Spin g-factor of nucleon and lepton can express anomalous magnetic moment of electron

Shan-Hong Li

Email: duke3366@163.com

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Abstract

Electron, muon, tauon, proton and neutron seem to be five independent particles, but this paper found that there is a relationship between their spin g-factors. In this paper, we find a formula for calculating the anomalous magnetic moment of electron, which links five particles together. The calculation result of the formula is 0.0011596521807414. It is in good agreement with the experimental measurement.

Introduction

The formula found in this paper is as follows:

$$a_e = \frac{\alpha}{2\pi}\frac{\left(g_p + g_n\right)^2}{9\pi^2}\frac{g_e^5}{g_\mu^5}\sqrt{\frac{g_\tau}{2}\frac{m_n}{m_p}} \tag{1}$$

Where:

a_e is the anomalous magnetic moment of the electron.

α is a fine structure constant.

g_p is the spin g-factor of a proton.

g_n is the spin g-factor of the neutron.

g_e is the spin g-factor of the electron.

π is the pi.

m_n is the mass of the neutron.

m_p is the mass of the proton.

g_μ is the spin g-factor of the muon.

g_τ is the spin g-factor of the tauon.

The calculation result of the formula (1) is: $a_e = 0.0011596521807414$.

The latest laboratory measurement is [1]: $a_e = 0.00115965218073(28)$.

Compared with the two, it can be found that the result of equation (1) is in good agreement.

The spin g-factor of the tauon in this paper is taken from the theoretical value [2]: $g_\tau = 1.00117721$. The values for other physical quantities in formula (1) are taken from the recommended values of 2018 CODATA.

If the value of the spin g-factor of the electron in formula (1) is also taken from the laboratory measurement [1], it is calculated as: $a_e = 0.0011596521807382$. It can be found that it also conforms well.

In this paper, because the values of g_n, g_μ and g_τ can be selected, the calculation results of formula (1) are greatly affected.

References

[1] arXiv: 0801.1134v2 [physics.atom-ph]

[2] arXiv: hep-ph/0702026v1