

Explanation of Supplementary Material

Zhihong Ye, John R. Arrington, Richard J. Hill, and Gabriel Lee

November 2, 2017

1 Fitting Results

The fit in this work is a bounded polynomial z-expansion:

$$G(Q^2) = \sum_{k=0}^{k_{\max}} a_k z^k, \quad \text{here, } z = \frac{\sqrt{t_{\text{cut}} + Q^2} - \sqrt{t_{\text{cut}} - t_0}}{\sqrt{t_{\text{cut}} + Q^2} + \sqrt{t_{\text{cut}} - t_0}}, \quad (1)$$

where G stands for G_E^p , G_M^p/μ_p , G_E^n or G_M^n/μ_n , and $t_{\text{cut}} = 4m_\pi^2$ (where $m_\pi = 0.13957$ GeV is the charged pion mass) and $t_0 = -0.7$ GeV² were chosen identical for all four form factors. The values of a_k for G_E^p , G_M^p , G_E^n and G_M^n are given in Table 1.

Note that the values in Table 1 were obtained from fits using radius constraints. These radii values are listed in Table 2. For G_E^p, G_M^p, G_M^n , the form factor errors were obtained from fits

Parameter	G_E^p	G_M^p/μ_p	G_E^n	G_M^n/μ_n
a_0	0.239163298067	0.264142994136	0.048919981379	0.257758326959
a_1	-1.109858574410	-1.095306122120	-0.064525053912	-1.079540642058
a_2	1.444380813060	1.218553781780	-0.240825897382	1.182183812195
a_3	0.479569465603	0.661136493537	0.392108744873	0.711015085833
a_4	-2.286894741870	-1.405678925030	0.300445258602	-1.348080936796
a_5	1.126632984980	-1.356418438880	-0.661888687179	-1.662444025208
a_6	1.250619843540	1.447029155340	-0.175639769687	2.624354426029
a_7	-3.631020471590	4.235669735900	0.624691724461	1.751234494568
a_8	4.082217023790	-5.334045653410	-0.077684299367	-4.922300878888
a_9	0.504097346499	-2.916300520960	-0.236003975259	3.197892727312
a_{10}	-5.085120460510	8.707403067570	0.090401973470	-0.712072389946
a_{11}	3.967742543950	-5.706999943750	0	0
a_{12}	-0.981529071103	1.280814375890	0	0

Table 1: Fit parameters for the extracted G_E^p , G_M^p/μ_p , G_E^n , and G_M^n/μ_n using the parameterization of Eq. (1), with $k_{\max} = 12$ for proton and $k_{\max} = 10$ for neutron, $t_0 = -0.7$ GeV² and $t_{\text{cut}} = 4m_\pi^2$. Note that five coefficients are determined by sum rules. The high-precision of the quoted parameters is necessary to provide sufficient precision in the form factors at very large or small z (Q^2) values.

radius	output value [fm]	error [fm]
r_E^p	0.879	0.012
r_M^p	0.851	0.028
r_M^n	0.864	0.079

Table 2: Constrained values of form factor radii for G_E^p, G_M^p, G_M^n . For G_E^n , we use the PDG constraint $\langle (r_E^n)^2 \rangle = -0.1161(22) \text{ fm}^2$ from neutron-electron scattering length measurements.

without the radius constraints; for the errors on G_E^n , we left the independent PDG constraint from neutron-electron scattering length measurements in place.

2 Parameterization of Fitting Errors

These errors were determined from the covariance matrices, which as stated in the main text, do not comprise the full form factor errors in the case of the proton. Instead, we parameterize the errors on the proton and neutron form factors in three different Q^2 regions with different functional forms as shown in the following equations:

$$\log_{10} \left[\frac{1}{\kappa} \frac{\delta G}{G_D} \right] = \begin{cases} A_0 + A_1 x, & \text{if } Q^2 < 10^{-3} \text{ GeV}^2, \\ \sum_{k=0}^{14} B_k x^k, & \text{if } 10^{-3} \leq Q^2 \leq 10^2 \text{ GeV}^2, \\ C_0 \sqrt{x - C_1} + C_2 & \text{if } Q^2 > 10^2 \text{ GeV}^2, \end{cases} \quad (2)$$

where $x = \log_{10}(Q^2)$, $\kappa = (1, \mu_p = 2.79284356, 1, \mu_n = -1.91304272)$ for $G = (G_E^p, G_M^p, G_E^n, G_M^n)$. For each form factor, values of these parameters are listed in Table 3.

Parameter	δG_E^p	$\delta G_M^p/\mu_p$	δG_E^n	$\delta G_M^n/\mu_n$
A_0	-0.97775297	-0.68452707	-2.02311829	-0.20765505
A_1	0.99685273	0.99709151	1.00066282	0.99767103
B_0	-1.97750308×10^0	-1.76549673×10^0	-2.07194073×10^0	-2.06920873×10^0
B_1	$-4.46566998 \times 10^{-1}$	$1.67218457 \times 10^{-1}$	1.13809127×10^0	$6.43156400 \times 10^{-2}$
B_2	$2.94508717 \times 10^{-1}$	-1.20542733×10^0	1.01431277×10^0	$-3.55593786 \times 10^{-1}$
B_3	1.54467525×10^0	$-4.72244127 \times 10^{-1}$	$-3.13301380 \times 10^{-1}$	$4.14897660 \times 10^{-1}$
B_4	$9.05268347 \times 10^{-1}$	1.41548871×10^0	$-2.73293676 \times 10^{-1}$	1.95746824×10^0
B_5	$-6.00008111 \times 10^{-1}$	$6.61320779 \times 10^{-1}$	$2.57350595 \times 10^{-1}$	$2.70525700 \times 10^{-1}$
B_6	-1.10732394×10^0	$-8.16422909 \times 10^{-1}$	$-2.06042113 \times 10^{-1}$	-1.52685784×10^0
B_7	$-9.85982716 \times 10^{-2}$	$-3.73804477 \times 10^{-1}$	$-1.68497332 \times 10^{-1}$	$-4.43527359 \times 10^{-1}$
B_8	$4.63035988 \times 10^{-1}$	$2.62223992 \times 10^{-1}$	$1.37784515 \times 10^{-1}$	$5.16884065 \times 10^{-1}$
B_9	$1.37729116 \times 10^{-1}$	$1.28886639 \times 10^{-1}$	$7.57591964 \times 10^{-2}$	$2.07915837 \times 10^{-1}$
B_{10}	$-7.82991627 \times 10^{-2}$	$-3.90901510 \times 10^{-2}$	$-2.67511301 \times 10^{-2}$	$-7.48665703 \times 10^{-2}$
B_{11}	$-3.63056932 \times 10^{-2}$	$-2.44995181 \times 10^{-2}$	$-1.72573088 \times 10^{-2}$	$-4.25411431 \times 10^{-2}$
B_{12}	$2.64219326 \times 10^{-3}$	$8.34270064 \times 10^{-4}$	$7.03581500 \times 10^{-4}$	$1.54965016 \times 10^{-3}$
B_{13}	$3.13261383 \times 10^{-3}$	$1.88226433 \times 10^{-3}$	$1.47962095 \times 10^{-3}$	$3.25322279 \times 10^{-3}$
B_{14}	$3.89593858 \times 10^{-4}$	$2.43073327 \times 10^{-4}$	$1.97375221 \times 10^{-4}$	$4.20819518 \times 10^{-4}$
C_0	0.78584754	0.80374002	0.45535960	0.50859057
C_1	1.89052183	1.98005828	1.95063341	1.96863291
C_2	-0.41047460	-0.69700928	0.32421279	0.23213950

Table 3: Parameters of form factor errors using the parameterization formula Eq. (2).

The above formulae and parameters are coded in two subroutines: one in C++ (`GetFF.C`) and one in Python (`GetFF.py`). For a given Q^2 value, the subroutine calculates both the central value and uncertainty of a form factor corresponding to an input flag ($1 \rightarrow G_E^p/G_D$, $2 \rightarrow G_M^p/\mu_p G_D$, $3 \rightarrow G_E^n/G_D$, $4 \rightarrow G_M^n/\mu_n G_D$). For example:

- `GEPGD, dGEPGD = GetFF(1, Q2)` in Python (`GetFF.py`)
- `int err = GetFF(1, Q2, &GEPGD, &dGEPGD)` in C++ (`GetFF.C`)

3 Look-Up Tables

We prepared look-up tables for proton and neutron form factors and their errors with the range of Q^2 values from 10^{-6} GeV² to 10^4 GeV². Two errors for each form factor are provided: one is calculated using the covariance matrices, and the other is calculated using the parameterization formulas. The look-up tables for proton and neutron are given in the files, "**proton_lookup.dat**" and "**neutron_lookup.dat**", respectively. Columns in each file correspond to:

1. Q^2 : Q^2 in GeV².
2. $G_E^{p(n)}/G_D$: $G_E^{p(n)}(Q^2)$ divided by $G_D(Q^2)$.
3. $dG_E^{p(n)}/G_D$: Error of $G_E^{p(n)}(Q^2)$ divided by $G_D(Q^2)$. For the proton, this is the combined error from the covariance matrix of the fit, the data set tension, and the TPE uncertainty at high Q^2 . For the neutron, this is calculated from the covariance matrix.
4. $dG_E^{p(n)}_{\text{Par}}/G_D$: Error of $G_E^{p(n)}(Q^2)$ divided by $G_D(Q^2)$, calculated from the parameterization formula.
5. $G_M^{p(n)}/\mu G_D$: $G_M^{p(n)}(Q^2)$ divided by $\mu_{p(n)}G_D(Q^2)$.
6. $dG_M^{p(n)}/\mu G_D$: Error of $G_M^{p(n)}(Q^2)$ divided by $\mu_{p(n)}G_D(Q^2)$, as in column 3.
7. $dG_M^{p(n)}_{\text{Par}}/\mu G_D$: Error of $G_M^{p(n)}(Q^2)$ divided by $\mu_{p(n)}G_D(Q^2)$, calculated from the parameterization formula.

4 Experimental data used in the fitting

All the existing experimental data were contained in the folders named `./data/proton/` and `./data/neutron` for proton and neutron, respectively.

4.1 `./data/proton/Mainz_ep_CrossSections_Rebinned.dat`

The kinematics, cross-section data, and other factors necessary for our fits to the rebinned Mainz A1 data set. Each row is one kinematic setting: repeated runs at the same setting from `Mainz_CrossSection_Raw` are combined into a single point. See Sec. VI B 2 of G. Lee *et al.*, Phys. Rev. D **92** (1) (2015), 013013, arXiv:1505.01489 [hep-ph]. Below, Bernauer et al. refers to J. C. Bernauer *et al.* [A1 Collaboration], Phys. Rev. C **90** (1), 015206 (2014), arXiv:1307.6227 [nucl-ex].

1. `Ebeam`: Electron beam energy (in MeV).
2. `spec`: Spectrometer (A, B, or C) was used to take the cross section measurement.
3. `theta_spec`: Central angle of the spectrometer (in degrees).
4. `Q^2Avg`: Average four-momentum transfer squared (Q^2) values (in GeV^2) of the data for the given spectrometer setting.
5. `csexp/csdip`: Ratio of the cross section to the dipole cross section with dipole mass squared $\Lambda^2 = 0.71 \text{ GeV}^2$. Note that this cross section does NOT include any correction for the hard TPE contribution (in the MaTj convention).
6. `delta_csexp_tot/csdip`: Total uncorrelated uncertainty on the cross section ratio. Includes statistical, plus 0.3% systematic uncertainty (0.4% for spectrometer B at 855 MeV). See Sec. VI C 3 of the paper.
7. `delta_csexp_stat/csdip`: Statistical uncertainty on the cross section ratio.
8. `csexp/csdip(mincut)`: Ratio of cross section to dipole (as column 5) with the tighter energy loss cut.
9. `csexp/csdip(maxcut)`: Ratio of cross section to dipole (as column 5) with the looser energy loss cut.
10. `Blun_TPE_corr`: Two-photon exchange correction (using MaTj subtraction), calculated using the form factors of Blunden et al., for the proton intermediate state. The corrected (Born) cross section ratio is column 5 divided by this factor.
11. `Fesh_TPE_corr`: Two-photon exchange correction using the McKinley and Feshbach prescription prescription, cf. Eq. (27) of Lee *et al.*. The corrected (Born) cross section ratio is column 5 divided by this factor.

12. **A1_syst_scale**: Multiplicative factor applied to the cross section ratios to determine the correlated systematic uncertainties following the Mainz A1 procedures. This is the quantity $1 + \delta_{\text{corr}}$ in Eq. (35) of Lee *et al.*, and is also called **systematic_scale** in the Bernauer *et al.* supplementary material. Note that the values here are based on the A1 analysis; in our final extraction, we use Eq. (35) with $x = \theta$ and $a = 0.004$ to evaluate these uncertainties.
13. **norms**: List of the normalization factors (from the 31 independent factors) that are applied to the cross section ratios (called **Norms** in the Bernauer *et al.* supplementary material).

4.2 `./data/proton/World_ep_CrossSections.dat`

1. **E0**: Electron beam energy (in MeV).
2. **Theta**: Electron scattering angle (in degrees).
3. **Q^2**: Four-momentum transfer squared (Q^2) values (in GeV^2).
4. **Sig**: Elastic cross section (in nb/sr). No TPE correction has been applied.
5. **dSig**: Total cross section uncertainty (in nb/sr).
6. **TPE(Blun)**: Two-photon exchange correction (using MaTj subtraction), calculated using the form factors of Blunden *et al.*, for the proton intermediate state. The corrected (Born) cross section is column 4 divided by this factor.
7. **TPE(Fesh)**: Two-photon exchange correction using the McKinley and Feshbach prescription (cf. Eq. (27)). The corrected (Born) cross section is column 4 divided by this factor.
8. **idat**: Number of the data set (1–32).
9. **Norm**: Normalization factor uncertainty for the data set (0.05 implies that the normalization factor for the data set is 1 ± 0.05).

Numbers refer to **idat** in column 8 above.

1. L. Andivahis *et al.*, Phys. Rev. D **50**, 5491 (1994) [8 GeV spectrometer].
2. L. Andivahis *et al.*, Phys. Rev. D **50**, 5491 (1994) [1.6 GeV spectrometer].
3. R. C. Walker *et al.*, Phys. Rev. D **49**, 5671 (1994).
4. T. Janssens, R. Hofstadter, E. B. Hughes and M. R. Yearian, Phys. Rev. **142**, 922 (1966).
5. W. Bartel *et al.*, Phys. Rev. Lett. **17**, 608 (1966).
6. W. Albrecht, H.-J. Behrend, H. Dorner, W. Flauger and H. Hultschig, Phys. Rev. Lett. **18**, 1014 (1967).
7. J. Litt *et al.*, Phys. Lett. B **31**, 40 (1970).

8. M. Goitein *et al.*, Phys. Rev. D **1**, 2449 (1970).
9. C. Berger, V. Burkert, G. Knop, B. Langenbeck and K. Rith, Phys. Lett. B **35**, 87 (1971).
10. L. E. Price, J. R. Dunning, M. Goitein, K. Hanson, T. Kirk and R. Wilson, Phys. Rev. D **4**, 45 (1971).
11. W. Bartel, F. W. Busser, W. r. Dix, R. Felst, D. Harms, H. Krehbiel, P. E. Kuhlmann and J. McElroy *et al.*, Nucl. Phys. B **58**, 429 (1973) [small angle electron settings].
12. W. Bartel, F. W. Busser, W. r. Dix, R. Felst, D. Harms, H. Krehbiel, P. E. Kuhlmann and J. McElroy *et al.*, Nucl. Phys. B **58**, 429 (1973) [large angle electron settings].
13. W. Bartel, F. W. Busser, W. r. Dix, R. Felst, D. Harms, H. Krehbiel, P. E. Kuhlmann and J. McElroy *et al.*, Nucl. Phys. B **58**, 429 (1973) [small angle proton settings].
14. P. N. Kirk *et al.*, Phys. Rev. D **8**, 63 (1973).
15. A. F. Sill *et al.*, Phys. Rev. D **48**, 29 (1993).
16. P. E. Bosted *et al.*, Phys. Rev. C **42**, 38 (1990).
17. M. Goitein *et al.*, Phys. Rev. Lett. **18**, 1016 (1967).
18. W. Albrecht, H. J. Behrend, F. W. Brasse, W. Flauger, H. Hultschig and K. G. Steffen, Phys. Rev. Lett. **17**, 1192 (1966).
19. S. Stein *et al.*, Phys. Rev. D **12**, 1884 (1975).
20. S. Rock *et al.*, Phys. Rev. D **46**, 24 (1992).
21. G. G. Simon, C. Schmitt, F. Borkowski and V. H. Walther, Nucl. Phys. A **333**, 381 (1980).
22. G. G. Simon, C. Schmitt and V. H. Walther, Nucl. Phys. A **364**, 285 (1981).
23. F. Borkowski, P. Peuser, G. G. Simon, V. H. Walther and R. D. Wendling, Nucl. Phys. A **222**, 269 (1974).
24. J. J. Murphy, Y. M. Shin and D. M. Skopik, Phys. Rev. C **9**, 2125 (1974).
25. D. Dutta *et al.* [JLab E91013 Collaboration], Phys. Rev. C **68**, 064603 (2003) [elastic cross sections from private communication with D. Dutta].
26. M. E. Christy *et al.* [E94110 Collaboration], Phys. Rev. C **70**, 015206 (2004).
27. I. A. Qattan *et al.*, Phys. Rev. Lett. **94**, 142301 (2005).
28. F. Borkowski, P. Peuser, G. G. Simon, V. H. Walther and R. D. Wendling, Nucl. Phys. B **93**, 461 (1975).
29. B. Dudelzak, Ph.D. thesis, <http://inspirehep.net/record/1086331>.

30. D. Ganichot, B. Grossetete and D. B. Isabelle, Nucl. Phys. A **178**, 545 (1972).
31. D. Frerejacque, D. Benaksas and D. J. Drickey, Phys. Rev. **141**, 1308 (1966).

4.3 `./data/proton/World_GEpGmp_Polarization.dat`

1. Q^2 : Four-momentum transfer squared (Q^2) values (in GeV^2).
2. `Rp`: Form factor ratio $(\mu_p G_E)/G_M$.
3. `dR_stat`: Statistical uncertainty on `Rp`.
4. `dR_syst`: Systematic uncertainty on `Rp`.
5. `idat`: Number of the data set (1–13).

Numbers refer to `idat` in column 5 above.

1. V. Punjabi *et al.*, Phys. Rev. C **71**, 055202 (2005); M. K. Jones *et al.* [Jefferson Lab Hall A Collaboration], Phys. Rev. Lett. **84**, 1398 (2000).
2. O. Gayou *et al.*, Phys. Rev. C **64**, 038202 (2001).
3. A. J. R. Puckett *et al.*, Phys. Rev. C **85**, 045203 (2012); O. Gayou *et al.* [Jefferson Lab Hall A Collaboration], Phys. Rev. Lett. **88**, 092301 (2002).
4. S. Strauch *et al.* [Jefferson Lab E93-049 Collaboration], Phys. Rev. Lett. **91**, 052301 (2003) [ratio values from private communication with S. Strauch].
5. B. D. Milbrath *et al.* [Bates FPP Collaboration], Phys. Rev. Lett. **80**, 452 (1998) [Erratum Phys. Rev. Lett. **82**, 2221 (1999)].
6. T. Pospischil *et al.* [A1 Collaboration], Eur. Phys. J. A **12**, 125 (2001).
7. C. B. Crawford *et al.*, Phys. Rev. Lett. **98**, 052301 (2007).
8. G. Ron *et al.* [Jefferson Lab Hall A Collaboration], Phys. Rev. C **84**, 055204 (2011); G. Ron *et al.*, Phys. Rev. Lett. **99**, 202002 (2007).
9. M. K. Jones *et al.* [Resonance Spin Structure Collaboration], Phys. Rev. C **74**, 035201 (2006).
10. G. MacLachlan *et al.*, Nucl. Phys. A **764**, 261 (2006).
11. X. Zhan *et al.*, Phys. Lett. B **705**, 59 (2011).
12. M. Paolone *et al.*, Phys. Rev. Lett. **105**, 072001 (2010).
13. A. J. R. Puckett *et al.*, arXiv:1707.08587 (2017). (note: six updated data points, three from A. J. R. Puckett *et al.*, Phys. Rev. Lett. **104**, 242301 (2010), plus three from M. Meiziane, *et al.*, Phys. Rev. Lett. **106**, 132501 (2011))

4.4 `./data/proton/GEpGMp_highQ2_constraints.dat`

Four form factor values with very large uncertainties are used to constrain the high- Q^2 behavior of G_E^p and G_M^p . These values are saved in one single file. The format of the data file is:

1. Q2: Momentum-transfer squared (Q^2) values (in GeV^2).
2. GEp/GD: Constraint value on the form factor ratio G_E^p/G_D .
3. dGEp/GD: Constraint value on the uncertainty of the form factor ratio G_E^p/G_D .
4. GMp/mup/GD: Constraint value on the form factor ratio $G_M^p/(\mu_p \cdot G_D)$.
5. dGMp/mup/GD: Constraint value on the uncertainty of the form factor ratio $G_M^p/(\mu_p \cdot G_D)$.

4.5 `./data/neutron/World_GE(M)n.dat`

The data files of the G_E^n and G_M^n share the same format:

1. Q2: Momentum-transfer squared (Q^2) values (in GeV^2).
2. GEN/GD: Form factor ratio $(\mu_p G_{E(M)}^n)/G_D$.
3. GEN/GD: Total uncertainty of the form factor ratio.
4. ExpType: Type of experimental measurement. The integer values corresponding to types of measurement are listed below:

For G_E^n ,

- 1: $D(e, e'n)p$ – recoil polarization,
- 2: $D(e, e'n)p$ – polarized target (exclusive),
- 3: $^3\text{He}(e, e')$ – polarized target (inclusive),
- 4: $^3\text{He}(e, e'n)$ – polarized target (exclusive),
- 5: Unpolarized: eD elastic $B(Q^2)$,
- 6: Unpolarized: eD quasielastic inclusive,
- 7: Theory (Schiavilla and Sick, from deuteron form factors).

For G_M^n ,

- 1: Inclusive $^2\text{D}(e, e')$ cross section measurement,
 - 2: $^2\text{D}(e, e'n)/^2\text{D}(e, e'p)$ cross section ratio,
 - 3: Inclusive $^3\text{He}(e, e')$ asymmetry.
5. ExpNum: Experiment number.
 6. dNorm: Normalization factor. A value of zero means no normalization factor was assigned.

For G_E^n , experiment numbers refer to **ExpNum** in column 5 above:

1. M. Meyerhoff *et al.*, Phys. Lett. **B327**, 201 (1994).
2. T. Eden *et al.*, Phys. Rev. **C50**, 1749 (1994).
3. I. Passchier *et al.*, Phys. Rev. Lett. **82**, 4988-4991 (1999).
4. C. Herberg *et al.*, Eur. Phys. J. **A5**, 131 (1999).
5. D. Rohe *et al.*, Phys. Rev. Lett. **83**, 4257 (1999).
6. J. Galak *et al.*, Phys. Rev. **C63**, 034006 (2001).
7. R. Schiavilla and I. Sick, Phys. Rev. **C64**, 041002 (2001).
8. H. Zhu *et al.*, Phys. Rev. Lett. **87**, 081801 (2001).
9. J. Bermuth *et al.*, Phys. Lett. **B564**, 199 (2003).
10. R. Madey *et al.*, Phys. Rev. Lett. **91**, 122002 (2003).
11. G. Warren *et al.*, Phys. Rev. Lett. **92**, 042301 (2004).
12. D.I. Glazier *et al.*, Eur. Phys. J. **A24**, 101 (2005).
13. E. Geis *et al.*, Phys. Rev. Lett. **101**, 042501 (2008).
14. S. Riordan *et al.*, Phys. Rev. Lett. **105**, 262302 (2010).
15. B. S. Schlimme *et al.*, Phys. Rev. Lett. **111**, 132504 (2013).

For G_M^n , experiment numbers refer to **ExpNum** in column 5 above:

1. S. Rock *et al.*, Phys. Rev. Lett. **49**, 1139 (1982).
2. A. Lung *et al.*, Phys. Rev. Lett. **70**, 718 (1993).
3. H. Gao *et al.*, Phys. Rev. **C50**, R546-R549 (1994). Note: Value for G_M^n taken from reanalysis of Ref. 6.
4. H. Anklin *et al.*, Phys. Lett. **B336**, 313 (1994).
5. G. Kubon *et al.*, Phys. Lett. **B524**, 524 (2002).
6. B. Anderson *et al.*, Phys. Rev. **C75**, 034003 (2007).
7. J. Lachniet *et al.*, Phys. Rev. Lett. **102**, 192001 (2009).

4.6 `./data/neutron/GE(M)n_highQ2_constraints.dat`

Two form factor values with very large uncertainties are used to constrain the high- Q^2 behavior of G_E^n and G_M^n , respectively. These values are saved into two separate files for G_E^n and G_M^n .

For G_E^n , the format of the file is:

1. **Q2**: Momentum-transfer squared (Q^2) values (in GeV^2).
2. **GE_n**: Constraint value on the form factor G_E^n .
3. **dGE_n**: Constraint value on the uncertainty of the form factor G_E^n .

For G_M^n (note that the values are divided by the dipole form factors), the format of the file is:

1. **Q2**: Momentum-transfer squared (Q^2) values (in GeV^2).
2. **GM_n/mun/GD**: Constraint value on the form factor ratio $G_M^n/(\mu_n \cdot G_D)$.
3. **dGM_n/mun/GD**: Constraint value on the uncertainty of the form factor ratio $G_M^n/(\mu_n \cdot G_D)$.