

## The Electron-Positron Sea (The Electric Sea)

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23rd April 2014*

**Abstract.** It is proposed that all space is permeated with a dense electrically neutral sea of electrons and positrons which serves as the medium for the propagation of light. The challenge remains to devise a stable bonding mechanism within this luminiferous medium that conforms with Maxwell's equations by providing the necessary solidity and the physical mechanism that will give rise to the characteristics of electromagnetic waves, while at the same time allowing for the fluidity that would avoid the problem of friction in the planetary orbits.

### Electric Current

I. The primary evidence that space is filled with a dielectric medium arises from consideration of the events that occur in the first moments after the power is connected to a simple DC electric circuit. If we attach an open ended conducting wire to the outgoing terminal of a battery, but attach no wire to the return terminal, nothing happens. This is not because an electric current can't move along a single wire, but rather because of the mechanism of the battery itself, which requires that current re-enters at the return terminal simultaneously as it exits from the outgoing terminal. Consider then the situation whereby we attach another open ended conducting wire to the return terminal, such that the two wires extend outwards from the battery in the complete opposite direction, anti-parallel to each other. At that exact moment, two pilot electrical effects must simultaneously move outwards from the battery, one along each wire in opposite directions to each other. We conclude this on the grounds that the circumstances in the immediate vicinity of the battery, at the moment when the second wire is connected, would not be any different than if the circuit were closed at the far end and connected to a light bulb. Neither of the two pilot effects can sense what lies ahead.

The events surrounding what exactly happens when an electric circuit is first connected to a battery is a mystery which cannot be explained within the context of the mainstream belief that electric current consists primarily in the motion of charged particles. We therefore need to consider an alternative physical model whereby electric current can flow, at least temporarily, in the space beyond a conducting wire, in order that we can establish physical

continuity between the two pilot effects, which being on different wires, don't appear to be physically connected to each other.

Let us first look at what must be happening in the return wire as the pilot effect moves away from the battery. Electric current must be flowing into the wire at the location of the pilot effect which is moving away from the battery. This electric current must be flowing in the opposite direction to the pilot effect, since the current must be flowing backwards towards the return terminal of the battery. In order to make sense out this, we must conclude that electric current is fanning into the return wire *from the space beyond the wire*, and that it is coming from the outgoing wire on the other side of the battery. This draws up a pattern of solenoidal flow lines, centred along the two wires, and expanding outwards from the battery in both directions. At the location of the pilot effect on the outgoing wire, which we will take to be on the right hand side of the battery, the current will fan outwards *into the space beyond the wire*. It will then turn around and flow in the opposite direction towards the left and carry on alongside the wire *in the space just beyond it*, passing the battery and fanning back into the return wire to the left of the battery at the point where the other pilot effect has reached. It will then flow to the right again and back into the battery. The crucial fact is that we must have a closed circulation, and that the closed circulation must be expanding. If either or both of these wires should be disconnected from their battery terminal before the pilot effect has reached the far end of the wire, the solenoidal current pattern will necessarily split into two solenoidal patterns that will each continue along their respective wires. In the special case where the outgoing wire and the return wire run close together and parallel to each other, as in a transmission line, the two discrete solenoidal pulses will fuse together into a single planar circulation in the likeness of a caterpillar track running between the two wires.

Consider now the situation that arises when the circuit is then closed and the input power is sustained, irrespective of the geometry of the circuit. The general principle will be that a closed circulation will expand outwards from the battery, and part of that circulation will flow across the gap between the outgoing section of the wire and the return section of the wire. This expansion will continue until the circulation exactly occupies the closed conducting wire, and then a steady state situation will ensue inside the conducting wire. The reason for the expansion of the circulation, in the first moments after the power is connected, is that as the current flows in the space beyond the conducting wire, a back EMF is induced which opposes it, and hence the closed circulation keeps expanding in order to circumvent this induced impedance, while the area enclosed within the expanding circulation inflates into an energized state. This induced impedance in space has a tendency to keep electric current confined to conducting materials, and the fact that it exists must indicate the presence of an underlying dielectric medium that is being linearly polarized when electric

current flows through it. If there were no impedance in space, there would be nothing to contain an electric current within a conducting circuit.

In the moments after the power is connected to a circuit, the section of the closed electric circulation that crosses the gap between the outgoing section of the wire and the return section, and which advances between the two wires, is misidentified with electromagnetic radiation by mainstream physicists, and likewise, the linear polarization that ensues as the current crosses the gap has been misidentified with the displacement current that is used in the derivation of the electromagnetic wave equation. This misidentified effect is used in cable telegraphy, and although it does exhibit wave behaviour, it also differs in important respects from wireless electromagnetic radiation.

In the steady state situation, when the electric current is totally confined within the conducting wires, charged particles will be driven along in the current flow, but this is only an effect of the current and not the primary essence of the current itself. Electric current itself must be the flow of a fundamental fluid-like aether, known in days of old as *vitreous electricity*. If positively charged particles are aether sources, they will be pushed along with the aether flow, while if negatively charged particles are aether sinks, then they will eat their way in the opposite direction towards the current source.

## The Dielectric Sea

II. James C. Maxwell, in Parts I and II of his 1861 paper “*On Physical Lines of Force*” [1], advocated a sea of molecular vortices as being the medium for the propagation of light, and when introducing *displacement current* in Part III, he argued that this sea of molecular vortices would be a perfect elastic solid. In his 1865 paper “*A Dynamical Theory of the Electromagnetic Field*” [2], Maxwell derives the electromagnetic wave equation. At the top of page 498, just before the displacement current equations (65), he says “*if the medium in the field is a perfect dielectric there is no true conduction, and - - - -*”. Maxwell was clearly alluding to the fact that the luminiferous medium is a dielectric. Combining Maxwell’s two perspectives, we might conclude that the electric particles that circulate around his molecular vortices must exist in equal and opposite charges.

At the end of the nineteenth century, Lord Kelvin (William Thomson) wrote an article entitled “*Aepinus Atomized*” [3] in which he talked about all of space being filled with *electrions*. Lord Kelvin said,

*“My suggestion is that the Aepinus’ fluid consists of exceedingly minute equal and similar atoms, which I call electrions, much smaller than the atoms of ponderable matter; and that they permeate freely through the spaces occupied by these greater atoms and also freely through space not occupied by them.”*  
(Lord Kelvin, 1901)

Although Lord Kelvin goes on to suggest that these *electrions* interact with an inverse square law of force, he doesn't appear to suggest that this fluid is dielectric. In a sub note at the end of his article, he does however acknowledge the inverse cube law of force that would ensue in the vicinity of an electric dipole, but in this case he seems to be talking about atoms of ponderable matter. Whatever, Lord Kelvin was not far off the idea that space is densely packed with electrons and positrons.

In 1930, Paul Dirac postulated the "*Dirac Sea*" as a model of the vacuum. The Dirac sea was not intended to be the medium for the propagation of light, but nevertheless, no matter what the intentions were, or however cryptically the concept was explained, it invoked the idea that electron-positron pairs could somehow be produced as a result of some underlying physical mechanism within the vacuum.

In more recent years an increasing number of dissident physicists have been coming forward and proposing that the medium for the propagation of light is a dense sea of electrons and positrons [4], [5], [6], [9], [10], [11]. Such a proposal however is invariably challenged with two questions. The first question concerns the issue of why the electrons and positrons do not annihilate each other, as would be the case in the Dirac Sea. The second question relates to how the electrons and positrons are bonded together in a stable structure that would be compatible with Maxwell's equations and account for electromagnetic phenomena while still allowing the planets to move in their orbits around the Sun without encountering drag friction.

## Planetary Orbits

**III.** Kepler's laws of planetary motion allow us to derive a radial differential equation in distance,  $r$ , from the polar origin,

$$d^2r/dt^2 = -k/r^2 + l/r^3 \quad (1)$$

where  $k$  is the gravitational constant, and where  $l$  is a constant related to the angular momentum. The basic form of this equation was first proposed by Gottfried Leibniz (1646-1716).

An inverse cube law force field is known to arise from a dipole, and since the centrifugal force term on the right hand side of equation (1) obeys an inverse cube law, this provides further evidence that there exists a background medium of electric dipoles, which as well as causing electromagnetic phenomena, also causes the inertial forces that keep the planets in their stable orbits.

Gravity on the other hand is a geometrical variation of electric current. It is a monopole force field that arises in conjunction with the large scale radial flow of pure aether into atomic and molecular matter. Gravity causes a region of the

surrounding electron-positron sea to be entrained with a planet's motion around the Sun. As the aether percolates through the background electron-positron sea, it causes a linear polarization of the tiny dipoles. Since these dipoles are rotating, this will result in a torque which will cause the dipoles to precess about the gravitational flow lines. This will result in centrifugal pressure acting at right angles to the gravitational flow lines. The gravitational field lines of two neighbouring planetary bodies touch together laterally, and the centrifugal pressure that is acting at right angles to the field lines will have a tendency to push the two planets apart. As the mutual transverse speed of two planetary bodies increases, the tiny dipoles at the interface between the two gravitational fields will angularly accelerate, and hence the centrifugal force will increase. This dipole generated centrifugal pressure which acts at right angles to the gravitational flow lines, acts in opposition to the attractive gravitational tension that is caused by the large scale aether inflow. Stable orbits are maintained by virtue of the fact that the attractive force is inverse square law whereas the repulsive force is inverse cube law, hence creating stable dynamic equilibrium nodes. Hence, far from creating friction that would cause the planets to spiral into the Sun, the electron-positron sea actually induces the very inertial forces that prevent this from happening. The transverse speed of a planet relative to the Sun induces a radial centrifugal force on the planet's entrained region of the electron-positron sea. This creates a hovercraft effect at the interface, and if the speed is high enough, the planet and its entrained region of electron-positron sea will rise upwards like a bubble, away from the Sun.

## **Electromagnetic Radiation**

**IV.** A dense sea of electrons and positrons would be electrically neutral and could serve as the physical medium for the propagation of light. We have already seen in section **I** above how cable telegraphy employs the propagation of linear polarization through such a medium. Indeed linear polarization served as the physical basis for displacement current in Maxwell's derivation of the EM wave equation [2], and it is therefore reasonable to consider that the cable telegraphy effects (capacitance effects) that propagate in the dielectric space beside an electric current in a conductor, constitute electromagnetic radiation. Maxwell left this detail open, and as such in the years after Maxwell, his displacement current became closely associated with capacitors [4]. There is however a problem. Modern textbooks teach Maxwell's displacement current in a manner such that the electric field term satisfies the zero curl electrostatic equation,  $\mathbf{E} = -\text{grad}\psi$ , where  $\psi$  is the scalar potential, but when deriving the electromagnetic wave equation, this electric field is equated with the dynamic electric field of time varying electromagnetic induction. This dynamic electric field comes from the non-zero curl equation,  $\mathbf{E} = -\partial\mathbf{A}/\partial t$ , that is associated with Faraday's law, and where  $\mathbf{A}$  is the electromagnetic momentum, known

nowadays as the magnetic vector potential. The fact that one of these  $\mathbf{E}$  fields has a zero curl, while the other one doesn't, means that equating them with each other within the same derivation amounts to sleight of hand. We must therefore deduce that the elasticity in electromagnetic radiation cannot be due to linear polarization and the irrotational electrostatic force. We need to establish a bonding structure for the electron-positron sea in which the displacement current mechanism satisfies the non-zero curl equation  $\mathbf{E} = -\partial\mathbf{A}/\partial t$ . We need to consider fine-grained angular displacement.

## **The Cubic Lattice Solution**

V. Amongst the extant theories proposing that space is densely packed with electrons and positrons, it is worth considering the face centred cubic structure advocated by solid state physicist Dr. Menahem Simhony [5]. Part of the strength of this theory lies in the manner in which it debunks the notion, that the electrons and positrons that fill all of space would annihilate each other. Dr. Simhony's model is based on the principle that when an electron-positron pair are believed to have annihilated each other, they have in fact merely entered into a bound state within a background cubic lattice that pervades all of space, and that the energy which is released in the form of two gamma photons, is accounted for by the lattice binding energy. Simhony drew attention to the fact that the appropriate equation  $\mathbf{E} = mc^2$ , which is commonly associated with Einstein, is in fact merely a derivative of Newton's equation for the speed of a wave in an elastic solid, which interestingly Maxwell uses at equation (132) in his 1861 paper [1]. Simhony further demonstrates an analogue of the electron-positron pair production/annihilation experiments using sodium and chloride ions within crystalline salt, in conjunction with ultra violet radiation and the Newton equation. If Simhony's theory could be shown to be compatible with Maxwell's equations then it should surely be proven, but this is exactly where the problem lies. Simhony's theory conflicts with Maxwell's equations. For a cubic lattice to be stable, Earnshaw's theorem reminds us that in addition to the attractive inverse square law electrostatic force which acts between the neighbouring electrons and positrons, we would also need to have a stabilizing short range repulsive force with an inverse power law greater than two [6], and this would conflict with the zero divergence in Maxwell's displacement current that is essential in order to derive the electromagnetic wave equation  $\nabla^2\mathbf{E} = \mu\epsilon\partial^2\mathbf{E}/\partial t^2$ . *See the Appendix.* Nevertheless, Simhony's theory provides persuasive evidence that a dense background sea of electron-positron dipoles does in fact exist, and it only remains to determine the precise structure.

## The Sea of Tiny Aether Whirlpools

**VI.** In a paper written in 1930 [7], Tesla speaks of how mankind knew long ago that the primary substance that fills all of space (the aether) is thrown into tiny whirls. In the eighteenth century, John Bernoulli the younger believed that all space is permeated by a fluid aether containing an immense number of excessively small whirlpools that press against each other with centrifugal force while striving to dilate [8]. In the nineteenth century, James Clerk-Maxwell used this same blueprint and proposed that the magnetic field is comprised of a specific alignment of tiny molecular vortices that are surrounded by electric particles [1]. In Maxwell's model, the individual magnetic lines of force consist of these tiny vortices mutually aligned along their rotation axes.

## The Double Helix Solution

**VII.** Since the derivation of the electromagnetic wave equation employs Ampère's circuital law, it follows that there must be a closed electric circulation at every point in space where wireless electromagnetic radiation exists, and so it is reasonable to assume that the background electron-positron sea is constructed of rotating electron-positron dipoles in which each electron is in mutual circular orbit with a positron. If Simhony's proposed cubic lattice version of the electron-positron sea were set into place and released, it would instantly collapse, unless of course there existed a short range repulsive force with a higher inverse power law than the electrostatic force of attraction, and of course such an *ad hoc* force would conflict with Maxwell's equations. Without such a short range repulsive force, the lattice would collapse, but before the whole thing would all collapse into a single point, each electron-positron pair would first collapse into a closed dipolar orbital system representing a miniature electric current circuit. Such low energy rotating dipole orbitals would not however possess any mechanism with which to bond together, and they would likely further collapse as the dipoles themselves began to bond together with each other. If however each dipole were to be inflated with pressurized aether from the positron, so as to cause the two particles within each dipole to exceed their escape velocity, the dipoles throughout the sea would then press against each other with centrifugal force while striving to dilate, hence hemming each other in, as in John Bernoulli's model mentioned in the previous section. The individual dipole orbits would remain closed, with the inward centripetal force being supplied by centrifugal force coming from their neighbours in the equatorial plane, while gyroscopic stability would prevent the rotating dipoles from flipping over. Space would then become a source of high energy based on fine-grained centrifugal pressure. It would then only remain to establish what would prevent the structure from exploding apart.

In Maxwell's model, the centrifugal pressure in the equatorial plane of the vortices, that causes magnetic repulsion to act at right angles to the magnetic field lines, is counterbalanced by an attractive force in the axial direction of each vortex in the same direction as the field lines, which being solenoidal therefore locks the whole system together into a stable equilibrium. If we were to substitute Maxwell's tiny vortices with rotating electron-positron dipoles, which themselves would constitute dipolar aethereal vortices, then the attractive tension acting along the magnetic lines of force could be accounted for on the basis that if the dipoles were aligned in a double helix, then every electron would be attracted, by the ordinary electrostatic force,  $\mathbf{E} = -\text{grad}\psi$ , to the positron in the neighbouring dipole in the axial direction [9]. See Fig.1 below,

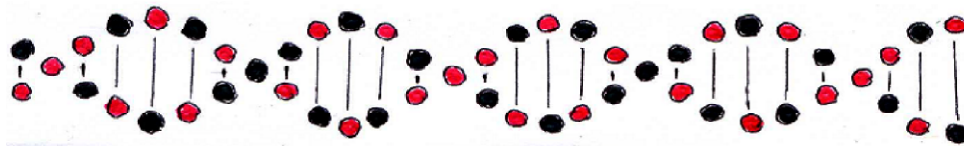


Fig. 1. A single magnetic line of force. The electrons are shown in red and the positrons are shown in black. The double helix is rotating about its axis with a circumferential speed equal to the speed of light, and the rotation axis represents the magnetic field vector  $\mathbf{H}$ .

The field lines between two like poles touch together laterally, and so magnetic repulsion is therefore caused by the fine-grained centrifugal force which acts sideways from the field lines. Magnetic field lines cross directly between two unlike poles, and so magnetic attraction is therefore caused by the electrostatic force acting between the electrons and positrons along the double helix. The rotating dipoles within this double helix based structure would have gyroscopic stability in addition to being held in position by the electron-to-positron bonding along the axial direction. Realignment between neighbouring dipoles would however occur in the dynamic state when the magnetic field is changing in time.

Wireless electromagnetic radiation would then be explained as time varying electromagnetic induction that is propagating between neighbouring dipoles, each which constitutes a tiny electric circulation. This would be different from the propagation of linear polarization in cable telegraphy. Wireless telegraphy would involve a propagation of fine-grained angular acceleration (or precession) of the dipoles [12], whereas cable telegraphy involves a propagation of linear polarization.

Linear polarization of a rotating dipole would create a torque and hence cause the dipole to precess, and so even cable telegraphy ultimately comes down to being a propagation of precession, but the difference is that in the wireless case the angular acceleration of each dipole is being induced by its neighbour, whereas in the cable case, the precession is being induced by an



externally applied electric circulation on a larger scale. More generally speaking, cable telegraphy involves the expansion or the translation of a large scale electric circulation, guided by two conducting wires, whereas wireless telegraphy involves a propagation of angular acceleration, at the speed of light, between neighbouring tiny electric circulations, in the form of rotating electron-positron dipoles that densely fill all of space.

The involvement of a repulsive force in the bonding mechanism within the electron-positron sea, as well as the freedom of the rotating dipoles to precess, results in a loosely bound solid which is able to move through the space between the atoms and molecules of ordinary matter, as like water flowing through a basket. This is in contrast to Simhony's cubic lattice solution which would not readily permit shearing, and hence would not allow for the passage of atomic and molecular matter. Simhony's electron-positron cubic lattice is like a block of electric ice which would freeze the planets in their orbits.

## References

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[http://vacuum-physics.com/Maxwell/maxwell\\_oplf.pdf](http://vacuum-physics.com/Maxwell/maxwell_oplf.pdf)
- [2] Clerk-Maxwell, J., "*A Dynamical Theory of the Electromagnetic Field*", Philosophical Transactions of the Royal Society, 155, pp 459-512 (1865). Abstract: Proceedings of the Royal Society of London 13, pp. 531--536 (1864)  
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- [3] Thomson, William, (Lord Kelvin), "*Aepinus Atomized*", from the Jubilee Volume presented to Prof. Boscha in November, 1901. *Baltimore Lectures*, 1904, Appendix E, pp. 541-568.  
[http://zapatopi.net/kelvin/papers/aepinus\\_atomized.html](http://zapatopi.net/kelvin/papers/aepinus_atomized.html)
- [4] Barker, Arden, (Monitek@aol.com), has no publications but he believes in the existence of a dense background sea of electrons and positrons as the medium for the propagation of electromagnetic radiation. He believes that the linear polarization that must necessarily occur in the space between the plates of a charging capacitor is the basis of electromagnetic radiation.
- [5] Simhony, M., "*The Electron-Positron Lattice Space, Cause of Relativity and Quantum Effects*", Physics Section 5, The Hebrew University, Jerusalem (1990)  
<http://web.archive.org/web/20040606235138/www.word1.co.il/physics/mass.htm>
- [6] Franklin Hu, a graduate of MIT has recently joined the growing number of advocates who propose that space is filled by a sea of electron-positron dipoles as the medium for the propagation of light, but whereby Simhony seems to be unaware of the issue concerning the dilemma that meeting the requirements of Earnshaw's theorem necessarily causes a conflict with Maxwell's equations, Hu on the other hand has dismissed this objection altogether on the grounds that he doesn't believe Earnshaw's theorem. Neither do Simhony nor Hu recognize the importance of the issue raised about linear polarization in section III, in that linear polarization cannot possibly be the physical basis for wireless electromagnetic radiation. Franklin Hu's main article can be read here,  
<http://vixra.org/pdf/1305.0075v1.pdf>

[7] O'Neill, John J., **“PRODIGAL GENIUS, Biography of Nikola Tesla”**, Long Island, New York, 15th July 1944, quoting Tesla,

*“Long ago he (mankind) recognized that all perceptible matter comes from a primary substance, of a tenuity beyond conception and filling all space - the Akasha or luminiferous ether - which is acted upon by the life-giving Prana or creative force, calling into existence, in never ending cycles, all things and phenomena. The primary substance, thrown into infinitesimal whirls of prodigious velocity, becomes gross matter; the force subsiding, the motion ceases and matter disappears, reverting to the primary substance”.*

<http://www.rastko.rs/istorija/tesla/oniell-tesla.html>

[8] Whittaker, E.T., **“A History of the Theories of Aether and Electricity”**, Chapter 4, pages 100-102, (1910)

*“All space, according to the younger Bernoulli, is permeated by a fluid aether, containing an immense number of excessively small whirlpools. The elasticity which the aether appears to possess, and in virtue of which it is able to transmit vibrations, is really due to the presence of these whirlpools; for, owing to centrifugal force, each whirlpool is continually striving to dilate, and so presses against the neighbouring whirlpools.”*

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<http://arxiv.org/abs/astro-ph/0703280>

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<https://web.archive.org/web/20080511185334/http://www.dualspace.net/>

[12] Lodge, Sir Oliver, **“Ether (in physics)”**, Encyclopaedia Britannica,

Fourteenth Edition, Volume 8, Pages 751-755, (1937)

*“The most probable surmise or guess at present is that the ether is a perfectly incompressible continuous fluid, in a state of fine-grained vortex motion, circulating with that same enormous speed. For it has been partly, though as yet incompletely, shown that such a vortex fluid would transmit waves of the same general nature as light waves— i.e., periodic disturbances across the line of propagation—and would transmit them at a rate of the same order of magnitude as the vortex or circulation speed”*

<http://gsjournal.net/Science-Journals/Historical%20PapersMechanics%20/%20Electrodynamics/Download/4105>

### **Appendix on Dr. Simhony’s Cubic Lattice Proposal**

The principle objection to Dr. Simhony’s cubic lattice proposal, which over rides the multitude of other objections to it, centres on the elasticity that is involved in the dielectric displacement mechanism which would be responsible for the electromagnetic wave propagation mechanism within the context of Simhony’s model. Simhony’s short range repulsive force, if it exists, must contribute to the displacement mechanism in the dielectric, and hence to the  $\mathbf{E}$  field in Maxwell’s displacement current,  $\epsilon\partial\mathbf{E}/\partial t$ , which is an essential ingredient in the derivation of the electromagnetic wave equation,  $\nabla^2\mathbf{E} = \mu\epsilon\partial^2\mathbf{E}/\partial t^2$ . In order to enable the electromagnetic wave equation to be derived using the displacement current, the  $\mathbf{E}$  field must have a zero divergence. This creates an inescapable fatal consequence for Simhony’s cubic lattice proposal in relation to Earnshaw’s theorem. If his short range repulsive force obeys the inverse square law just like the attractive electrostatic force that it is designed to oppose, then the structure will collapse since there can be no stable static equilibrium nodes. That is the reason why Simhony proposes that his short range repulsive force must obey a higher inverse power law than the inverse square law. If however his short range repulsive force does not exactly obey the inverse square law, the divergence of  $\mathbf{E}$  will not be zero and so it will therefore conflict with the electromagnetic wave equation, and hence his proposed cubic lattice structure cannot possibly be the medium for the propagation of light.

Defenders of Simhony’s cubic lattice structure however object to this criticism. A number of counter arguments in defence of Simhony’s cubic lattice structure have been advanced as follows,

- (1) That because intrinsic magnetic spin moment exists, as is demonstrated by the Stern-Gerlach experiment, Simhony's short range repulsive force must necessarily be due to the intrinsic magnetic spin moment of the electrons and positrons.

But it doesn't matter what causes the short range repulsive force. The objection cited above stands, no matter what the cause is. Claiming that the short range repulsive force is caused by intrinsic magnetic spin moment does not alter the argument in the slightest.

- (2) That even if the short range repulsive force has a non-zero divergence by virtue of its non-inverse square law relationship, it will nevertheless have a zero divergence by virtue of being an axial vector since it arises from intrinsic magnetic spin moment.

It is impossible for the short range repulsive force to be an axial vector if it arises from the intrinsic magnetic spin moment of the electrons and the positrons, because for that to be so, the force would have to be the curl of the  $\mathbf{B}$  field, and as such it would conflict with Ampère's Circuital Law, which says that  $\text{curl } \mathbf{B} = \mu \mathbf{J}$  where  $\mathbf{J}$  is electric current and not a force. Even if the short range repulsive force is an axial vector independently of the magnetic field, the zero divergence will only apply on the smaller scale of the field within which the short range repulsive force is an axial vector, and not within the larger scale axial vector field itself. For example if  $\mathbf{A}$  is the momentum of the aether within Maxwell's tiny vortices,  $\text{curl } \mathbf{A} = \mathbf{B}$ , where  $\mathbf{B}$  is an axial vector representing the vorticity of the tiny vortices, and hence  $\text{div } \mathbf{B} = 0$ . The axial  $\mathbf{B}$  field as a function of its distance  $r$  from a polar origin will not however have a zero divergence, unless it is an inverse square law function.

- (3) That even though the short range repulsive force has a non-inverse square law relationship, the zero divergence requirement of the electromagnetic wave equation is nevertheless satisfied because the  $\mathbf{E}$  field in the displacement mechanism is not coming from the non-inverse square law inter-particle force, but rather it applies 'across the lattice' and not within the lattice.

The very essence of displacement current, within the context of an electron-positron sea that acts as the medium for the propagation of light, is that the displacement mechanism relates to the displacement of the particles from their equilibrium positions within the lattice, and to the ensuing restorative force. The  $\mathbf{E}$  field in the displacement current most certainly does not act across the lattice, but rather it acts at a specific point within the lattice where the particles have been disturbed from their equilibrium position, and it is due to the inter-particle force.

- (4) That the cubic lattice is a dynamic equilibrium and not a static equilibrium, by virtue of the fact that the electrons and positrons vibrate about their static equilibrium positions, and that hence Earnshaw's theorem doesn't apply.

This objection is based on a misunderstanding of the meaning of static equilibrium. Static equilibrium in the context means that particles can vibrate about their static equilibrium positions. Vibrations about a static equilibrium position do not make it into a dynamic equilibrium. A dynamic equilibrium exists when a stable dynamic configuration remains in a steady state by virtue of the mode of motion of the individual constituents. An example of dynamic equilibrium is that of the motion of the planets around the Sun, whereby the steady state configuration depends on the sustaining of the already existing motion.

- (5) That crystal salt has a cubic lattice structure, and so it must be possible for an electron-positron sea to have a cubic lattice structure.

This objection fails on the grounds that we don't fully know what is going on inside a salt crystal, whereas we do know exactly what is going on within Simhony's proposed cubic lattice array of electrons and positrons, and we can hence clearly see the flaw in Simhony's proposal. At any rate, salt is not the medium for the propagation of light and doesn't therefore have to conform to Maxwell's equations, and furthermore, all indications are, that due to the electron orbitals in the sodium and chloride ions, the structure is a dynamic equilibrium and not a static equilibrium, and hence doesn't have to conform to Earnshaw's theorem.

- (6) That  $E = mc^2$  applies to the lattice energy in crystal salt, and so if  $E = mc^2$  also applies to the binding energy in the electron-positron sea, then the electron-positron sea must also have a cubic lattice structure.

The equation  $E = mc^2$  follows directly from Newton's equation for the speed of a wave in an elastic solid, simply by multiplying Newton's equation across by volume. There is no stipulation that Newton's equation applies only to cubic lattice structures and there is certainly no basis to believe that it would not apply to alternative structures that involve discrete dipoles within a dielectric, such as the double helix structure proposed in this article.

- (7) That Maxwell's equations may not be quite universal, and that the electromagnetic wave propagation mechanism within the cubic lattice is governed by rules that lie in the region where Maxwell's equations err.

Maxwell's equations govern electromagnetic phenomena and electromagnetic waves. It is highly unlikely that the medium for the propagation of light will be governed by rules that lie outside the jurisdiction of Maxwell's equations.

- (8) That magnets can levitate in a gravitational field and that therefore Earnshaw's theorem is wrong.

There could however be a number of reasons why magnets levitate without invalidating Earnshaw's theorem. For a start, the point of origin of the gravitational field is different from the point of origin of the magnetic field, but much more likely is the fact that magnetic repulsion is not an inverse square law force, but rather has a higher inverse power law. Earnshaw's theorem is a mathematical theorem that cannot be wrong in principle. Any apparent breaches of this law can only be due to unknown physical effects. Simhony's cubic lattice structure, being merely a theoretical proposal based on classical mechanics, does not contain any unknown physical effects that might undermine the operation of Earnshaw's theorem. Indeed it's with Earnshaw's theorem in mind that Simhony insists that his short range repulsive must have a non-inverse square law relationship.

- (9) That if the magnetic axes of the intrinsic magnetic spin moment of the electrons and positrons were precessing, then the repulsive force would be shared out in all radial directions over time, and that furthermore, this precessional effect would mean that we are dealing with a dynamic equilibrium and not a static equilibrium, and that hence Earnshaw's theorem does not need to apply.

Earnshaw's theorem would still apply, because the required stability of the cubic lattice structure is based on the linear displacements and separation distances of the electrons and positrons. Neither rotation nor precession of the electrons and positrons would in any way impact on Earnshaw's theorem within the context of a cubic lattice. This is despite the fact that there would be no rational reason for believing that the magnetic axes of the electrons and positrons would undergo such a sustained forced precession that is so well regulated for the specific purpose of causing Simhony's short range repulsive force to act radially in all directions. There wouldn't even be any basis for assuming that the magnetic axis would rotate on an axis fixed in space, never mind that this rotational axis would precess. The natural state of affairs is for neighbouring magnets that are facing each other with like poles, to re-orientate themselves and then attract each other. Intrinsic magnetic spin moment would therefore join forces with the electrostatic force and cause the cubic lattice structure to collapse. Intrinsic magnetic spin moment would have the complete opposite effect to that desired for the purpose of supplying Simhony's short range repulsive force.

More generally in response to (9), Simhony's cubic lattice structure fails because the required short range repulsive force cannot simultaneously satisfy the two mutually exclusive constraints, those being Maxwell's equations and Earnshaw's theorem. It is impossible to satisfy both of these two constraints, because they both depend exactly on whether or not the short range repulsive force obeys the inverse square law. If it obeys the inverse square law, the structure will collapse. If it doesn't obey the inverse square law, then it conflicts with Maxwell's equations. It doesn't matter what causes the short range repulsive force, because no matter what causes it, it must necessarily still fail to satisfy one of these two constraints. The fact that the required radial repulsive force might be caused by a fancy piece of gyration does not in any way make it immune from the two constraints.

- (10) That a spinning magnet levitates against gravity in defiance of Earnshaw's theorem, due to the fact that it is spinning, and that hence Simhony's short range repulsive force could defy Earnshaw's theorem if it were to be caused by intrinsic magnetic spin moment..

The fact that the levitating magnet is spinning has no bearing on the fact that a static equilibrium node has been established between the magnetic field and the gravitational field. The gyroscopic stability merely prevents the magnet from flipping over. We can levitate ring magnets that are not spinning, by placing them over a pole. The intrinsic magnetic spin moment of electrons and positrons on the other hand is a quantum mechanics concept that is the cause of the magnetic field surrounding the electrons and positrons, and its effect would be to cause actual force, both repulsive and attractive. We cannot therefore establish an equivalence between the role that the spin of a classical magnet plays in causing gyroscopic stability during magnetic levitation, on the one hand, and the role of intrinsic magnetic spin moment in causing a stabilizing repulsive force, on the other hand. At any rate, none of this addresses the core objection detailed in number (1) above regarding the divergence of a non-inverse square law force field.

- (11) That Maxwell didn't know about the positron, and that if he had, he would have adopted Simhony's cubic lattice model instead.

This assertion fails on the basis that when Maxwell was deriving the electromagnetic wave equation in his 1865 paper "*A Dynamical Theory of the Electromagnetic Field*", he was quite specific about the fact that he was working within the context of a dielectric elastic medium. Maxwell was already in effect assuming electrons and positrons in principle, even if he wasn't referring to them by name. Furthermore, Maxwell's sea of molecular vortices was the hydrodynamical basis for what became "*Maxwell's equations*". It's hardly likely that Maxwell would have substituted his model for a cubic lattice structure that so blatantly contradicts his now famous equations in the most important aspect i.e. with respect to the displacement current mechanism that is involved in the transfer of electromagnetic energy through space.