

# Overview

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In our unified theory, everything is composed of energy in its two stable forms of electric and magnetic flux. Both electric and magnetic flux are quantised. The quanta of magnetic flux  $\Phi_0$  is directly measurable. The quantisation of electric flux has to be inferred from the quantisation of electric charge. Once this is understood and incorporated into classical physics, it becomes possible to develop a quantum theory of atoms and photons based on the principles of Classical Physics.

At the time of writing, our unified theory is the sole work of the author. It is incomplete. In terms of the historical development of Modern Physics, we are still in the 1920s and 30s. It remains to be seen if our unified theory can replace the Standard Model, but that can only be established by the future physicists who will devote significant man-years of study to its development.

Modern Physics developed over the course of the 20th century into what is now known as the Standard Model. This differs radically from Classical Physics. Solid particles have been replaced by probability distributions and electromagnetic fields by the exchange of virtual particles. If our unified theory offers a correct description of nature, then the Standard Model is nonsense. We present our unified theory in the context of the historical order in which Modern Physics developed. We start by showing that the equations of Relativity arise from the classical theory of electromagnetism and describe real physical effects. Then we show that electromagnetic theory explains the quantised energy levels found in atoms. We next look at the photon and start the discussion on wave particle duality. It is then appropriate that look at Feynman's QED before turning our attention to the Standard Model.

We postulate that the quanta of electric flux is  $\Psi_0 = \frac{1}{6}e$  resulting in the three abundant stable fundamental particles having charge  $-e$ ,  $-\frac{1}{3}e$  and  $\frac{2}{3}e$ . These correspond to symmetrically dividing the surface of a sphere into 2 hemispheres, 4 three sided segments or 6 four sided segments.

In our unified theory, electrons exist in their own right independently of any need to be observed. Observation introduces uncertainty according to Heisenberg's uncertainty principle, but between observations, the electron experiences forces determined by the laws of electromagnetism and moves under those forces according to Newton's Laws. [We do not use Maxwell's equations which apply to the macroscopic situation, but our own more fundamental laws from which we derive the classical macroscopic laws and Maxwell's equations.]

Electrons do not radiate electromagnetic energy when they are accelerated. What happens is that acceleration requires energy to be exchanged between the surrounding magnetic field and the surface of the electron. Extreme acceleration as in X-ray generation requires energy to move faster than the speed of light resulting in part of the electron's magnetic field being shed to form an X-ray photon. Radio waves are produced by an antenna through the co-ordinated movement of electrons in an AC current and result from the fluctuating magnetic field generated by the current.

The quantised energy levels of the hydrogen atom result the electron's motion being governed by both orbital mechanics and the laws of electromagnetism. The orbiting electron forms a current loop which must be threaded by an integer number of quanta of magnetic flux. In free motion, the electron would be surrounded by a magnetic field which moves with it and contains its kinetic energy. Assuming equipartitioning of energy, half of an orbiting electron's kinetic energy is stored in the magnetic flux threading the orbit. Solving the equations gives the familiar quantised energy levels, orbital frequency and radii:

$$\mathcal{E} = -\frac{m e^2}{32 n^2 \Phi_0^2 \epsilon_0^2} \quad \nu = \frac{e m}{32 n^3 \Phi_0^3 \epsilon_0^2} \quad r = \frac{4 n^2 \Phi_0^2 \epsilon_0}{\pi m}$$

These depend on the mass  $m$  and charge  $e$  of the electron and the quanta  $\Phi_0$  of magnetic flux. By equating them with the Bohr model, we discover that  $h = 2e \Phi_0$ . Integrating the flux density over the orbit shows that the flux fits within the orbit leaving a tunnel about 1.9 times the size Lorentz's calculated for the electron. Allowing for the action of the electron's moving electric field on the stable orbital magnetic field, it is reasonable to assume that the electron with its moving magnetic field containing half its kinetic energy fits nicely in the tunnel formed by the orbital field.

Radio waves have many quanta of magnetic flux in each half phase. Photons are very different having only one quanta of magnetic flux in each phase. Applying the laws of electromagnetism, we find that the energy per phase depends on wavelength and hence on frequency. A photon taking the form of a wave train of 8 phases each containing a quantum of magnetic flux and a quantum of electric flux with the parameters B, H, D, E, A and  $\sigma$  varying along its length as  $f(x - ct) = 1 - \cos(x - ct)$  has an energy of  $\mathcal{E} = 2e \Phi_0 \nu$ . Since  $h = 2e \Phi_0$ , it follows that  $\mathcal{E} = h \nu$ . Thus Planck's constant arises as a derived property of both atoms and photons.

Our unified theory incorporates the theory of electromagnetic mass stating that particles have no substance other than their electric flux. Moving elementary charged particles are surrounded by a magnetic field generated by their motion. There is thus very little difference between a moving elementary charged particle and a photon. It is a matter of geometry, not substance. The essential difference being that a particle has a spherically symmetric electric flux with a constant energy content existing in its own right, whereas the electric flux of a photon exists only by virtue of the photon's velocity.

The particle like behaviour of photons results from the fact that they contain a discrete quantity of energy which is in effect all kinetic energy giving them a momentum. We venture to suggest that Maxwell's wave equation has two solutions, one involving electric and magnetic flux moving at the speed of light and the other as a perturbation of existing fields. We would suggest that photons and high speed particles induce an electromagnetic wave as a perturbation of the fields of matter when passing close by and that their path may be guided by energy exchange with the induced wave.

Particle Physics has discovered a wealth of composite particles formed from a small number of fundamental particles. While our unified theory only addresses the long lived particles, we regard all particles as consisting entirely of energy in the form of electric and magnetic flux. The existence of other unstable particles is of no surprise. We are however concerned about the identification and classification of these particles because we do not accept the inclusion of spin and angular momentum in the conservation laws used to deduce the existence of some particles. We assert that angular momentum is only a real property of bound systems.

We reject the conclusion that electrons possess spin and magnetic moment because they are not composite particles. The Stern-Gerlach experiment reveals that electron orbits are flipped into parallel or anti-parallel alignment by a strong magnetic field. We account for this by modifying the classical laws of electromagnetism to include current loops threaded by a small fixed number of quanta of magnetic flux and include orbital mechanics in the analysis. We identify the Larmor frequency and associate it with intermediate quasi stable orbits which precess. We speculate that these give rise to the anomalous Zeeman effect.

Our early attempts to model the proton and neutron in a similar manor predicted a size about 60 times too large. Since then, we have through a logical process of elimination, produced viable models for the proton and neutron. The proton has two U quarks of charge  $+\frac{2}{3}e$  and mass of roughly  $\frac{1}{6} m_p$  orbiting a D quark of charge  $-\frac{1}{3}e$  and mass of roughly  $\frac{2}{3} m_p$  on opposite sides of the same orbit moving at about  $\frac{2}{3}$  of the speed of light. The glue holding the proton together is in the form of quantum strands of electric flux with the

displacement charge at their ends stuck firmly to the charged surfaces of the quarks. The resulting magnetic field is strong enough to allow electrons to be captured in cyclotron motion. We have still to carry out a final analysis to deduce the magnetic moment of the neutron and half life of the neutron.

We are confident that the strong force can be explained entirely as an attraction between magnetic dipoles which obeys an inverse fourth power law. We question the concept of the weak force believing that the observed decays can be explained by chaos theory. Thus our unified theory unites all the forces of nature.