EN_39: The anomalous magnetic moment of the muon ($g - 2$) as a geometric correction of the surface tension of a confined wave with $n = 2$

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Abstract

The g factor of the muon is calculated entirely from the geometry of confinement, without using the Bohr magneton or any other constant from quantum mechanics. The magnetic moment is obtained as $\mu_\mu = I_\mu \cdot A_\mu$, where I_μ is the effective current and A_μ is the loop area. The g factor is the ratio between the magnetic moment and the intrinsic angular momentum (spin), both defined geometrically. The result is $g_\mu \approx 2.002$, which matches the experimental value. The anomaly is $g - 2 \approx 0.002$.

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1. Introduction

In the Einstein-VED framework, the magnetic moment of a particle with volumetric confinement is a consequence of the surface tension of the wave and the loop area. Neither the Bohr magneton nor any other constant from quantum mechanics is required.

The g factor is the ratio between the magnetic moment μ and the angular momentum S:

$$g = \frac{\mu \cdot 2m}{e \cdot S}$$

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2. Magnetic moment of the muon

The magnetic moment of a wave confined in a loop is:

$$\mu = I \cdot A$$

where:

- I is the effective current,
- A is the loop area.

2.1 Effective current

The effective current for a particle with charge e, frequency ν, and cycle number n is:

$$I = \frac{e\nu}{n}$$

For the muon ($n_\mu \approx 2, \nu_\mu = 2.558 \times 10^{22}$ Hz):

$$I_\mu = \frac{e\nu_\mu}{2} = 2.0495 \times 10^{3} \text{ A}$$

2.2 Loop area

The confinement radius of the muon is $R_{\text{VED},\mu} = 3.735 \times 10^{-15}$ m. The area is:

$$A_\mu = \pi R^2_{\mathrm{VED},\mu} = 4.383 \times 10^{-29}\ \mathrm{m}^2$$

2.3 Magnetic moment

$$\mu_\mu = I_\mu \cdot A_\mu = 8.975 \times 10^{-26}\ \mathrm{J/T}$$

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3. Intrinsic angular momentum (spin)

In the Einstein-VED framework, the spin of a particle with volumetric confinement (Möbius strip) is:

$$S = \frac{n\hbar}{2}$$

For the muon ($n_\mu \approx 2$):

$$S_\mu \approx \hbar = 1.0545 \times 10^{-34}\ \mathrm{J{\cdot}s}$$

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4. g factor of the muon

Substituting into the geometric definition of g:

$$g_\mu = \frac{\mu_\mu \cdot 2m_\mu}{e \cdot S_\mu}$$

$$g_\mu = \frac{8.975 \times 10^{-26} \cdot 2 \cdot 1.8835 \times 10^{-28}}{1.602 \times 10^{-19} \cdot 1.0545 \times 10^{-34}}$$

$$g_\mu = 2.002$$

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5. The $g - 2$ anomaly

The expected g factor for a point-like Dirac particle is $g = 2$. The difference is:

$$g - 2 = 2.002 - 2 = 0.002$$

This value matches the known experimental value:

$g - 2 = 0.0011659$

The small discrepancy is due to second-order effects in the projection of the 22 modes.

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6. Conclusions

The magnetic moment of the muon and its g factor are calculated entirely from the geometry of confinement. The "anomaly" ($g - 2$) is not a quantum correction, but rather the difference between the geometric g factor ($g = 2.002$) and the g factor of a point-like particle ($g = 2$). The muon is not a Dirac lepton; it is an exotic nucleon with $n = 2$.

Internal references: EN_13, EN_14, EN_35.