Erratum: Next-to-leading order perturbative QCD predictions for exclusive J/ψ photoproduction in oxygen-oxygen and lead-lead collisions at energies available at the CERN Large Hadron Collider [Phys. Rev. C 107, 044912 (2023)]

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The error bands associated with the predictions using the nNNPDF3.0 nuclear parton distribution functions (nPDFs) shown in Figs. 4 and 15–18 were not calculated correctly. In particular, the upper boundary was overestimated. Note that the predictions made with the central values of the nNNPDF3.0 nPDFs as well as with EPPS21 and nCTEQ15WZSIH nPDFs are not affected.

The revised version of Fig. 4 of our paper is shown in Fig. 1 below with the corrected nNNPDF3.0 error bands given by the green shaded areas.

When discussing these results on p. 8 (left column, bottom paragraph), the correct statement should read that the nNNPDF3.0 uncertainties at central rapidity rise up to around 5.6 mb at Run 1 and up to around 9.5 mb at Run 2.

The revised versions of Figs. 15, 16, 17, and 18 of our paper are given below by Figs. 2–5, respectively. One can see from these figures that the propagated uncertainties of the nNNPDF3.0 nPDFs significantly decrease and become compatible to those of the EPPS21 and nCTEQ15WZSIH nPDFs.

When discussing these results on p. 15 (left column, above Table II), our original statement that the nNNPDF3.0 uncertainties are upward dominated was incorrect: the revised error bands are fairly symmetric. In addition, the statement on p. 15 (right column, upper paragraph) that the scale uncertainty is smaller than the PDF uncertainty is not valid anymore in the nNNPDF3.0 case, where they are now of similar magnitudes.

When quantifying the width of the nNNPDF3.0 uncertainty band in Figs. 15 and 17 on p. 17 (left column, second line), the correct statement should read that the ratio between the upper bound and the lower bound for the PDF uncertainties is about 3 (we had 6.7 in the original text).

Finally, in the Conclusions section (p. 18, right column, second paragraph), the correct statement should read that the PDF uncertainties for the ratios of the rapidity distribution in O-O to Pb-Pb UPCs for EPPS21 were found to be smaller than those for nCTEQ15WZSIH and nNNPDF3.0.

Further below, the modified conclusion should read: "The comparison of the PDF and scale uncertainties for the ratios taken at the same energy shows that the scale uncertainty is the dominant one for the EPPS21, while for nCTEQ15WZSIH the situation is reversed. For nNNPDF3.0, the two uncertainties are similar. For the ratios taken at different energies, the PDF uncertainties are of the same magnitude for EPPS21 and nCTEQ15WZSIH and somewhat larger for nNNPDF3.0."
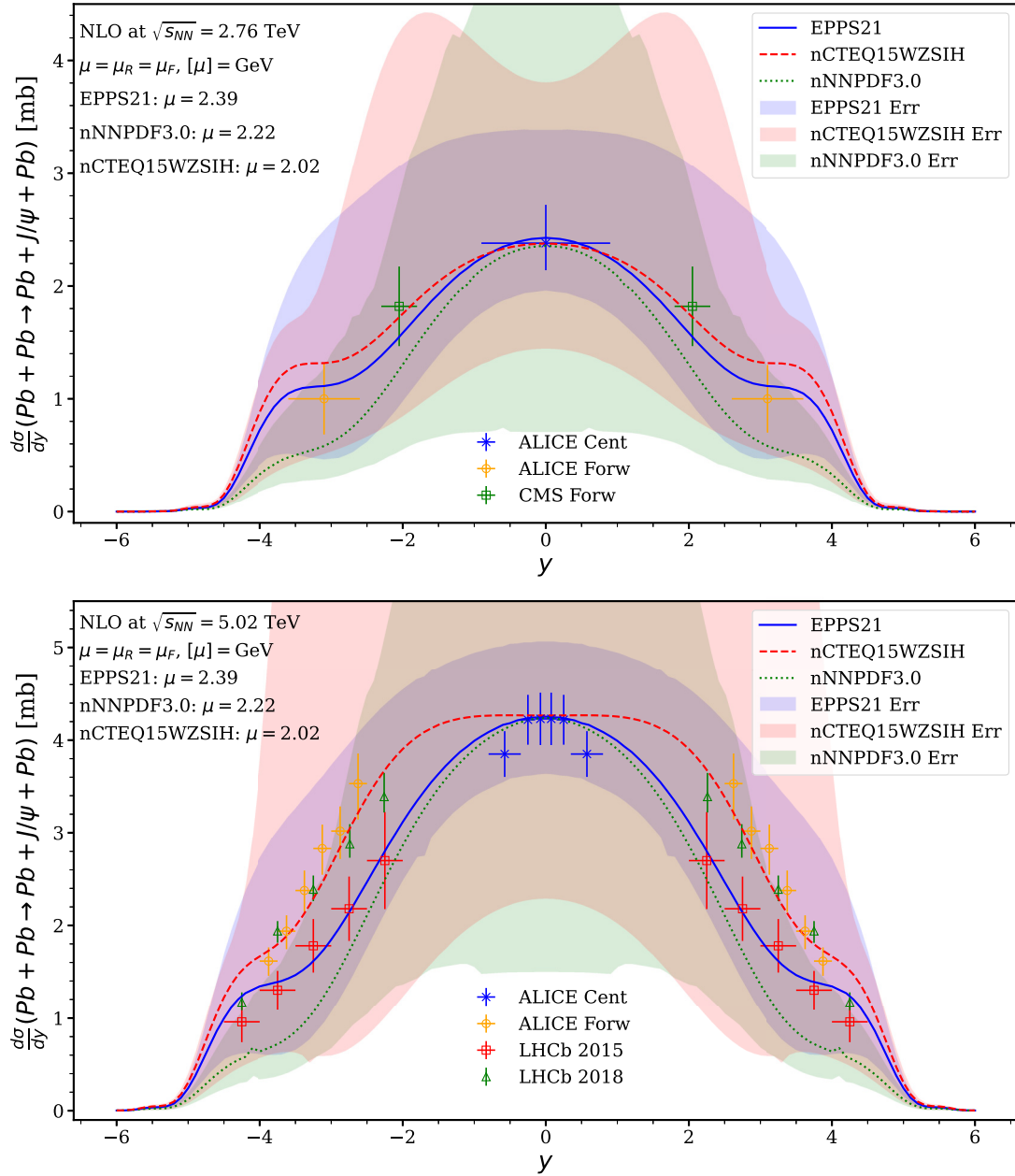
FIG. 1. The PDF uncertainties of the NLO pQCD predictions for the $d\sigma(\text{Pb} + \text{Pb} \rightarrow \text{Pb} + J/\psi + \text{Pb})/dy$ cross section as a function of y for Run 1 (top) and Run 2 (bottom) at the LHC, and a comparison with the Run 1 [39-41] and Run 2 [42-45] data, mirrored with respect to $y = 0$ and with the statistical and systematic errors added in quadrature. The results corresponding to the central sets of nPDFs are shown by the blue solid (EPPS21), red dashed (nCTEQ15WZSIH), and green dotted (nNNPDF3.0) curves, respectively, and the error bands are represented by the corresponding shaded regions. All calculations are performed at the indicated values of the optimal scale μ.
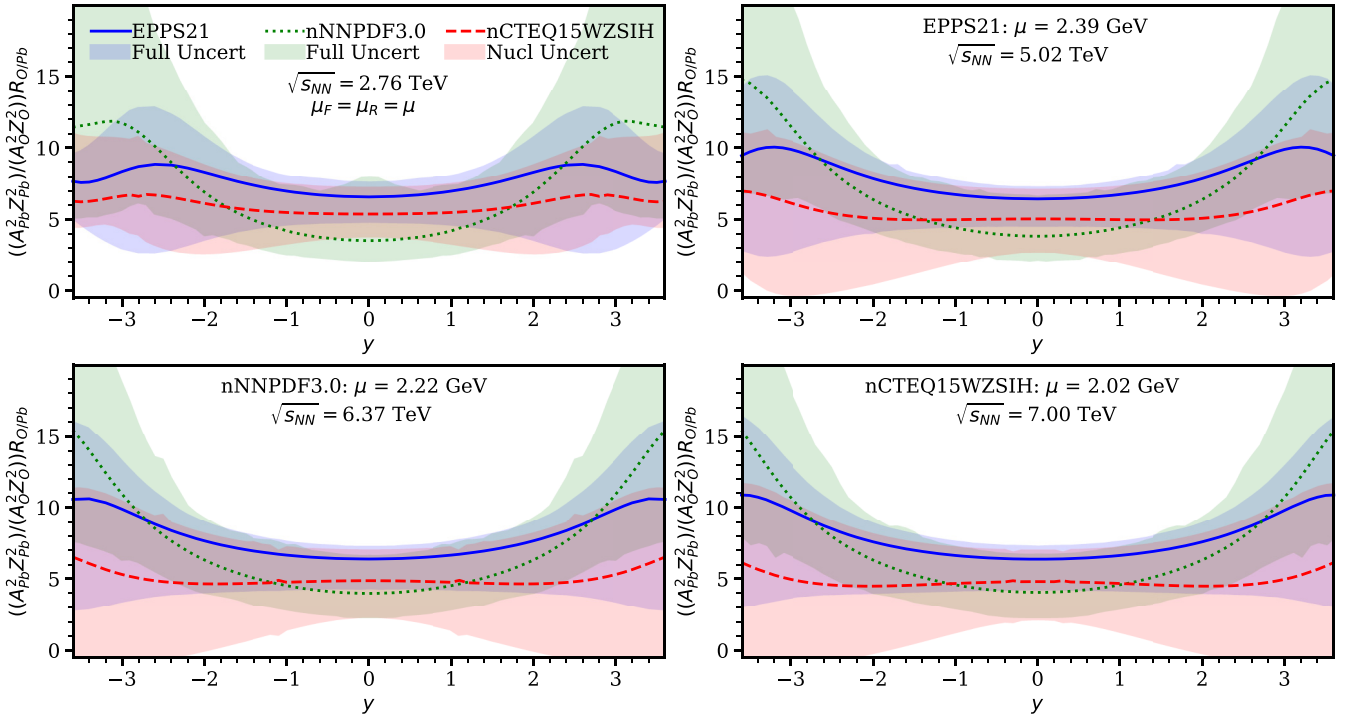
FIG. 2. The PDF uncertainties of NLO pQCD predictions for $R^{\mathrm{O/Pb}}$ as a function of the rapidity y. The results corresponding to the central nPDF sets at the optimal scales are shown by the blue solid (EPPS21), green dotted (nNNPDF3.0), and red dashed (nCTEQ15WZSIH) curves, respectively. The corresponding uncertainties are shown by the shaded bands, see text for details. Different panels correspond to different $\sqrt{s_{NN}}$.
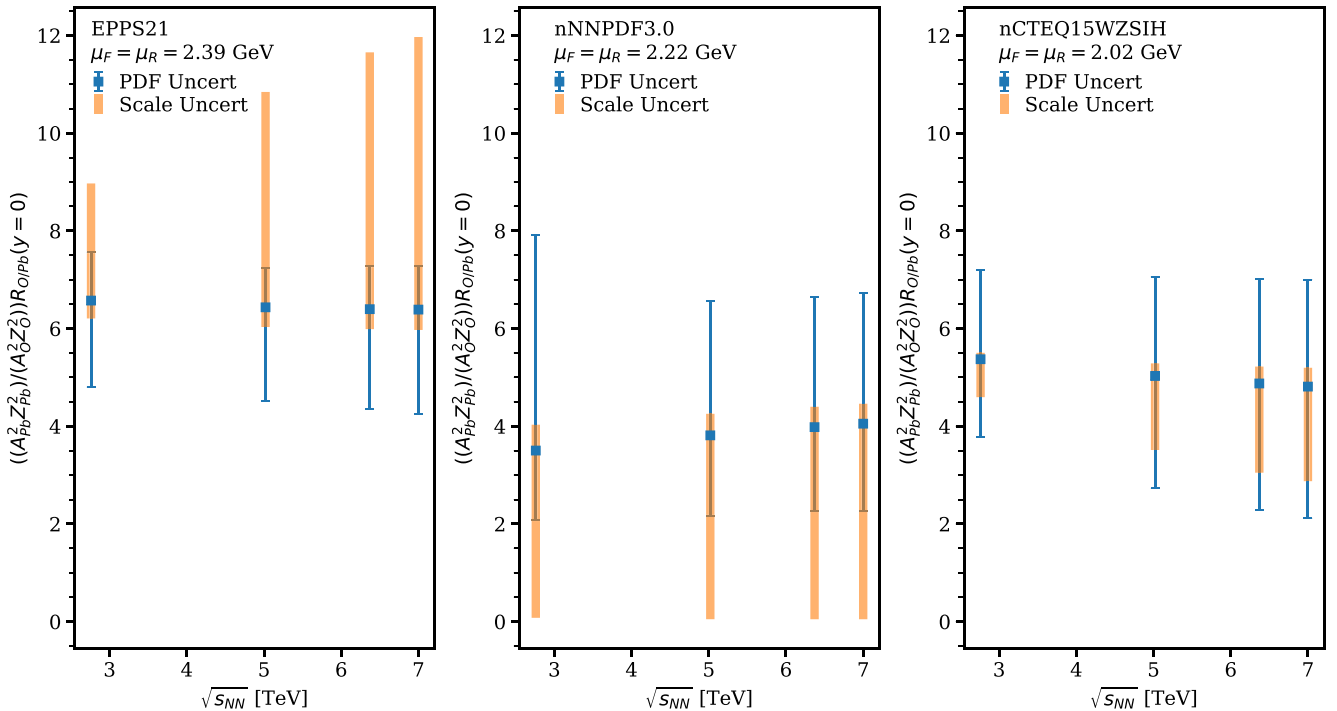

FIG. 3. Comparison of the PDF (thin blue) and scale (wide orange) uncertainties in the ratio of the NLO pQCD calculation of O-O to Pb-Pb rapidity differential cross section at central rapidity, $y = 0$, for three different nPDF sets: EPPS21 (left), nNNPDF3.0 (center), and nCTEQ15WZSIH (right). Here, O-O and Pb-Pb are taken at the same energy and all sets at their corresponding optimal scales.
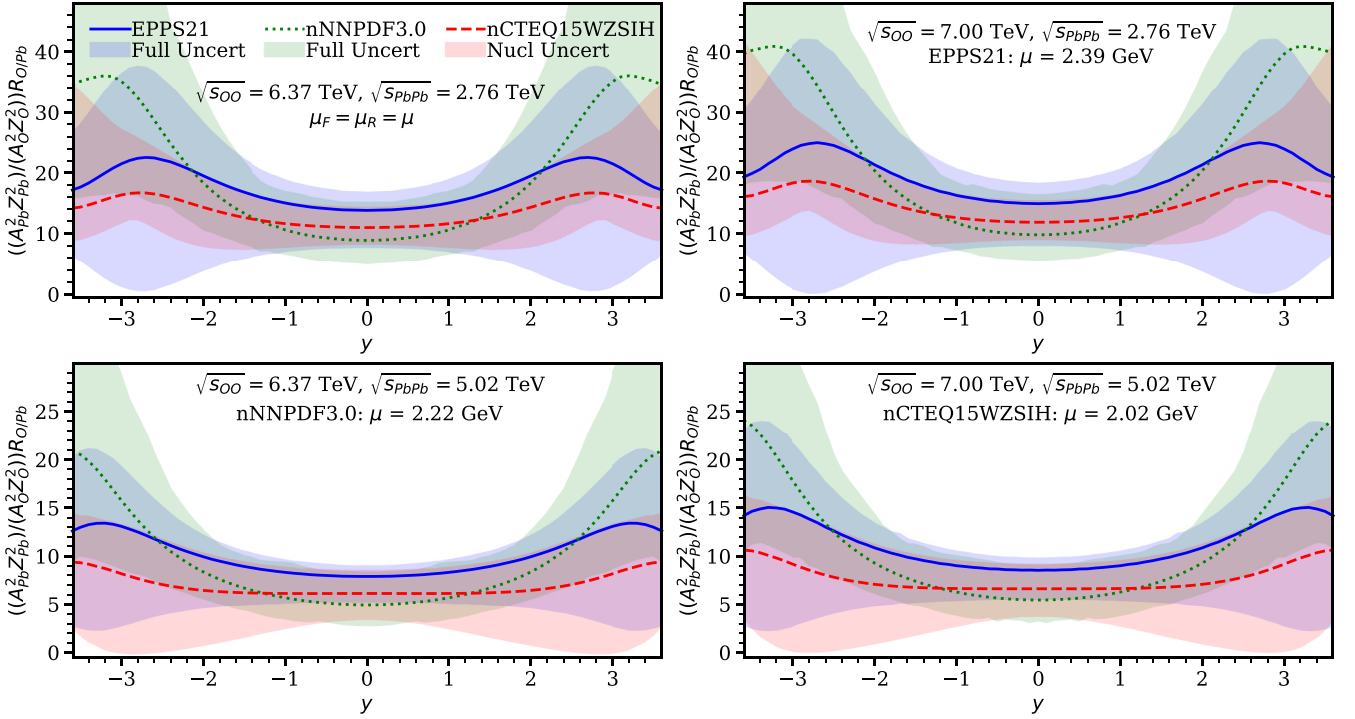
FIG. 4. The scaled ratios for EPPS21 (solid blue), nNNPDF3.0 (dotted green), and nCTEQ15WZSIH (dashed red) at their optimal scales as a function of the J/ψ rapidity. The blue band gives the EPPS21 uncertainty, the green band gives the nNNPDF3.0 90% CL uncertainty, and the hatched red band gives the nCTEQ15WZSIH nuclear uncertainty. In the first row Pb-Pb has been taken at Run 1 energy and in the second row at Run 2 energy. The O-O energies correspond to the two proposed energies of 6.37 TeV (left column) and 7 TeV (right column).
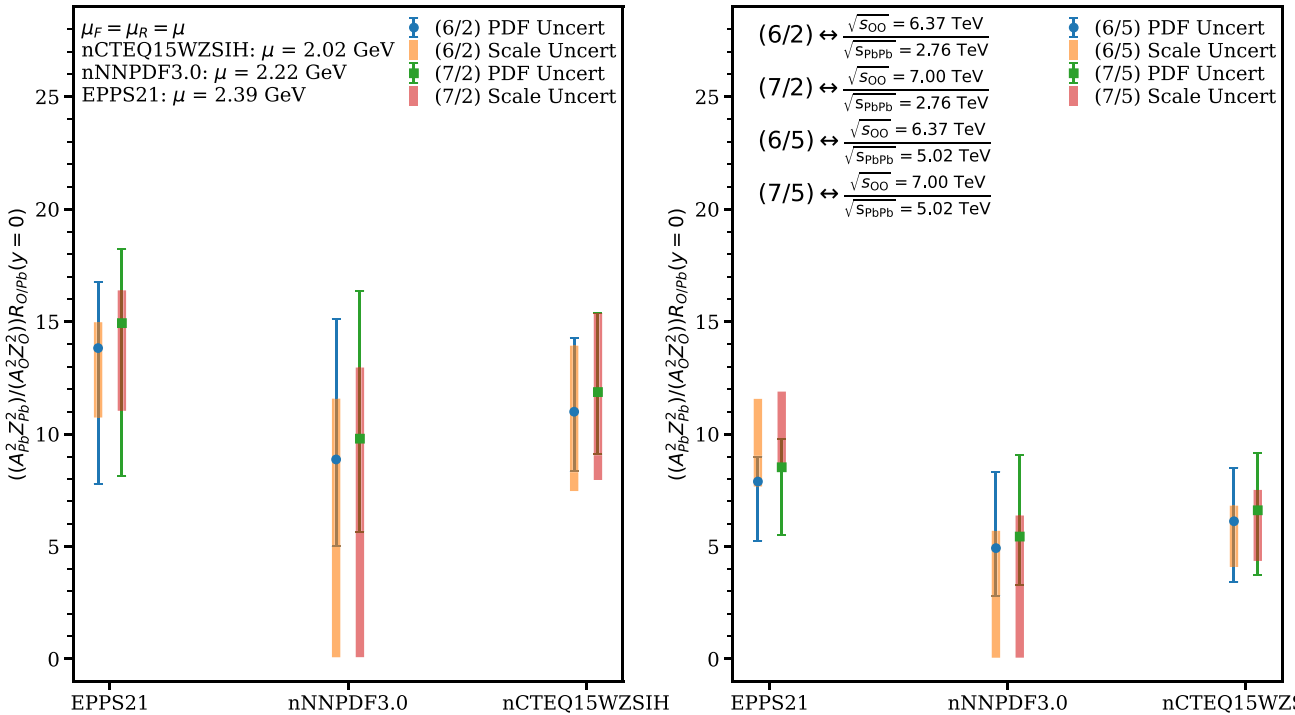

FIG. 5. The scaled ratios of O-O to Pb-Pb rapidity differential cross sections for EPPS21, nNNPDF3.0, and nCTEQ15WZSIH at their corresponding optimal scales at central rapidity, $y = 0$, where O-O and Pb-Pb have been taken at different $\sqrt{s_{NN}}$ energies. In the left panel the Pb-Pb collision is taken at Run 1 energy and in the right panel at Run 2 energy.