

# Overview

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Our unified theory starts from the assumption that the laws of physics are those required to make it possible to build our universe. In particular, the laws of electromagnetism are those required to form elementary charged particles and enable them to form stable particles, atoms and molecules.

We regard the concepts of Classical and Modern Physics with suspicion because they developed within the historical context of scientific discoveries. Maxwell's equations predate the discovery of the electron and the quantisation of magnetic flux. We know the equations work, but we may need to rethink the concepts behind them. The first thing to realise is that the electromagnetic phenomena upon which we have build our technological society are an accident of nature!

The first concept we have to throw away is the notion that electrons and protons have both substance and charge while neutrons have only substance. We have to realise that mass is not a property of substance and that substance does not exist in its own right. At the most fundamental level, only energy exists in its two stable forms of electric and magnetic flux. They are complementary. Electric flux ends in electric charge while magnetic flux forms continuous loops. Electric charge and Electric flux are not separate entities, they are part of the same thing.

The second concept we have to throw away is that of electric flux as being singular. The action of moving electrons in generating a magnetic field is proof that their electric fields coexist in space and move through one another generating the magnetic field.

Magnetic fields exist to give elementary charged particles the property of inertia from which we derive the concept of inertial mass. Inertial mass is a purely electromagnetic phenomena. The motion of the electric flux of an elementary charged particle through the background formed by the electric flux of all other elementary charged particles generates a magnetic field surrounding it and containing its kinetic energy. The property of inertia results from the need to do work to change the kinetic energy.

To explain centrifugal force, we need to assume that the energy in magnetic fields is generated and adsorbed in the surfaces of elementary charged particles and moves parallel to their electric flux. This radically affects our understanding of how magnetic forces are generated.

Our unified theory deduces the fundamental laws of electromagnetism which describe:

- How elementary charged particles exert electric forces upon one another
- How electric potential exists
- How magnetic fields are formed

Then we derive the Classical laws of electromagnetism:

- Ampere's law
- The law of Biot-Savart
- The force on an electron moving through a magnetic field
- Faraday's Law
- The energy content of magnetic fields

$$\oint \vec{H} \cdot d\vec{l} = I$$
$$\vec{B} = \mu_0 I \oint \frac{\hat{l} \wedge \hat{r}}{4 \pi r^2} dl$$
$$\vec{F} = q \vec{v} \wedge \vec{B}$$
$$V = -N \frac{d\Phi}{dt}$$
$$\mathcal{E} = \frac{1}{2} I \Phi$$

The rest of the classical theory can be deduced following the standard proofs.

In the classical theory, we say that magnetic flux "cuts" a conductor. This is an ambiguous statement dating from the times when inadequate systems of units were used. In modern SI units, a magnetic field has two distinct properties, magnetic intensity  $\vec{H}$  and flux density  $\vec{B}$ . In our unified theory,  $\vec{H}$  is a mathematical artefact describing the sum of the actions  $\vec{H}_i = \vec{v}_i \wedge \vec{D}_i$  of the motions of the electric fields of the individual electrons. Because it is only a mathematical artefact, we can write  $\vec{H}_{earth}$  and  $\vec{H}_{magnet}$  and meaningfully express the resulting field as  $\vec{H} = \vec{H}_{earth} + \vec{H}_{magnet}$ . But the resulting magnetic field  $\vec{B} = \mu_0 \vec{H}$  is singular. It is formed of quantum strands of magnetic flux which do not cross and cannot pass through one another. It is nonsense to write  $\vec{B} = \vec{B}_{earth} + \vec{B}_{magnet}$  because that would imply that the two magnetic fields can coexist in space.

The classical laws of induction, generation and motor action all work, but we must revise our concepts and understand that when we refer to the flux of a magnet cutting a conductor, we are referring to the mathematical artefact  $\mu_0 \vec{H}_{magnet}$  and that the real substance of the magnetic field described by its flux density  $\vec{B} = \mu_0 (\vec{H}_{conductor} + \vec{H}_{magnet})$  does not cut the conductor.

We look at the conceptual errors relating to the energy stored in magnets and magnetic field which have allowed fools and charlatans to think that electromagnetic devices can extract free energy from the supposed zero-point energy of the vacuum.

We also discuss how the quantisation of magnetic flux affects the laws of electromagnetism in situations where the magnetic field contains only a small number of quantum strands and how this affects the behaviour of atoms in magnetic fields.