Change of proton magnetic moment in nuclear magnetons due to the change of the atomic-mass values

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In connection with the revision of the tabulated values of the atomic masses and the forthcoming coordination of the fundamental physical constants, the result of the 1971 measurement of the proton magnetic moment in nuclear magnetons is re-examined by taking recent data into account. For the 1982 values of the atomic masses, the magnetic moment of a proton in a nuclear magneton, without correction for the diamagnetic screening of the water molecule, is given by $\mu_p'/\mu_n = 2.7927729 \pm 0.0000012$ $(4.3 \cdot 10^{-5}\%)$.

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In view of the revision of the tabulated values of the atomic masses and the forthcoming coordination of the physical constant, it became necessary to recalculate the values of μ_p'/μ_n measured in Ref. 1. The revision of the results revealed certain inaccuracies in the intermediate coefficients in Eqs. (1) and (2) of Ref. 1, due to insufficiently correct rounding off the last significant figures.

A new exact calculation of μ_p'/μ_n in accord with the experimental data of 1971 has shown that our mean value of μ_p'/μ_n must be changed by $-0.29 \times 10^{-4}\%$. Although this change lies within the limits of the error interval indicated in Ref. 1, we deem it necessary to report the corrected value of μ_p'/μ_n obtained from the experimental data of Ref. 1 for the atomic mass values cited in Ref. 2:

$$\mu_p'/\mu_n = 2.7927736 \pm 0.0000012 \quad (4.3 \cdot 10^{-5}\%).$$

New corrected tabulated values of the atomic masses have now been reported. With account taken of the new mass values of the atoms ^{1}H, ^{4}He, ^{20}Ne, and ^{40}Ar and of our measurement data used in Ref. 1, the value of the magnetic moment of the proton in a nuclear magneton, without correction for the diamagnetic screening of the proton in the water molecule, is

$$\mu_p'/\mu_n = 2.7927729 \pm 0.0000012 \quad (4.3 \cdot 10^{-5}\%).$$

In revised set the atomic masses the errors in the masses of ^{20}Ne and ^{40}Ar are somewhat higher than those in Ref. 2, but these differences as shown by the calculations, do not change the error indicated above for μ_p'/μ_n.

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