Erratum: Polarization transfer observables in elastic electron-proton scattering at $Q^2 = 2.5, 5.2, 6.8$, and 8.5 GeV^2 [Phys. Rev. C 96, 055203 (2017)]

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Subsequent to the release of our original paper, we discovered in the context of preparing our technical supplement [1] for journal publication that a typographical error had existed in the text file that the analysis program used to construct the beam polarization "database" for both the original analysis, published in Ref. [2], and our final analysis. The electron-beam polarization P_e and the analyzing power A_y cancel exactly in the ratio R, which is proportional to the ratio P_t/P_ℓ of the transferred polarization components. On the other hand, the extraction of the relative ϵ dependence of $P_\ell/P_\ell^{\text{Born}}$ relies on knowledge of the beam polarization. As such, data taking was interrupted roughly every two days during the GEp-2γ experiment to perform invasive measurements of the beam polarization using the Hall C Møller polarimeter [3].

The run range affected by the typographical error was entirely contained within the data collected at $Q^2 = 2.5$ GeV^2 with a beam energy of $E_e = 3.680$ GeV during January 2008. The data from this configuration were combined with the data collected at $E_e = 3.548$ GeV due to the nearly complete overlap of these two settings in terms of Q^2 and ϵ acceptance. It is worth remarking that this typographical error went unnoticed for so long because it only affected a small fraction of the data (less than half of the combined data for $\langle\epsilon\rangle = 0.790$) and the difference between the actually assigned beam polarization and the polarization that should have been assigned was comparable in magnitude to the point-to-point systematic uncertainty of the measurement itself. As such, its effect did not show up in various diagnostic plots and statistical tests, such as the time stability of the extracted $P_\ell/P_\ell^{\text{Born}}$ ratio.

The data for both $E_e = 3.548$ and $E_e = 3.680$ GeV were reprocessed using the corrected beam polarizations to determine the effect of the typographical error on the combined physics results at $\langle\epsilon\rangle = 0.790$. Because the value of P_e cancels in the ratio R, changes in the assumed beam polarization can only affect the results for R via statistical fluctuations due to changes in the relative weighting of different run ranges in the unbinned maximum-likelihood estimators for R. These effects are negligible on the scale of both the statistical and the systematic uncertainties of the data. More noticeable changes are expected in the ratio $P_\ell/P_\ell^{\text{Born}}$ since the extracted value of P_ℓ is inversely proportional to the assumed value of P_e.

Table I shows the effect of the corrected beam polarization database on the polarization transfer observables for the combined data for the $\langle\epsilon\rangle = 0.790$ setting, the only measurement affected by the typographical error. The analyzing power did not need to be recalibrated since it was determined using the $\langle\epsilon\rangle = 0.153$ data, which were not affected by the typographical error. As expected, the change in the ratio R is negligible. The value of P_ℓ^{Born}, which is computed event by event from the global fit described in the Appendix of the original paper and does not depend on P_e, is also unchanged. The magnitudes of P_t, P_ℓ, and $P_\ell/P_\ell^{\text{Born}}$ are reduced by a common multiplicative factor, reflecting the fact that the beam polarization had been *underestimated* for the run range affected by the typographical error. The most important result of the corrected analysis is that the ratio $P_\ell/P_\ell^{\text{Born}}$ has decreased by 0.0024 from 1.0167 to 1.0143, a change comparable in magnitude to the statistical uncertainty but small compared to the total and point-to-point systematic uncertainties. The $P_\ell/P_\ell^{\text{Born}}$ result for the original publication [2] would be reduced by the same multiplicative factor as the final result. The physics conclusions of both publications are not materially changed by this correction.

The changes in the final physics results, summarized in Table I, necessitate the following changes or corrections to the original paper. Figure 13 of our original paper should be replaced by Fig. 1, which is identical in all respects except that the results

TABLE I. Effect of the typographical error in the beam polarization database on the acceptance-averaged physics results at $Q^2 = 2.5\,\mathrm{GeV}^2$, $\langle\epsilon\rangle = 0.790$. Results for the average kinematics and total accepted ranges of Q^2 and ϵ are unchanged and therefore omitted. See Table XI of the original paper for additional details.

	Original paper, original P_e	Corrected P_e
Central Q^2	2.500	2.500
Central ϵ	0.783	0.783
$R \pm (\Delta R)_{\mathrm{stat}} \pm (\Delta R)_{\mathrm{syst}}$	$0.6915 \pm 0.0059 \pm 0.0039$	$0.6915 \pm 0.0059 \pm 0.0039$
$P_t \pm (\Delta P_t)_{\mathrm{stat}}$	-0.1622 ± 0.0013	-0.1618 ± 0.0013
$P_\ell \pm (\Delta P_\ell)_{\mathrm{stat}} \pm (\Delta P_\ell)^{(\mathrm{total})}_{\mathrm{syst}}$	$0.5816 \pm 0.0014 \pm 0.0040$	$0.5802 \pm 0.0014 \pm 0.0040$
$P_\ell^{\mathrm{Born}} \pm \Delta_{\mathrm{stat}} P_\ell^{\mathrm{Born}}$	0.5720 ± 0.0006	0.5720 ± 0.0006
$\left(\frac{P_\ell}{P_\ell^{\mathrm{Born}}}\right) \pm \Delta_{\mathrm{stat}}\left(\frac{P_\ell}{P_\ell^{\mathrm{Born}}}\right) \pm \Delta^{(\mathrm{total})}_{\mathrm{syst}}\left(\frac{P_\ell}{P_\ell^{\mathrm{Born}}}\right)$	$1.0167 \pm 0.0027 \pm 0.0071$	$1.0143 \pm 0.0027 \pm 0.0071$
$\Delta^{(ptp)}_{\mathrm{syst}}\left(\frac{P_\ell}{P_\ell^{\mathrm{Born}}}\right)$ (cf. $\langle\epsilon\rangle = 0.153$)	0.0061	0.0061

for P_ℓ as a function of Q^2 for the highest-ϵ point are extracted using the corrected beam polarization database. Visually, the two versions of the figure are indistinguishable. Figure 19 of our paper should be replaced by Fig. 2. The numbers quoted in Table XI of our paper should be changed as appropriate to reflect the corrected numbers in Table I. Finally, there are several passages in the main body of the text and in the abstract that should be modified in light of the corrected final results. These are listed below:

(1) In the abstract, under "Conclusions:" Change "roughly 1.7%" to "roughly 1.4%" and "$\approx 2.2\sigma$" to "$\approx 1.9\sigma$".
(2) On p. 10, in Sec. II C, the last paragraph starting with "The glass transparency …:" Replace the duplicate phrase "signal strength signal strength" with "signal strength".
(3) In Table XI, p. 26, replace the values of P_t, P_ℓ, and $P_\ell / P_\ell^{\mathrm{Born}}$ with the corrected values shown in Table I.

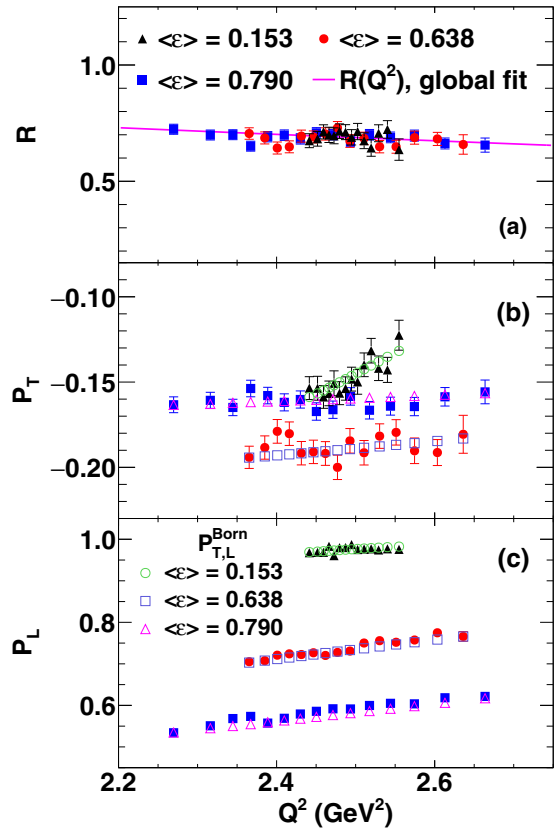

FIG. 1. Replacement figure for Fig. 13 of our original paper with corrected values of P_ℓ as a function of Q^2 for the highest-ϵ point.

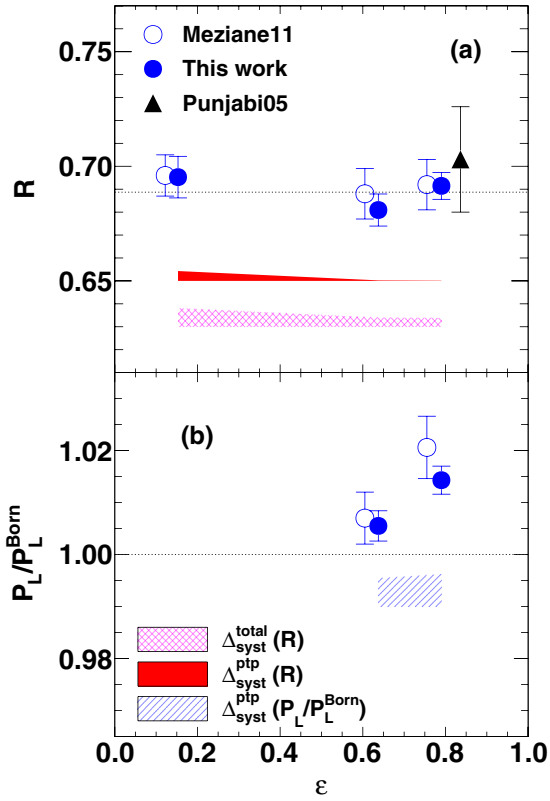

FIG. 2. Replacement figure for Fig. 19 of the original paper with corrected values of $P_\ell/P_\ell^{\rm Born}$ for the highest-ϵ point. The $P_\ell/P_\ell^{\rm Born}$ result of Ref. [2] was corrected by the same multiplicative factor ($1.0143/1.0167 = 0.9976$) as the final result since the only change in the analysis was the correction of the beam polarization, and this would have an identical effect on the result of the original analysis.

(4) On p. 27, the following changes should be made to the numbers in the sentence starting with "The deviation from unity…:"
   (a) $6.2 \rightarrow 5.3$,
   (b) $2.7 \rightarrow 2.3$,
   (c) $2.2 \rightarrow 1.9$.

(5) In the Conclusion, p. 36, in the sentence starting with "The only deviation from the Born approximation…," "1.0167" should be changed to "1.0143".

[1] A. J. R. Puckett *et al.* (GEp-III, GEp-2Gamma Collaborations), arXiv:1707.07750.
[2] M. Meziane *et al.* (GEp2γ Collaboration), Phys. Rev. Lett. **106**, 132501 (2011).
[3] M. Hauger *et al.*, Nucl. Instrum. Meth. Phys. Res. Sect. A **462**, 382 (2001).