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## Coherent $J/\psi$ photoproduction in ultra-peripheral PbPb collisions at $s_{NN}=2.76$ TeV with the CMS experiment (Article) [\(Open Access\)](#)

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### Abstract

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The cross section for coherent  $J/\psi$  photoproduction accompanied by at least one neutron on one side of the interaction point and no neutron activity on the other side,  $X_{n0n}$ , is measured with the CMS experiment in ultra-peripheral PbPb collisions at  $s_{NN}=2.76$  TeV. The analysis is based on a data sample corresponding to an integrated luminosity of  $159\mu\text{b}^{-1}$ , collected during the 2011 PbPb run. The  $J/\psi$  mesons are reconstructed in the dimuon decay channel, while neutrons are detected using zero degree calorimeters. The measured cross section is  $d\sigma_{X_{n0n}^{\text{coh}}}/d\eta(J/\psi) = 0.36 \pm 0.04(\text{stat}) \pm 0.04(\text{syst})$  mb in the rapidity interval  $1.8 < |\eta| < 2.3$ . Using a model for the relative rate of coherent photoproduction processes, this  $X_{n0n}$  measurement gives a total coherent photoproduction cross section of  $d\sigma^{\text{coh}}/d\eta(J/\psi) = 1.82 \pm 0.22(\text{stat}) \pm 0.20(\text{syst}) \pm 0.19(\text{theo})$  mb. The data strongly disfavor the impulse approximation model prediction, indicating that nuclear effects are needed to describe coherent  $J/\psi$  photoproduction in  $\Upsilon$ +Pb interactions. The data are found to be consistent with the leading twist approximation, which includes nuclear gluon shadowing. © 2017 The Author(s)

### Author keywords

CMS Heavy ion collisions  $J/\psi$  Physics Ultra-peripheral collisions UPC

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