

# Electromagnetism

## Introduction

Magnetism and the electromagnetic effects which have made it possible for us to generate electricity and build electric motors are accidents of nature. Electric and magnetic flux are the building blocks of nature and the laws governing their interaction are those required to make it possible to build atoms and photons.

In our unified theory, everything in the universe is made of energy in its two stable forms of electric and magnetic flux. The two are unified in the sense that they are complementary. Every natural process involves the exchange of energy between its two forms. Electric flux exists to form elementary charged particles. Magnetic flux exists to provide electrons and quarks with the property of inertia and allow them to form protons, neutrons and atoms.

Elementary charged particles are nothing but electric flux extending out in every direction from an inner spherical surface of electric charge. The charge is not a separate entity, but part of the flux! The electric flux of each elementary charged particle exits independently of the others and they all coexist in space. The force between two elementary charged particles results from the fact that the inner surface of charge of each sits within the flux of the other. They have potential energy by virtue of their positions within each other's electric field. The total electric energy of an elementary charged particle is  $E = m c^2$  of which  $\frac{3}{4} m c^2$  is contained in its electric flux and  $\frac{1}{4} m c^2$  is the potential energy resulting from its separation from its antiparticle (or other particles of opposite charge).

Work has to be done by electric potential acting on an elementary charged particle to increase its kinetic energy. This action takes time. Thus magnetic flux gives the elementary charged particle the property of inertial mass. Without it, the elementary charged particles would rush together with infinite acceleration and the universe would end.

Both electric flux and magnetic flux are quantised making the formation of atoms possible.

When an electric current flows through a coil of wire, it generates a magnetic field. You could be looking at an example right now if your monitor is of the older large heavy type which has a TV tube. Inside are four funny shaped coils wrapped around the thin end of the tube. They generate the magnetic fields which cause the electron beam to scan back and forth building the picture. On a much smaller scale, a single electron orbiting around the nucleus of an atom generates a magnetic field in the same way. The magnetic fields within your monitor or TV contain zillions of quanta of magnetic flux. The magnetic fields within atoms have only a few quanta of magnetic flux, often only one quanta.

Rutherford's model of the hydrogen atom with the electron orbiting the nucleus creates a current loop generating a magnetic field. The quantised nature of magnetic flux means that the orbit must be threaded by an integer number of quanta of flux. Magnetic fields contain energy. The amount depends on the number of quanta of flux and the current. Because we must have a whole number of quanta, we can only have certain amounts of energy corresponding to 1, 2, 3 ..... quanta of magnetic flux. This results in only certain sized orbits being stable. An atom can adsorb light when a photon gives the electron exactly the right amount of energy to lift it to a higher orbit. If the electron is disturbed, it may fall back emitting a photon of light. Splitting the light up with a prism reveals thin lines of different colours and gives us a way of measuring the different energy levels within the atom. This is how we know that only certain orbits are possible.

The allowed orbits of the electron relate to the number of quanta of flux. The orbital kinetic energy of the electron is shared equally between the flux threading its orbit and that within one radius of its surface which moves with the electron. Analysis of the geometry of the flux threading the orbit shows that its energy content is concentrated in a tunnel surrounding the orbit.

Classical Physics developed before it was discovered that magnetic flux was quantised. It was impossible for

anyone to understand how this would cause a stable magnetic field to be created around the electron's orbital path. According to Classical Physics, the electron should radiate energy all the time and spiral in towards the nucleus. The stable magnetic field surrounding its path prevents this from happening. Our unified theory also discusses the generation of radio waves in this context.

A single hydrogen atom is a tiny magnet. We measure the strength of a magnet by a property called its "magnetic moment". Rather than calling the hydrogen a tiny magnet, we say it has a magnetic moment. Modern Physics claims that an electron all by itself has a magnetic moment just as strong as the magnetic moment of a hydrogen atom. We dispute this.

In our view, any particle which possesses a magnetic moment must be a composite particle consisting of two or more elementary charged particles. Quantum mechanics asserts that the ground state orbit of an electron has no angular momentum and that the observed magnetic moment must be a property of the electron. We consider this to be a nonsense. There no way in which a particle the size of an electron could generate a magnetic moment of such magnitude. The force of attraction between magnets is such that it would result in electrons being stuck together in chains.

An electron and a positron cannot form a stable particle because their masses are equal and their charge opposite preventing their orbital motion forming a current loop. Three quarks on the other hand can form a stable particle with the two similar charged quarks orbiting the third (at opposite points on the same orbit).

Electrons and other charged particles consist of electric flux, but electric flux can also exist in its own right within photons and radio waves.

The motion of electric flux generates a magnetic field. The motion of magnetic flux generates an electric field. The combination of these factors allows energy to exist as a bundle of electric and magnetic flux travelling through the background at such a speed that the motion of each generates the other. The conditions for this are:

- That the electric and magnetic flux are everywhere at right angles to each other and the direction of motion.
- That both move through the background with a velocity which depends on two properties of electric and magnetic fields called permittivity and permeability.

In the Physicist pages, we show how the maths predicts this. Classical Physics includes "Maxwell's Equations" which take the laws of electricity and magnetism and show how electromagnetic waves can be formed. Our unified theory does the same, only somewhat more neatly, but we differ from Maxwell in our understanding of the concepts. Maxwell's solution is rather like standing on the breakwater and watching the water go up and down. Our solution is rater like travelling along keeping pace with the waves and looking at their shape.

Physically speaking, Maxwell sees the electric and magnetic flux as stationary in the æther and varying in strength. Our solution has the electric and magnetic flux moving at the speed of light. The important thing to understand is that both interpretations have exactly the same equations.

The quantisation of electric and magnetic flux results in two solutions of the equations which describe radio waves and photons respectively. Radio waves have many quanta of flux in each half phase. Photons have just one quanta of electric and one quanta of magnetic flux in each phase. We suggest that the quanta of electric flux is  $1/6$  of the flux of an electron resulting in photons 8 phases long (which is not inconsistent with the fact that distant storms at sea create wave trains of 7 peaks) .

Observation of interference phenomena suggests that Maxwell's original understanding of electromagnetic radiation is still valid in describing the way in which wave motion can be generated within existing stable electric and magnetic fields. We believe single photon diffraction (if it exists) to result from an interaction

between the two solutions.

We have stated that Electromagnetism is an accident of nature. The laws of Electricity and Magnetism as they were first formulated relate to manufactured objects and machines. Faraday discovered that the relative motion between an electric circuit and a magnetic field generated an electric current. He formulated a law in terms of magnetic flux cutting the circuit, but this is not how nature works. Nature works much more simply, but with much more complexity! The relationship between the magnetic flux and an individual moving electron is simple. Energy moves back and forth between each individual electron and the magnetic field. The effects of these add up naturally. These processes are controlled by the geometry of the magnetic field and wire of the circuits. To imitate nature we must do some diabolical mathematics to sum the individual actions of moving electrons into the action of a current. This kind of maths is only taught in universities to mathematicians, physicists and engineers.

Before Einstein came along Lorentz and others were trying to explain two strange new phenomena. The first was that it had been impossible to detect the earth's motion through the æther. In particular, any attempt to measure the speed of light gave the same answer. The other strange result came with the discovery that beta radiation, and cathode rays were both high speed electrons. Experiments were designed to measure the charge and mass of the electron. Some of the beta radiation consisted of electrons travelling at near light speed and when the mass of these electrons was measured, it was found to be greater.

Lorentz realised that a moving electron should generate a magnetic field, so he did some sums and worked out just how small an electron had to be for its kinetic energy to be contained in the magnetic field generated by its motion. Having concluded that inertial mass is entirely due to this electromagnetic action, he then went on to consider the consequences of the motion of the magnetic field generating an electric field. With a few lines of maths, he proved from the laws of electromagnetism that the same feedback effect which supports the existence of photons and radio waves also acts within all moving matter. The effects only become significant at near light speed.

So electromagnetism is responsible for the effects which are described by the equations of relativity. Matter contracts in the direction of motion and its inertial mass increases. The increase in mass causes clocks to slow and the other relativistic effects follow.