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The Quantization of Space

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Abstract

In the present work, it will be shown that the dimensionless number 137 of the fine-structure constant α demands a quantization of space. For this purpose, we refer to a volume constant of electromagnetic processes, which takes effect as a volume quantum. This involves not only a re-evaluation of the Dirac equation but also, and above all, a determination of Einstein's velocity vector as the fundamental property of these processes. A prerequisite is the linking of the hydrogen spectrum with the hydrogen nucleus.

Keywords

Hydrogen Spectrum, Dirac Equation, Einstein's Velocity Vector, Newton's Law of Universal Gravitation, Planck-Constant, Spin-Orbit Coupling

1. Introduction

The fact that the fundamental natural constant α can be formed with the electron charge *e*, the speed of light *c*, and the reduced Planck constant $\hbar$, should be sufficiently well known and does not therefore justify any further discussion. This would apply if it were not for the dimensionless number of this constant, for which has *found by experiment* the approximate value of 137. If we consider this number and follow the words of P.A.M. Dirac, then *there is no known reason why it should have this value rather than some other number* [1], or to quote Richard P. Feynman: *It has been a mystery ever since it was discovered more than fifty years ago, and all good theoretical physicists put this number up to their wall and worry about it* [2].

This may sound over-exaggerated but is not. After all, on closer examination, this number was not only a "*mystery*" in Feynman's time but it remains so today. And it will also remain so in future, if its derivation is not fundamentally queried. What is meant here is the quantum-mechanical derivation of the hydrogen spectrum and its relationship to the electron e^-, while the hydrogen nucleus p^+ is ignored.

Now, the objection could be raised here, that e⁻ is coupled to p⁺ via Coulomb and thus to the electrical charge Q. Hence, via Q there is very much indeed a relationship between p⁺ and the hydrogen spectrum, which is also something that we have no intention of disputing. However, it must be admitted that this relationship is only indirect. If we actually bundle the terms scheme of hydrogen to form a continuous line, which would then correspond to the Rydberg constant R_H, and transfer this line into the distance between e⁻ and p⁺, then although it can indeed be seen that R_H is coupled to p⁺ via Q, it is also apparent that a gap nevertheless remains. This aims at a link between R_H and p⁺, which gives rise to the question: What is meant here by 137? And this question that remains to be answered. A graphic representation is given in **Figure 1**.

2. Momentum

Let us now turn to the link we are striving to achieve, which admittedly is not quite as easy as may initially appear. This is because a link such as this cannot be created in this way. At least not if this is taken to mean a simple extension of R_H

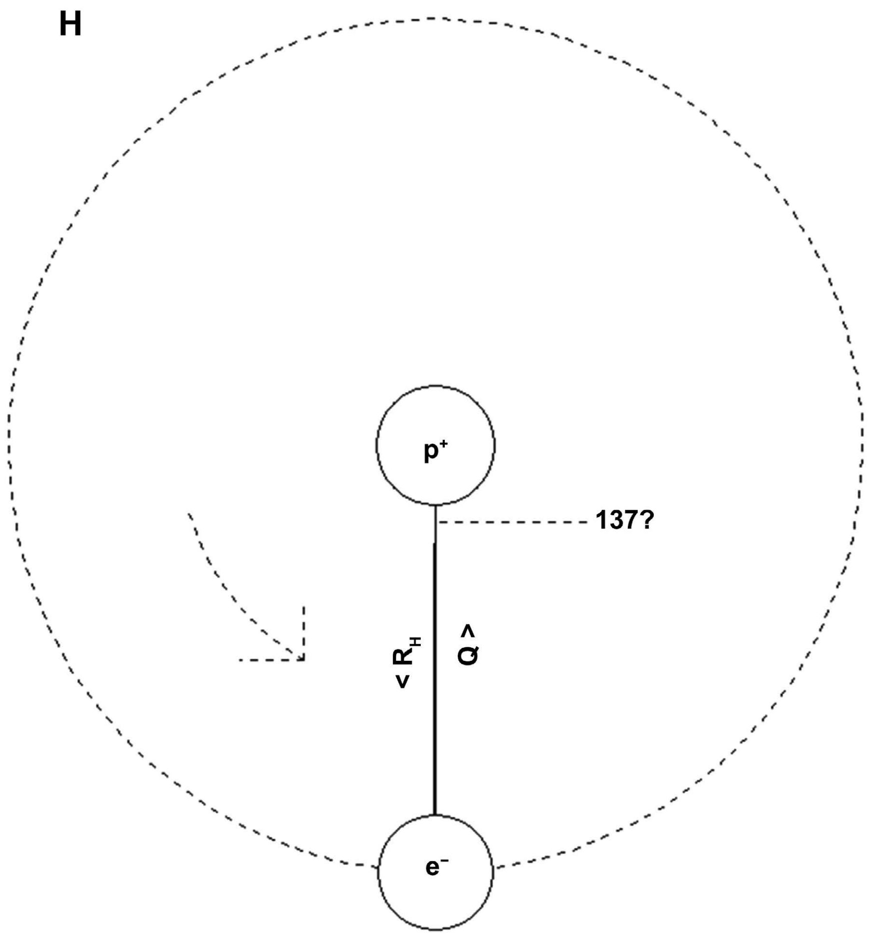

Figure 1. This figure shows the coupling between e⁻ and p⁺ via Q, while a gap between R_H and p⁺ remains.

in the direction of p^+. This is not only prohibited by Dirac's relativistic wave equation and its splitting into a hyperfine structure, but above all by the allowance of negative energy through this equation. For this purpose, the positron e^+, postulated by Dirac and confirmed by Anderson still has to be added, and this marks the end point of the hydrogen spectrum. Moreover, this point which cannot be exceeded.

Consequently, the only remaining possibility is an approximation from the opposing direction, although here too a problem arises. This is because e^+ cannot be exceeded from this direction either and is consequently defined as the absolute end point of the hydrogen spectrum. Unless we concentrate not only on the hydrogen nucleus but also include its electric charge of $Q = -1/3 + 2/3 + 2/3$ in our explanation as well and assume that e^+ is contained within this charge. After all, then a positive end point of negative energy comes into effect, and the link strived for becomes established of its own accord, which admittedly is not without consequence for the charging behavior. If we first consider the charge component $Q = -1/3$ as the point of linkage and take account of the input of external energy, then we are no longer exclusively concerned with an electrical charge of $Q = -1/3 + 2/3 + 2/3 = 1$ inside the hydrogen nucleus. Instead, an electric potential of $U = -1/3 + 1 + 2/3 + 2/3 = 2$ appears temporarily, which is able to exhibit a momentum of $p = 6$ exactly as demanded by the ohmic resistance of Ω = 1/3. In short,

$$p = 1 \times \frac{2}{1/3} = 6$$

We observe that a positive endpoint of negative energy demands not only a linking of R_H and p^+, but also and above all a momentum of $p = 6$, which takes effect as the integral multiple of $Q = 1$.

3. Fine Structure

Before we focus our discussion of the fine-structure constant α and consider its dimensionless number more closely, we must refer to our condition once more and emphasize that we never wanted to replace p^+ by e^+. After all, we are very well aware that we would no longer be concerned with a hydrogen atom but with a hydrogen-like positronium, which have to annihilate and hence destroy itself. Yet it is out of question in this case. It is therefore still in case that a positive endpoint of negative energy demands not only a connection between R_H and p^+, but also a momentum of $p = 6$, which takes effect as the integral multiple of Q = 1, or of the elementary charge of $e = 1.602 \times 10^{-19}$ C, which then is one and the same thing.

After having said this, we now wish to concentrate on α. After all, if it dimensionless number is to exist, then it must be possible to demonstrate the value 137 at the position of the linkage. Initially, the result is disappointing. In any case, this value cannot be derived from a charge of $6 \times 1.602 \times 10^{-19}$ C. Unless we introduce a mass of $m = 6$ into our consideration and extend this mass by the mass point $m = 1$. This is because we are then not only concerned with a charge of $e = 9.612 \times 10^{-19}\ \text{C}$ within p^+. Instead, a mass of $m = 6 + 1$ appears additionally, which is inversely proportional to the effect. And because this effect not only captures the position of the linkage, but 100% of the hydrogen spectrum—just as Bohr's principle of correspondence demands this—we are actually concerned with a position that can produce the number 137. To which of course the electron charge $e/100$ also has to be added, which is related to this position via Q. This corresponds to a position of electromagnetic processes, exactly as required by the agreement of electromagnetic coupling constant and the fine-structure constant. In short,

$$\alpha = \frac{9.612 \times 10^{-19}}{6 + \left(1 + e/100\right)} \times 100\% = 137$$

We observe that the dimensionless number 137 results from a momentum that can exhibit both a charge and a mass, which is inversely proportional to the effect. However, we have not conclusively explained 137 with this. Let as actually follow this momentum through to its end then we are dealing with a constant for its charge while its mass is a variable. Which determines the term scheme of hydrogen in the mass point $m = 1$. This distinguishes 137 as a prime number and draws attention to its scattering in the squares 121 and 16 within which the natural numbers 11 and 4 are contained.

4. Volume Constant

After the preceding explanation, it should now be clear that the number 137 must be derived from a link between R_H and p^+. Nevertheless, this cannot yet be said of its scattering. However, before we deal with this scattering in more detail, we wish to discuss the value 144, which can be derived from the addition of 137 + 6 + 1. What is meant by this is a vector addition that appears as a volume constant of electromagnetic processes. Contained within it is a velocity vector, which admittedly still has to be determined.

Yet this is easier said than done because we will search in vain for a volume constant able to exhibit such a vector within the quantum theory. And this applies to both the quantum mechanics and the quantum mechanical extensions to the highly diversified quantum field theories. The reason can be seen in Albert Einstein's relativistic orientation of e^- which, although it contains the terms position and velocity is, however, not able to exhibit a volume constant of electromagnetic processes. And there is certainly no velocity vector within it [3]. Mistrust is therefore called for. Or to put it in words of Werner Heisenberg: *We thus have good reason to suspect the uncritical application of the terms "position" and "velocity"* [4]. And because this case we wish to distance ourselves from Einstein's Orientation in order to substitute e^- by p^+. This allows the velocity vector c, to emerge as a fundamental property of the elementary charge e, within a volume constant of electromagnetic processes. What is meant by this is a vectorial alignment of p to the gravitational constant $G = 6.674 \times 10^{-11}\ \text{m}^3/\text{kg} \cdot \text{s}^2$

which is inversely proportional to the effect. And because this effect does not capture the position of the link, but instead 100% of the hydrogen spectrum—just as Bohr's principle of correspondence demands this—we are in actual fact dealing with a constant that raises the mass point $m = 1$ into the space in order to take effect as a volume constant, $V_e = 144$ In short,

$$V_e = \frac{9.612\times10^{-19}}{6.674\times10^{-11}\ \text{m}^3/\text{kg}\cdot\text{s}^2}\times100\% = 144$$

We observe that the vectorial direction of p demands an inversely proportional effect of G. In this respect, we are not dealing with a mass attraction between particles within the hydrogen atom, as is generally presumed, but instead with an inversely proportional effect of space, which is able to exhibit a volume constant of $V_e = 144$ at the position of the link. Contained in this is the natural number 12.

5. Volume Quantum

Let us now talk about the scattering of 137 and concentrate on the natural numbers 11 and 4, which are contained within the natural number 12. Or within the square $(11 + 1)^2$ as we can also say, which contains such a scattering.

Here we refer to the addition of external energy. What is meant by this is an activation of $V_e = 144$, which as square $(11 + 1)^2$, is able to exhibit a mass point of $m = 1$. Contained in this is a point-based activation of the first and second binominal formula. If we follow this activation to its conclusion, then the Babylonian multiplication demands a vectorial direction of the natural number 11, which supplies as the Rydberg frequency $R = (11/10)c$, an activation of the natural number 12. This correspondents to a magnetic moment of $M = 4$, which can be derived from $12/c$. In this respect, we are concerned with a volume constant of electromagnetic processes at the position of the link, which is able to produce both the Rydberg frequency $R = 3.2967\times10^{15}\ \text{Hz}$ and the magnetic moment $M = 4$. This contains the inverse effect $N = 1.1 \times 10 = 11$ which supplies a vectorial direction of these processes.

However, this in no way deals with the required scattering. This is because our search for $M = 4$ within this direction will be in vain. The reason can be seen in an activation of the natural number 12 which contains a shift in mass from $m = 1$ to $m = 2$. This is because if a square of $(11 + 1)^2$ is contained within the volume constant $V_e = 144$, and hence a mass point of $m = 1$, then the magnetic moment $M = 4$, demands a square of $(10 + 2)^2$ and hence a mass point of $m = 2$, which is inversely proportional to the effect. This corresponded to an angular momentum of $m^1/m^2 = 1/2$ while $N = 11$ remains. From this it follows that within the volume constant $V_e = 144$, the angular momentum $s = 1/2$ links the magnetic moment $M = 4^2$ with the inverse effect $N = 11^2$, in precisely the way demanded by the value of $4^2 + 11^2 = 137$.

The volume of the electron remains, which is equivalent to a volume quantum of $V_h = 145$. In this connection, we refer to the inversely proportional relationship that takes effect between p and Planck's constant $h = 6.626 \times 10^{-34}\ \text{J} \cdot \text{s}$. And because this effect, records both V_e = 144 as well as the volume of the electron and hence 100% of the hydrogen spectrum—just as Bohr's principle of correspondence demands this—we are in fact dealing a volume quantum, which is able to exhibit the value V_h = 145. In short,

$$V_h = \frac{9.612 \times 10^{-19}}{6.626 \times 10^{-34}\ \text{J} \cdot \text{s}} \times 100\% = 145$$

We observe that the volume quantum, V_h = 145, demands both a volume of the electron and a volume constant of electromagnetic processes. But this is not the end of the matter. Because, the electron-mass of m_e = 1 still has to be added to this, which takes effect on this constant via Q. This corresponds to an effect of 1 + 6 + 1 = 8, which not only produces the required scattering of these processes, but in particular contains its spatial sequence.

Here we refer to a constant that can derived from $9.612 \times 10^{-19}\ \text{C}/8 = 1.2$. If we in fact consider this constant and take into account the value from 12/1.2 then m = 2 raises the natural number 12 into space to produce $(12 + 2)^2$ as a sequence of 10 energy levels. And in fact inversely proportional and diminishing with the square of the distance, precisely as demanded by the Rydberg constant R_H = 11/(12/1.2) demands in which the value of 137 is contained. As far as the question posed initially is concerned, within the Rydberg constant we are concerned with a constant that takes effect as both a magnetic moment and as an inverse effect. At the same time, however, neither can be determined with any accuracy. This then corresponds to Heisenberg's uncertainly principle and appears in the Compton Effect. A graphic representation is given in **Figure 2**.

6. The Quantization of Space

In conclusion we shall discuss the derivation of the fine-structure spectrum in quantum mechanics, which following the linking of R_H and p^+ cannot exist. This is shown by both the value $V_h = 146$ and the electrical charge Q = 1. This contains a break in symmetry that draws attention to a spatial structure of negative energy, which is established below the hydrogen nucleus. Here, this is called the quantization of space.

Let us start with the value $V_h = 146$ which can be derived from the addition of $(11)^2 + (4 + 1)^2$. What is meant by this is a quantum mechanical disentanglement of 12/c, by coupling the magnetic moment $M = 4$, to the electron mass, $m_{e^-} = 1$. This is called relativistic spin-orbit coupling, which cannot exist in this way. In this connection, we refer to the inversely proportional relationship that takes effect between p and the reduced Planck constant, $\hbar = 6.528 \times 10^{-16}\ \text{eV} \cdot \text{s}$ And because this constant does indeed cover 100% of the hydrogen spectrum—just as Bohr's principle of correspondence demands this—but at the same time omits 12/c, we are in fact concerned with a quantum mechanical disentanglement, which is then only able to exhibit the value $V_h = 146$. In short,

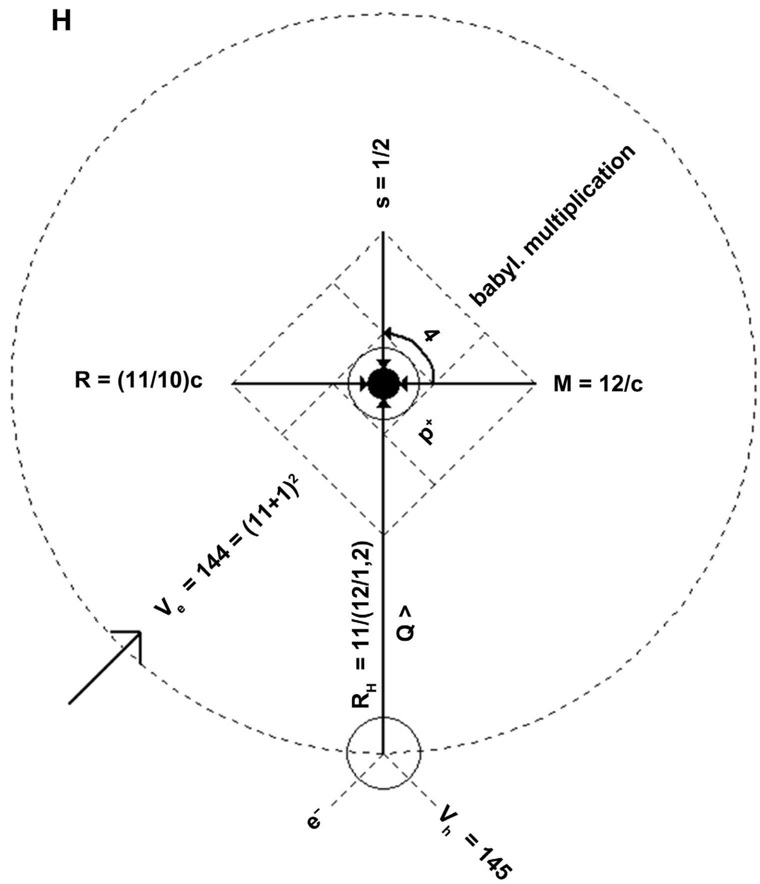

Figure 2. This figure shows the linking of R_H and p^+, which allows p^+ to emerge as a volume constant of electromagnetic processes while e^- takes effect as a volume quantum.

$$V_h = \frac{9.612\times10^{-19}}{6.582\times10^{-16}\ \text{eV}\cdot\text{s}}\times100\% = 146$$

We observe that the quantum mechanical disentanglement $V_\hbar = 146$, demands a resolution of the relativistic spin-orbit coupling. This is because $12/c$ then takes effect as Einstein's universal constant, λ [5], and is therefore able to exhibit a magnetic moment of $M = 4$, which is able to produce an angular momentum of $s = m^1/m^2 = 1/2$, while the electron remains without its own intrinsic angular momentum. This is corresponds to a break in symmetry, precisely as demanded by $V_e = 144$. And when P.A.M. Dirac says: *I think one is one safe ground if one makes the guess that in the physical picture we shall have at some future stage e and c will be fundamental and ħ will be derived* [1], then one has to agree with him. However, with the supplement that: *because c is a fundamental property of e which is causally imposed within p, while ħ has to be substituted by* $V_h = 145$.

After having stated this, we wish to concentrate on the quantization of space, which contains an electrical charge of $Q = 1$. In this context, we observe that the equivalent $m = 1$ has to be contained within this charge if a quantization such as this is to exist. What is meant by this is a charge-mass equivalent that does in fact determine the energy quantum of p but cannot, however, be derived from an electrical charge of $U=-1/3+1+2/3+2/3=2$. And not in any case from $Q=-1/3+2/3+2/3=1$ unless that this we not only refer to *U*, but also additionally to another electrical charge of $\bar{e}=(1/3+2/3)+(1/3+2/3)=2$ which is established as spatial structure of negative energy below the hydrogen nucleus. If we in fact accept such a structure, then we have to deal with 2 charges inside the hydrogen nucleus, which are inversely proportional to one another. This corresponds to a quantization of space, which in actual fact can exhibit a charge of $Q=2/2=1$. Contained in this is a charge-mass equivalent of $m_e=1$. In short,

$$Q=\frac{U}{\bar{e}}=1$$

However, this is not the end of the matter. This is because our search for a mass point of $m=1$ within this equivalent will be in vain. But this does not mean that we would have to forgo such a point. Instead, we refer to a hidden variable of $e=2/3$, which can be derived from an electrical charge of $U=-1/3+1+(2/3+2/3)$. If we in fact consider this variable and take into account the spatial structure of negative energy, which is established below the hydrogen nucleus, then within the hydrogen nucleus we are not only concerned with "*fermionic top quark partners T of charge* 2/3", as the CMS collaboration demands [6], but additionally with an energy difference of $\Delta_e=1/3-(-1/3)=2/3$, which takes effect in the event of an energy change. This corresponds to the inversely proportional effect of a positron, which, as a positive endpoint of negative energy, is able to exhibit a charge structure of [−(−1/3) + 2/3] precisely as required by $m=1$. In short,

$$m=\frac{\bar{e}^+}{\bar{e}^+}=1$$

The charge structure of the electron remains. In this connection, we refer to an energy difference of $\Delta_e=2/3$, which is not only imposed within the hydrogen nucleus but also as matter of necessity within the electron. This corresponds to a hydrogen charge of $Q=-(1/3+2/3)+(-1/3+2/3+2/3)=0$. However, the addition of external energy is not contained within this. If we in fact consider this energy, then a charge of $Q=-(1/3+2/3)+(-1/3+1+2/3+2/3)=1$ appears, which in actual fact contains a positive end point of negative energy, but not, however, to enter into a process of annihilation. Instead a volume constant of electromagnetic processes appears which takes effect as a volume quantum. Or as *a finite number of energy quanta that are localized as points of space*, to give Einstein's *Heuristic Point of View* a correct spatial order [7].

From this it follows that after linking R_H and p^+, we are not only concerned with a resolution of the electron-spin coupling but above all with a resolution of the quantum field theory, which has to be substituted by a quantization of space. Admittedly a disastrous state of affairs, but we have no other choices.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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