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Production of c cbar c cbar in single and double parton scattering in collinear and kt-factorization approaches

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We present first results for the $2 \to 4$ single-parton scattering $gg \to c\bar{c}c\bar{c}$ subprocess for the first time fully within the k_t-factorization approach. In this calculation we have used the Kimber-Martin-Ryskin unintegrated gluon distribution which effectively includes some class of higher-order gluon emissions, and an off-shell matrix element squared calculated using recently developed techniques. The results are compared with our earlier result obtained within the collinear approach.
Only slightly larger cross sections are obtained than in the case of the collinear approach.
Inclusion of transverse momenta of gluons entering the hard process leads to a much stronger azimuthal decorrelation between cc and $\bar{c}\bar{c}$ than in the collinear-factorization approach.
A comparison to predictions of double parton scattering (DPS) results and the LHCb data strongly suggests that the assumption of two fully independent DPS ($gg \to c\bar{c} \otimes gg \to c\bar{c}$) may be too approximate.

1) A. van Hameren, R. Maciula and A. Szczurek,
"Single-parton scattering versus double-parton scattering in the production of two $c\bar{c}$ pairs and charmed meson correlations at the LHC",
Phys. Rev. D89 (2014) 094019.

2) A. van Hameren, R. Maciula and a. Szczurek,
Production of two charm quark-antiquark pairs in single-parton scattering within the k_t-factorization approach,
arXiv:1504.06491, submitted to Phys.Lett.B.

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