

Coherent photoproduction of $\psi(2S)$ vector mesons in Pb–Pb UPC

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One of the open questions in QCD today is the cause of the shadowing phenomenon in nuclei. To understand this phenomenon it is necessary to study gluon distributions in nuclei at small x . There are several models trying to describe such phenomenon in QCD which have to be experimentally scrutinised and confirmed. One of the suitable processes to investigate gluon distributions in nuclei is the coherent photoproduction of a vector meson. The measurement of its cross section can serve as a verification of one or more theoretical predictions of this QCD phenomenon.

The tools for the calculation of the cross section of the coherent photoproduction of the vector meson $\psi(2S)$ were prepared, such as determination of the yield of $\psi(2S)$, the calculation of luminosity, the determination of the product of the acceptance and efficiency and estimation of some related systematic uncertainties. The studies presented here were performed with data from Pb–Pb collisions at a centre-of-mass energy $\sqrt{s_{NN}} = 5.02$ TeV collected during the Run 2 data-taking period at the LHC with the ALICE detector at mid-rapidity. The measurement of the cross section at this rapidity region and with almost 2 times higher energies than in Run 1 will provide an important contribution to the search for the origin of the shadowing.

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