

Diffractive production of heavy mesons at the LHC

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Collaboration

Abstract content

We discuss diffractive production of open charm and bottom mesons at the LHC [1]. The differential cross sections for single- and central-diffractive mechanisms for $c\bar{c}$ and $b\bar{b}$ pair production are calculated in the framework of the Ingelman-Schlein model corrected for absorption effects. In this approach one assumes that the pomeron has a well defined partonic structure, and that the hard process takes place in a pomeron-proton or proton-pomeron (single diffraction) or pomeron-pomeron (central diffraction) processes. Here, leading-order gluon-gluon fusion and quark-antiquark annihilation partonic subprocesses are taken into consideration. Both pomeron flux factors as well as parton distributions in the pomeron are taken from the H1 Collaboration analysis of diffractive structure function and diffractive dijets at HERA. The extra corrections from subleading reggeon exchanges are explicitly calculated and are also taken into consideration. Predictions for single- and central-diffractive production in the case of inclusive D and B mesons, as well as $D\bar{D}$ correlations are presented, including detector acceptance of the ATLAS, CMS and LHCb Collaborations. The experimental aspects of possible standard and dedicated measurements are carefully discussed.

For the first time, the differential cross sections for the diffractive $c\bar{c}$ pair production are calculated in the framework of the k_t -factorization approach, i.e. effectively including higher-order corrections. The unintegrated (transverse momentum dependent) diffractive parton distributions in proton are calculated with the help of the Kimber-Martin-Ryskin prescription where collinear diffractive PDFs are used as input. The latter are obtained by means of the Ingelman-Schlein model. Several quark-level differential cross sections are shown, including one-dimensional distribution and two-dimensional correlation distributions (e.g. $\varphi_{c\bar{c}}$ -azimuthal angle correlations or pair transverse momentum p_t distributions). The hadronization of charm quarks is taken into account by means of fragmentation function technique. Predictions for single-diffractive production of D^0 meson including detector acceptance of the ATLAS experiment are presented. Crucial aspects of possible standard and dedicated measurements within the ATLAS detector are also discussed.

[1] M. Luszczak, R. Maciula and A. Szczurek, Phys. Rev. D 91 (2015), 054024

[2] M. Luszczak, R. Maciula, A. Szczurek and M. Trzebinski, Diffractive charm production at the LHC within k_t -factorization approach, a paper in preparation

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