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Production of two $c\bar{c}$ pairs and two identical D mesons - evidence for double parton scattering mechanism.

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We discuss charm production at LHC. The production of single $c\bar{c}$ pairs
is calculated in the k_t-factorization approach. We use several
unintegrated gluon distributions from the literature. Some of them
include effect of small-x staturation and fullfil Balitsky-Kovchegov
evolution equation. The hadronization is included with the help of
fragmentation functions found for the production of c ($\bar{c}$) in e^+e^- collisions. Differential distributions for several
charmed mesons will be presented and compared to recent results of the ALICE
and LHCb collaborations. Some missing strength is identified.
Different schemes of fragmentation are discussed.

We concentrate on production of two pairs of $c\bar{c}$ within a simple
formalism of double-parton scattering (DPS). We perform calculation both
in collinear and k_t-factorization approaches. Surprisingly large
cross sections, comparable to single-parton scattering (SPS)
contribution, are predicted for LHC energies.
Both total inclusive cross section as a function of energy and
differential distributions are shown.
We include recently discussed evolution of double partons in the case
of two scales.
We discuss perspectives how to identify the double scattering
contribution. We find much larger cross section for large rapidity distance
between charm quarks from different hard parton scatterings
compared to single scattering.
Predictions for two $c\bar{c}$ pair production in single-parton
scattering will be presented.
We present also first results for the $c\bar{c}c\bar{c}$ production
in the k_t-factorization approach. The results are compared with
those for the collinear approach.

Predictions for the production of different pairs of charm mesons
(D^0D^0, $D^0\bar{D}^0$, etc.) are presented for the kinematics of
ATLAC, CMS, ALICE and LHCb experiment. Differential distributions of single meson
provided that both mesons are measured by the detector, distribution in azimuthal angle
between two mesons and in dimeson invariant mass are calculated and will be compared
with recent experimental data. Predictions for future measurements are given.

LITERATURE:

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