

## THE CREATION OF THE PROTON

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### Introduction

Although particle physicists think they can probe the mysteries of creation by building mammoth accelerators costing billions of dollars to produce high speed impact of protons they do not have any theory giving insight into how those protons themselves are created. So they proceed in wild attempts to create other forms of matter thinking that will tell them how the universe itself was created. It is just the same for the problem of gravitation, given that cosmologists can justify vast expenditure in probing the depths of remote space based on their unproven notion that gravitation applies without moderation within very dense matter deemed to exist in so-called neutron stars. Yet they still have no theory showing how  $G$ , the constant of gravitation, is determined here on Earth in terms of electrical interaction as between particles. This author's insight into the latter problem, his efforts in the past being unheeded, was the subject of the previous paper No. 3 in this series. Here in this paper we shall address once again the former problem, that of proton creation, the author's findings on this theme, now dating back some 30 years. This having also been ignored by the scientific community notwithstanding its vital importance is now restated in a more advanced form in the hope that, in accounting for matter creation, it will serve to provide answers sought by unguided research and so serve to spare unwarranted waste of money on futile and ill-founded experimental effort.

### The Basic Question

Concerning the proton, which, being the heavy nucleus of the hydrogen atom, accounts for 99.95% of its mass, the basic question we face is "Why is it stable, whereas other particles are short-lived and decay after only a transient existence?" The secondary question is: "Why does it have a mass that is slightly greater than 1836 times that of its hydrogen atom partner, the electron?"

Here I note that the electron, though assumed by physicists to be stable and have no decay lifetime, does contrive to tunnel through obstructing electric potential barriers as if it suffers demise on one side of such a barrier and is reincarnated on the other side  $10^{-13}$  or so seconds latter. It seems so logical then to accept that protons and electrons are special in the sense that they may, indeed, have a finite lifetime, but there are forces at work which require the energy shed by their decay to recreate them virtually immediately in the same energy form and close to where they decay. This is merely saying that surplus energy that exists in the space environment of our quantum underworld contrives to create matter by appearing as protons and electrons.

Physicists, by quantum theory, can picture action in that quantum underworld, much as it is disguised by their mathematical equations, but they still lack the insight to see how energy unable to be absorbed by that underworld has to take material form by creating those electrons and protons. The reason, of course, is that they have been brainwashed into believing the theory advocated by Albert Einstein which makes probing that underworld based on aether theory a taboo subject. So, unless they change their belief, they are not

destined to understand how the proton is actually created and, in particular, why it has a mass some 1836 times that of the electron.

They should however realise that there is intermediate ground to be explored that is truly in the realm of quantum theory, namely what determines the actual value of Planck's constant  $h$  and what is known as the fine-structure constant which relates  $h$  with the speed of light and the charge of the electron. Yes, here we see the importance of the electron, that partner to the proton. Surely the message is: "Fathom what it is that determines the value of fine-structure constant and you will be on track in the quest to understand how matter is created." Yet, physicists, in spite of knowing how to spend vast sums of money to fund construction of their high energy particle colliders and space probes, do not know how to go about even looking for the answer to the mystery of the fine-structure constant. The ghost of Einstein stands in their way!

### **The Bottom Line in Particle Physics**

As you can see I intend to put my case rather firmly and I admit that, as I write this, I am motivated by a rejection, having offered to tell the physics community how protons are created by presenting a poster on the occasion of the 'Physics 2005' conference to be held in April 2005 under the auspices of the Institute of Physics in U.K. of which I am a member. One must, you see, be seen to conform with the current beliefs of those who act as scrutineers for such occasions. New ideas that may cast doubt on certain theoretical notions that are currently in fashion cannot be entertained.

That conference aims to celebrate Einstein's centenary and so concerns cosmology and quantum physics. It is an appropriate occasion to hear new views on matter creation and, in particular, what I refer to as 'the bottom line in particle physics'. This is a reference to the role played by the three particles that feature alongside one another below the quarks in the standard particle grid used by particle physicists. These particles are the electron, the muon and the taon, the fundamental leptons that play a major role in quantum electrodynamics.

In the previous paper [1], the subject of which was also offered as a poster session presentation at the above conference but duly rejected, I have shown how  $G$ , the constant of gravitation is determined in terms of the role played by the taon. This leaves us to answer the question: "What role, if any, is served by the muon?" As to the electron, we see it everywhere, so much so that it is appropriate to take it as a reference by which to relate the properties of other particles, but there is still the question of how the electron itself is created. Can that be answered?

Well, here I admit that I have no clear answer but I will at the end of this paper float an idea that others may find interest in exploring.

Here, my object is to account for the creation of the proton and, indeed, you will see that my answer is clear and precise in deriving a theoretical value for the proton/electron mass ratio that conforms with experiment. The virtual muon population that pervades all space is the agency that performs this creative act.

Before proceeding, and in order to gain the reader's attention, I will again, as I did in my 1986 paper [2], repeat a quotation from an authoritative scientific source dated 1985.

I note with some pride, pride I share with a colleague in advancing this theory, that when the leading experts, R. S. Van Dyck, Jr., F. L. Moore, D. L. Farnham and P. B. Schwinberg, involved in making such measurements reported in 1985 their findings in *Int. J. Mass Spectrometry and Ion Processes*, **66**, p. 327 they stated:

*The value that they [Aspden and Eagles] calculate is remarkably close to our experimentally measured value (i.e. within two standard deviations) This is even more curious when one notes that they published this result several years before direct precision measurements of this ratio had begun.*

They had measured the proton-electron mass ratio to within a precision of 41 parts in a billion and this measurement was reported some 10 years after we had presented the theoretical value derived from aether theory.

You see, it was 30 years ago in 1975 that this major step in understanding how matter is created was put on scientific record, but I still face the task of gaining its acceptance. The passage of time has, however, clarified some of the factors involved and so much of this paper is new and original, particularly the focus I shall be placing on the links between protons, taons and dimuons, the dimuon being a charged particle having double the mass of the virtual muon, and the virtual muon being the form the muon takes in its virgin state as part of the quantum electrodynamic underworld of space.

### **A Pre-Einstein Principle**

The physics governing proton creation is that founded in electron theory dating back to the pre-Einstein years, before 1905. In particular I shall be using a classic formula once used in many student textbooks and one I see in a 1904 book by reference to J. J. Thomson, the scientist who discovered the electron. I have presented the relevant quotation from that book in Chapter 2 of a work I have put on record in January 2005 [3]. It would be best for reader to read that chapter before delving into what follows. The point I there make is that  $E = Mc^2$  owes nothing to Einstein for its derivation. Indeed, as I there explain, the simple truth is that this fundamental formula arises from the fact that a charged particle reacts to an accelerating electric field so as to conserve its intrinsic energy and has nothing whatsoever to do with mathematical gymnastics performed in so-called 'four-space'.

The 'principle' I refer to in this section concerns the form of the electric charge we symbolize as  $e$ , whether this be the charge of the electron, the proton or any other fundamental particle. J. J. Thomson's formula for the energy of this charge is:

$$E = 2e^2/3a \quad (1)$$

where  $a$  is the radius of a sphere in which the charge is confined and in which the charge is so distributed that a uniform pressure prevails within that sphere and is balanced by the external pressure asserted at its surface by its self-field. One can easily verify that three quarters of this energy sits in the field outside the radius  $a$  whereas one sixth lies within the charge sphere.

As we now proceed you will see that there is liberal use of this equation and that it applies to separate charge components of a charge pair, comprising opposite polarity charges of magnitude  $e$  in surface contact. Thus the sum of two such terms as in (1) offset by a term  $e^2$  divided by the sum of their radii would represent the energy of the combination.

### A System of Notation

We will refer to the proton as P, the virtual muon as  $\mu$ , the dimuon as Q, the taon as  $\tau$  and the electron as e. The dimuon is a charge confined with a radius of half that of the virtual muon and so the energy of the dimuon is twice that of the muon.

Why do I introduce the dimuon? My answer simply is that this is the quantum of energy that my theory tells me exists in each cubic cell unit of the quantum underworld of space. As I noted in my previous paper [1], where I derived G, such cubic cell units have a cube side distance d which is equal to  $108\pi$  times the electron radius  $a$ . We are, you see, going to show how protons are created from energy shed by the quantum underworld, the aether, and the units of energy Q or the units of the energy of a virtual muon  $\mu$  are the source of the energy needed to create the proton.

As to notation, if I write:

$$(A:B)$$

this represents the energy of two charged particles A and B in surface contact and if I write:

$$(A:B)^*$$

this represents the energy applicable if B happens to be the necessary charge form corresponding to the combination having shed energy to adopt an overall minimum energy state subject to the first charge A being of constant form.

Thanks to that Thomson formula above it is a simple task to take the sum of the energies of the two particles as offset by their electrostatic interaction energy and by differentiation with respect to a variable radius of the second charge evaluate the minimum energy and that radius and thereby the value of B.

One finds that B is equal to  $(\sqrt{3/2} - 1)$  times A or 0.22474A whereas the energy shed has the value  $(\sqrt{3/2} - 1)^2$  times A or 0.0505102A and so we are ready to delve into the secrets of proton creation.

### The Proton Creation Process

We begin by supposing that somehow the proton as a single charge form P has been created. Why then is it so stable as to be the primary component of all matter? Can it somehow be associated with another particle form that has led to a minimum energy situation? If so then what is that particle form? It would, from the above analysis, have an energy that is 0.22474 times P which happens to be the combined energy of two virtual muons or the dimuon Q.

Surely that is not a coincidence. Our proton must somehow be able to exist, even if only transiently, in the form:

$$(P:Q)^*$$

but if so it has shed energy that has itself a particle form, whether as a single particle or particle combination, that has a net charge e.

The latter energy is, in fact, the quantity  $\Delta$  of the expression:

$$(Q:\Delta)^*$$

So, our empirical enquiry, given that P has been created, tells us that it might exist in an overall stable net energy state given by:

$$(P:Q)^* + \Delta \mathbb{V}$$

even though it may be switching form, oscillating as it were, between its single form P and a three-particle state. This is consistent with the experimental observation that the proton exhibits a three-quark composition.

Now, though this accounts the stability of the proton or next task is to explain how it is actually created and, a most important consideration, why it is a unique form of stable matter. That link with the dimuon energy quantum may seem a sufficient answer and, indeed, that was the status of my research back in 1975 when the theory of the proton/electron mass ratio was first recorded [4]. However, some 11 years on from there, in 1986, I advanced the theory when I saw how shedding that energy  $\Delta$  was the clue to proton creation from a virtual muon source [5].

I asked what would happen if  $n$  virtual muons were to transfer their energy and a charge  $e$  to the particle combination  $(Q:\Delta)^*$  and cause  $\Delta$  to be separated whilst  $Q$  merged with the muon inflow to create the combination  $(P:Q)^*$ . I realised that  $n$  would have to be odd, meaning inflow of one more positively charged virtual muon than the inflow of negatively charged virtual muons. Also, to be sure, one might expect a mismatch of energy and so some further energy shedding than occurs in forming  $(Q:\Delta)^*$ .

To my genuine surprise however, and intense satisfaction, it became evident from the mathematics involved that  $n$  not only had to be odd but that it could only have a unique value to keep energy in balance with no loss by radiation.

To find  $n$ , note that:

$$n\mu + (1 - 0.0505102)Q = Q/(0.22474487) \quad (2)$$

and that  $Q$  is  $2\mu$ . One can see that  $n$  has to equal 7.

The result is that the proton must have a mass that is 8.898979486 times the mass of the virtual muon, the mass energy of the latter being half that of a cubic cell of the quantum underworld of space, found by pure theory to be equal to the mass energy of 206.3329 electrons.

Therefore the proton/electron mass ratio obtained by this theoretical pursuit is slightly above 1836.152 as recorded in that 1975 paper [4].

In the light of this I cannot see how anyone can doubt the role played by the virtual muon in creating the proton and so creating matter generally. If one seeks to question the derivation of that factor 206.3329 then that requires reference to my book '*Physics Unified*' [6] published in 1980. It is fully of record on my website [www.aspden.org](http://www.aspden.org) and on page 112 you will see an equation (160) which is the result of a full derivation of that figure above. The equation actually is:

$$E_0 = 412.665816 m_e c^2$$

where  $E_0$  is the energy  $Q$  or  $2\mu$  of the above analysis.

### Particle Creation and the Electron

I said above that I would 'float an idea' concerning the electron whilst on this subject of matter creation. I have, in my research so far, taken the electron's existence for granted and I have, for some 15 years now, been more concerned with energy issues of our real world than the underlying physics theory that preoccupied me as a private interest from 1955 to 1980. So in coming back to the subject of matter creation, I can point to a clue pertaining the electron and positron forms of matter.

First note that, in deriving that  $E_0$  energy quantum above, the vital step was that of determining the mass and energy of a fundamental particle that pervades all space and accounts for the Heisenberg jitter motion of quantum theory. The energy density of that particle is identical to the energy density of  $E_0$  divided by the volume of the cubic cells of the quantum underworld, each of side distance  $108\pi$  times the charge radius of the electron. The volume of the charge occupied by that fundamental particle was deemed to be an odd

multiple of the volume of the electron. This step was need to refine the calculation of the fine-structure constant determined by my theory, as discussed in reference [7]. The electron came into the act in that context and also in regard to its quantum angular momentum of  $h/2\pi$  as used in formulating the theory of that quantum underworld of space.

Now, in regard to the creation of matter in the form of atoms of higher order than hydrogen, my theory of early record did contemplate the proton becoming associated with a meson in a two particle charge combination of the kind noted above with the energy thereby shed being absorbed in the main by creating what I referred to as electron-positron chains. These comprised a line of electrons interposed between positrons in adjacent charge surface contact and I noted that about 166 or so electrons and positrons in a chain might form a discrete link between two adjacent particle sites in the quantum underworld, as one can see by halving that  $108\pi$  factor.

As early as 1974, in reference [8], I recorded my ideas on the subject of heavier atoms and their structure but at that stage I had settled on the belief that the meson linked to the proton component in the atomic nucleus had to be that charge form Q introduced above. Furthermore, since we are here considering atoms of atomic number greater than unity, we confront the neutron as a component in the atomic nucleus. Here I declare quite categorically that the neutron as such has no presence in an atomic nucleus. When created as a free particle form it exists as a combination of electrons and/or positrons with a proton or antiproton and survives for several minutes before decaying. The so-called neutron of the atomic nucleus is an antiproton form that happens to have replaced a charge occupying a lattice site in the space medium.

The thought I now float concerns the form that energy might take when shed by the union of the P and Q particle forms and a pointer to the electron-positron pairing.

I have stressed in the previous paper [1], No. 3 in this series, that the taon has a role as a graviton in accounting for gravitation and that gravitons provide dynamic balance for an equal mass of matter sharing the quantum jitter motion. Note therefore the approximate energy equality between:

$$\begin{array}{l} e + (P:Q) + (P:Q) \\ \text{and:} \quad \tau + (e:e) + (e:e) \end{array}$$

In terms of electron mass (P:Q) has an energy of  $[1 - (\frac{3}{2} - 1)^2]P$  or, with P as a little over 1836.152, some 1743.4 electron mass units and so the combined energy of the three components is 3487.8. The (e:e) electron-positron components may be shown to have an energy of 1.25 electron units, this being 2 minus their interaction energy. So if we deduct 2.5 from 3487.8 to get 3485.3 we might expect the taon  $\tau$  to have a mass energy equivalent to 3485.3 electron units.

The reader may verify by reference to the previous paper [1] that the value of the taon mass in electron units which gave us the precise value of G as measured was 3485 electron units.

The suggestion therefore is that the proton creation process has features which indicate electron-positron pair creation forming components that can combine to create links between components in the atomic nucleus, especially as the (P:Q) forms sit at one end of such links. The  $\Delta$  energy component of the three-state proton form has enough energy to create such links with a little energy to spare.

The energy quantum involved has presumably not been detected as a meson owing to the transient quark nature of existence of the  $\Delta$  form.

A question which then should be raised is that of why I take two (P:Q) combinations as the basis of taon creation. Why not six or seven? The answer has to be that Nature plays a statistical game of trial and error and will create numerous particle forms, as will the high energy particle colliders at CERN and elsewhere. However, the particles that will take control will be those having a higher creation rate at specific energy values and which have energy determined by two factors. We see that in the case of the proton because its energy was determined first without that factor  $n$  of 7 being assumed but then we found that only the factor 7 could give the right energy input. So where is that other factor for the taon? Well it is presented on page 156 of reference [9], as published in 1986. There, also taking the energy of the proton as the base reference, I indicated how a series of hyperons developed by processes involving charge-pair annihilation and consolidation of charge with conservation of charge energy and charge volume and all based on the proton, dimuon and taon forms. Indeed, the clear message from that analysis of six hyperons, all of which were found to have theoretical energy values in conformity with observation, was that the energy of the taon was greater than that of the proton by the factor 3 raised to the power  $7/12$ . The latter has the value 1.898107 and, the proton/electron mass ratio being 1836.152, this gives the taon/electron mass ratio as 3485.2

### Conclusion

One can but conclude that the quest to understand how matter is created is best pursued by such analysis rather than trying to create freak forms of matter using high energy particle colliders. I do stress the need to rethink adherence to Einstein philosophy given what I have said in my four chapters in my recent work '*Physics without Einstein: A Centenary Review*' [3]. Until the scientific world recovers its good sense and takes another look at the mysteries of our cosmos with the aether in mind and Einstein ignored we really have no hope of inspiring future science students and gaining a better understanding of the phenomena which dominate, indeed constitute, our very existence.

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