mechanism to inclusive charmed meson spectra measured recently by ALICE, ATLAS and LHCb. We discuss also production of two J/Ψ mesons.

Primary author: SZCZUREK, Antoni (Institute of Nuclear Physics)

Presenter: SZCZUREK, Antoni (Institute of Nuclear Physics)

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