

The Mechanics of Charged Particles

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The following notes are an attempt to simply and understand how charged particles work in terms of waves of energy:

An electron is the simplest of the charged particles and can be thought of in the following way:

The electron can be thought of as a standing wave comprised of either:

- (a) An inward wave spiralling slightly into the centre and then being radiated directly out from the centre in a straight line as the outward wave.
- (b) An inward wave flowing directly in towards the and then spiralling slightly as it flows outwards as the outward wave.

The other solution would represent a positron.

Assuming (a) is the correct model for an electron, then the following description applies:

The slight spiral is due to the slight slowing of the propagation speed of the wave as the energy density in space increases (the electron's gravitational potential), and the path direction of the wave being slightly off from pointing directly towards/away from the electron's centre. This spiralling then accounts for the $\frac{1}{2}$ intrinsic angular momentum (spin) of the electron.

The standing wave thus formed when the inward and outward waves are summed has nodes that will be moving inwards or outwards and rotating around the electron's centre.

The inward waves are reflected off the standing wave nodes that are rotating and change direction to form the outward waves. Due to the path length difference between the inward and outward waves (as one is spiralling and the other is flowing in a straight line) there will be a "flow of phase" inwards with respect to the electron's centre.

Looking at a cross section through an electron, there would appear to be a slightly higher frequency wave moving at a slightly slower speed moving inwards, summed with a slightly lower frequency wave moving higher speed moving outwards. At the nodes, where the inward wave becomes the outward wave & vice versa, there would be a Doppler shift of the frequency & a change of direction.

There is an energy balance between inward and outward waves (i.e. inflow = outflow, resulting in no net energy loss/gain). The frequencies, amplitudes & speeds of the waves would be set such that the energies of the inward & outward waves are identical & each can become the other when Doppler shifted at the nodes.

There exists, at any point in space, a phase drift inwards or outwards with respect to the electron's centre. This phase drift causes the attraction/repulsion associated with the electric field when it interacts with other charged particles. As one moves further from the electron's centre, the amplitude of the waves decreases, so too does the electric field and its associated force due to these waves (i.e. lower wave amplitude = lower momentum in waves = lower force on other charged particles).

When the electric field of the electron interacts with other charged particles (for example another identical electron), the inward and outward waves of each electron overlap. When this happens, at the interface between the two electrons (exactly equal distances between each electron's centre) the two outward waves will form a standing wave and the two inward waves will form a standing wave – each of these standing waves will have no phase drift as an equal amount of each frequency is coming from the other electron. Thus the nodes of the standing wave at this point will not be moving.

The outward wave of the electron normally forms the inward wave when it reflects off a moving node (causing the wave number change between the outward and inward waves), but at this midway point the node is not moving, and so the outward wave will be reflected to form an inward wave of higher frequency than usual (Doppler shifted). Similarly, the nodes from the electron's centre to the midway point become progressively slower, until at the midway point the node stops completely. Thus the interface between two electrons provides a frequency conversion, or momentum change to the inward/outward waves. These frequency/momentum changes will propagate through each node to the electron's centre causing the whole electron to move – thus the electron has been accelerated to a certain velocity.

The reason why charged particles can only form at certain masses may be due to a perfect match being formed between the amount of curvature in the path of the inward-falling wave due to the gravitational potential of the energy that comprises that charged particle, and the frequencies of the two waves (inward/outward) that form the standing wave. Only certain combinations will result in a stable standing wave configuration.

When an electron is captured by an atom and enters an orbital, the stable configuration changes from being spherical into a number of different orbital patterns, depending on the environment into which it is placed. There will be different momentum exchanges with the waves of other charged particles in the atom, causing the stable standing wave pattern to change accordingly. The quantum amounts of energy and frequency and spin are still conserved, however, and when the electron is ejected from the atom later, the waves are capable of reorganising themselves back into a stable structure (spherical once more) where these quantum amounts still exist in the same proportions.

