

A brief description of the ***EPOLA*** Model
of vacuum space attributed to Prof. M Simhony.

The electron-positron lattice (*e-po-la*) model of vacuum space, developed since the early 1970's by Professor Menahem Simhony, presumes that the space of our Universe is permeated by a real three-dimensional crystal lattice of real electrons and positrons. Simhony, a solid-state physicist in the field of semiconductors, now retired but whose work is still referenced, discussed his early ideas for a lattice of electrons and 'holes' with P.A.M. Dirac, who confirmed that real positrons were implied.

This initial concept is proven by a correct interpretation of three well-known existing milestone experiments in physics:

- In 1887, the Michelson-Morley experiment proved that the carrier of light, the sought-after aether was neither continuous nor fluid - it was a particulate medium.
- Rutherford showed in 1911 that atoms were not comprised of liquid blobs of matter but well spaced, extremely small, nuclei and electrons, more highly separated than the Sun and planets of our Solar system in proportion to the scale of their component particles.
- Anderson's experiment in 1932 found that an electron and positron pair - but never as the single entities in isolation - were freed from the vacuum (especially where stressed by the presence of atomic matter) by a pulse of adequate energy (a 1.02MeV gamma photon) and then collapsed back separately into the vacuum with a release of energy (0.511MeV each) in *exactly* the same manner that sodium and chlorine ions are released from and reabsorbed into a crystal of rock salt (at the UV frequency of an 8eV pulse of energy).

The epola model provides an explanation for all the physical properties of matter outside the nucleus (and some nuclear reactions) and satisfies the requirements for a dielectric aether envisaged by Faraday and developed by Maxwell to produce the mathematical basis of our current understanding of electricity and magnetism.

Consider this lattice, held together by the mutual attractions of the electrons and positrons and stabilised by their short-range mutual repulsion to satisfy Earnshaw's theorem of 1842, forming an extremely stiff (strongly bonded) but highly elastic polycrystalline structure. By analogy with ionic crystals and by classical methods, the strength of the bonds (0.511MeV) can be used to calculate the velocity of the bulk deformation waves induced in the lattice by interacting vibrations and displacements of the electrons and positrons in *exactly* the same way as the speed of sound in a rock salt crystal can be calculated. The calculated velocity of the bulk deformation waves in the vacuum lattice turns out to be the same as the measured velocity of light in vacuum!!

Waves of corresponding in-phase coincident vibrations of the electron and positron lattice particles, just as Huygens explained in his theory of waves dating from 1690, spread through the epola at the speed of light from any elastic disturbance of the lattice particles from their equilibrium rest positions. Photons are now shown to be the consequential waves' electrostatic and magnetic disturbances hosted by these vibrating point sources in the epola and explains the phenomenon of particle-wave duality. Planck's law is a consequence of the particulate epola transferring energy in half-wave clusters of particles.

Positrons are not 'annihilated' by electrons but paired off to disappear into the lattice which itself is invisible to the electromagnetic waves it carries. The epola behaves as an n-type semiconductor in our material world where there is a surplus of free electrons. By analogy with rock salt the epola is most likely to exist in a face centred cubic lattice structure and further calculation shows that the dimensions of a unit cell of the lattice is ~4.4 femtometres (4.4×10^{-15} m) - which would be about the size of a box required to enclose the nucleus of a copper atom. Many thousands of lattice units would fit between the nucleus and electrons of a copper atom. However, even guest electrons will each distort the lattice by their charge and short-range repulsive effects so that vibrations from relative motion of atom and epola particles will pulse through the epola.

These physical vibrations of the electrons and positrons explain the reason for momentum and inertia of atomic and molecular structures through the epola. When the lattice units stretch open to access a particle of the atomic matter, a standing wave accompanies and precedes the particle at the speed of light, freely opening the lattice ahead and closing it behind. Until that is, the consistent velocity (speed or direction) is changed and a billion-billion electrons and positrons must change their frequency of vibration to accommodate the new route with a requirement for energy dependent upon the acceleration of the particle. Likewise when the particle requires to slow then energy must be dissipated from the accompanying wave. The accompanying wave would be identified as an electromagnetic wave of 'de Broglie' wavelength.

Atomic orbital electrons obey the Pauli exclusion rule because they must have the co-operation of an epola accompanying wave to obtain a stable orbit. The hydrogen atom has only one electron which rotates around the proton nucleus at a rate of 1/137 times the velocity of light (*alpha*, the 'fine structure constant of space' = 1/137; defined by *A. Sommerfeld, 1916*). The accompanying wave of vibrations of the epola precedes the electron and prepares the path for loss-less motion whilst it forms a closed circular standing wave. Gradual changes due to motion of the atom are smoothed by the vast numbers of epola particles and the orbit adjusted with the common tendency of waves for frequency invariance. However, rapid acceleration of the electron or excessive velocity of the atom will allow the electron to escape from orbit and cause ionisation of the atom. Molecular matter will have a limiting velocity of about 3 Mm/s (1/100th the velocity of light). Electronic equipment would fail before then and we shall not be permitted to travel at more than about 100km/s because our bodies would heat up above 40°C. (The Apollo missions carried men at ~10km/s and unmanned Voyager reached ~70km/s). An individual subatomic particle is not limited to the velocity of light but to exceed that speed it must break through the epola which is not yet pre-formed by an accompanying wave with a shock wave requiring massive continuous input of energy and generation of Cherenkov radiation in response by the epola.

Simhony suggests an experiment to measure the orbit adjustment redshifts, additional to Doppler effects, in the emission spectra of atoms moving relative to the epola, whether towards us or away.

Simhony explains that physical vibrations (phonons) in conductors can be selected to coincide with vibrations in the epola to cause the property of superconductivity when conduction electrons are presented with a clear transport path but with a frequency dependent on the size and proportions of the sample of material.

Gravitation is explained by the thinning of epola between opposed guest particles in the lattice, in comparison with the infinite dissipation of distortions behind them, causing a push effect to accelerate the particles gradually towards one another - not very strongly in comparison with electrostatic attractions which are some 10^{35} times stronger.

In 1864, James Clerk Maxwell wrote in his Dynamical Theory of the Electromagnetic Field; *"..... if we look for the explanation of the force of gravitation in the action of a surrounding medium, the constitution of the medium must be such that, when far from the presence of gross matter, it has immense intrinsic energy, part of which is removed from it wherever we find the signs of gravitating force..."*

Calculation of the mass density of the epola, with one electron or positron per unit cell of $(4.4\text{fm})^3$, gives 10^{13}kg/m^3 or 10^{10} times the density of water.

The thinning of epola brought about by distortions from hosting atomic particles within the lattice is the reason for a slowing of the velocity and bending of light through the vacuum in the vicinity of large bodies such as the Sun and causes, in part, refraction of light through a block of glass. Mostly, slowing of visible light through atomic matter is caused by delays from absorption and re-emission of energy by orbital electrons however high frequency x-rays and gamma rays with much shorter wavelength pass through atomic matter without much interference and here the measured reduction is very closely as calculated for the change in density of the epola.

The neutrino, a mystery to the standard models of physics, is said by Simhony to be a linked electron-positron pair sharing an accompanying wave and acting as an exciton of the epola. Muons and tauons, larger leptons than electrons, may yet turn out to be combinations of electrons and positrons or small portions of the epola housing an electron or positron.

The weak nuclear force, responsible for the emission of beta particles (free positrons or electrons) with a neutrino or an antineutrino is undoubtedly connected to the collapse of an epola cell by its interaction with the nucleus. Large nuclei would find difficulty in passing through the epola without becoming fissile. Does acceleration through the epola influence the rate of nuclear decay?

In parts of the cosmos, the epola will not have the same lattice spacings as our local region of epola and the velocity of light will differ. Where the epola is very hot, sufficiently to be melted, the velocity of light would be highly impaired and lost completely where gaseous. Where the epola was holed or totally displaced by an extended nuclear body there would be no light-carrying medium giving the appearance of a black hole.

In our region of space the epola particles vibrate randomly about their equilibrium lattice sites with a temperature of $\sim 3^\circ\text{K}$. This so-called 'background' radiation is really a 'foreground' radiation elsewhere different temperatures of the epola would appear to astronomers as grey or dark matter, perhaps even mistaken for distant galaxies.

Was the origin of our Universe due to seeding from the first random crystallisation of dimensional excursions, later to be known as electrons and their counterparts the positrons and is the Universe still crystallising and expanding? Does the epola account for the supposedly missing 90% of the mass of the Universe?

Please visit <http://www.epola.co.uk> for more information, links to evidence, audio discussions with Prof. Simhony and links to his own website. R. Guy Grantham. Rev2. (grammar) 30th April 2006 [<rgg@epola.co.uk>](mailto:rgg@epola.co.uk)