A Non-Standard Model: an alternative Theory of Everything

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Summary

This paper recaps the main results of our photon, proton and electron models and also revisits our earlier hypothesis of the neutrino being the carrier of the strong force carrier. As such, we think this paper contains all necessary ingredients of an alternative interpretation of quantum mechanics. We refer to this interpretation as a *realist* or classical interpretation because it does not require any equations or assumptions beyond the classical framework of physics: Maxwell's equations and the Planck-Einstein relation are all that is needed.

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Introduction

From our previous papers[1], it is obvious that we do not think much of the mainstream distinction between bosons and fermions. We find the complementary distinctions between elementary and composite particles, and between stable and non-stable particles, much more useful. The reader should immediately note that these distinctions are related but not the same: they effectively *complement* each other. Let us give some examples:

- We think of photons, electrons and protons as elementary particles. Elementary particles are, obviously, stable. They would not be elementary, otherwise. In contrast, not all stable particles are elementary.
- We think of atoms as *stable* composite particles, for example: we can, effectively, remove electrons from them (by ionization). That reveals their composite structure. Atoms are stable but, obviously, they are *not* indestructible. In fact, ionization requires very little energy: the electromagnetic bond between the nucleus and the electrons is quite weak.
- A neutron is an example of a composite particle which is *non*-stable: outside of the nucleus, it spontaneously disintegrates into a proton and a neutron.[2] Pions are another example of non-stable composite particles.[3]

We should make a few additional notes here. First, while we think of electrons and protons as elementary particles, we think they have some internal *structure*.[4] This is why they are also *not* indestructible, as evidenced from, say, high-energy proton-proton collisions in CERN's LHC.

Second, we do not believe in the quark hypothesis. We think the quark hypothesis results from an unproductive approach to analyzing disintegration processes: inventing new quantities that are supposedly being conserved, such as strangeness (see, for example, the analysis of K-mesons in

[1] See, for example, *Feynman's Worst Jokes and the Boson-Fermion Theory* (https://vixra.org/abs/2003.0012).
[2] The neutron's *mean* lifetime is just under 15 minutes (), which is an eternity in the sub-atomic world, but quite short on the human time scale, of course. Neutron disintegration also involves the emission of the mysterious neutrino, which we shall talk about later.
[3] Pions are classified as mesons. We also have baryons. However, to make sense of the concept of mesons and baryons, one needs to believe in quarks. Mesons are supposed to consist of two quarks, while baryons are supposed to consist of three. Because we do not believe in quarks, we think the distinction is not useful. Worse, we think it is an example of *non*-productive theory. For a complete scientific overview of what happens to unstable particles, we refer the reader to the tables of the Particle Data Group (http://pdg.lbl.gov/2019/tables/contents_tables.html).
[4] Their structure is given by the ring current or *Zitterbewegung* model, which we will present in a moment.

Feynman's *Lectures*[5]), is… Well… As strange as it sounds. We, therefore, think the concept of quarks confuses rather than illuminates the search for a truthful theory of matter.

Third, as mentioned above, we think all matter-particles carry charge—even if they are neutral. When they are neutral, there is a positive and negative charge inside which balances out. We think photons and neutrinos – all particles which travel at the speed of light – do *not* carry any electric charge. They are nothing but a traveling field. The reader will now ask: what *is* a traveling field? Our answer is this: think of a force without a charge to act on. This brings us to our fourth and most fundamental remark:

We think a charge comes with a *very* tiny but non-zero rest mass. We also think a charge takes up some very tiny but non-zero space.[6] We think most of the mass of the electron and the proton can be explained by Wheeler's concept of 'mass without mass': the equivalent mass of the energy in a local oscillation of the charge. In other words, we think the mass of protons and electrons is relativistic. However, for the equations to make sense, some non-zero rest mass must be assumed.[7]

The remarks above lead to the following simple table of matter-particles:

Matter-particles	**Elementary**	**Composite**
Stable	Electrons and protons[8]	Atoms and molecules
Non-stable		All non-stable particles (e.g. neutrons, pions, kaons,…)

The table above suggests we should try to why some only very few (composite) particles are stable. We think it has to do with the Planck-Einstein Law. We think it models a fundamental *cycle* in Nature, and if that cycle is slightly off, particles will disintegrate into stable components, which do respect the Planck-Einstein Law—*exactly*, that is.

Stable versus non-stable particles: the Planck-Einstein Law

We think of electrons and protons as oscillations in time and in space. Because of relativity theory, we need to quickly say a few things above that first: what is relative and what isn't?

Relativity theory tells us time is relative (your clock isn't mine, and vice versa) but that is not a sufficient reason to mix the concepts of space and time into the rather vaguely defined concept of *spacetime*. Space is what it is – just three-dimensional Cartesian space – and time is also what it is: the clock that ticks away. Both are related through the idea of motion: an object moving from here to there covering

[5] See: Feynman's *Lectures*, Vol. III, Chapter 11, Section 5 (https://www.feynmanlectures.caltech.edu/III_11.html#Ch11-S5).
[6] The latter remark is not as fundamental as the former, however.
[7] The non-zero rest mass also explains the anomaly in the magnetic moment (and radius) of protons and electrons, so we feel good about this assumption.
[8] The reader will note we leave the photon (and the neutrino) out of the table. We do *not* think of them as matter-particles. We might have referred to them as bosons, but the concept of bosons has been contaminated by the idea of messenger particles 'mediating' forces (think of W/Z bosons here), so we do not like to use it. If we would have to use a common term for photons and neutrinos, we'd refer to them as light or light-particles, as opposed to matter-particles.

some distance Δs in some time interval Δt. Its velocity – as measured in our reference frame – is equal to $v = \Delta s/\Delta t$. The relativity of time is nicely captured in the following formula for the Lorentz factor:

$$\gamma = \frac{1}{\sqrt{1 - v^2/c^2}} = \frac{\mathrm{dt}}{\mathrm{d\tau}}$$

The t-time is the time in our reference frame – which is, quite aptly, referred to as the *inertial* reference frame (think of it as *my* clock) – while the τ-time is the *proper* time: the clock of the moving object (think of it as *your* clock). We may usefully distinguish between the velocity in the *x*-, *y*- or *z*-direction and it may, therefore, also be necessary – but only very occasionally – to distinguish between the Lorentz factor in the *x*-, *y*- or *z*-direction. If this comes as a surprise to you, you should note that Einstein himself – in the seminal 1905 article in which he introduces the principle of relativity – distinguished between the 'transverse' and 'longitudinal' mass of an electron, and *not* because he was confused or mistaken on the subject.[9]

Any case, that should be enough of an introduction to the concepts of space, time and motion. Let us get on with the matter—literally. We introduced a photon, electron, and proton model in previous papers.[10] So what about other particles, such as neutrons or mesons?

As mentioned above, we think of these as non-stable *composite* particles and, hence, they should be analyzed as non-equilibrium systems. The reader will, of course, immediately cry wolf: the neutron is stable, isn't? It is, but only inside of the nucleus. Hence, that too requires a different type of analysis: such analysis may or may not resemble the analysis of electron orbitals or other atomic systems. It is of no concern to us here now.

The point is this: we think non-stable particles are non-stable because their *cycle* is slightly *off*. What do we mean by that? We mean their cycle time (T) does not fully respect the Planck-Einstein relation ($E = h \cdot f = \hbar \cdot \omega$), which – in this context – we may write as:

$$\mathrm{T} = \frac{1}{f} = \frac{h}{\mathrm{E}} \Leftrightarrow \mathrm{E} \cdot \mathrm{T} = h$$

Hence, we think of non-stable particles as non-stable *oscillations* which have some excess energy they need to get rid of by ejecting a stable or unstable *matter*-particle (electrons and protons are stable, but an unstable configuration may also eject a neutron or some meson[11]) or, else, one or more photons or neutrinos. The so-called second and third generation of charged particles are also non-stable and we think of them in the same way: we do not see any mystery in terms of explanation here.

[9] For a concise discussion, see: https://www.mathpages.com/home/kmath674/kmath674.htm

[10] See: https://vixra.org/author/jean_louis_van_belle.

[11] It may also be some other *baryon*. Wikipedia offers a decent introduction to the particle zoo (https://en.wikipedia.org/wiki/Hadron) but it should be obvious to the reader that we do not agree with the traditional classifications. Why? Because we do not adhere to the quark hypothesis. We think the quark hypothesis results from an unproductive approach to analyzing disintegration processes: inventing new quantities that are supposedly being conserved, such as strangeness (see, for example, the analysis of K-mesons in Feynman's *Lectures*, Vol. III, Chapter 11, section 5), is… Well… As strange as it sounds. We, therefore, think the concept of quarks confuses rather than illuminates the search for a truthful theory of matter.

Hence, the cycle of stable particles is *not* slightly off. It is *on*—and very precisely so. What do we mean with that, then? Let us briefly recap our model(s) here.

The ring current model of matter-particles

As mentioned above, we do not think the distinction between spin-1/2 and spin-1 particles (bosons versus fermions) is productive.[12] We think the basic distinction is this:

1. Matter-particles carry electric charge—even if they are neutral: we think of a neutron as some combination of a proton and an electron, for example.[13]
2. In contrast, photons (and neutrinos) are, effectively, force carriers.

What's a force carrier? It is nothing but a traveling field. What's a field? A field is a force without a charge to act on. Of course, the reader may think this definition confuses as much as it explains, but we think it is clear enough. In case the reader would be confused, then we strongly advise him or her to read one or more previous papers on our photon model.[14]

We will come back to photons and neutrinos. Let us first discuss our ring current model of matter-particles—of electrons and protons, that is. Unlike other ring current or *Zitterbewegung* theorists, we do *not* invoke Maxwell's laws of electrodynamics to explain what a proton and an electron might actually *be*—not *immediately*, at least (we will need Maxwell's laws later, though). Our model only uses (1) Einstein's mass-energy equivalence relation, (2) the Planck-Einstein law, and (3) the formula for a tangential velocity. Indeed, the basics of the ring current model may well be summed up by the latter:

$$c = a \cdot \omega$$

Einstein's mass-energy equivalence relation and the Planck-Einstein relation explain everything else[15], as evidenced by the fact that we can immediately derive the Compton radius of an electron from these three equations:

$$\left.\begin{array}{r} \left.\begin{array}{r} \mathrm{E} = \mathrm{m}c^2 \\ \mathrm{E} = \hbar\omega \end{array}\right\} \Rightarrow \mathrm{m}c^2 = \hbar\omega \\ c = a\omega \Leftrightarrow a = \dfrac{c}{\omega} \Leftrightarrow \omega = \dfrac{c}{a} \end{array}\right\} \Rightarrow \mathrm{m}a^2\omega^2 = \hbar\omega \Longrightarrow \mathrm{m}\frac{c^2}{\omega^2}\omega^2 = \hbar\frac{c}{a} \Leftrightarrow a = \frac{\hbar}{\mathrm{m}c}$$

The geometry of the ring current model is further visualized below. We think of an electron (and a proton) as consisting of a pointlike elementary charge – pointlike but *not dimensionless*[16] - moving about at (*nearly*) the speed of light around the center of its motion.

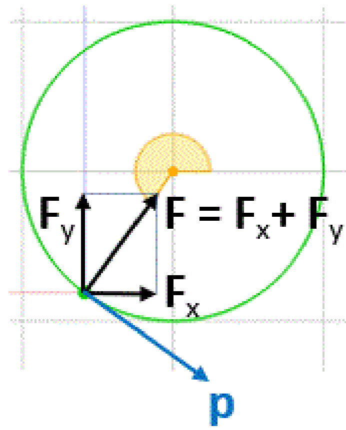
[12] We refer to our jokingly harsh conceptual analysis of this distinction in: https://vixra.org/abs/2003.0012.

[13] See our paper on protons and neutrons: https://vixra.org/abs/2001.0104.

[14] See, for example: https://vixra.org/abs/2001.0345.

[15] In this paper, we make abstraction of the anomaly, which is related to the *zbw* charge having a (tiny) spatial dimension.

[16] See footnote 15.



The relation works perfectly well for the electron. However, when applying the $a = \hbar/mc$ radius formula to a proton, we get a value which is about 1/4 of the *measured* proton radius: about 0.21 fm, as opposed to the 0.83-0.84 fm charge radius which was established by Professors Pohl, Gasparan and others over the past decade.[17] In previous papers[18], we motivated the 1/4 factor by referring to the energy equipartition theorem and assuming energy is, somehow, equally split over electromagnetic field energy and the kinetic energy in the motion of the *zbw* charge. However, the reader must have had the same feeling as we had: these assumptions are rather *ad hoc*. We, therefore, propose a more radical assumption:

> When considering systems (e.g. electron orbitals) and excited states of particles, angular momentum comes in units (nearly) equal to *ħ*, but when considering the internal structure of elementary particles, (orbital) angular momentum comes in an integer fraction of ħ. This fraction is 1/2 for the electron[19] and 1/4 for the proton.

Let us write this out for the proton radius:

$$\left.\begin{array}{r}\left.\begin{array}{r}\mathrm{E}=\mathrm{m}c^2\\ \mathrm{E}=\dfrac{\hbar}{4}\omega\end{array}\right\}\Rightarrow \mathrm{m}c^2=\dfrac{\hbar}{4}\omega\\ c=a\omega\Leftrightarrow a=\dfrac{c}{\omega}\Leftrightarrow\omega=\dfrac{c}{a}\end{array}\right\}\Rightarrow \mathrm{m}a^2\omega^2=\frac{\hbar}{4}\omega\Longrightarrow \mathrm{m}\frac{c^2}{\omega^2}\omega^2=\frac{\hbar c}{4a}\Leftrightarrow a=\frac{1}{4}\frac{\hbar}{\mathrm{m}c}$$

An explanation of the anomaly

We should add one correction here, which is related to the so-called anomaly of the magnetic moment. We do not think of it as an anomaly at all, in fact, because we have a perfectly rational explanation for it: we think the *zbw* charge has some very tiny (but non-zero) rest mass. This, then, explains why its tangential velocity is *very near* but not exactly equal to *c*. It should be noted that the accuracy of the Planck-Einstein relation is preserved because we also distinguish between a theoretical and an actual

[17] For the exact references and contextual information on the (now solved) 'proton radius puzzle', see our paper on it: https://vixra.org/abs/2002.0160.
[18] See reference above.
[19] The reader may wonder why we did not present the ½ fraction in the first set of equations (calculation of the electron radius). We refer him or her to our previous paper on the effective mass of the *zbw* charge (https://vixra.org/abs/2003.0094). The 1/2 factor appears when considering *orbital* angular momentum only.

radius. To be precise, based on the *measured* value of the magnetic moment, we can calculate the actual velocity and radius of the *zbw* charge in the electron as[20]:

$$r = \frac{a}{\sqrt{1+\frac{\alpha}{2\pi}}} \approx 0.99942 \cdot \frac{\hbar}{mc}$$

We get a radius that is slightly *smaller* than the theoretical *a* = ħ/m*c* radius. Does that make sense? It does: if the real and theoretical frequency are the same, and if the real tangential velocity of our zbw charge (*v*) is slightly smaller than the speed of light (*c*), then the real radius must be slightly smaller too. In fact, the *v*/*c* and *r*/*a* ratios must be exactly the same, as we can see from the tangential velocity formula:

$$1 = \frac{\omega}{\omega} = \frac{v/r}{c/a} \Leftrightarrow \frac{v}{c} = \frac{r}{a}$$

We effectively assume that the Planck-Einstein relation is being obeyed here—not approximately, but *exactly!* We can, therefore, calculate the relative velocity as:

$$\beta = \frac{v}{c} = \frac{r}{a} = \frac{a}{a \cdot \sqrt{1+\frac{\alpha}{2\pi}}} = \frac{1}{\sqrt{1+\frac{\alpha}{2\pi}}} \approx 0.99942$$

Very nice! Now we can calculate the actual rest mass of the pointlike *zbw* charge:

$$\mathrm{m_0} = \sqrt{1-\beta^2} \cdot \mathrm{m_\gamma} = \sqrt{1-\beta^2} \cdot \frac{\mathrm{m_e}}{2} = \sqrt{1 - \frac{1}{1+\frac{\alpha}{2\pi}}} \cdot \frac{\mathrm{m_e}}{2} = \sqrt{\frac{\alpha}{2\pi+\alpha}} \cdot \frac{\mathrm{m_e}}{2} \approx 0.017 \cdot \mathrm{m_e} \approx 0.034 \cdot \mathrm{m_\gamma}$$

Hence, we arrive at the conclusion that the rest mass of the pointlike *Zitterbewegung* charge is equal to about 1.7% of the rest mass of the electron (m_e), or 3.4% of its relativistic mass (m_γ). Is this a credible result? We think so, but we will invite the reader to carefully review the calculations, of course!

The electron versus the proton: separate forces or *modes* of the same?

What are the implications for the assumed centripetal force keeping the elementary charge in motion? The centripetal acceleration is equal to $a_c = v_t^2/a = a\cdot\omega^2$. It is probably useful to remind ourselves how we get this result so as to make sure our calculations are relativistically correct. The position vector ***r*** (which describes the position of the *zbw* charge) has a horizontal and a vertical component: $x = a\cdot\cos(\omega t)$ and $y = a\cdot\sin(\omega t)$. We can now calculate the two components of the (tangential) velocity vector ***v*** = d***r***/dt as $v_x = -a\cdot\omega\cdot\sin(\omega t)$ and $v_y\ y = -a\cdot\ \omega\cdot\cos(\omega t)$ and, in the next step, the components of the (centripetal) acceleration vector $\boldsymbol{a_c}$: $a_x = -a\cdot\omega^2\cdot\cos(\omega t)$ and $a_y = -a\cdot\omega^2\cdot\sin(\omega t)$. The magnitude of this vector is then calculated as follows:

$$a_c^2 = a_x^2 + a_y^2 = a^2\cdot\omega^4\cdot\cos^2(\omega t) + a^2\cdot\omega^4\cdot\sin^2(\omega t) = a^2\cdot\omega^4 \Leftrightarrow a_c = a\cdot\omega^2 = v_t^2/a$$

Now, Newton's force law tells us that the magnitude of the centripetal force $|\mathbf{F}|$ = F will be equal to:

[20] For the details of the calculation, see the reference above.

$$F = m_\gamma \cdot a_c = m_\gamma \cdot a \cdot \omega^2$$

As usual, the m_γ factor is, once again, the *effective mass* of the *zbw* charge as it *zitters* around the center of its motion at (nearly) the speed of light: it is *half* the electron mass.[21] If we denote the centripetal force inside the electron as F_e, we can relate it to the electron mass m_e as follows:

$$F_e = \frac{1}{2} m_e a \omega^2 = \frac{1}{2} m_e \frac{\hbar}{m_e c} \frac{E^2}{\hbar^2} = \frac{1}{2} \cdot \frac{m_e{}^2 c^3}{\hbar}$$

Assuming our logic in regard to the *effective* mass of the *zbw* charge inside a proton is also valid – and using the $4E = \hbar\omega$ and $a = \hbar/4mc$ relations – we get the following equation for the centripetal force inside of a proton[22]:

$$F_p = \frac{1}{2} m_p a \omega^2 = \frac{1}{2} m_p \frac{\hbar}{4 m_e c} \frac{4^2 E^2}{\hbar^2} = 2 \cdot \frac{m_p{}^2 c^3}{\hbar}$$

How should we think of this? In our oscillator model, we think of the centripetal force as a restoring force. This force depends linearly on the displacement from the center and the (linear) proportionality constant is usually written as k. Hence, we can write F_e and F_p as $F_e = -k_e x$ and $F_p = -k_p x$ respectively. Taking the ratio of both so as to have an idea of the respective strength of both forces, we get this:

$$\frac{F_p}{F_e} = \frac{k_p}{k_e} = \frac{2 \cdot \frac{m_p{}^2 c^3}{\hbar}}{\frac{1}{2} \cdot \frac{m_e{}^2 c^3}{\hbar}} = 4 \cdot \frac{m_p}{m_e} \Leftrightarrow \frac{F_p}{m_p} = 4 \cdot \frac{F_e}{m_e} \Leftrightarrow \boldsymbol{a_p} = 4 \cdot \boldsymbol{a_e}$$

The $\boldsymbol{a_p}$ and $\boldsymbol{a_e}$ are acceleration vectors – not the radius. The equation above seems to tell us that the centripetal force inside of a proton gives the *zbw* charge inside – which is nothing but the elementary charge, of course – an acceleration that is *four* times that of what might be going on inside the electron.

Nice[23], but how meaningful are these relations, really? If we would be thinking of the centripetal or restoring force as modeling some *elasticity* of spacetime – which is nothing but the *guts* intuition behind

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[21] The reader may not be familiar with the concept of the effective mass of an electron but it pops up very naturally in the quantum-mechanical analysis of the linear motion of electrons. Feynman, for example, gets the equation out of a quantum-mechanical analysis of how an electron could move along a line of atoms in a crystal lattice. See: Feynman's *Lectures*, Vol. III, Chapter 16: *The Dependence of Amplitudes on Position* (https://www.feynmanlectures.caltech.edu/III_16.html). We think of the effective mass of the electron as the relativistic mass of the *zbw* charge as it whizzes about at nearly the speed of light. The rest mass of the *zbw* charge itself is close to – but also not quite equal to – zero. Indeed, based on the measured anomalous magnetic moment, we calculated the *rest* mass of the *zbw* charge as being equal to about 3.4% of the electron rest mass (https://vixra.org/abs/2002.0315).

[22] The reader may briefly wonder why we would assume that the effective mass of the elementary charge inside the proton would also be *half* of the mass of the (elementary) particle, which is the *proton* here—not the electron! We will invoke the energy equipartition theorem here: half of the *total* energy (or mass) of the particle is kinetic (so that is the effective mass of the *zbw* charge inside), while the other half is in the force field that keeps the *zbw* charge in its orbital motion.

[23] The 1/4 ratio sounds *much* better than the ratios between the electromagnetic and strong force we derived using Yukawa's equation for the nuclear potential. See, for example: https://vixra.org/abs/1906.0311, in which we do a rough calculation showing the nuclear force must be in the range of 358,000 N! We think this rather ridiculous value shows Yukawa's formula may not be very sensible.

all of the more complicated string theories of matter – then we may think of distinguishing between a *fundamental* frequency and higher-level harmonics or overtones.[24]

Hence, our answer to the question in the title of this section is this: the so-called strong force inside of a proton is just another *mode* of the same centripetal force that keeps the *zbw* charge inside an electron in its orbital motion. Of course, the obvious question here is: what is the *nature* of this force? Here, we must revert to classical physics: because the force grabs onto an electric charge – the *same* elementary charge, actually[25] – it must be electromagnetic. Here, we do need to refer to Maxwell's laws. The following section explains why.

Electrons and protons as superconducting current rings

The $a = \hbar/mc$ and $a = \hbar/4mc$ equations – for the electron and proton respectively – are undetermined: because $\hbar$ and c are constants, the radius effectively depends on the *mass*. Why is the mass of the electron what it is, and why is the mass of a proton what it is? The limited set of equations above effectively allows us to dream up any elementary particles—with any mass or any radius. So what makes an electron an electron and what makes a proton a proton?

Here is where we need Maxwell's laws, and the other constants of Nature – most notably the electric and magnetic constants ε_0 and μ_0, which are related to each other and to the fine-structure constant as follows[26]:

$$(1)\ \varepsilon_0\mu_0 = \frac{1}{c^2} \qquad (2)\ \varepsilon_0 = \frac{q_e^2}{2\alpha hc} \qquad (3)\ \mu_0 = \frac{2\alpha h}{q_e^2 c}$$

Here we see everything is related to everything: our model is not only determined by Einstein's mass-energy equivalence, the Planck-Einstein relation and the geometry of the model (the tangential velocity formula). No! We also need the electron charge and the electric/magnetic constant. Our oscillator model and the traditional ring current (or *Zitterbewegung* model) need each other!

At this point – and for the convenience of the reader – we should effectively remind ourselves of the history of the model. Oliver Consa (2018) offers a good overview of it.[27] It was first proposed in 1915, by the British physicist and chemist Alfred Lauck Parson—but it got a lot more attention when Schrödinger stumbled upon it when exploring solutions to Dirac's wave equation for a free electron. Schrödinger shared the 1933 Nobel Prize for Physics with Paul Dirac for "the discovery of new productive forms of atomic theory", and it is worth quoting Dirac's summary of Schrödinger's discovery in his Nobel Prize Lecture:

> "The variables give rise to some rather unexpected phenomena concerning the motion of the electron. These have been fully worked out by Schrödinger. It is found that an electron which seems to us to be moving slowly, must actually have a very high frequency oscillatory motion of

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[24] For a basic introduction, see my blog posts on *modes* or on music and physics (e.g. https://readingfeynman.org/2015/08/08/modes-and-music/).

[25] The only difference between the *zbw* charge inside an electron and a proton is the *sign* of the charge: plus versus minus.

[26] The reader can easily *google* these results. We get the second and third equation from combining the first and the definition of the fine-structure constant.

[27] See: Oliver Consa, Helical Solenoid Model of the Electron (http://www.ptep-online.com/2018/PP-53-06.PDF).

small amplitude superposed on the regular motion which appears to us. As a result of this oscillatory motion, the velocity of the electron at any time equals the velocity of light. This is a prediction which cannot be directly verified by experiment, since the frequency of the oscillatory motion is so high and its amplitude is so small. But one must believe in this consequence of the theory, since other consequences of the theory which are inseparably bound up with this one, such as the law of scattering of light by an electron, are confirmed by experiment." (Paul A.M. Dirac, *Theory of Electrons and Positrons*, Nobel Lecture, December 12, 1933)

As such, we should consider all of these models to be mathematically equivalent. We just like ours because it gives a *physical* interpretation of the wavefunction. Indeed, we know the wavefunction consist of a sine and a cosine: the cosine is the real component, and the sine is the imaginary component. We think of both of them as being *equally real* in the sense that each of these two oscillations effectively account for *half* of the total energy of the electron.[28]

The reader may wonder: what is real here? Is it the electric current and the electromagnetic field and force that keeps the charge in its orbit, or is the sine and cosine oscillations? We do not have a good answer to this question: all we can say is that we know that the description of an electron in terms of a two-dimensional oscillation should be equivalent to the description of what keeps the pointlike *Zitterbewegung* charge going, and that is – as far as we know – the *electromagnetic* force resulting from the current.

We may, perhaps, add one remark here. The reader will be very familiar with electromagnetism and will, therefore, be inclined to consider the description in terms of a superconducting loop more intuitive and, therefore, think of it as being more real too, perhaps. However, we should remind the reader of the relativity of electric and magnetic forces, which is why we think that our two-dimensional oscillator model as more than just a mere mathematical equivalent to a description in terms of electromagnetic fields and forces. In fact, we feel there is something more fundamental to *our* description—but we readily admit that is probably because we have worked with it for a long time now.

Let us move to the next.

The neutrino as the carrier of the strong(er) force

We already mentioned that we think of a photon a simple oscillation of the electromagnetic *field*: it does not carry any electric charge itself. This is why the concept of virtual photons is not appealing: if we believe that two electric charges produce some electromagnetic field that keeps them together, then we don't need virtual photons to carry energy or momentum between them.

We can now think of neutrinos as oscillations of the above-mentioned 'strong' or – there may be higher modes – strong*er* version of the electromagnetic field.[29] Why? Let us – for reasons of convenience – refer to the stronger version of the centripetal force as… Well… The strong force. 😊

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[28] Of course, the reader may want to know how we think of the motion of non-free electrons—electron *orbitals*, most notably. We refer our reader to our manuscript (https://vixra.org/abs/1901.0105), which is based on the notion of *layers* of motion.

[29] If the charge remains the same, but the force is stronger, then the field (think of it as the force without a charge

If we have two forces, we must also have two different energies. Why? Energy is force over a distance. Distance is distance, so they do not have any stronger or weaker variant. In contrast, if we distinguish between a strong force and an electromagnetic force, then we should also distinguish between electromagnetic from strong energy. Hence, the idea of neutrinos taking care of the energy equation when some shake-up involves a change in the energy state of a nucleus makes perfect sense to me.

In other words, the idea of a counterpart of the photon (as the carrier of the electromagnetic force) for the strong force – i.e. the neutrino as the carrier of the strong force – makes perfect sense to me.

What about the weak force?

We now have both the electromagnetic and strong force covered. What about the weak force? Our answer to that is brutally short: we do not believe there is something like a weak force. We know Glashow, Salam and Weinberg got a Nobel Prize in Physics for modeling the weak force but – from what we wrote above – it is rather obvious we think it is a crucial mistake to think of the weak force as a force. We think decay or disintegration processes should be analyzed in terms of transient or resonant oscillations and in terms of classical laws: conservation of energy, linear and angular momentum, charge and – most importantly – in terms of the Planck-Einstein relation. Forces keep things together: they should not be associated with things falling apart.

An alternative Theory of Everything? What about gravity?

The reader will probably think this is a rather meagre alternative Theory of Everything, and he or she is right. There are two or three reasons why we kept it meagre—perhaps only one, really:

1. We want the reader to have some fun thinking through the concepts themselves.
2. See the reason above.
3. We are rather tired of repeating things we talked about in previous papers.

However, we should note we did cover *all* of the stable and non-stable particles in this paper—in five pages only! That, in itself, is quite an achievement, isn't it? 😊

The final question must be this: if the strong force is just another *mode* of the electromagnetic force, then what about gravity?

We have no answer to that question. That's why our theory is not any better than the Standard Model: it's a theory about *almost* everything. Having said that, the reader will have to acknowledge it's much simpler and – therefore – much more fun ! 😊

Back to the question. What's *gravity*? Gravity is and remains a mystery. Efforts to think of it as some residual force (electromagnetic and strong forces may not cancel out) look equally tedious and non-productive as, say, trying to think about what quarks or W/Z bosons might actually *be*. Einstein's geometrical approach to gravity continues to make sense, intuitively—but that's only because of its mathematical beauty, basically. Of course, we fully acknowledge that a beautiful theory is not necessarily true. On this point, we may quote Dirac[30]:

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to act on) will be stronger as well.

[30] We quickly *googled* and the results indicate Dirac wrote these words in an article for the May 1963 issue of

> "It seems that if one is working from the point of view of getting beauty in one's equations, and if one has really a sound insight, one is on a sure line of progress. If there is not complete agreement between the results of one's work and experiment, one should not allow oneself to be too discouraged, because the discrepancy may well be due to minor features that are not properly taken into account and that will get cleared up with further development of the theory."

We think our simple equations are rather beautiful. Let us see how much energy and time[31] we have left to make further progress on them. Not all that much, probably—which is good: the *Mystery Wallahs* will want to stay in business!

[…] OK… We may have frustrated the reader here 😊 so let us conclude by rephrasing or rewording our remark on the gravitational force above: we think it just keeps the Universe – expanding or not[32] – *together*. Indeed, we have the Earth going around the Sun (or – in a Ptolemaian world view – the Sun around the Earth, but we don't like to think that way because then we have too many reference frames to deal with), and we also have the Milky Way next to Andromeda, and so on and so on. In other words, I like to think of gravity as a very simple idea: we live in One Universe. Full stop. Without gravity, the Universe wouldn't stick together, would it? Einstein's geometrical approach to gravity – which basically amounts to saying gravitation isn't a force either – makes, therefore, a lot of sense to us. Indeed, when everything is said and done, we live in one Universe only, and its macro-structure is defined by what we refer to as gravity. Einstein's geometric approach tells us we should not bother about trying to define gravity as a residual force: as far as I am concerned, the idea of gravity – as captured in Einstein's geometric approach to it – just tells us the Universe is what it is.

Conclusions

While this paper is only a few pages, we do think it offers a simple but correct explanation of (almost) everything. The reader should probably think of it as a Great Simplification Theory rather than a Great Unification Theory but – if the simplifications are mathematically correct, which we think they are – then that should be good enough.

Jean Louis Van Belle, 7 March 2020

Scientific American. Dirac was born in August 1902, so he was getting closer to retirement then. It is interesting to see how Dirac distanced himself from mainstream quantum mechanics at a later age. He must have had the same feeling: al this hocus pocus can*not* amount to a *real* explanation.

[31] Planck's quantum of action is that of (physical) action: the product of energy and time. For some weird reason, this weird physical dimension suddenly makes sense to us, but then I must admit I am approach Dirac's age when he wrote this. Math and physics do exhaust the human brain.

[32] The Universe is expanding, of course! We do not doubt the measurements here. At the same time, it is sticking together! Fortunately! Otherwise we would not be here to write any stories about it. 😊