Contrasting internal structures: Photon and electron

Pons, D.J. [1]

Abstract

We develop a conceptual model for the internal structures of the photon and electron, based on the cordus model. The main differentiating feature between the photon and electron is identified as the way it deals with its field structures or hyff. The photon has a fibrillating relationship with its field, whereas the electron is a pulsating field-pump. The resulting model permits an explanation of the discrete (approximately quantised) electrostatic force, the propulsion mechanism for the speed of light, and the gravitational bending of light. These are side-effects and the larger advantage of this model is the potential to explain photon-electron interactions generally.

Keywords: photon, electron, field, hidden variable solution

Edition 1 > Date: Tuesday, 20 September 2011 > Document: Pons_Cordus_5.2_ElectronPhoton_E1.0.11.doc

1 Introduction

The root assumption of orthodox physics is the premise that particles are merely zero-dimensional points. Consequently the conventional physics, including quantum mechanics (QM), sees no internal structure to the photon and electron. These fundamental particles are held to be simple points, and Bell's theorem is typically taken as confirming this interpretation. However, 'simple' might not be an apt term, since QM nonetheless and paradoxically believes the particles have certain properties, such as frequency, spin, and polarisation. QM calls these 'intrinsic' variables and denies that there is any internal structure that carries these variables. Hence QM denies the legitimacy of what are called hidden variable solutions.

Purpose

Thus the purpose of the present paper, which is to describe the internal structure of the photon and electron, is totally irrelevant to orthodox physics. We take the position of physical realism: that externally manifest physical properties logically require some sort of internal physical substructure to carry the mechanisms. Our aim is to identify what that internal structure might look like, and put forward some conceptual models. Ultimately we wish to get closer to answering the deeper questions of physics: how does annihilation actually work?; how is a photon emitted? To do this requires a model of the internal structures,

[1] *Please address correspondence to Dr Dirk Pons, University of Canterbury, Christchurch, New Zealand.*

because asking how an electron emits a photon is a meaningless question from the point perspective.

So we need a different way of thinking if we are going to make any progress towards these fundamental questions. Quantum mechanics simply is not up to the task of giving us physical interpretations of processes between substructures that it denies even exist. So the new paradigm will have to be radically different to QM [1]. However it is undeniable that QM is massively successful as a mathematical model, and thus we can reasonably expect that a new paradigm will also need to be consistent with QM's mathematical models.

There is reason to believe that there may be a better theory than QM. In particular, a case may be made that Bell's theorem is fundamentally wrong, being only an artefact of circular logic [2, 3]. If Bell's theorem is put aside, then QM's point construct also fails. Thus it is possible to conceive of internal structures for particles, as the cordus conjecture shows [4].

Previously we have predicted some of the internal structures for the photon [4, 5], quarks [6], and electron [7]. Now we consolidate these ideas into more specific models, focussing on the photon and electron. We are particularly interested in these two 'particules', as a better understanding of their internal mechanics has the potential to unlock other effects such as annihilation.

Background: Cordus conjecture
The cordus model [4] is used as the starting point. This perspective refutes the premise of the point particle, and instead replaces it with the idea of the 'cordus particule', consisting of two 'reactive ends' a small distance apart ('span') and joined by a 'fibril'. The reactive ends are energised at a frequency [5], during which time they emit one or more transient force pulses ('hyffons') into space along lines called 'hyperfine fibrils' (hyff) [8]. This makes up the electrostatic, magnetic, and gravitation (EMG) fields, which are thus also discretised.

2 Structural differences between photon and electron

We need to have a clear model of the difference between the photon and electron particules, because we expect those differences will support the process, which in turn give rise to emission, absorption, annihilation, etc.

We have separately created a model that differentiates between matter and antimatter (M-aM) [7]. This novel explanation is made in terms of the arrangement of hyff, and these considerations are again important here. Thus we distinguish the photon and electron by the way their hyff behave, particularly the handedness thereof, which we call *ma*.

2.1 Photon as a fibrillating hyff-pump

The cordus model identifies that the field structures (hyff) of the photon have some peculiar characteristics. Specifically, the photon is a *fibrillating* hyff-pump, whereas the electron and indeed all other matter and antimatter is a pulsating pump. The photon reactive end pumps *out* a hyffon, and then promptly *withdraws* it, and reverses the direction, see Figure 1. The photon never releases its hyffon.

The outward hyffon motion corresponds to negative charge, and inward to positive (a cordus convention). Thus the photon changes sign, hence the observed reality that the electric field of the photon reverses sign. The frequency model for the photon is set out in a companion paper [5] and describes the internal structures and how their mechanics delivers the externally observed effects.

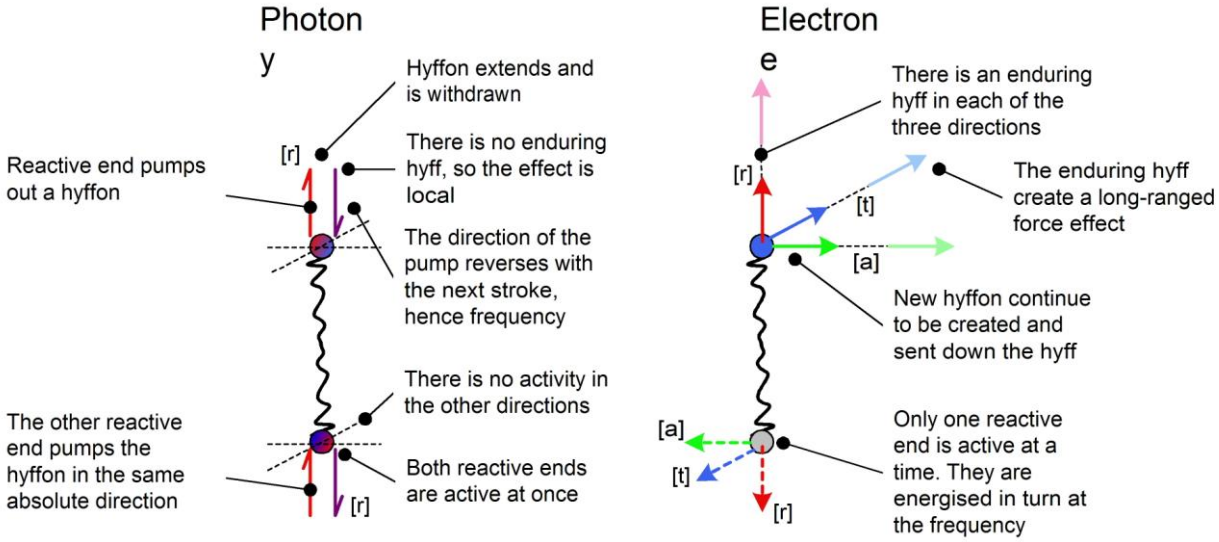

Figure 1: Models for the photon and electron, showing the different characteristics of their pumps. The photon has a fibrillating pump that only shuttles energy outwards and then immediately afterwards brings it back inwards, whereas the electron consistently pushes hyffon force fragments outwards in a pulsating manner. Both cordi therefore have a frequency, but the difference is what they do with it. All other matter and antimatter behaves like the electron, though the direction of pumping is reverse for positive charge.

The fibrillating nature of the photon arises because of a close coupling between the field and the fibril: the energy bounces between the two.

2.2 Electron as a pulsating hyff-pump

The electron, and all M-aM, pushes a hyffon outwards along a persistent hyff – or pulls inwards in the case of positive charge).[2] The hyff is enduring, and the direction of propagation of the hyffons is consistently outwards (or inwards as the case may be), see Figure 1. Hence we call this a *pulsating* pump, as opposed to the fibrillating pump of the photon.

The electron releases its hyffon into the wild, and then manufactures a new one.

2.3 Explanation of various effects

The main differentiating features between the photon and the electron are shown in Table 1.

	Photon	**Electron**
Number of hyff	one pair	three pairs
Nature of the pump	Fibrillating (retains hyffon)	Pulsating (releases new hyffon)
Sign of charge	Alternating: +- 1/3	Constant: 3x(-1/3)

Table 1: Main differentiating features between the photon and the electron

This permits us to explain various effects.

Range of the electric fields

The photon has only a short range for its electromagnetic (EM) fields: their strength drops off very quickly with distance.[3] The electron has a much greater range for its EM fields – potentially infinite – and though they do drop off with radius it is not as quickly as the photon's. This is explained by the *Nature of the pump*: the photon does not release its hyffons and therefore has a short range, whereas the electron can reach infinite range with time because it relinquishes its hyffons (though its hyffons are diluted by the volume of space).

Correction to positive charge model

One of the implications of the present work is how the hyff interact. In the immediate previous paper [7] we suggested several physical interpretations for the positive and negative hyffons. The preferred model at that time was that 'the positive hyffon are force increments directed

[2] What is the hyff made of, and what are its mechanisms? We acknowledge that the deeper mechanics of this have not been addressed. However we suggest that perhaps the hyffons themselves are daisy-chained together to form the hyff, or that the hyffon is simply a disturbance on the linear structure of the hyff.

[3] Cordus suggests, as a rough rule, whenever one sees an EM field drop off as an exponential function, then suspect a fibrillating hyff effect. For example, cordus interprets the evanescent wave as such a hyff effect.

proximally, but they themselves propagate distally. In other words that the *action* is directed medially.' We now have cause to reject that, because it cannot explain electrostatic attraction and repulsion without adding more phenomena (which we are reluctant to do unless they are also required elsewhere). Instead we adopt one of the other suggestions.

So now we explain negative charge as hyffons that move outwards from the reactive end (a sign convention) and positive charge as hyffons that move inwards. We suggest that the positive hyffons are indeed extracted from the remote hinterland, which we now specifically identify as the fabric [6], i.e. the mesh of all the other hyffons from all the other particules in the universe.

Electrostatic attraction therefore arises because dissimilar signed hyffons can share hyff emission directions (HEDs), and this causes the discrete force of the hyffon to draw the bodies together. Electrostatic repulsion is thus conflict within similar signed hyff systems, such that there is over-subscription of the HEDs. This causes the particules to seek to re-energise further away from each other if they can, i.e. a repulsive force for like charges. This means that the electrostatic force is the same basic mechanisms as the strong force, albeit at a larger range. Force, as we have elsewhere stated, is nothing more than a geometric constraint on the position of re-energisation of a reactive end.

Genesis and charge

It is generally accepted by physics that leptogenesis and baryogenesis converted photons into matter, though the precise mechanisms are still unknown.

The cordus interpretation is that the creation of matter also created the hyffon system, of which the electron system shown here is representative. So the working model here is that the mesh of hyffons between matter particules did create, and continues to replenish, the *fabric*. The matter particules continue to supply and withdraw hyffons from that fabric. So in a sense all positive hyff connect up to negative hyff, but not necessarily to a specific other particule formed at genesis but rather to the network of hyffons that makes up the fabric. The photon however, does not contribute to the fabric, because it does not release its hyffon.

The presence of matter particules therefore withdraws and contributes to the immediate fabric, and thus shapes and warps the fabric. This concept is therefore similar to the idea of space-time being warped by large masses. Though there is a basic compatibility between the cordus concept of fabric and the space-time of general relativity, the proposed underlying mechanisms are very different.

In addition, this implies that electric charge is somewhat like magnetic poles: there are no monopoles, at least not on average across the universe.

Speed of light: the propulsion mechanism

This change to the hyffon working model also permits the further development of the cordus concept for the photon [4]. The photon only has a single pair of radial hyff (one from each reactive end). By contrast the fabric of the universe has forma hand [7]. Thus the photon has one hyff emission direction (HED) [6] whereas its surrounding has three. We suspect that this mismatch is what causes the photon to travel at the speed of light. Since it does not have hyff in the other directions, it has to move at the speed of the hyffons making up the fabric, i.e. speed is a compensatory mechanism. (We acknowledge we have not fully defined this mechanism.) Thus the photon is propelled through space by the fabric, and takes its speed from the fabric. Thus the speed of light is a secondary variable: the deeper variable is the density of the hyff in the fabric. This model is consistent with our earlier model [9] for light, but explains the propagation slightly better.

Gravitational bending of light

This also offers an explanation for the gravitational effect on light. Light is known to be deflected slightly by gravity, but whether light itself has mass is uncertain to conventional physics. It is known to have momentum though, at least when arrested.

The cordus explanation is that light probably does *not* have mass, because it only emits a single [r] hyff. Mass is otherwise the interaction of the torsion [r,a,t] hyffon [10] with the fabric: a torsion hyffon requires a hand at emission, which the photon does not have.

The gravitational bending of light is instead explained by cordus as due to the gradient in the fabric density near a large mass. On the side of the photon nearest the mass, the fabric is slightly denser so a frequency cycle of the photon on that side accomplishes a slightly lesser displacement, i.e. the speed of light is slightly slower, thus bending the trajectory. If this explanation is really correct, then we would expect to see the gravitational bending of light being dependent on its polarisation, and possibly this is testable.

3 Discussion

What has been achieved?

We propose a model wherein the fundamental differentiating factor between the photon and electron is the behaviour of their internal structures, particularly the hyff. This is a novel accomplishment in itself –if it is valid- as even the internal structures of these particles are unknown to orthodox physics, let alone their behaviours.

We have inferred these internal structures from basic logic and design synthesis applied to the prior cordus models. Most of the precursor ideas already exist elsewhere in the cordus work, but the contribution here is putting them together so that the two structures can be directly compared and contrasted. This is a key development as it permits further advances.

With models of the photon and electron in hand, we now have the capability to infer their interaction processes. There are several processes of interest, including annihilation, photon absorption, photon emission, and leptogenesis.

The photon's purpose in the universe

There is significance, from the cordus perspective, in the peculiar fibrillating field of the photon: it makes the photon a universal energy carrier.

The photon is not out to create an electro-magnetic-gravitational (EMG) empire for itself, like the matter and antimatter particuloids. Instead it is the unit of energy currency between assemblies of matter. The photon transfers spare energy around the place. It is an escapement mechanism whereby particuloids that are over-prescribed (in terms of positional constraints on re-energisation) can get rid of that energy [11].

The photon is not quantised, but flexible in its ability to contain whatever energy it is given: like an expandable container. Yet it is sufficiently like a matter particuloid to be able to interact with matter. Further, it has no ma hand and is therefore able to freely interact with, and transfer energy between, both matter and antimatter – it appears to be the only mechanism for this. It is the slim bridge between the world of matter particuloids, and the antiworld. The photon is therefore a key component in the formation of matter, hence annihilation and leptogenesis.

Lemma on hyff pumps

We summarise the above assumptions in these lemmas:

Ma.2 Hyff pumps

Ma.2.1 The photon is a fibrillating hyff-pump: the reactive end pumps out a hyffon, and then promptly withdraws it, and reverses the direction. The photon never releases its hyffon.

Ma.2.2 Matter and antimatter particules, e.g. electron, have a pulsating pump that for negative charge pushes a hyffon outwards along a persistent hyff – or pulls inwards in the case of positive charge. The hyff is enduring, and the direction of propagation of the hyffons is consistent.

Ma.2.3 The outward hyffon motion corresponds to negative charge, and inward to positive (a cordus convention). As a working model we suggest that the positive hyffons are extracted from the remote hinterland, which we specifically identify as the fabric, i.e. the mesh of all the other hyffons from all the other particules in the universe.

Ma.2.4 Electrostatic force arises because dissimilar directioned hyffons can share hyff emission directions (HEDs), and this causes the discrete force of the hyffon to draw the bodies together. Similarly similar charges compete for HEDs and thus repel eath other.

Ma.2.5 The fabric of the universe is created by the matter particules of the universe.

Ma.2.6 The propulsion mechanism for the speed of light is the imbalance between the single hyffon pair of the photon, and the three HEDS of the fabric.

Ma.2.7 The photon moves at the local speed of the fabric, which in turn depends on the mass distribution. The photon trajectory may be bent by gradients in the fabric density.

Conclusions

Returning to the original purpose of this paper, we now have a hidden variable solution: a description of the internal structures of the photon and electron. This is a radical break from orthodox physics, and a potentially significant development in fundamental physics. We have got past the limitations of the point-premise, which arguably has stifled progress in physics, and have shown that it is indeed possible to create a working model of the internal structure of light and matter. We do not claim that this model is necessary valid, because that has not yet been tested. There is no fundamental incompatibility between our cordus model and the *mathematical* models of quantum mechanics, but we acknowledge that the *conceptual* differences are large, and that the orthodoxy might have issues. We have broken Bell's theorem to get here, so we encourage critical evaluation of how we did that [2].

If one wishes to take the prior position that photon and electron *must be* points, then the present paper may seem irrelevant. However we can see potential to expand this model to annihilation and other photon-electron interactions. There is now a reasonable chance that we might indeed be able get closer to answering the deeper questions of physics, like 'how does annihilation actually work?'

References

1. Kuhn, T.S.: *The Structure of Scientific Revolutions*. 1996, 3 ed., Chicago, IL: University of Chicago Press.

2. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus matter: Part 3.1 Wider Locality. *vixra*, 2011, v. 1104.0022. Available from: http://vixra.org/abs/1104.0022.

3. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Why does quantum mechanics not scale up? *vixra*, 2011, v. 1107.0019. Available from: http://vixra.org/abs/1107.0019.

4. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus Conjecture: Part 1.1 Quis es tu photon? . *vixra*, 2011, v. 1104.0016. Available from: http://vixra.org/abs/1104.0016.

5. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus optics: Part 2.1 Frequency. *vixra*, 2011, v. 1104.0019. Available from: http://vixra.org/abs/1104.0019.

6. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus in extremis: Part 4.4 Quarks. *vixra*, 2011, v. 1104.0030. Available from: http://vixra.org/abs/1104.0030.

7. Pons, D.J.: Mirror images: Cordus reconceptualisation of Matter and Antimatter. *Vixra*, 2011, v. 1109.0009. Available from: http://vixra.org/abs/1109.0009.

8. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus in extremis: Part 4.1 Electromagnetism. *vixra*, 2011, v. 1104.0027. Available from: http://vixra.org/abs/1104.0027.

9. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus in extremis: Part 4.2 Fabric of the universe. *vixra*, 2011, v. 1104.0028. Available from: http://vixra.org/abs/1104.0028.

10. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus in extremis: Part 4.3 Gravitation, Mass and Time. *vixra*, 2011, v. 1104.0029. Available from: http://vixra.org/abs/1104.0029.

11. Pons, D.J., Pons, Arion. D., Pons, Ariel. M., & Pons, Aiden. J.: Cordus matter: Part 3.3 Energy cycles within matter. *vixra*, 2011, v. 1104.0024. Available from: http://vixra.org/abs/1104.0024.