QPT 2019

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Contribution ID: **111** Type: **not specified**

# Photoproduction of $J/\Psi$ in non-single-diffractive $p+p$ collisions and its application to constrain the gluon distribution


## Summary

Significant enhancement of $J/\Psi$ production at very low transverse momenta were recently observed by the ALICE and STAR collaborations in peripheral hadronic $A+A$ collisions. The anomalous points to coherent photon-nucleus interactions in violent hadronic heavy-ion collisions, which were conventionally studied only in ultra-peripheral collisions. Assuming that the coherent photoproduction is the underlying mechanism responsible for the excess observed in peripheral A+A collisions, its contribution in p+p collisions with nuclear overlap, i.e. non-single-diffractive collisions, is of particular interest. In this presentation, we perform a calculation of exclusive $J/\Psi$ photoproduction in non-single-diffractive p+p collisions at the RHIC and LHC energies based on the pQCD motivated parametrization using the world-wide experimental data, which could be further employed to improve the precision of the phenomenological calculations for photoproduction in $A+A$ collisions. The differential rapidity and transverse momentum distributions of $J/\Psi$ from photoproduction are presented. In comparison with the $J/\Psi$ production from hadronic interactions, we find that the contribution of photoproduction is negligible.

The measurement of photoproduction can also be used in the work of the extraction of the nuclear shadowing factor, where the VMD model can impose stronger constrains to parton distribution, which will lead to a smaller uncertainty to the nuclear shadowing factor.

Recently the LHCb and ALICE collaborations presented results of their measurements of exclusive $J/\Psi$ photoproduction in ultraperipheral proton-proton and nucleus-nucleus collisions at the LHC, respectively. These results are of particular interest because the analysis of exclusive $J/\Psi$ photoproduction within the leading logarithmic approximation of perturbative QCD(pQCD) predicts that the cross section of this process is proportional to the gluon density of the target squared. Since the fracton $x$ of the target momentum carried by the gluons is inversely proportional to the beam momentum, at the high energies achievable at the LHC, it is potentially possible to obtain unique information on the small $x$ behavior of the gluon density in the proton and nuclei and, thus, to constrain the current ambiguity in this quantity.


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