Explaining and the precise calculation of anomalous magnetic momentum of muons in FNAL on the basis of quantize space and time theory

By Hamid Reza Karimi
Electrical Engineering Department Islamic Azad University, South Tehran Branch
Tehran, 17776-13651, Iran
email:hr.karimy@gmail.com

Abstract:
In this paper by using the quantized space and time theory we explain that why magnetic momentum of muons in Fermilab National Accelerator Laboratory (FNAL) has anomaly and doesn't compatible with the predicted amounts in the standard model. Also the speed of muons in cyclotron will be calculated precisely.

Key words: Muon, momentum, anomalous, time quanta, space quanta

1-Introduction:

One of the achievements of the space and time theory is “Charge formula", It shows that how charged subatomic particles affect on around the time-space quanta and exchange energy with electromagnetic fields with relativity.

$$q = \frac{\sqrt{8\pi\varepsilon_0 m_0 c^2 l_0}}{\sqrt[4]{1-\frac{v^2}{c^2}}} C = \frac{1\bullet 602\times 10^{-19}}{\sqrt[4]{1-\frac{v^2}{c^2}}} C \qquad (1)[1]$$

$$l_0 = 1\bullet 409\times 10^{-15} m \qquad (2)[1]$$

$$m_0 = 9\bullet 10938188\times 10^{-31} kg \qquad (3)[1]$$

Where m_0 is the initial active mass, and l_0 is length quanta around the particle.

By using this formula it can be found that, time- space around the particles bend by the energy of the charged particles and convert to eight arches by the length of ($\pi\times l_0$).This formula is regarded to relativity because the length around the particle doesn't decrease and merely changes to arches, but the internal active mass of charged particle increases under the relativity rules. In the standard model, the charge of elementary particle is constant. And this concept makes the anomaly in magnetic momentum results of muon in FNAL.

2. Calculation of the muon frequency in cyclotron

At first we should calculate the speed of muon which created in the electromagnetic field of FNAL. In this experiment the momentum of 3,1 Gev/c apply on each muon. By using two following formulas {(4) and (5)} we can calculate the basic speed of muon in cyclotron.

$$p_{\max} = \frac{h\times\sqrt{1-\frac{v^2{}_{\max}}{c^2}}}{n\times l_0\times\sqrt{1-\frac{v^2}{c^2}}} \qquad (4)[1]$$

$$E_{\max} = \frac{p_{\max} c^2}{v_{\max}} \qquad (5)[1]$$

Vmax(under the radical): $[0,1] \times v$ (6)[2] .

$$r = n \times l_0 \qquad (7)[1]$$

$$r = \sqrt[3]{\frac{M_\mu}{M_e}} \qquad (8)$$

$$r = \sqrt[3]{\frac{1.88353109 \times 10^{-28} kg}{9.10938188 \times 10^{-31} kg}} \approx 6 \times l_0 \qquad (9)$$

V max:The maximum speed of charged particle,
h: plank constant,
P max: the maximum of momentum of each muons .
r: the radius of mouns.
M_e :mass of electron
M_μ mass of muon

The equ 4 and 5, have the main role in calculation of energy exchange and particle momentum in the quantized space and time theory.

Vmax under radical is a constant and quantized number and it appears in the speed of zero and the exact amount of the maximum speed. The following formula is used to calculate the speed of the muons in FNAL.

$$E_{\max} = \frac{p_{\max} c^2}{v_{\max}} \qquad (10)[1]$$

$$p_{\max} = \frac{h}{n \times l_0 \times \sqrt{1-\frac{v^2}{c^2}}} \qquad (11)$$

The maximum momentum (Pmax) in a determined speed is equal to a momentum which can move the center of muons by the distance of their radius.

Because the momentum 3.1Gev/c is given to the muons in the laboratory, we use the mentioned formula to theoretically obtain the base speed of the muons from the electromagnetic field.

$$p_{\max} = \frac{h}{n \times l_0 \times \sqrt{1-\frac{v^2}{c^2}}} = 3 \bullet 1 Gev/c \qquad (12)$$

$$\lambda = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{3 \bullet 1 G \times e \times 6 \times l_0}{h \times c} = 21 \bullet 137 \qquad (13)$$

$\lambda =$ Lorentz Impact factor.

Thus, we have

$$v = 299456761 \bullet 2 m/s \qquad (14)[2]$$

The exact base speed is obtained from the exchange of muon particles momentum with the electromagnetic field of device formula which is impressive.

Using this speed, the period and the base frequency of muons in cyclotron are obtained.

$$T = \frac{7 \bullet 112 \times 2 \times \pi}{299456761 \bullet 2 m/s} = 149 \bullet 2 ns \qquad (15)[2]$$

$f = 6701514.Hz$ (16)[2]

Radius of central orbit of cyclotron=7.112m [2]

Which unbelievably corresponds to the base period level in the FNAL experiment ($T = 149 \bullet 2ns$) [2].

3. Theoretic calculation of muons magnetic momentum anomaly in FNAL

Supposedly, if two muons in a cyclotron stand at a distance of one space quantum, with the momentum exchanged from the first muon to the next one, beings in the motion direction and in the electromagnetic fields direction, this momentum equals,

$$r_{\mu 1} + r_{\mu 2} = 12 \times l_0 \qquad (17)$$

$$E_{\mu-\mu} = \frac{p_{\max} c^2}{v_{\max}} = \frac{h \times c}{n \times l_0 \times \sqrt{1 - \frac{v^2}{c^2}}} = 1 \bullet 4Gev \qquad (18)$$

$$p_{\max} = 3.1Gev/c + 1.4Gev/c \qquad (19)$$

However, the maximum possible energy of a muon is 4.3Gev [3]and the obtained level is greater than that of the maximum muon energy; hence, the speed is said to have reached its maximum level ($v = v_{\max} = 299792407.5m/s$), [3]increasing the radiation of the energy on the base of relativity charge formula.

Thus, the predicted speed is lower than that in the cyclotron at the standard model and this discrepancy of speed equals,

$$\Delta v = 299792407.5 - 299456761.2 = 335646 \bullet 2 m/s \qquad (20)$$

Now, assuming the first muons constant and the second ones as receiving the momentum,(The consequenced equations have been presented in a previous study of the author by the title of " solving Einstein twins' paradox "[4].
The anomalous in the magnetic momentum of muons in cyclotron obtain by using charge formula. as follows,

$$q_2 = \frac{1 \bullet 602176462 \times 10^{-19}}{\sqrt[4]{1 - \frac{335646.2^2}{c^2}}} = 1 \bullet 602176964 \times 10^{-19} C \qquad (21)$$

$$\frac{q_2}{q_1} = 1 \bullet 000000313 \qquad (22)$$

By applying the maximum speed in the following formula, the anomalous frequency of muons and their actual period in the FNAL cyclotron will be:

$$T' = \frac{7 \bullet 112 \times 2 \times \pi}{299792407 \bullet 5} = 149 \bullet 05 ns \qquad (23)$$

$$f' = 6708864.4 Hz$$

Using the $\frac{q_2}{q_1} = 1 \bullet 000000313$ coefficient, the anomalous magnetic momentum of muons in FNAL is estimated

$$\mu_\mu = g(\frac{q}{2m_\mu})\vec{s}$$

Where (24)[2]

$$g = 2(1 + a_\mu)$$

$$\mu'_\mu = g(\frac{1 \bullet 000000313 \times q_1)\vec{s}}{2m_\mu}) \quad (25)$$

Using the anomalous magnetic momentum of muons μ'_μ, the angular speed anomaly and detectors anomaly can be determined, yielding the total anomaly in the FNAL experiment.

Conclusion: If the charge of elementary particles is not taken into relativity account, in high-energy experiments, it would be impossible to calculate the energy exchange of sub-atomic particles with the surrounding time and space. The time and space quantization theory is advantageous in that it provides exact energy calculations numbers.

Reverences:

--

[1]Hadronic journal volume 33, Number3, June 2010 Quantized space a- Time and internal structure of elementary particles: A new model 249 Hamid Reza Karimi Electrical engineering Department Azadof south of Tehran 17776-13651, Iran hr.karimy@gmail.com.

[2] PHYSICAL REVIEW LETTERS 126, 141801 (2021)

"Measurement of the Positive Muon Anomalous Magnetic Moment to 0.46 ppm by:B. Abi,44 T. Albahri,39 S. Al-Kilani,36 D. Allspach,7 L. P. Alonzi,48 A. Anastasi,11,a A. Anisenkov,4,b F. Azfar,44 K. Badgley,7

S. Baeßler,47,c I. Bailey,19,d V. A. Baranov,17 E. Barlas-Yucel,37 T. Barrett,6 E. Barzi,7 A. Basti,11,32 F. Bedeschi,11

A. Behnke,22 M. Berz,20 M. Bhattacharya,43 H. P. Binney,48 R. Bjorkquist,6 P. Bloom,21 J. Bono,7 E. Bottalico,11,32

T. Bowcock,39 D. Boyden,22 G. Cantatore,13,34 R. M. Carey,2 J. Carroll,39 B. C. K. Casey,7 D. Cauz,35,8 S. Ceravolo,9

R. Chakraborty,38 S. P. Chang,18,5 A. Chapelain,6 S. Chappa,7 S. Charity,7 R. Chislett,36 J. Choi,5 Z. Chu,26,e T. E. Chupp,42

M. E. Convery,7 A. Conway,41 G. Corradi,9 S. Corrodi,1 L. Cotrozzi,11,32 J. D. Crnkovic,3,37,43 S. Dabagov,9,f

P. M. De Lurgio,1 P. T. Debevec,37 S. Di Falco,11 P. Di Meo,10 G. Di Sciascio,12 R. Di Stefano,10,30 B. Drendel,7

A. Driutti,35,13,38 V. N. Duginov,17 M. Eads,22 N. Eggert,6 A. Epps,22 J. Esquivel,7 M. Farooq,42 R. Fatemi,38 C. Ferrari,11,14

M. Fertl,48,16 A. Fiedler,22 A. T. Fienberg,48 A. Fioretti,11,14 D. Flay,41 S. B. Foster,2 H. Friedsam,7 E. Frlež,47

N. S. Froemming,48,22 J. Fry,47 C. Fu,26,e C. Gabbanini,11,14 M. D. Galati,11,32 S. Ganguly,37,7 A. Garcia,48 D. E. Gastler,2

J. George,41 L. K. Gibbons,6 A. Gioiosa,29,11 K. L. Giovanetti,15 P. Girotti,11,32 W. Gohn,38 T. Gorringe,38 J. Grange,1,42

S. Grant,36 F. Gray,24 S. Haciomeroglu,5 D. Hahn,7 T. Halewood-Leagas,39 D. Hampai,9 F. Han,38 E. Hazen,2

J. Hempstead,48 S. Henry,44 A. T. Herrod,39,d D. W. Hertzog ,48 G. Hesketh,36 A. Hibbert,39 Z. Hodge,48 J. L. Holzbauer,43

K. W. Hong,47 R. Hong,1,38 M. Iacovacci,10,31 M. Incagli,11 C. Johnstone,7 J. A. Johnstone,7 P. Kammel,48

M. Kargiantoulakis,7 M. Karuza,13,45 J. Kaspar,48 D. Kawall,41 L. Kelton,38 A. Keshavarzi,40 D. Kessler,41

K. S. Khaw,27,26,48,e Z. Khechadoorian,6 N. V. Khomutov,17 B. Kiburg,7 M. Kiburg,7,21 O. Kim,18,5 S. C. Kim,6 Y. I. Kim,5

B. King,39,a N. Kinnaird,2 M. Korostelev,19,d I. Kourbanis,7 E. Kraegeloh,42 V. A. Krylov,17 A. Kuchibhotla,37

N. A. Kuchinskiy,17 K. R. Labe,6 J. LaBounty,48 M. Lancaster,40 M. J. Lee,5 S. Lee,5 S. Leo,37 B. Li,26,1,e D. Li,26,g L. Li,26,e

I. Logashenko,4,b A. Lorente Campos,38 A. Luca`,7 G. Lukicov,36 G. Luo,22 A. Lusiani,11,25 A. L. Lyon,7 B. MacCoy,48

R. Madrak,7 K. Makino,20 F. Marignetti,10,30 S. Mastroianni,10 S. Maxfield,39 M. McEvoy,22 W. Merritt,7

A. A. Mikhailichenko,6,a J. P. Miller,2 S. Miozzi,12 J. P. Morgan,7 W. M. Morse,3 J. Mott,2,7 E. Motuk,36 A. Nath,10,31

D. Newton,39,a,d H. Nguyen,7 M. Oberling,1 R. Osofsky,48 J.-F. Ostiguy,7 S. Park,5 G. Pauletta,35,8 G. M. Piacentino,29,12

R. N. Pilato,11,32 K. T. Pitts,37 B. Plaster,38 D. Počanić,47 N. Pohlman,22 C. C. Polly,7 M. Popovic,7 J. Price,39 B. Quinn,43

N. Raha,11 S. Ramachandran,1 E. Ramberg,7 N. T. Rider,6 J. L. Ritchie,46 B. L. Roberts,2 D. L. Rubin,6 L. Santi,35,8

D. Sathyan,2 H. Schellman,23,h C. Schlesier,37 A. Schreckenberger,46,2,37 Y. K. Semertzidis,5,18 Y. M. Shatunov,4

D. Shemyakin,4,b M. Shenk,22 D. Sim,39 M. W. Smith,48,11 A. Smith,39 A. K. Soha,7 M. Sorbara,12,33 D. Stöckinger,28

J. Stapleton,7 D. Still,7 C. Stoughton,7 D. Stratakis,7 C. Strohman,6 T. Stuttard,36 H. E. Swanson,48 G. Sweetmore,40

D. A. Sweigart,6 M. J. Syphers,22,7 D. A. Tarazona,20 T. Teubner,39 A. E. Tewsley-Booth,42 K. Thomson,39 V. Tishchenko,3

N. H. Tran,2 W. Turner,39 E. Valetov,20,19,27,d D. Vasilkova,36 G. Venanzoni,11 V. P. Volnykh,17 T. Walton,7 M. Warren,36

A. Weisskopf,20 L. Welty-Rieger,7 M. Whitley,39 P. Winter,1 A. Wolski,39,d M. Wormald,39 W. Wu,43 and C. Yoshikawa7

(Muon g − 2 Collaboration)

1Argonne National Laboratory, Lemont, Illinois, USA 2Boston University, Boston, Massachusetts, USA 3Brookhaven National Laboratory, Upton, New York, USA 4Budker Institute of Nuclear Physics, Novosibirsk, Russia

5Center for Axion and Precision Physics (CAPP)/Institute for Basic Science (IBS), Daejeon, Republic of Korea

6Cornell University, Ithaca, New York, USA

7Fermi National Accelerator Laboratory, Batavia, Illinois, USA 8INFN Gruppo Collegato di Udine, Sezione di Trieste, Udine, Italy 9INFN, Laboratori Nazionali di Frascati, Frascati, Italy

10INFN, Sezione di Napoli, Napoli, Italy

11INFN, Sezione di Pisa, Pisa, Italy

12INFN, Sezione di Roma Tor Vergata, Roma, Italy

13INFN, Sezione di Trieste, Trieste, Italy

14Istituto Nazionale di Ottica—Consiglio Nazionale delle Ricerche, Pisa, Italy

15Department of Physics and Astronomy, James Madison University, Harrisonburg, Virginia, USA

16Institute of Physics and Cluster of Excellence PRISMA+, Johannes Gutenberg University Mainz, Mainz, Germany

17Joint Institute for Nuclear Research, Dubna, Russia

0031-9007=21=126(14)=141801(11) 141801-1 Published by the American Physical Society

18Department of Physics, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea

19Lancaster University, Lancaster, United Kingdom 20Michigan State University, East Lansing, Michigan, USA 21North Central College, Naperville, Illinois, USA 22Northern Illinois University, DeKalb, Illinois, USA 23Northwestern University, Evanston, Illinois, USA

24Regis University, Denver, Colorado, USA

25Scuola Normale Superiore, Pisa, Italy

26School of Physics and Astronomy, Shanghai Jiao Tong University, Shanghai, China

27Tsung-Dao Lee Institute, Shanghai Jiao Tong University, Shanghai, China

28Institut für Kern—und Teilchenphysik, Technische Universität Dresden, Dresden, Germany

29Universita` del Molise, Campobasso, Italy

30Universita` di Cassino e del Lazio Meridionale, Cassino, Italy

31Universita` di Napoli, Napoli, Italy

32Universita` di Pisa, Pisa, Italy

33Universita` di Roma Tor Vergata, Rome, Italy 34Universita` di Trieste, Trieste, Italy 35Universita` di Udine, Udine, Italy

36Department of Physics and Astronomy, University College London, London, United Kingdom

37University of Illinois at Urbana-Champaign, Urbana, Illinois, USA 38University of Kentucky, Lexington, Kentucky, USA 39University of Liverpool, Liverpool, United Kingdom

40Department of Physics and Astronomy, University of Manchester, Manchester, United Kingdom

41Department of Physics, University of Massachusetts, Amherst, Massachusetts, USA

42University of Michigan, Ann Arbor, Michigan, USA 43University of Mississippi, University, Mississippi, USA 44University of Oxford, Oxford, United Kingdom 45University of Rijeka, Rijeka, Croatia

46Department of Physics, University of Texas at Austin, Austin, Texas, USA 47University of Virginia, Charlottesville, Virginia, USA 48University of Washington, Seattle, Washington, USA

(Received 14 March 2021; accepted 25 March 2021; published 7 April 2021)

[3].Precise Theoretical Calculation of the Higgs Boson Mass on the Basis of Quantized Space and Time Theory.https://vixra.org/abs/2005.0235

[4]: HADRONIC JOURNAL VOLUME 34, NUMBER 3, JUNE 2011 ,SOLVING EINSTEIN TWINS' PARADOX, 271
Hamid Reza Karimi,Electrical Engineering Department
Azad University of South of Tehran
Tehran, 1388748591, Iran