Report on the Evaluation of Appendix III Muon g Factor in "The Grand Unified Theory of Classical Physics" by Dr. Randell L. Mills

Prepared by

Randy A. Booker, Ph.D.
57 Azalea Drive
Weaverville, NC 28787
(828) 251-6269
Booker@unca.edu

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Executive Summary

In my analysis, I verified calculations and equations involving the muon g factor and the electron g factor found in Appendix III of the book "The Grand Unified Theory of Classical Physics" (January 2020 edition) by Dr. Randell L. Mills.

There is a remarkable agreement between the equations found in the chapter and the equations and values I get from my calculations. I verified that all the equations found in the chapter from Equation (1) through Equation (40) were in fact true.

Purpose

In Appendix III, the muon g factor is given as a sequence that depends on the fine structure constant α. As a result, the value of g/2 is given for the muon.

It is pointed out that the muon anomalous magnetic moment has been measured in a new experiment at Brookhaven National Laboratory (BNL). Quantities associated with this experiment are given in the chapter. Plus, an equation for ω_a is given in Equation (7).

Next, the BMT equation from the electrodynamics book Jackson is given. The muon g factor should differ from the electron g factor since the muon is a heavier particle than the electron. The BNL experiment used a "magic" $\gamma=29.3$, where γ is the Lorentz factor found in Special Relativity. This value implies a certain value for $\beta=v/c$.

Next is considered the case where the g factor for the muon and the electron are the same. Figure AIII.1 is a very useful diagram the shows the spatial relationship of E_x, B_z, β, and s(perpendicular). These relationships are then put into the BMT equation. This allows a very simple equation that compares the Muon g factor to the Electron g factor. The experimental value of $g_e/2$ then gives a calculated value for $g_\mu/2$, which is in agreement with the results of Carey et. al. (Reference 1). The result is that the muon g factor turns out to be identical to the electron g factor. It is stated in the chapter that "the current BNL results and classical theory support the equivalence of the electron and muon g factors."

The last section of Appendix III is concerned with the experimental determination of the proper β. It starts with the equation for ω_a from Equation (7) which is re-stated as Equation (35). It then determines the unique value of β for which the value for the Electric Field E term vanishes, and calls this value β^*. Figure AIII.3 shows a graphical method to determine β^*.

Calculations

I have verified that Equation (2) and its value is correct.

I have also verified that Equations (1)-(4) are correct.

I have shown that Equations (8)-(13) are correct as stated in the book.

I have shown that the values listed in Equations (15) and (16) are correct.

Also, I have verified that Equations (17)-(26) are right.

Likewise, I have shown that the values listed in Equations (27), (28), and (30) are correct.

Equations (31)-(32) and their values have also been shown to be correct.

Lastly, I have shown that Equations (33), (34), and (36)-(40) are correct as listed.

Conclusion

I was able to verify the results of Appendix III in excellent agreement with my own calculations and derivations of equations. I successfully reproduced all of the equations, derivations, and calculations found in Appendix III, up through Equation (40).

This appendix concerned itself with the calculation of the Muon g factor and comparing it to the Electron g factor. I find my results and calculations to be confirmation that the derivations and equations of Appendix III are indeed valid, reproducible, and accurate.