Erratum: Spin asymmetries A_1 of the proton and the deuteron in the low x and low Q^2 region from polarized high energy muon scattering [Phys. Rev. D 60, 072004 (1999)]

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The virtual photon-proton (-deuteron) asymmetries $A_1^{p,d}$ presented in [1] were measured in the kinematic region where the four-momentum transfer Q^2 extended down to 0.01 GeV^2. A full account of the formalism is given in [2]. In this kinematic region one cannot neglect m_μ^2/Q^2 terms in the expression for the cross section. These terms were correctly taken into account in the unpolarized part of the cross section, $\overline{\sigma}$ [cf. Eq. (2.2) in [2]]; they were however omitted in the polarized part, $\Delta\sigma$ [Eqs. (2.4)–(2.6) in [2]].

The cross sections $\Delta\sigma_\parallel$ and $\Delta\sigma_T$, corresponding to the two configurations where the nucleon spin is either along or orthogonal to the muon spin [cf., Eq. (2.4) in [2]] should be written as follows:

$$\frac{d^2\Delta\sigma_\parallel}{dx\,dQ^2}=\frac{16\pi\alpha^2 y}{Q^4}\left[\left(1-\frac{y}{2}-\frac{\gamma^2y^2}{4}-\frac{m_\mu^2y^2}{Q^2}\right)g_1-\frac{\gamma^2y}{2}g_2\right] \tag{1}$$

and

$$\frac{d^3\Delta\sigma_T}{dx\,dQ^2\,d\phi}=-\cos\phi\,\frac{8\alpha^2y}{Q^4}\,\gamma\,\sqrt{1-y-\frac{\gamma^2y^2}{4}}\left[\frac{y}{2}\left(1+\frac{2m_\mu^2}{Q^2}y\right)g_1+g_2\right]. \tag{2}$$

The measured asymmetries $A_\parallel$ and $A_\perp$ are related to A_1 and A_2 [cf., Eqs (2.7)–(2.8) in [2]] through the depolarization factor D,

$$D=\frac{y[(1+\gamma^2y/2)(2-y)-2y^2m_\mu^2/Q^2]}{y^2(1-2m_\mu^2/Q^2)(1+\gamma^2)+2(1+R)(1-y-\gamma^2y^2/4)}, \tag{3}$$

the factor d for the orthogonal spin configuration,

$$d=\frac{\sqrt{1-y-\gamma^2y^2/4}(1+\gamma^2y/2)}{(1-y/2)(1+\gamma^2y/2)-y^2m_\mu^2/Q^2}D, \tag{4}$$

and kinematic factors η and ξ,

$$\eta=\frac{\gamma(1-y-\gamma^2y^2/4-y^2m_\mu^2/Q^2)}{(1+\gamma^2y/2)(1-y/2)-y^2m_\mu^2/Q^2}, \tag{5}$$

$$\xi = \frac{\gamma(1 - y/2 - y^2 m_\mu^2/Q^2)}{1 + \gamma^2 y/2}. \tag{6}$$

The only approximation applied in these equations is in neglecting terms m_μ^2/E^2 which are of the order of 10^{-7} in our kinematic range. With the above definition the depolarization factor is always smaller than unity.

The missing m_μ^2/Q^2 terms in the polarized part of the cross section is most apparent at low Q^2. Therefore our low x, low Q^2 data presented in [1] were reanalyzed using the corrected equations. The results for the reanalyzed proton and deuteron spin asymmetries $A_1^{p,d}$ and spin structure functions $g_1^{p,d}$ are given here in Tables I and II for newly accessed region at low Q^2. The change in $A_1^{p,d}$ and in its statistical error is significant only in the two bins corresponding to the smallest values of x and Q^2. The average values of x and Q^2 change in the first bin of x because D is used in the weight calculations. Changes at higher x are negligible and the physics conclusions given in [1] are unchanged.

TABLE I. Modifications to Tables III and V in Ref. [1]. The asymmetry $A_1^p(x)$ and the spin structure function $g_1^p(x)$ at the average Q^2 for newly accessed region at low x.

$\langle x \rangle$	$\langle Q^2 \rangle$ (GeV^2)	A_1^p	g_1^p
0.00011	0.03	$0.026 \pm 0.023 \pm 0.009$	$3.5 \pm 3.1 \pm 0.4$
0.00022	0.06	$0.019 \pm 0.019 \pm 0.005$	$2.5 \pm 2.5 \pm 0.6$
0.00039	0.10	$0.002 \pm 0.020 \pm 0.002$	$0.3 \pm 2.5 \pm 0.2$
0.00063	0.17	$-0.004 \pm 0.022 \pm 0.002$	$-0.4 \pm 2.3 \pm 0.2$

TABLE II. Modifications to Tables IV and VI in Ref. [1]. The asymmetry $A_1^d(x)$ and the spin dependent structure function $g_1^d(x)$ at the average Q^2 for newly accessed region at low x.

$\langle x \rangle$	$\langle Q^2 \rangle$ (GeV^2)	A_1^d	g_1^d
0.00011	0.03	$-0.013 \pm 0.050 \pm 0.006$	$-1.7 \pm 6.6 \pm 0.6$
0.00022	0.06	$0.056 \pm 0.040 \pm 0.015$	$7.6 \pm 5.3 \pm 1.6$
0.00039	0.10	$0.030 \pm 0.043 \pm 0.008$	$3.7 \pm 5.3 \pm 1.0$
0.00063	0.17	$0.047 \pm 0.046 \pm 0.012$	$5.0 \pm 4.9 \pm 1.2$

[1] SMC, B. Adeva *et al.*, Phys. Rev. D **60**, 072004 (1999).
[2] SMC, D. Adams *et al.*, Phys. Rev. D **56**, 5330 (1997).