XXI International Workshop on Deep-Inelastic Scattering and Related Subjects



Contribution ID: 154

Type: Talk in Parallel Session at DIS2013

Diffractive production of quark-antiquark pairs

Wednesday 24 April 2013 14:20 (20 minutes)

We discuss the diffractive dissociation of gluons into heavy quark pairs. The particular mechanism is similar to the diffractive dissociation of virtual photons into quarks, which drives diffractive deep inelastic production of charm in the low-mass diffraction, or large β -region. The amplitude for the $gp \to Q\bar Qp$ is derived in the impact parameter and momentum space. The cross section for single diffractive $pp \rightarrow Q\bar{Q}pX$ is calculated as a convolution of the elementary cross section and gluon distribution in the proton. Both the integrated and the differential distributions in e.g. transverse momentum and rapidity of the charm and bottom quark and antiquark, quark-antiquark invariant mass are calculated for the nominal LHC energy for different unintegrated gluon distributions from the literature. The model leads to much smaller fractional longitudinal momentum losses than in the Ingelman-Schlein (IS) model. Quark and antiquark are produced exclusively either in the $y_1, y_2 > 0$ region or in the $y_1, y_2 < 0$ region. The gluon dissociation contributes into the region of very small x_{IP} , much smaller than in the Ingelman-Schlein model with absorption. These characteristics can be used to separate the present mechanism from the Ingelman-Schlein one. The ratio of the bottom-to-charm cross sections are shown and discussed.

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Session Classification: WG2: Low x and Diffraction

Track Classification: Small-x, Diffraction and Vector Mesons