## Production of two J/Psi mesons in proton-proton collisions at the LHC

Monday 26 June 2017 14:37 (20 minutes)

The presentation will be based on our paper in preparation [1]. We discuss production of pairs of  $J/\psi$  quarkonia in proton-proton collisions in the context of recent results obatained at the LHC at large transverse momenta. The leading-order  $O(\alpha_s^4)$  contribution is calculated in both collinear and the  $k_t$ -factorization approach with the KMR unintegrated gluon distributions. We include also two-gluon exchange contribution which is of the order of  $O(\alpha_s^6)$  (not included routinely in collinear-factorization approach). This contribution is calculated in the moment only in the collinear approximation. In addition we calculate cross sections for  $pp \to \chi_c(J_1)\chi_c(J_2).$ A feed-down from double  $\chi_c$  production to double  $J/\psi$ production is estimated for a first time. The double parton scattering cross section and differential distributions are calculated using an educated parametrization of experimental single  $J/\psi$  differential distributions in rapidity and transverse momentum at the LHC energies. Many differential distributions are calculated. Results of our calculations are compared with very recent ATLAS data \cite{ATLAS}. We find that the two-gluon exchange mechanism and feed down from double  $\chi_c$  production lead to very similar (in shape) distributions in rapidity distance between the  $J/\psi$ mesons as the double-parton scattering approach. Much larger cross sections are obtained in the  $k_t$ -factorization approach. Including the mechanisms leaves much less room for the double parton scattering contribution which cannot be calculated from first principle. The  $\sigma_{eff}$  parameter for DPS needed to describe the ATLAS data is much larger than from previous analyses of double quarkonium production, where a smaller number of mechanisms was included. We present distributions in rapidity distance, two  $J/\psi$  invariant mass, azimuthal angle correlations between the two  $J/\psi$  mesons and transverse momentum of the pairs of quarkonia. In all cases the sum of the four considered contributions reminds experimental ATLAS distributions [2].

1) A. Cisek, W. Sch\"afer and A. Szczurek, a paper in preparation.

2) ATLAS collaboration, CERN-EP-2016-211, arXiv:161202950.

Author: SZCZUREK, Antoni (Institute of Nuclear Physics)

Presenter: SZCZUREK, Antoni (Institute of Nuclear Physics)

Session Classification: Theory Development in Forward Physics Session

Track Classification: Theory development in forward physics