

ENERGY SCIENCE REPORT NO. 10

CYCLOTRON RESONANCE IN HUMAN BODY CELLS

by

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# CYCLOTRON RESONANCE IN HUMAN BODY CELLS

## PART I: INTRODUCTION

There are times when it is necessary to wander slightly from one's field of expertise to trespass briefly and as a stranger in a discipline that is sending signals into one's own territory.

It has been suggested from evidence in the medical field that overhead electric power lines and electric blankets can be harmful to one's health and there are those expert in the science of electrical engineering who argue that low frequency electromagnetic radiation cannot possibly have any harmful effects.

Self-appointed in the quest to reconcile differences of opinion in this debate, I once dared to express my opinion as an academically-trained electrical engineer as to why overhead electric power lines and electric blankets can pose a health hazard. My case was based on a combination of two circumstances.

Firstly, I have contended for many years that the whole of our empirical knowledge concerning electrodynamic interactions is founded on evidence collected from experiments in which the main field reactions are set up by the motion of electrons. My thesis has been that, where reactions to electromagnetic fields are seated in heavy mobile ions, rather than electrons, then anomalies do arise. Indeed, there are anomalous forces set up in some instances, as reported in scientific periodicals of high repute, which exceed by a thousand fold the theoretical expectation based on electron theory.

Secondly, given that the medical community now suspects that fields set up by overhead electric power lines can stimulate unwanted activity in human body cells, I ask myself whether the ions in our body fluids that must react to those fields are electrons as such or are of heavier molecular form. In the latter case, taking the ions found in water, namely the hydronium ion  $\text{H}_3\text{O}^+$  and the hydroxyl ion  $\text{OH}$ , I can see that we are dealing here with the same electrical territory as that in which one experiences those high force anomalies mentioned above. Clearly, therefore, since the electrical engineer has failed to give account of the anomalous energy activity witnessed in plasma discharges where heavy ions are the reacting charge carriers, that engineer has no right to declare that the electromagnetic fields he is producing cannot be harmful. He simply does not know.

All he can be sure about is that people working in the electrical power generation and distribution industry have no reason to worry about electricity affecting their health, so long as they keep well out of reach of live wires and their high voltages. He is, incidentally, all too aware of the characteristic smell of ozone owing to the ionization of air produced by an electrical discharge. It is a warning that something may be wrong and that he is getting too close to an electrical hazard. However, without such a warning the question is whether there is a less obvious influence which puts us at risk if we get close to electrical cables which are spaced apart, one carrying current in one direction and the other carrying current the opposite direction.

That, by the way, is the feature which overhead power lines and electrical blankets have in common. In the electrical wiring used in the domestic power supply to electric cookers, electric fires, lighting etc. the current is not something that flows one way. It has to enter an appliance, do its work and then go back to its source. In the wiring system wires carrying current to the appliance are twisted closely around the wires carrying the return current flow. This means that their field effects cancel and the normal domestic power cable poses no hazard problem so long as the insulation in the cable is sufficient to withstand the voltages used and the current, which generates heat, is obliged to restrict its damage to blowing an occasional fuse in the protection system. Our health hazard concern, however, is with those overhead power lines and electric blankets.

Remember here that the professional electrical engineer who maintains overhead power lines has expert knowledge of how electricity carried through metal wire by one set of electrons can interact with electricity carried through metal wire by another set of electrons. That is his trade and he knows it well. What he does not know anything about is how electricity flowing in the human body and carried, not by electrons, but by ionic particles, may interact with other such ionic particles in the human body and how their interaction can be aggravated by the electrical and magnetic fields which that engineer creates by his power distribution apparatus.

Of course, he will say that he too is human and that his body is exposed to such effects, but then I urge him to consider whether he really does spend his working days close to overhead power lines which are energized. If he does, then I wonder how he contrives to do anything useful. Again I stress that here I am not referring to an energized cable which carries current along conductive strands in close proximity but in opposite directions. I am referring instead to a situation where he may sit close to, and virtually between, two widely-spaced electrical power lines each conveying uncompensated currents, as otherwise there is little field exposure.

Dare I then point out that a baby's bottom, which is commensurate in size with the spacing between metal wire strands in an electric blanket, is the kind of exposure to unbalanced field effects of the kind which that engineer rarely, if ever, encounters in his power line work. He is wise enough to switch the power off before climbing up between those overhead lines.

On the broader subject of electromagnetic fields, we all have exposure to the electromagnetic wave spectrum, which ranges through its radio and television frequencies, the infra red frequencies and on through optical frequencies and beyond. We know that if such radiation is concentrated to high intensities

then we can suffer. Physicists know that at the high frequency end of the spectrum, as one progresses through the ultra-violet range, there are X-rays and  $\gamma$ -rays which can be very harmful. However, for the very low frequencies used in power cables and the very weak electromagnetic fields they produce, electrical engineers and physicists see no reason for concern about a radiation hazard.

Yet, as I say, since the basis of electrical science is founded on electrical activity seated in electrons and our body fluids involve activity seated in ions that are very much heavier than electrons, there is reason for doubt.

Now, the stimulus for writing the text of this introductory essay of this Report No. 10 comes from a Letter to the Editor in the July/August 1996 issue of Electronics World (page 590). It was authored by Dr. David Fisher of Cardiff in Wales and was a declaration framed in an accusative context directed at anyone who believes in 'anti-gravity and perpetual motion (free energy)' with the finger pointed in my direction. Quoting from it:

"I was, in fact, thinking of Dr. Aspden who, readers will recall, believes in this nonsense and has also proposed a 'cyclotron' theory in order to 'explain' the so-called link between electromagnetic fields and disease."

This was probably a result of an article of mine published by Electronics and Wireless World, pp. 29-31 (1989). It was entitled 'Anti-Gravity Electronics'.

The latter article had also attracted similar criticism, expressing doubts as to my wisdom as a professionally qualified physicist, for my views on the gravity theme. My attacker was C. Hellingman writing in Physics Education, **27**, 112-115 (1992). In rallying to defend my case I wrote another article which was published by the Institute of Physics in U.K. in that same periodical, Physics Education, **28**, 202-203 (1993). It was entitled 'The Law of Perpetual Motion'. As to my 'cyclotron' subject that had featured in an earlier article of mine in EWWW, pp. 774-775 (September 1991). The title of that article was 'Power Lines, Cancer and Cyclotron Resonance'. Note that EWWW, or Electronics World + Wireless World, represents a staged period of gradual transition as the publishers of Wireless World decided to rename their periodical Electronics World. I am tempted to note here that the word 'wireless' has gone out of fashion, along with the word 'aether', but remind you that Nature still needs the aether to sustain those wireless waves and no amount of electronics can eradicate its existence!

This being Report No. 10, the final Report in this Energy Science Series, and the other reports all being concerned with energy matters in the context of electrical power and the fundamental physics involved, I am now going to digress somewhat in this introduction. Indeed, I have decided to present this Report in three parts, this Introduction being the first part. If the reader's interest is restricted to the health hazard issue posed, as by power lines, then the next few pages of this section up to page 9 should be skipped.

I planned to publish and, indeed, did compile, a 28 page document bearing the title of this Report No. 10, some 7 years ago, in 1990. I was, however, distracted at the time by other pressing interests, such as the

research matters discussed in Energy Science Reports 2 and 3 in this series. The text of that 1990 document does, I now believe, warrant publication as it does add something of significance to the energy theme of the early Energy Science Reports. Also, I find I am obliged to react to the criticism, such as that of Dr. Fisher quoted above.

Accordingly, I have decided to publish that 1990 document unamended as Part II of this Report and add a Part III which is really an Appendix comprising other items that have appeared in print and some that I have now published on Internet. These include a new commentary on Schumann Resonance, owing to recent input from A. G. Callegari of Much Hadham, Hertfordshire in England. Also there is a paper I wrote in 1988, as published in October of that year, which dates from a little before I became wedded to the relevance of the cyclotron theme. It is entitled 'The Proton Factor and its Unknown Effects'. I believe it will interest some readers, but I include it especially because my research on the energy theme tells me that energy in our universe is being recycled.

Energy which finds its way into space as part of what cosmologists see as the running down of the universe as it expands into oblivion is really being repackaged and put into order in the quantum underworld that pervades all space. From that quantum sea of energy, protons and electrons, the components of the hydrogen atom, are being created to restore that lost energy in matter form, meaning that we are part of a universe that is a steady-state system.

My interest in energy from a power generation viewpoint arises because I can see a way of intercepting the energy in a phase of the regeneration cycle, after it has become quantized but before it is released in proton form. As a side issue I then wonder whether the ongoing creation of protons (accompanied by the demise of protons) within atoms forming our body cells can imply a health hazard.

If you, the reader, share Dr. Fisher's view and suspect that this is all nonsense, then do defer your judgement, at least until you know enough about my research to see the strength of my case. The physics involved has allowed me to deduce by pure theory the proton/electron mass ratio to the part in tens of million level of precision measurement. The 'proton factor' must not be overlooked in the study of potential health implications.

If such ideas, which are rooted deeply within the discipline of physics, go beyond the scope of your interest, then it is time to jump on now to page 12. Otherwise, and particularly if you, the reader, are well versed in theoretical physics and so are ever ready to challenge an intruder who questions the state of that art as a sound foundation on which to go forward, then let me try to shatter your confidence.

Do ask yourself why it is that all the fundamental particles known in physics decay and have a short lifetime, with the exception of the proton and the electron. The electron, however, can, within the period of one ten millionth of a millionth of a second jump from one side to the other of a theoretically-impenetrable potential barrier. It is called 'electron tunnelling', but who is to say that that the electron does not decay on one side of that barrier only to find that its energy and its charge are given to a newly created electron on the other side of that barrier? We can all live forever if physics can contrive to rejuvenate us by a recycling process! What I am really saying here is that the proton and the electron are

the basic forms in which matter is newly created from spent energy shed into the quantum underworld of the aether. Therefore, the proton and the electron can have finite lifetimes and suffer decay, but such events pass unnoticed because they are recreated in close proximity to their demise. They have a life after death!

However, if protons shed from atoms in a molecule in DNA reappear in different atoms, not necessarily within that same DNA structure, might not that have some effect upon our health?

I want simply to point out that physics, being an exact science, even in its interpretation of quantum mechanics, tends to see things as all 'black' or all 'white'. (Physics can 'see' Black Holes even though, if they exist at all, they are invisible and they can 'see' space in a contrasting light because they 'know' there is no aether even though something governs those wireless waves which ripple through it.)

The proton has an immeasurably-long lifetime. The assumed age of the universe is not even as long as one trillionth of the mean lifetime of the proton. Yet, for all we know, the proton occupying a certain region of space may have a characteristic age measured in minutes or days, but not years.

I believe the proton and its decay have a significant bearing upon our human condition but I am not here urging you to believe what I say, but rather just to suspect that physicists err by ignoring this possibility. The truths will emerge if we study the effects that proton demise and recreation may have and the appropriate arena for such study could well be the biophysical world where isotopic transmutations and molecular changes can have 'knock-on' effects. It may not be easy to prove but the task will be all the more difficult if physicists cling too tightly to their textbook training and do not seek out the questions that they have never before asked and so have never answered!

## Quantum Field Theory

It is generally supposed that physicists know all that there is to know about electromagnetism and the related field theory, at least concerning the phenomena which intrude upon our immediate environment. Field theorists claim great achievements which can bewilder and, indeed, outclass the concerns of the scientist or engineer who has to deal with real problems faced in our daily routine. Field unification, the quest to understand the nature of the force of gravity and its link, if any, with quantum field theory and exotic high energy particles, as well as the creation of neutron stars and probing the physics of the Big Bang and Black Holes, are the territories that they see as warranting exploration.

So, let us take a look at the overview presented by Victor F. Weisskopf in the November 1981 issue of Physics Today (pp. 69-85) under the title: 'The Development of Field Theory in the last 50 Years'. I refer to that because it describes the history of quantum field theory and, unlike most articles written on that subject, it actually exposes the weaknesses and uncertainties as they stood in 1981 and, indeed, as they

remain today.

I have a personal reason for referring to this Weisskopf article, because, as a young electrical engineer interested in electromagnetism as a research pursuit, I was 'put in my place' repeatedly as I tried to publish my findings on topics which trespassed onto the territory of quantum electrodynamics. I was told that Einstein and Dirac had covered that ground and there was no chance that my research, which obliged me to think more and more about an energy form pervading the aether, could warrant the slightest attention.

Eventually, in frustration, and having solved the mystery of unifying the electromagnetic and the gravitational force, I published my own books on the subject, including 'Physics without Einstein' in 1969 and 'Modern Aether Science' in 1972 and, later, 'Physics Unified' in 1980. Thereafter, and mainly because I took early retirement in order to return to academic research in the university in my home town, I was able to get a stream of scientific papers published but many of the more important papers are not to be found in the mainstream periodicals. The editors of those periodicals avoid anything controversial that might ripple the oceans of 'relativity' and 'quantum field theory' by introducing a sea of aether energy.

However, in July 1996 I decided to publish 'Aether Science Papers', collecting together a selection of some of my more important published papers. It being impossible to argue theory to get the theoretical physics community to see the need for a 'modern' quantum electrodynamic insight into the 'aetherial' world of the vacuum state, I am taking my efforts forward by seeking ways of tapping energy from that 'aether'. This, in the main, is the reason I have written this series of Energy Science Reports. This final Report No. 10, however, is more concerned with energy transfer processes that are anomalous in electron-based physics, but which can affect the fluids in human body cells.

So, what does Weisskopf have to say about the weaknesses of quantum field theory? Well, it seems that it all began in 1927 when Paul Dirac gave birth to the theory of quantum electrodynamics. Already by then "Albert Einstein had put an end to the concept of aether" and already by then "the field-free and matter-free vacuum was considered as truly empty space." The quotations are of text taken from the Weisskopf article.

Electromagnetic radiation posed problems but Max Planck had delivered the quantum theory as, without it, "total energy density becomes infinity; empty space would be an infinite sink of radiation energy". With the introduction of quantum mechanics "the vacuum gradually became populated...there must be zero-point oscillations of the electromagnetic fields in the vacuum state".

Under the heading "Triumph and Curse of the Filled Vacuum" Weisskopf then writes "Dirac's daring assumption had most disturbing consequences, such as infinite charge density and infinite (negative) energy density of the vacuum". "These ideas seemed incredible and unnatural to everybody". "Even if we consider the filled vacuum as a clumsy description of reality, the existence of virtual pairs and of pair fluctuations shows that the days of fixed particle numbers are over".

Here Weisskopf is referring to the ongoing electron-positron pair creation and annihilation activity that features in quantum electrodynamics. Note the use of the word 'virtual', which is a convenient way of referring to something aetherial that is there but yet is not real in matter terms.

It seemed then that the 'infinities' were posing problems, but that these were solved, as by arguing by symmetry that two theoretical systems coexist in the same space, one involving infinite negative energy density and the other involving infinite positive energy. "There remains, however, the unpleasant fact of the existence of vacuum fluctuations without any energy". "The infinities of the filled vacuum and of the zero-point energy of the vacuum turned out to be relatively harmless compared to other infinities that appeared in quantum electrodynamics when the coupling between the charged particles and the radiation field was considered in detail".

Then it seems several assumptions were made to avoid problems connected with an infinite electron mass and some numbers pertaining to the anomalous g-factor of the electron began to fit what was measured. Here were "the signs of victory in the war against infinities". [A reader having a copy of my book 'Aether Science Papers' should refer here to pages 48-53 for a simple 'aether-based' account of the electron's anomalous g-factor that is superior to the QED derivation].

Weisskopf continues: "In spite of these victories there remain nagging problems in quantum electrodynamics. There are definite indications that we understand only a partial aspect of what is going on." "Will there be a theory that avoids renormalization by using non-perturbative methods? Or will a future unification of electrodynamics and general relativity heal the disease of divergences? There is no way to understand and derive the mass of the electron within today's electrodynamics. The problem has become even more acute since heavier electrons such as the muon and the tau-electron have been discovered. There is not the slightest indication why electrons with different masses should exist."

[Again, I say, read my book 'Aether Science Papers' and you will see all the answers to all these issues, save that I do not unify electrodynamics and general relativity, but show instead that electrodynamic forces and gravitational forces are unified by the role played by an aether which has quantum electrodynamic properties. Indeed, the virtual muon form is the primary aether energy. It is seated in a central inertial frame intermediate the counter-balanced jitter motion oscillations of the matter frame (electrons and protons) and the graviton frame (tau-particles). The phenomena which are purported to support Einstein's General Theory of Relativity are also fully explained in terms of that same aether.]

Later in his article Weisskopf ventures into the realm of the heavy bosons, notably the neutral Z boson. [This is high energy territory which concerns the 'supergraviton' of my theory and which I shall mention briefly at the end of Part III of this Report.]

Concerning such theory, Weisskopf then mentions "spontaneous symmetry breaking". "It has the following remarkable property: Its energy is such that it has a minimum, not when the field is zero, but when it has a finite value...that would mean that the vacuum has a certain fixed direction in isospace." [I could not get my early papers on the aether theme accepted by orthodox journals because such a `fixed' direction was implicit in a dynamic system that has two-dimensional linear harmonic oscillatory motion

(i.e. circular) in its zero-point state of minimal energy. Einstein's theory did not predict the need for such a direction! You will soon see why that feature also has some bearing on the subject of this Report].

Weisskopf continues: "The situation is like that of a ferromagnet, in which a direction in real space is determined as long as the energy transfers are smaller than the Curie energy."

[This was precisely the foundation on which I developed my aether theory, based on my research at Cambridge University in 1950-1953. I was testing energy anomalies in electrical sheet steels under varying mechanical stress conditions. Besides magnetization loss anomalies I knew there were stress energy anomalies to consider, but the standard theory of the ferromagnetic state, which relies heavily on Dirac's electron spin concept, needed to be adapted to have the 3d electrons of adjacent atoms sharing a component of synchronous motion. This model, which ran counter to the Dirac philosophy, was adopted as the basis of my aether theory which I began developing as soon as I left Cambridge. The aether itself is a 'crystal structured' system of aether charges in synchronized motion, a 'ferromagnetic' system in a sense, but the forces of attraction set up by the presence of matter are gravitational forces which are really electrodynamic forces characterized by the frequency of that synchronous motion, which happens to be that at which electrons and positrons are created. The embryonic form of this theory as it stood in 1959 is presented in my first publication on this aether theme 'The Theory of Gravitation', which I published in January 1960.]

Weisskopf then moves on to QCD, 'Quantum Chromodynamics', an effort to parallel QED, quantum electrodynamics in the realm of the proton, but the story advances relentlessly to a summary of the unresolved problems. "Is the renormalization procedure sound?" This is the name given to the trick used in QED to solve the problem of the infinities. "The answer to this question may save or condemn field theory". "The large value of the effective coupling constant of quantum chromodynamics at small momentum transfers causes serious problems as to the nature of the vacuum itself. The field fluctuations may turn out to be very large and may require new conceptions of the nature of the vacuum."

"The present theories contain arbitrary constants. In QED it is the coupling constant  $2e^2/hc$  at large distances and the masses of the different electrons. Today three such electrons are known, but there may be more. There is no way visible at present to explain how their mass values may emerge from the field theories."

"We have no explanation for the mass of the electron, that is the smallness of the ratio (1/1836) between the electron mass and the proton mass."

"Our present view of elementary particles is plagued by the following problem: Nature as we know it consists almost exclusively of.. quarks (the constituents of protons and neutrons), and of ordinary electrons. ...But there definitely exist higher families of particles...They appear only under very exceptional circumstances that are realized during the early instances of the Big Bang, perhaps in the centre of neutron stars, and at the targets of giant accelerators. What is their role in Nature, why do they exist? Rabi exclaimed when he heard of the first of those 'unnecessary particles', the muon: "Who

ordered them?" Again, field theory does not seem to contain the answer to this question."

"We will find out sooner or later whether field theory is able to clear up some of these outstanding problems. It may be that a very different approach will be required to solve the questions for which field theory so far has failed to provide answers. ... We have not yet been able to make sense of much of what Nature says to us."

"Looking back over a lifetime of field theory, it seems obvious that we have learned much since 1927, but there is a great deal more that is still shrouded in darkness. New ideas and new experimental facts will be needed to shed more light upon the deeper riddles of the material world."

This ends my quotations from Victor Weisskopf's 'Physics Today' article. Looking back over my own lifetime (I was born in that year 1927) I can but say that Weisskopf failed to realize that answers to almost all of those mysteries were of published record before 1981. My book 'Physics Unified', published in 1980, gave the update as of that time. It tells you how to unify gravity and electromagnetism and validates the argument by showing how  $G$ , the constant of gravitation can be deduced in relation to the electron's electromagnetic charge to mass ratio by pure theory. The derivation of the mass of the virtual muon is a major feature of the theory and it is shown on pp. 115-116 of that book how from that one deduce the mass of the proton in electron mass units. It is found to be slightly greater than 1836.152. That coupling constant used in QED is a dimensionless physical constant measured to part per million precision. Using the aether theory disclosed in 'Physics Unified' that value is derived at p. 112 in full accord and with the same degree of precision.

As to explaining the mass of the electron, that too is found in my published work, but mass is not a dimensionless physical quantity and so it cannot be derived by theory except as a ratio to other physical quantities. The task really boils down to explaining inertia and understanding why the electron is a favoured state of matter, given that the creation process of the proton is already explained.

Finally, to conclude this digression into the world of the orthodox theoretical physics and its many mysteries which (dare I say it?) only my aether theory can resolve, I did not, at the time I wrote 'Physics Unified' in 1980 have a way of determining the mass of the super-heavy electron, the tau particle. I was then still busy working in my Director capacity in IBM's European Patent Operations, but my theory (see pp. 118-122 in my 1980 book) was yielding explanations for the creation of those short-lived 'higher families of particles' mentioned by Weisskopf. It was only when I retired and began developing my theory further from a university base that the tau emerged in a rather beautiful form. It is vital to the gravity process, but to read about that requires reference a 1989 paper of mine, the eighth of the 14 papers reproduced in my book 'Aether Science Papers'. Weisskopf could not have written a better article from my point of view to set the stage for a presentation of my aether theory. But a stage and a performance need an audience and physicists are all too busy to pay attention. You must, however, now picture all those theoretical physicists in academia still trying to solve those mysteries and overcome the weaknesses of quantum field theory, whilst, I, knowing the solution, proceed here to address the real mysteries of physics, such as why overhead power lines pose a health hazard.

I would not write in such a strident style with its risk of offending the sensitivity of the elders of the scientific community were it not for the fact that at the age of 69 I feel I am obliged put my case with some force in order to claim attention. If that is seen as an excuse for ignoring the physics underlying my theory, then I lose nothing, as that is the way it has been for four decades now. If I can arouse interest amongst those who have to find a worthwhile future in researching theoretical physics, as in the student community, then that will be some gratification.

However, to proceed and before coming to the documentary account in Part II of the initial version on which this Report is based, I will get this Report back on the track of its title by reverting briefly to that cyclotron question.

### Introducing Cyclotron Resonance

One perplexing question for any such student is that posed by claims that a strong permanent magnet strapped in close contact with the stomach can have a beneficial effect but only if it is correctly mounted with its north and south poles properly positioned. Why should a north pole of a magnet held against the body exert any action different from a south pole? As far as I know, the human body is not magnetically polarized, so if the action depends upon ions and their reacting motion in that field, the only factor of difference concerns whether those ions in our body fluids respond by moving clockwise or counterclockwise relative to the magnet's polar axis.

This means that the response depends upon the perspective of whoever is viewing the action, whether from in front or from behind, and that surely does not solve the problem.

There is, however, a topic I can discuss and one which features in my other writings that can be relevant here. See, for example, my Energy Science Report No. 8. I call it 'vacuum spin', but mean 'aether spin', knowing that this can induce electric polarization and, owing to that rotation, develop a magnetic field. The governing axis involved in this 'aether spin' is that needed for a 'fixed direction in isospace' which Weisskopf mentions.

The very symmetry of the magnetic field set up by a magnet offers no scope for seeing the north and south poles as exerting any difference in their energy influence. The physicist's notion of the vacuum state gives no reference frame work that we can apply in trying to solve this problem. However, if we bring into play an aether with a preferred direction, then there can be differences in electrical induction arising from positive and negative ions reacting to the field set up by a magnet. I can see that 'aether spin' will develop in a stronger or weaker sense according to the orientation of the magnet relative to the 'aether spin' axis.

This subject, however, is something that needs a great deal of evidence from observations which compare

effects at corresponding latitudes in the northern and southern hemispheres. My information on this topic was mainly gleaned from casual conversation with participants at various conferences dealing with other matters. Therefore I can only offer these tentative remarks on this magnet anomaly theme at this time.

I am now going to jump ahead a little way by mentioning that I once ventured into a conference forum on the subject of the health hazards of low frequency electromagnetic fields to say why there is a problem. I spoke about this basing my comments on the paper reproduced later in this Report (pp. 16-22). My case was that there is a resonant reaction as our body fluids respond as if tuned to the 50 Hz or 60 Hz fields of the electrical power industry and that resonance is attributable to those hydronium and hydroxyl ions already mentioned.

Water, incidentally, features in several other scientific anomalies involving unusual energy properties, but we will concentrate here solely on the theme of my talk at that conference.

I declared that there was a kind of resonant effect similar to that produced by the cyclotron, the cyclotron being a device in which charged particles describe orbits when subjected to a steady magnetic field and pick up energy from a superimposed alternating electric field. Cyclotrons are used in high energy particle physics to pump enormous amounts of power into those charged particles.

A physicist might find it amusing to hear the suggestion that our bodies can operate as cyclotrons but I believe the proposition is far more tenable than some of the other beliefs held by the physics community. I find it not only amusing but totally ludicrous for physicists to waste their time imagining what happened in the first  $10^{42}$  seconds following the Big Bang, when the temperature of the universe was supposedly so high as to be equally meaningless.

The operating frequency of an electron cyclotron can be more than 10,000,000 times that of the power frequencies of our domestic environment and the magnetic fields used in the cyclotron can be 1,000 times greater, but it is the ratio of these two large numbers that relates to the mass of the resonant particle. So, if there is a cyclotron reaction in the cells within the human body, the resonant ions would need to have mass of the order of 10,000 times the mass of the electron, which is the case for the molecular ions found in our body fluids.

However, the point I wish to make here is the answer to a point put to me after I delivered my paper at that conference. The questioner stated that the theory of the cyclotron cannot apply to our body cells because it requires the orbital radius of the motion of ions to be about one metre.

The radius  $r$  of charge motion in a cyclotron is determined by the balance of the force  $Hev/c$  and the centrifugal force  $mv^2/r$ , from which the  $r$  is  $mvc/He$ . The cyclotron frequency in rad/s is  $He/mc$ . Here  $e/mc$  is the charge/mass ratio in electromagnetic units,  $v$  is the speed of the charge and  $H$  is the strength of the magnetic field. To find  $r$ , assuming it applies to ions moving at speeds set by the thermal activity with two degrees of freedom, we equate  $kT$  and  $mv^2/2$ , where  $k$  is the Boltzmann constant and  $T$  is the body temperature in Kelvin. From this we can estimate  $v$  and find  $r$  by dividing by 314 rad/s, assuming

resonance at 50 Hz. Since  $m$  is of the order of  $3 \times 10^{26}$  kg and  $kT$  is  $4 \times 10^{21}$  joules we can estimate  $v$  as being 500 m/s. When this is divided by the power line frequency expressed in radians per second one sees that  $r$  is of the order of one metre.

This is, I presume, one reason why those physicists who are attentive to the weak field health hazards of electrical power sources have not considered the cyclotron resonance hypothesis as relevant.

In order, therefore, to defend my case I had but to muster the mathematical skills of my schooldays to come to the following argument, but I will present the result without using any mathematics. Imagine a particle to be enclosed in a confined space no greater than, say, 10 microns from boundary to boundary. Can that particle, in bouncing from the boundary walls as it proceeds on its course from one wall to the other, many thousands of times per second, have a motion that follows an orbital path of one metre radius? By this I am simply asking whether, if that particle is an ion constrained to follow a helical path of radius  $r$  centred on an axis parallel with the direction of a magnetic field, it can describe small arcs of that path between its collisions. The answer has to be: "Yes".

Now, how does this differ from the cyclotron situation? The answer to that question is that in the cyclotron the ion is allowed freedom to describe a full circular orbit unimpeded so that, as it moves over one half of its orbit, it is accelerated by the electric field acting in forward direction and, as it moves over the second half of its orbit, it is still accelerated in its forward direction because by then the electric field has reversed its direction. There is phase-locking owing to the resonant tuning of the cyclotron frequency and the charge to mass ratio of the ion.

As an aside here, it is noted again that the real mystery of this human cyclotron effect is that of understanding how one can have a resonance for a person situated under an overhead power line (or resting on a live electric blanket) in North America where the frequency is 60 Hz and also have resonance affecting a similarly situated person in Europe where a 50 Hz frequency is used. That was the formidable question that had to be answered! Explaining that was really why I was willing to stand before a conference audience to make my contribution to a discipline outside my main field of interest.

Before coming to that detail in the main text, this matter of the scale of the cyclotron orbit has to be dealt with, because the ions in their thermal motion in our body cells simply cannot describe full orbits in synchronism with the weak field oscillations generated in homes close to overhead power lines.

Well, imagine you are looking from above at a school playground and see thousands of schoolboys all rushing around and bumping into one another, bustling with energy and all moving at speed but all tending to veer to the right between collisions as they follow curves of the same radius  $r$ . What you will see might seem to be a state of chaos, but if you were to be viewing that from a platform which was rotating about your sighting position at an angular velocity exactly equal to that of the motion of the boys on the ground, only then you would be looking at the chaotic state of normal thermal motion. You see, there is a state of orderly circular motion superimposed upon the normal motion occurring when colliding particles travel in straight lines between collisions.

In other words, the ions moving in their basic thermal activity in the fluids in your body cells have a component of orderly rotary motion owing to the presence of the ambient magnetic field set up by body Earth. The fact that the mean free path, the distance travelled between collisions, is much smaller than that radius  $r$ , as determined by what is termed the Larmor formula, is irrelevant. It becomes relevant only in so far as we need now to consider how a pulsating electric field can have an effect. The main fact involved is that the angular frequency of that motion is the same, whether the cell housing the activity spans 100 metres or 10 microns. Suppose first that such a field were to be a steady electric field acting with a component directed in the plane of the orbital motion, that is at right angles to the direction of the magnetic field. The positive and negative ions would be displaced in opposite directions until there is equilibrium by the field reaction set up by charge displacement. Now suppose that the electric field oscillates in direction at precisely the angular speed at which the whole system of ions turns owing to the effect of that magnetic field. You will then see that the charge displacement is sustained. The charge displacement is not oscillatory in the sense that it passes through a zero value twice per cycle but is instead represented, in effect, by a dipole system rotating at the resonant frequency with its kinetic energy increasing progressively as the dipole spacing extends.

The point of all this is the clear message that the combination of the Earth's magnetic field and the weak electric field effects of an overhead power line can induce a resonant response setting up a rotating electric dipole state within human body cells. There is a resonance condition and in the cyclotron used in high energy physics this pumps energy steadily from a weak field to build up high energies in particles which accelerate outwards as that radius  $r$  grows in proportion to particle speed.

The same process applies to our dipole system formed by numerous charges in each of our body cells. The presence of an ambient electric field alternating at power frequency will pump energy into those cells, energy which sets up pressure across membranes at the cell wall.

For experts, whether concerned with cyclotrons or with electrical power distribution, to deny that cyclotron-type resonance can occur in the human body, solely on the grounds that the cells in our bodies are too small, is, in my opinion, quite irresponsible. I make this assertion deliberately and with a conviction that stems from an analogous problem concerned with the nature of the magnetic field reaction in something as simple as a lump of copper! I will now digress briefly onto that subject before reverting to the health hazard theme.

In simple terms, I ask the electrical engineer who denies cyclotron-type resonance in human body cells to tell me whether he has ever understood how a d.c. magnetic field can penetrate a lump of copper. There is one fast moving free electron in copper for virtually every atom present and, by the laws of electromagnetism, those electrons should all be deflected by that magnetic field to act in concert in setting up an enormous reaction field. The reason they do not cancel the field is because the energy deployment optimizes to permit them only to halve the magnetic field. Yet, even that halving effect is not recognized, so the electrical engineer lives on in ignorance of the truth, whereas the physicist sees only an anomaly in experiments comparing the magnetic moment set up by the electron reaction and the proportional angular momentum involved. The physicist refers to it as a  $g$ -factor (its value being 2), but what the physicist

cannot see is that all primary magnetic fields are really of double the strength assumed but they are invariably halved by that reaction of the electrons in orbit in their reaction to the applied field.

Lacking such insight, it is then no wonder that those electrical engineers and physicists cannot cope with the more advanced problem of the ionic reactions in a human body fluid, where the reacting ions are not all electrons of the same mass and polarity. Instead, we are dealing here with a mixture of positive and negative ions having different masses.

This introduces a recipe for a type of cyclotron reaction which is not governed by a single resonant frequency determined only by the mass of the ion and the frequency of the pulsating field. There is scope, given the extra parameters introduced by the dual ion composition, for a self-tuning action over a range of frequencies, which can develop that resonance which feeds power into the human system drawn from those weak fields that pulsate at power frequency.

Explaining that is really is my main contribution in this Report, but I will aim to include other topics by which anomalous electrical phenomena can intrude into the health domain.

For example, consider a facet of science where the space we occupy comprises something that is electrically charged, but neutralized by the displacement of ions in our body. Ostensibly, there is no net electrical field effective inside us, because everything is cancelled and is in equilibrium. However, now suppose that underlying space charge arises from a kind of induction process of cosmic origin and is liable to change over a period of time. Again, there need be no problem, because the ions in our body will adjust to neutralize the overall effect. Go now just a little further and suppose that for, say, six months of the year, the background space charge is of increasing strength, whereas during the other six months it diminishes in strength. The human body ions have to somehow find a surplus of one polarity for half the year and a surplus of the other polarity for the other half of the year. May it then not be that the body exhibits different responses to treatment in one such period from those experienced in the other such period?

How do scientists cope with such anomalies, given that they pin their faith and their whole knowledge of electrical science upon empirical data confined to experiments on electron currents in metal wires?

They will, of course, not have heard of a phenomenon which I call 'vacuum spin'. I believe that there is an aether capable of storing energy by developing a spin condition. That involves electrical charge displacement. Let me now speculate.

There are in science phenomena referred to as 'Earth Lights'. Something can emerge from mountain sides, for example, which sets up a glow, as if a gaseous object exuded from the mountain side is burning away. Imagine that is a spherical aetherial form that has, within it, a radial electric field, because its core has electric charge. The air coextensive with that aetherial sphere will become ionized and so there will be a glow, wherever that aether sphere goes, until it disperses its energy by decay.

Now, that is a rather extreme manifestation of something that may be latent, almost everywhere where there is a source in which ions in motion interact with the weak magnetic field of the Earth to develop a rotary motion, leading in turn to that aether spin situation.

The Earth itself may well have, internal to its structure, an intrinsic electric charge system associated with the induction of the geomagnetic field. Then a flow of water inside the Earth may become the seat of ionic displacement so that, for example, a stream of water may emerge from a hillside with an electrical charge transfer. I say: "may", well knowing that I am speculating here, but I did wonder about such a possibility when I read, quite recently, something sent to me by Dr. E. Larson of Northglenn, Colorado, USA.

It was the text of a book by Owen Lehto entitled 'VIBRATIONS: A Practical Study of the Forces that Affect our Health', published in 1992 by Nutritional Research Center, P.O. Box 308, Keller, WA 99140, USA. Between pages 12 and 15 there is the story about putting two calves out to a field to graze. "The first calf was taken to a small knoll, where it started to eat contentedly. The second one was staked lower down on a flat piece of ground. The grass was slightly wet from rain the night before. I drove a metal stake into the ground and from this stake was a metal chain that went around the calf's neck. Instead of eating it began to run around in circles until it was able to pull the stake loose. It then ran up to where the other calf was eating and began to graze." Investigations to determine the reason for the calf's discomfort indicated the presence of something electrical. The author found that if he stood in the lower area of the pasture and allowed his right arm to hang like a plumb bob and held his left arm with his palm facing downwards, his right hand started to swing with a rapid counterclockwise motion. If he did this test at the top of the knoll the swing was clockwise. Further tests described in the book led to the conclusion that water in motion under the ground was somehow responsible for this phenomenon. Static electricity was in evidence.

Now, I could dismiss this as being attributable to the Earth's electrostatic field. A field that can be as high as 500 volts per metre, particularly at night, exists and is a phenomenon long recognized by physicists. I have discussed this in my book 'Modern Aether Science' in Chapter 15 entitled 'The Earth's Electricity'. Contrary to orthodox belief it arises, not from the charging of body Earth by the periodic lightning discharges, but from solar radiation pressure which is absorbed by electrons. Although these electrons are in atoms that are electrically neutral overall, there is a displacement effect which puts the Earth's surface in a negatively charged state. The heat absorbed by the atmosphere during the day is sufficient to sustain this radiation pressure, even at night. The direct sunlight during the day can, however, partially ionize the air and cause the stored charge to leak a little then, which is why the fields are stronger at night than during the day.

So, one could presume that such a field could be the cause of the distress of that calf. However, why do we all not experience such effects on a regular basis and why does the motion of water play a role? Well, I can but speculate. The feature of that knoll suggests an action which might involve what I referred to above as 'vacuum spin'. A spherical aether form developing a spin condition inside a knoll and in some way attributable to a flow of water within that knoll could develop an aether charge distribution of one electrical polarity balanced by a charged state of the water having opposite electrical polarity. This

'vacuum spin' could well also develop turbulence in the aether, resulting in the shedding of weak and invisible versions of those 'Earth Lights' I mentioned and that could be the problem. The water flow would carry some of that electrical charge with it in its passage underground. Then one can glimpse a way of linking physics with what is claimed by those who practice dowsing.

Our bodies are inevitably affected by all such extraneous electrical conditions that pervade the atmosphere and the very space we occupy. Indeed, as I shall indicate in Appendix VI on pp. 54-57, there could be activity within our body cells that involves a kind of electric motor action with superconductivity being in evidence. Also, there could be a low frequency field effect set up in the ozone layer which can further aggravate our existence (see Appendix III on pp. 40-41), but most of this Report concerns cyclotron resonance and the overhead power line and electric blanket problem.

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The pages which now follow from here until the Appendix section constitute PART II of this Report and comprise a slightly edited but otherwise unamended collection of separate articles compiled by the author in 1990.

# THE HAZARD RISK

## A U.S. PERSPECTIVE

The following are excerpts from 1988 and 1989 articles by Thomas F. Valone of Integrity Research Institute\*, who has devised a 60 Hertz Magnetic Dosimeter expressly to measure exposure risks of weak but dangerous field conditions.

"Since the New York State Power Lines Project, Scientific Advisory Panel's Report was released, ('Biological Effects of Power Line Fields') in July 1987, there has been an increased awareness of the potential health risks of 60 Hertz magnetic field exposure from power lines."

"The study of Savitz confirms the results of previous studies to some extent and adds to the credibility that exposure to extremely low frequency magnetic fields might be the cause of childhood cancer" (Ahlbom et al, 1987)."

"Another study which has also generated public concern is the finding that heating blankets and heated waterbeds are correlated to excessive miscarriages among pregnant women (Wertheimer and Leeper, 1986). This study has caused the manufacturers of these items to look into ways to design their products to reduce the magnetic field exposure for users. The average magnetic field ranges from 4 mG for heated waterbeds to 15 mG for heating blankets (Becker, 1985)."

These concerns "have also sparked manufacturers to reconsider their designs of these products, though only one manufacturer is currently advertising reduced magnetic exposure."

"With its implication in childhood leukaemia (Wertheimer & Leeper, Am. J. Epidemiol., **109**, 273, 1979), childhood tumours (Wertheimer and Leeper, J. Bielectro. Soc., **7**, 273, 1986) and, recently, learning disabilities (Wall Street Journal, p. B6 11 October 1988), the biological effects of electric power lines, both in the house and outside, are discovered by researchers."

"The latest finding by the former president of the New York Academy of Sciences, Kurt Salzinger, indicates that rats exposed in utero to extremely low frequency (ELF) radiation showed signs of learning disabilities...a problem, he says, that 'didn't go away as rats got older'."

\* Address (1997): Integrity Research Institute, 1422 K Street NW, Suite 204, Washington, DC 20005, USA. Tel: 800-295-7674.

## MOLECULAR MECHANISMS OF MAGNETIC MEDICINE

The following is a quoted excerpt from an article of the above title which appeared in the April 1988 issue of U.S. Periodical MAGNETS. Its author is Lynn A. Surgalla of Department of Biophysical Sciences, School of Medicine, State University of New York at Buffalo in U.S.A.

### "ION TRANSPORT ACROSS CELLULAR MEMBRANES:

A number of researchers have reported effects of time varying magnetic fields on the ion flux through membranes. Blackman et al (1982) reported that a 16 Hz sinusoidally varying magnetic field caused increased efflux of calcium ions from chick brain tissue in vitro. It has been purported in recent papers (McLead and Liboff, 1986; Liboff, 1985) that the influence of externally applied, low-level magnetic fields on biological ion transport can be explained by cyclotron resonance theory. The cyclotron resonance frequencies for several biologically important ions such as calcium, sodium, potassium, magnesium, etc., all fall in the 10-100 Hz range when the static magnetic field is in the amplitude range of the earth's field. There is experimental evidence that cyclotron resonance in cells exists (Thomas et al, 1986). The calculated cyclotron resonance frequencies of the various ions were found to coincide with the experimental frequencies which induced ion flux through cell membranes (Liboff, 1985)."

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# CYCLOTRON RESONANCE OF HADRONIC IONS IN LIQUIDS

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## ABSTRACT

Although cyclotron resonance is believed to be the cause of harmful effects on the human body when subjected to weak low frequency electromagnetic fields, a crucial problem is why evidence in America and Europe gives similar concern, bearing in mind that a frequency resonance is involved and the power frequencies of 60 Hz and 50 Hz used on these continents are different. A possible solution to this scientific problem is presented and, in addition, a simple practical solution which should eliminate the health hazard from electric blankets and, by analogy, underfloor electric heating systems is proposed.

## INTRODUCTION

A major problem now developing in biochemistry is that posed by the harmful effects of weak electric and magnetic fields, evidenced by the higher incidence of cancer and leukaemia in the vicinity of overhead electric power lines and even from proximity with underfloor electric heating systems and certain electrical appliances such as electric blankets.

It has been suggested that cyclotron resonance effects in the body fluids and particularly the bloodstream causes a build up of ion energy which promotes unwanted penetration or rupturing of cell membranes. On the other hand, in a healthy body suffering from a bone fracture, the accelerated actions caused by these fields might even aid the healing process.

It is, therefore, important that we develop a better understanding of the cyclotron process involved.

## CYCLOTRON RESONANCE

What we mean by 'Cyclotron Resonance' is the concerted action on charged particles of two independently acting fields known to the electrical engineer. Firstly, there is the steady field which constrains the thermal motion of the particles so that it has a cyclical or oscillatory component at a frequency governed only by the field strength and the particle mass. Secondly, there is an alternating field which, with the cyclotron resonant state, is in tune with that frequency. The cyclotron is a machine used in high energy physics to accelerate charged particles which move in circular orbit about the axis of a magnetic field whilst an alternating electric field having a frequency equal to the orbital cyclic motion of the particles pumps energy into them to cause them to go faster and faster. A weak A.C. field in voltage terms can produce particles with energies equivalent to those obtainable using enormous D.C. voltages and what is now to be discussed is the replication of this process in the ionized liquid in a human body which is ever subject to the Earth's magnetic field and can, under certain circumstances, be exposed to harmful weak A.C. fields at mains power frequency.

## THE ION FREQUENCY

It is clear that the primary factor in producing cyclotron resonance in our bodies is the Earth's magnetic field. This has a steady value wherever we are on the Earth's surface and differs little from a  $50 \mu\text{T}$  (microtesla) (0.5 gauss) field. Its direction does vary with both latitude and longitude owing to the angle of dip of the Earth's field and the fact that the geomagnetic poles are offset from the geographic poles. This direction is not relevant so far as the active random motion of ions in our body fluids is concerned. By a gyromagnetic process these ions will, in some measure, share in responding to that geomagnetic field to set up a reaction field by moving in helical paths about the field axis.

It is characteristic of this cyclotron reaction process that the angular frequency of the response in the helical orbits is simply  $Hq/m$ , this being the product of the field strength  $H$  and the electromagnetic charge  $q$  to mass  $m$  ratio of the ion involved. The ion mass which matches a 50Hz power frequency is approximately that of the ions dissociated in aqueous solutions, namely the positive hydronium ion or the negative hydroxyl ion. The extraneous oscillating fields, whether electric or magnetic, can pump energy into a resonance building up the penetration power of the ions, but only if that power frequency is a good match for the particular cyclotron frequency of the ions present in that Earth field.

The awkward question then faced is why there should be problems arising from power frequencies which can be precisely 60Hz in USA and precisely 50Hz in U.K. If 60Hz has harmful effect in the geomagnetic field in USA, then why should 50Hz be harmful in U.K. where the geomagnetic field has the same strength? This question is the main thrust of this paper.

## THE HADRON-LEPTON GYROMAGNETIC REACTION

Our electromagnetic theories have been established on the basis of experiments performed by using electron currents or magnets which owe their magnetic field to internal electron motion. Electrons are leptons which means that they can interact with a field by creating and annihilating charge pairs of their own lepton form. The heavy positive ion nucleated by an atomic nucleus owes its net charge to a different particle form known as the hadron. The question arises as to whether hadrons interact magnetically as do leptons.

Now, there are sound theoretical reasons for understanding how the electromagnetic interactions with which we are familiar can apply to the lepton-lepton interaction and the hadron-lepton interaction. However, there is equal reason to suspect that the hadron-hadron interaction is different and this seems to be indicated by experiments involving discharge currents in aqueous solutions.

What this means to our cyclotron problem is that, if the Earth's magnetic field has its source in hadron charge and the reacting ions are hadrons, then the hadron-hadron interaction is affecting the cyclotron reaction and it is not truly determined by a formula based on the Lorentz force law.

In general terms it must be realized that an applied steady magnetic field will develop reactions in ionized liquids which are partly produced by negative ions (lepton charge) and partly by positive ions (hadron charge). Thus if these react differently the resultant magnetic field which determines the forces on the reacting ions may effectively have a different strength from that deemed to apply in determining the cyclotron resonance frequency. More to the point, if the resonance can deploy energy between the two types of ion to optimize the action, then that effective field strength can adjust within limits so as cause the cyclotron resonant frequency set by the ion mass to conform precisely with the driving power frequency.

This is the basis on which the damaging effects can stem from the same ion type, whether we have a 50Hz power frequency or a 60Hz power frequency. The task is, therefore, to analyse this proposition and to see how those limits are set, so that remedial design techniques can be found for eliminating the dangers involved.

## PRIOR RESEARCH ON GYROMAGNETIC REACTION EFFECTS

A consideration of magnetocaloric effects and gyromagnetic reactions leads one to question whether the basic g-factor of 2 is really due to Dirac's mathematical concept of electron spin. There are very sound reasons (including the fact that positrons in an electron gas respond as if they have twice the mass of the

electron) for accepting that there is a half-cancelling field reaction. What this means is that, when we measure the gyromagnetic reaction and find that it is twice the value we had expected from basic theory, we should not look for new physics by formulating 'spin' as an abstract concept. Instead we should realize that what we assume to be the magnetic field is not just that we apply by powering an electromagnet. It is really the difference between the field we apply and the natural field reaction of the free ions present. It seems probable that the field reaction invariably halves the primary field action and that we have not realized this and related what is measured to the primary action only.

This is justified by the simple expedient of matching the reaction component of the kinetic energy of the reacting ions with the field energy of the resultant magnetic field. For optimum energy deployment the primary field action is invariably halved by reaction of Maxwell's displacement charge in the vacuum or by conduction electrons in copper. The question, however, is whether that halving effect applies to the positive, as opposed to the negative heavy ions in electrically dissociated liquids. The action of the negative ion is likely to be dominated by the surplus electron, whereas the action of the positive ion will be dominated by the surplus charge of the proton. In physics, the proton, as a hadron is different in properties from the electron, as a lepton. They do respond differently and anomalies are showing up in certain experiments involving electrical discharge through water. Hence there is a serious doubt about reaction effects in dissociated aqueous solutions. Subject to the latter doubt, and concerning the field strength halving effect just mentioned, all this means is that the calculation of any magnetic field action of current must introduce that g factor of 2 to enhance the field strength before it is halved by the inevitable offset reaction.

The physical process involved in the interaction of moving charges is that of retarded energy transfer and this can be affected so as to enhance the primary magnetic field if a reaction field sets up effects which transfer energy in the reverse direction. This is all embraced by the inductance property of the primary circuit and it will be understood that, except where the core is ferromagnetic, the magnetic field energy calculated in the normal way in terms of the magnetizing current is a measure of that energy fed into the inductance. However, the actual magnetic field determining the Lorentz force on an ion in a liquid may be different or, if we prefer, the Lorentz force may not be that prescribed by use of the formula as it applies to interactions in free space.

In order to understand the lepton-hadron involvement in this process we will perform an analysis assuming that the primary field is leptonic in nature and that the reaction is partially leptonic (by an energy share factor  $\beta$ ) and partially hadronic (by a factor  $1-\beta$ ). Hadron-hadron interactions should not, it would seem, then be regarded as contributing or even present and yet this is not so. First, imagine that  $\beta$  is zero.

We suppose that there is a primary field of strength  $gH_p$  produced by a solenoid surrounding the test substance. We think the field produced is  $H_p$  but it is really  $gH_p$ .  $H_p$  is that expected from the current action.  $g$  is an unknown factor involved in the inductance reaction. The net field strength, allowing for the reaction field  $H_r$  is denoted  $H$ . Therefore:

$$gH_p - H_r = H \dots\dots\dots (1)$$

Now, the Lorentz force acting on the reacting leptons of charge  $q$  and mass  $m$  sets up an equation of motion:

$$Hqv = mv^2/r \dots\dots\dots (2)$$

where  $r$  is the helical orbit of the reacting lepton and  $v$  is its speed in orbit in the plane normal to the field axis.

The reacting magnetic moment is  $g$  times the reacting lepton density summation of  $qvr/2$  and this translates into a reacting field component if, in the gaussian units used, we multiply by  $4\pi$ . Using equation (2) to express  $mv^2/2$  as  $Hqvr/2$ , the reacting field component becomes:

$$H_r = 4\pi g(E/H) \dots\dots\dots (3)$$

where  $E$  is the kinetic energy density associated with the orbital reaction  $v$  motion components.

It was suggested that energy deployment was optimum, meaning that  $E$  will tend to a maximum as potential energy minimizes. Therefore the task is to substitute (3) in equation (1) to see how  $H$  adjusts.

$$4gE = gH_p H - H^2 \dots\dots\dots (4)$$

$\delta E/\delta H$  is zero when  $gH_p = 2H$ , but we imagine that, apart from a minor diamagnetic or paramagnetic reaction in a non-ferromagnetic substance, there is really no recognized diminution of the field strength owing to the gyromagnetic reaction. We then see that  $H_p$  and  $H$  are equal and this means that  $g$  must be 2. Thus the  $g$ -factor of 2 evidenced by gyromagnetic experiments is explained without recourse to the abstruse formalism of the relativistic Dirac formulations.

Note, however, that  $E$  is then equal to  $H^2/8\pi$ , which is the magnetic field energy density stored electromagnetically. Clearly, it is the reacting orbital ion or other reacting charge that is the agent for feeding inductance energy back into a magnetizing solenoid when it is demagnetized. Also, instead of adopting this energy optimization argument we could simply have declared that  $E$  was  $(H_p)^2/8\pi$  and put this in equation (4) to find that if  $g = 2$  then  $H = H_p$ .

The question now faced is what happens if that reaction field is partly attributable to hadrons, meaning that  $\beta$  is not zero. To proceed, we will assume, pending further discussion, that the  $g = 2$  factor applies for fundamental reasons. We examine the situation where there is a mix of single polarity (negative) lepton-related ion reaction and a single polarity (positive) hadron-related ion reaction.

Note that we are not here discussing what is known as 'nuclear magnetic resonance', where the resonant spin states are set up inside the atom. Instead we are dealing with the case in which the atom has become ionized and is in free motion.

The lepton-produced component field  $H$  derived from equation (1) is:

$$H = gH_p - f[\beta]H_r \dots\dots\dots (5)$$

and this is further offset by a hadron reaction component  $(1-f[\beta])H_r$ . Here  $f[\beta]$  is a function of  $\beta$  representing reaction field strength apportionment, whereas  $\beta$  is field energy density apportionment.

However, the  $f[\beta]H_r$  term can be written as  $4\pi g\beta E/H$ , because the lepton interacts normally with both the lepton and hadron components of  $H$ . On the other hand, the  $(1-f[\beta])H_r$  term can be written as  $4(1-\beta)E/H_p$ , because the hadron interacts in the normal electromagnetic way only with the lepton component of  $H$  specified by equation (5).

Put  $g = 2$  and  $E = (H_p)^2/8\pi$ . Then we obtain:

$$H = 2H_p - \beta(H_p)^2/H - (1 - \beta)(H_p)/(2) \dots\dots\dots (6)$$

Evidently, if  $\beta = 1$  then  $H = H_p$ , as expected, but if  $\beta = 0$  then  $H = (3/2)H_p$ .

In other words, if the leptonic ion reaction predominates the effective  $H$  field governing cyclotron action is close to that normally expected, but if the hadronic ion reaction predominates the cyclotron action can occur at a frequency up to 50% larger than that normally expected.

Evidently, if this ion reaction process has been correctly interpreted, there is then reason to understand how the power frequency that perturbs the cyclotron action in a liquid can influence the apportionment of the reaction energy density  $E$  between the two types of reacting ion to seek out a cyclotron resonance intermediate that of the two ion types. The energy exchange optimizes to assure maximum energy transfer. There is no need for a perfect frequency tuning with the specific individual ion mass properties and the background D.C. field.

The only condition is that the positive ions involved must have masses which for the power frequency used need, for cyclotron resonance, a D.C. field that lies between 66.7% and 100% of that given by the cyclotron formula. Typically, therefore, the hydronium ion at 50Hz requires a D.C. field of between 41 $\mu$ T and 60 $\mu$ T, whereas at 60 Hz the field has to be between 49 $\mu$ T and 74 $\mu$ T.

For the hydroxyl ion the 50Hz range is 36 $\mu$ T to 54 $\mu$ T and the 60Hz range is from 44 $\mu$ T to 66 $\mu$ T.

Bearing in mind that the geomagnetic field is of the order of 50 $\mu$ T we then see that the 50Hz and 60Hz power frequencies are virtually the ideal frequencies for activating the harmful effects of cyclotron resonance. Conversely, if these frequencies were to be doubled and the ion types specified are the ones which really are the prevalent variety causing the problem, then these field requirements would double and cyclotron resonance in the geomagnetic field could not occur.

It is not suggested that A.C. power frequencies, as such, should be doubled. Rather, the proposition is that the powering of harmful heating appliances, such as electric blankets, should involve the use of an unsmoothed full-wave rectified version of the normal A.C. power frequency supply. This would

eliminate the harmful frequency and leave a double frequency and higher harmonic frequency power supply with much weaker current amplitude. The main heating effect would be that of the D.C. component and no cyclotron resonance with the hydronium or hydroxyl ions could occur.

## CONCLUSION

This paper has discussed cyclotron resonance in relation to the harmful effects of weak A.C. fields. Electric blankets are particularly prone to such problems because the electric current is carried by wires which are spaced apart. In a normal electric flex the current flows one way in one wire and returns through another wire twisted around the first wire. The result is that there is really no resulting electromagnetic field to worry about because the field of one wire cancels that of the other. This is not the case for the electric blanket, where the wires can be several cm. apart and therefore result in a field which penetrates well into a body resting on that blanket.

The paper has addressed the key issue of how cyclotron resonance can apply both to the 60 Hz and 50 Hz environments. The explanation has brought to bear fundamental theoretical issues which the author has been studying and advocating for many years but which theoretical physicists will regard as controversial. However, less controversial is the belief that the health hazard is connected with cyclotron resonance and the practical remedy need not depend upon acceptance of the author's theoretical proposition.

Certainly manufacturers of electric blankets would be well advised to provide suitable power converters in their blanket switches which eliminate the 50 Hz and 60 Hz frequencies. The cost of such a modification would only be a few percent of the cost of the blanket and this is seen as the first and easiest step forward that one can take in facing up to the real health hazard problems posed by the weak low frequency fields to which we are all exposed.

## REFERENCES

The following references are not identified in the above text but they will give background to the matters raised above.

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A. Philips, 'Killing Fields - The Politics', Electronics World and Wireless World, p. 120-124 (February 1990).

## APPENDED NOTE CONCERNING THE $g$ -FACTOR

Why should  $g$  be 2? Although physicists tend to view this as something relying on the mathematical analysis deeply involved with the relativistic-quantum electrodynamics of Paul Dirac, this author believes that the true answer probably arises from the energy transfer processes as charges in motion interact. The point is that energy supplied to activate the charges producing a magnetic field has to find its way into the orbits of the reacting ions. The energy makes this journey via the Coulomb field interactions of charge. Energy does not travel from one charge to the other along an infinitely thin line drawn between the two charges and the energy cannot travel at faster than light speed. Were we to assume that energy does travel directly along that line at the speed of light, then it can be shown that  $g = 1$ . However, the real journey is a mean distance to the distributed Coulomb field system of exactly the intercharge distance and this is followed by a second leg of travel of identical mean distance from the Coulomb field to that other charge. This doubles the journey time and so the Coulomb retardation which accounts for the Lorentz force and thereby makes  $g = 2$ .

It is beyond the scope of this paper to give a full analysis of this action, but it can be understood by first reviewing how the Lorentz force can be deduced from the Coulomb interaction, as shown in detail elsewhere by the author, and then taking account of certain arguments used by the author to explain aspects of the gravitational interaction. The latter is not simply a propagation of energy to give basis for the deployment of magnetic field energy, but is one step advanced from this, since the gravitational interaction is a magnetic interaction and the magnetic energy redeployment with changing mass positions is an onward iteration of the primary process. The essential point is that there is a retardation effect that is greater than that assumed by line of sight propagation between the interacting charges.

# KILLING FIELDS - SOLVING THE PROBLEM OF OVERHEAD POWER LINES

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The health hazard posed by living in close proximity to overhead electric power lines and attributable to cyclotron resonance induced in human body cells by weak electromagnetic fields can be eliminated but only if we cease to use our 50 Hz or 60 Hz frequencies and rely on D.C. exclusively or double the operating frequency to 100 Hz or 120 Hz.

## INTRODUCTION

The fact that cancer has been linked to electromagnetic radiation from power lines and appliances has now been recognized by the US Environmental Protection Agency [1]. A recent editorial in Electronics World [2] reports how, in 1974, epidemiologist Dr. Nancy Wertheimer established a connection between child leukaemia victims and 7600 volt feed lines to pole mounted transformers feeding house supply systems. This was later followed by a sequence of articles including 'Killing Fields' in their titles [3, 4, 5, 6] giving a devastating account of the risks posed by living under the influence of the effects of what are, in fact, weak electromagnetic fields.

The problem has been traced experimentally to a resonance effect akin to what is known in physics as 'cyclotron resonance' [7, 8, 9]. In a cyclotron a modest cyclic field can be caused to accelerate a moving ion to enormous energy levels by a gradual resonant build up process which taps energy from the weak field pulsating in harmony with the orbital frequency of ion motion in a steady magnetic field. In the human body that steady field is the Earth's magnetic field and the ions in motion are those chemical ions in solution in our body fluids and present within our body cells. The activating field conducive to resonance is that extraneous electric or magnetic field set up by an overhead power line or an appliance

such as an electric blanket, where the wires carrying compensating currents are well spaced. It is this spacing that is crucial to the existence of those small but hazardous weak fields.

The question we now face is not so much that of understanding the cause, but rather one of eliminating the problem. Pending a discovery of a solution, those expressing responsible opinion on this matter are cautiously pointing out that, assuming electromagnetic radiation does have an effect, it can only be to help to proliferate cancers already present. This, however, is not a convincing assertion, given that we probably all have a latent capacity to develop cancer cells if exposed to fields which can accelerate transmutations.

This article addresses directly the straightforward issue of eliminating the possibility of cyclotron ion resonance brought about by A.C. field influences in a domestic or normal commercial environment, where the only prevalent D.C. magnetic field is that provided by body Earth itself.

Concerning electric blankets or underfloor heating, these can be remedied by the expedient of using D.C. power excitation or even full-wave unsmoothed rectified A.C. as by using what the author terms the 'Harwen switch' [10]. This is simply a two pole switch having a bridge rectifier incorporated in the switch housing on the output side. However, the solution to be applied to overhead power lines, short of conversion to high voltage D.C. transmission, is not so easy in view of the very substantial voltages and currents involved and the heavy capital investment in existing structures.

## THE HAZARD FREQUENCY RANGE

Cyclotron resonance cannot occur if the hazardous frequency range lies outside that of the exciting field. We are singularly unfortunate in that the 50 Hz or 60 Hz frequencies, which relate to the two-pole structure of the magnetizing rotor fields of synchronous alternators running at a sensible design speed of 3,000 or 3,600 rpm, happen to be close to that of ions in our bodies responding to the Earth's 50  $\mu$ T magnetic field.

The cyclotron formula requires that the angular frequency of the resonance should be simply  $Hq/m$ , where H is the strength of the geomagnetic field and  $q/m$  is the charge to mass ratio of the ion. For unit atomic mass on the C 12 scale  $q/m$  is 96 million coulombs per kg. Therefore, if H is 50  $\mu$ T, an ion of unit atomic mass and the normal unit charge will have a cyclotron angular frequency of about 4800 rad/sec or about 760 Hz.

Table I shows the resonant cyclotron frequencies of single ions of different forms when subject to the steady geomagnetic field.

TABLE I

Ion	Mass	Frequency
hydroxyl OH	17	45-67
hydronium OH <sub>3</sub>	19	40-60
sodium Na	23	33-50
magnesium Mg	24	32-47
chlorine Cl	35	22-33
potassium K	39	19-29
calcium Ca	40	19-28

The lower frequency expressed in Hz is that at which a single presence of such ions in solution causes the thermal or Brownian motion of the ion to build up pressures by virtue of the transfer of energy as the ions accelerate to higher and higher speeds in weak but sustained perturbing fields having that resonant frequency.

Independently, this author has shown that the inter-reaction processes involved when two dominant forms of ion are present can cause one ion form to develop its own field and so coact with the geomagnetic field to bring about a resonance at a frequency up to 1.5 times higher than that for a single ion, by a self-tuning of the system. This is indicated by the higher frequency listed. In other words, over a limited frequency range above that of natural resonance of the single ion form, there will be perfect resonance of one of the ion forms even though the external frequency is not exactly as required for that form assuming that H is exclusively the geomagnetic field strength.

Whilst it is then easy to picture cyclotron motion of the positive and negative ions individually there are problems in imagining how they can build up their energy and set up pressures owing to their reacting orbital motion in the earth's weak magnetic field. The question at issue is that of why the oppositely charged ions, which travel clockwise and counterclockwise, respectively, do not simply collide to share their energy. That is the puzzling facet to the experimental evidence supporting the cyclotron resonant effects. To overcome this, in a simple pictorial sense, it may suffice to consider the positive and negative ions as grouping, respectively, in a sequence of alternate parallel planes defining their freedom of action by restricted motion about the field axis. This will minimize collision probabilities. The result is then equivalent to having two concentric solenoids producing augmenting reaction fields, with the ion type of larger mass constituting the outer solenoid.

The author is aware of the extensive experimental research which has focused on ion forms involving Ca, Na, etc, but what may have been missed in this prior research is the appreciation that water forms its own ion form in that it dissociates into hydroxyl and hydronium ions as listed in Table I. It would seem, at least to this author, that the prevalence of such ions and their rather special relationship to the 50 Hz and

60 Hz frequencies, both of which they encompass by their combined effect, and as illustrated in Table I, has to give the underlying basis for field-induced activity in body fluids.

However, this is not a critical point. What is critical is the need to realize that no normal free and prevalent ion form in our body fluids has a resonant condition which corresponds to 100 Hz or 120 Hz. Only lithium of atomic mass 7 if it were present in solution as a free single-atom ion could come near to satisfying the resonance requirement.

In this situation, bearing in mind that the very prevalent hydroxyl and hydronium ions, which are the natural dissociated ions of water, are probably the dominant cause in the hazard risk at 50 Hz or 60 Hz, it can reasonably be presumed that a hazard free situation prevails at 100 Hz or 120 Hz. Therefore, as a simple expedient, the object should be to eliminate the 50 Hz or 60 Hz basic frequency and operate instead at twice this frequency.

Now, this may not seem to be a feasible solution, except for the electric blanket or underfloor heating situation where full wave rectified unsmoothed 50 or 60 Hz A.C. will allow heating to rely on a mixture of 81% D.C. and 19% A.C. mainly at 100 or 120 Hz.

In the case of the overhead power line, unless one can think in terms of screening power lines, which seems uneconomic, or using normal closely wound cable forms, as used underground, the most appropriate, but drastic, remedy long term is to adopt a new standard frequency for power generation and supply, such as 100 Hz.

## THE FUTURE

Given that weak electromagnetic fields at the power frequencies 50 Hz and 60 Hz do pollute our environment in the sense that they make it hostile for the chemistry of our body functions, there is no real choice other than making sure we live well removed from power lines or accept the higher incidence of cancer and leukaemia as tolerable.

Hopefully the future will see technology advance, perhaps on the warm superconductor front, to the stage where overhead power lines will carry D.C. in preference to A.C. To the extent that converters are then used to generate A.C. domestically or industrially for special purposes, that conversion can be to 100 Hz to avoid risk. More likely, however, since appliances needing to be powered by A.C. are not like underfloor heating or electric blankets with well-spaced current and return currents productive of stray fields, the hazards of the latter can be avoided by powering by D.C.

In the meantime, this author has considered taking the precaution of adapting the switches on his electric blankets to include, on the output side, a full-wave bridge rectifier to eliminate heating the blanket with

hazard-producing current at 50 Hz, even though the power is drawn from a 50 Hz mains supply.

On reflection, however, the best course seems to be not to use an electric blanket at all, an action which, if followed by many others should spur manufacturers to cause them to add such a hazard-eliminating feature to their blankets. As things stand they prefer to ignore the problem until its solution becomes an industry standard.

Table II below shows how the power supplied to a purely resistive load is divided between the frequency components of an unsmoothed full-wave rectified sinusoidal 50 Hz voltage source.

TABLE II

Frequency	Power
0	81.0569
100	18.0127
200	00.7205
300	00.1323
400	00.0408

Finally, the author is all too conscious that the personal views expressed in this article concerning the simple remedy of using a modified electric blanket switch is more a matter of opinion than something easily supportable by test data. All that can be said is that if those many researchers who point to cyclotron resonance are correct, then it makes sense to power those field producing appliances, and particularly the electric blanket, with a frequency that lies outside the possible hazard range.

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[8] A. R. Liboff, 'Cyclotron resonance in membrane transport,' in: Chiabera, A. Nicolini, C., Schawn, H.P. (Eds.): "Interactions between Electromagnetic Fields and Cells" (Plenum, London) p. 281 (1985).

[9] B. R. Mclead, A. R. Liboff, 'Dynamical characteristics of Membrane Ions in Multi-field Configurations at Low Frequencies', Bioelectromagnetics, 7, 177 (1986).

[10] U.K. Patent Application No. 9002718 (7 February 1990).

## **EXPLANATORY NOTE**

A contracted version of the above article has been published in Electronics World + Wireless World, at pp. 774-775 in the September 1991 issue. The U.K. Patent Application of reference [10] was deemed by the U.K. patent examiner as constituting two inventions and eventually published by the U.K. Patent Office on November 27th, 1991 as Serial Nos. 2,244,393 and 2,244,394 but neither were followed through to grant. On the other hand, a corresponding U.S. Patent Application was granted on September 29th, 1992 as Serial No. 5,151,577 (see Appendix V below), but the author has decided that commercial restrictions on the use of such an invention are not warranted and has allowed that patent also to lapse. It is hoped that the invention will be used freely by manufacturers of electric blankets.

The author at the time this 1990 section of text was written had formed a company in U.K. named HARWEN LIMITED to take forward research on various inventions in the new energy field, including the device to be used to avoid the hazard risk with the electric blanket. At the outset it was also sought to register in U.K. the name HARWEN as a Trademark on Part A of the U.K. Trademark register. The examiner accepted that HARWEN was an 'invented word' which qualified for registration, but imposed the proviso that I secured a sanction from Harwell, the seat of the atomic research activity sponsored by the U.K. government. I then discovered that the U.K. Atomic Energy Authority had taken extreme precautions in themselves registering a series of trademarks, virtually as a defensive action, to block anything external which might possibly seem connected with Harwell. In these unexpected circumstances and knowing that I would be mounting efforts to encroach upon the power generation field by my patent filing, I thought it prudent to abort my use of the name HARWEN and not solicit the sanction from Harwell that would allow me to proceed with trademark registration. It was for this reason that I then changed the company name to THERMODYNAMICS LIMITED.

I hope this note will therefore explain the use of the word HARWEN as used in the next item in this Report and, incidentally, and for the record, as used a 1990 paper in Speculations in Science and Technology [13, 295-299 (1990)] entitled 'The Harwen Energy Radiation Regenerator'. The latter is a subject unrelated to the electrical blanket theme.

# THE HARWEN BLANKET SWITCH

A remedial design aimed at eliminating harmful electric effects.

While scientists are still struggling to understand how the very weak electric fields set up by electric blankets can possibly be linked with miscarriage or leukaemia, the HARWEN switch offers a safeguard against the likely cause, which is 'cyclotron resonance'. The switch includes a converter which converts all the power into a form which excludes the harmful frequency range before the electricity reaches the spaced wires which set up the fields that can act on the user's body cells.

Question: What is cyclotron resonance?

Answer: The cyclotron is a machine used in high energy physics to accelerate charged particles which move in circular orbit about the axis of a magnetic field whilst an alternating electric field having a frequency equal to the orbital cyclic motion of the particles pumps energy into them to cause them to go faster and faster. A weak A.C. field in voltage terms can produce particles with energies corresponding to enormous voltages.

Question: What has that to do with the human body?

Answer: The replication of this cyclotron resonance process can occur in the ionized liquid in a human body which is ever subject to the Earth's magnetic field and can, under certain circumstances, be exposed to harmful weak A.C. fields at mains power frequency. The enhanced activity resulting from the consequent energy transfer sets up pressures which can cause penetration of cell walls and thereby produce abnormalities.

Question: Why are electric blankets singled out as being harmful?

Answer: There are stray field effects at mains frequency because manufacturers find it safer to space the wires carrying currents in the forward and reverse directions, whereas in normal power supply cables the wires lie close together.

Question: What is so special about the mains frequency of 50 Hz?

Answer: It is characteristic of the cyclotron reaction of a moving electric ion that the angular frequency of the reacting motion is simply  $Hq/m$ , this being the product of the field strength  $H$  and the electromagnetic charge to mass ratio of the ion involved. The ion mass which matches a 50Hz power frequency is approximately that of the ions dissociated in aqueous solutions present in the human body, as in the blood stream, namely the positive hydronium ion or the negative hydroxyl ion. The extraneous oscillating fields, whether electric or magnetic, can pump energy into a resonance building up the penetration power of the ions, but only if that power frequency is a good match for the particular cyclotron frequency of the ions present in that Earth field and 50 Hz is critical in this regard.

Question: Does not the problem arise also in U.S.A. where the mains frequency is 60 Hz?

Answer: Yes, but there is reason to understand how the power frequency that perturbs the cyclotron action in a liquid can influence the apportionment of the reaction energy density between the two principal types of reacting ion and so seek out a cyclotron resonance intermediate that of the two ion types. It can be argued that cyclotron resonance will occur when the ions involved have masses which, for the power frequency used, needs a D.C. field that lies between 66.7% and 100% of that given by the cyclotron formula. Typically, therefore, the hydronium ion at 50Hz requires a D.C. field of between  $41\mu\text{T}$  and  $60\mu\text{T}$ , whereas at 60 Hz the field has to be between  $49\mu\text{T}$  and  $74\mu\text{T}$ . For the hydroxyl ion the 50Hz range is  $36\mu\text{T}$  to  $54\mu\text{T}$  and the 60Hz range is from  $44\mu\text{T}$  to  $66\mu\text{T}$ .

Question: Is the Earth's magnetic field in the danger range for both 50 Hz and 60 Hz power supplies?

Answer: Yes. The geomagnetic field, which penetrates into our houses and our bodies, is of the order of  $50\mu\text{T}$ . This means that the 50Hz and 60Hz power frequencies are virtually the ideal frequencies for activating the harmful effects of cyclotron resonance. Conversely, if these frequencies were to be doubled and the ion types specified are the ones which really are the prevalent variety causing the health risk, then these field requirements would double and cyclotron resonance in the geomagnetic field could not occur.

Question: So how does the Harwen switch work?

Answer: It incorporates a semiconductor device which converts the mains power into an unsmoothed full-wave rectified version of the normal A.C. power frequency supply. This eliminates the harmful frequency, puts 81% of the power into D.C. and the rest of the power into a double and higher harmonic frequencies of much weaker current amplitude. No heat is wasted and no cyclotron resonance with the hydronium or hydroxyl ions can occur.

Question: Does this mean that the switch offers guaranteed assurance that there will be no harmful effects arising from the blanket?

Answer: No. It will be quite some time before scientists can be sure about this matter and the risks are small anyway. The Harwen switch is a simple and cheap way of taking a precautionary measure, bearing in mind that the evidence points to a problem with normally powered blankets. The problem is elusive and, though the design of the Harwen switch is based on physics, scientists generally are very slow to respond to changes which involve revising existing theory.

Question: Will all electric blanket manufacturers need to offer some such precautionary measure aiming to reduce the health hazards?

Answer: Certainly manufacturers of electric blankets would be well advised to provide suitable power converters in their blanket switches which eliminate the 50 Hz and 60 Hz frequencies. The cost of such a

modification would only be a fraction of the cost of the blanket and this is seen as the first and easiest step forward that one can take in facing up to the real health hazard problems posed by the weak low frequency fields to which we are all exposed.

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The following paper by H. Aspden was published In volume 12, the 1989 issue of Speculations in Science and Technology at p. 17.

## EXTREMELY LOW FREQUENCY ELECTROMAGNETIC RADIATION AND BIOLOGICAL EFFECTS

**ABSTRACT:** Although there is a vast amount of evidence to show that extremely low frequency electromagnetic (ELF) radiation is a health hazard, there is no currently accepted physical reason why this should be so. One possible explanation is presented, based on an existing theory for the gyromagnetic reaction anomalies.

**INTRODUCTION:** The analysis in this paper brings together three separate physical phenomena in an attempt to explain why ELF radiation is harmful to health. The phenomena with which we are concerned are:

- (a) The well-researched and documented evidence that ELF radiation can cause leukaemia, enhanced DNA synthesis, mechanical vibration of brain tissue, tumours, calcium transport across cell membranes, chronic stress and other disorders.
- (b) The gyromagnetic oscillations which exhibit the resonance of an atmospheric field cavity enveloping the Earth.
- (c) The gyromagnetic reaction that opposes any magnetic field that penetrates through ionized gas plasma, ionized liquid solutions or even the vacuum if the latter contains active charge that can be displaced according to Maxwell's equations.

It is already established that there is a link between (a) and (b), as discussed in a review paper by T. F. Valone [1]. The seriousness of the connection between ELF radiation and health is such that Valone reports on the development of a special ELF Spectrum Analyzer the object of which is to provide an instrument capable of detecting and analyzing electromagnetic fields having frequencies ranging from 10

Hz down to 0.01 Hz.

In Valone's paper there are more than 20 references that support the statement in (a) above. Here, however, we present just one such reference besides the Valone reference itself. This is to a paper in SCIENCE by A. R. Liboff et al. [2] entitled 'Time-Varying Magnetic Fields: Effect on DNA Synthesis'.

So far as the (b) phenomenon is concerned this relates to what is called the 'Schumann resonance' [3]. There is a fundamental frequency of about 7.8 Hz arising from the time it takes for electromagnetic radiation trapped within the ionosphere-earth cavity to propagate around the body Earth. 186,000 miles per second and a wavelength of about 24,000 miles, corresponding to the Earth's circumference, gives the 7.8 Hz frequency.

This resonance is known to regulate in some way the timing of the biocycles. Valone states:

'It has been noted that the basic oscillation frequency of the brain (alpha rhythm) is the same as the Earth's fundamental resonant frequency.'

THE GYROMAGNETIC REACTION: In reading Valone's fascinating review of this subject the author's attention halted at:

'ELF magnetic fields on the other hand pass right through the body without any appreciable attenuation but ironically have been found to have many significant biological effects.'

It is this statement which is, indeed, an accepted proposition in established physics that this author finds can be challenged. The reasons are of record in the first volume of Speculations in Science and Technology in a 1978 paper by the author entitled 'Crystal Symmetry and Ferromagnetism' [4]. The reader will, of course, see no connection between ferromagnetism and the human biocycles. However, the point is that the author gave very good reasons for suggesting that a steady or low frequency magnetic field acting on a medium containing charge in motion would cause that charge to react to the extent that the reaction kinetic energy density was equal to the magnetic field energy density.

In a fuller treatment of the theory involved it is argued that it is this reaction that feeds the inductive energy back to the magnetizing system as it is de-energized. Furthermore, in asserting priority to deploy kinetic energy to match the magnetic field energy density, the reacting ions having the greater mass will take priority in asserting the reaction.

It is not proposed here to enter into the full physical support for this contention, as reference [4] should suffice to sustain the proposition. However, what we can do is to show why this reaction effect is very relevant to the ELF hazards.

The crucial formula governing the reaction is that associated with the cyclotron notion of a charge reacting to a steady magnetic field of intensity  $H$ . In the cgs system of units the cyclotron angular

frequency is given by  $Hq/m$ , where  $q$  is the electromagnetic unit of electron charge of a typical ion and  $m$  is the mass of that ion.

Therefore, if we are looking at the effects of the field  $H$  on a saline solution, for example, we will find that there is a characteristic frequency of reacting motion for each type of free ion in that electrolytic solution. Consider the chlorine ion as one prevalent in a resonance attributable to the presence of sodium chloride. This has a mass of very nearly  $6 \times 10^{23}$  gm, whereas  $q$  has the numerical value  $1.6 \times 10^{20}$ . It follows that the angular frequency of the motion will be  $266(H)$  rad/s or, as a frequency, about  $42(H)$  Hz.

Already, therefore, we have reason to see that there is the possibility of resonance between this frequency and that 7.8 Hz fundamental of the Schumann resonance, but that such a resonant condition will only occur at or very near to a specific value of  $H$ , which in the case of the Cl ions is  $(7.8)/(42)$  or 0.19 gauss.

**THE ELF RADIATION INTERACTION:** Now the Earth's magnetic field has an intensity of about 0.5 gauss (i.e. 50  $\mu$ T) and, though this is not the same everywhere on the Earth's surface, a value of this order is the steady field applicable wherever we choose to be. Consider then the effect of a slowly varying magnetic field that is of sinusoidal form and has an amplitude of, say, 0.4 gauss. In this context 50 Hz is slow. The excursions of the combined field will pass very slowly through that critical value of 0.19 gauss twice per cycle. This means that the electric field pulsations at 7.8 Hz associated with that geomagnetic cavity resonance will combine with the rhythm of the reaction ion motion at exactly the same frequency to build up resonant lateral pulsations at exactly that 7.8 Hz frequency.

On the other hand, if the disturbing field has a high amplitude or a very rapid cycle of change, the passage through the 0.19 gauss threshold will be very rapid and there will be no progressive build-up of oscillations. Even allowing for the fact that the opportunity for resonance occurs more often, owing to the increased frequency, the progressive build-up has no opportunity to establish a strong concerted cyclic displacement of the ion population in, for example, the human blood stream.

What this amounts to is that strong electromagnetic radiation at power frequencies or weak radiation at high frequency will excite no ion resonance with the 7.8 Hz field. However, ELF radiation of small magnetic field amplitude can be a cause of pulsations that might well promote such resonance and affect cell behaviour in our bodies. This seems consistent with the evidence presented in (a) above.

There is, of course, scope, based on the theory presented, for examining how the type of free ion present in a reacting medium might be sensitive to different critical magnetic fields. The use of controlled ELF signals of different amplitudes might then operate selectively in developing the resonance under discussion.

**CONCLUSIONS:** Thus, given a physical basis for the way in which ELF radiation operates to affect our health, such as that just presented, we have then the means by which to devise verifying tests and even equipment that can reduce or eliminate the hazards.

We will not speculate on that here. The author does, however, believe that there is something of basic scientific importance in this biomedical connection with the gyromagnetic reaction.

Generally, physicists believe that in a metal conductor, where the electrons are the free ions, there is no such thing as 'free electron diamagnetism'. They argue this on statistics but with the hindsight knowledge that there seems to be no attenuation whatsoever of the applied magnetic field. The author has reason to believe that the magnetic fields produced by isolated charge in circuitual motion are twice as strong as predicted on conventional theory. This affords the scope for a reaction effect that normalizes the net field at its unity value. The optimum reaction in terms of energy deployment leads to that factor of 2 and ensures that just enough ions react to half-cancel the primary effect. This is why experiment shows that there is an anomalous g-factor of 2 when the angular momentum change in a steel rod is related to the change of magnetic moment of the orbital electrons deemed to account for the change of magnetization of that rod.

The orthodox theory has led to the notion that a point charge can set up magnetic moments by spinning but it takes a specific and somewhat abstract mathematical treatment to give basis to such a proposition. One would not normally be able to make sense of a statement that a point can spin. However, this could be an erroneous interpretation, in which case we see scope for using the cyclotron theory to explain the ELF-resonant ionic reactions in, for example, the human blood stream.

In a strange way, therefore, the mysteries of the health hazards of ELF radiation might be connected with the mysteries of the ferromagnetic or gyromagnetic state. The anomalies may well have a common solution on the lines indicated above.

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## NOTE ON SCHUMANN RESONANCE

H. Aspden

The Schumann resonance ELF hazard discussed in the previous section does not apply to problems connected with electric blankets or proximity with overhead electric power lines. It is an action which occurs wherever one is positioned on Earth, because it derives its power from oscillations in the ionospheric cavity enveloping the whole of body Earth.

It is in the category of the ever present cosmic radiation which, to some extent, must contribute to our limited life expectancy. It is therefore a natural hazard, rather than one which man has created by design of electrical appliances or distribution systems.

However, we must recognize that the hazard effect from this Schumann resonance relative to that of electric blankets or overhead power lines is small, bearing in mind that it provides the statistical background or data norm on which the hazard risks of electric blankets and power lines are measured and found to be excessive.

While one could think in terms of neutralizing the Earth's magnetic field and any extraneous D.C. field in our homes and workplaces, that is a formidable proposition which lies outside the bounds of practicality. However, we can, as has been shown earlier in this report, take simple precautionary measures to overcome the blanket problem. Concerning, the effect of overhead power lines, this is a topic already discussed on pp. 22-26.

[Added Note: More will be said about Schumann resonance on pp. 35-37 (Appendix I). It is suggested that in the upper atmosphere in the region of the ozone layer, where oxygen molecules are ionized, there could be cyclotron resonance activity developing effects which are superimposed upon the basic Schumann resonance phenomenon.]

# DEBATABLE ASPECTS OF CYCLOTRON RESONANCE IN IONIZED LIQUIDS

H. ASPDEN

Although there is a developing belief that cyclotron resonance of ions in body fluids plays an important role in biological systems, and this is claimed to have experimental support, certain other experiments aimed expressly at detecting such resonance are reported to give a null indication. Thus Durney et al [1] attempted to measure the effects of resonant magnetic fields on transport of ions across simulated cell membranes. They used an electrolyte containing either calcium, potassium or sodium ions and varied the field strengths at 100 Hz or lower. They measured membrane capacitance and electrical conductance only to conclude that, as these did not vary by as much as 1%, there was no evidence of any resonance.

One must, therefore, ask the question as to why the cyclotron action is presumed to be evidenced by discernable electrical displacement. One should not assume that the resonance process is the same as that of free electrons in solid conductors. In this latter case the positive ions are not free to move as they are in a liquid.

In so far as the cyclotron action stimulates cell growth or cell damage in biological systems this can presumably be attributable to the concentration of thermal energy into the ions as opposed to the neutral molecules in solution. In a sense, since there are positive and negative ions which must neutralize one another macroscopically, there can be no significant electrical displacement, but that does not mean that there is no enhanced activity by the ionized components of the system.

The effects could be those we associate with temperature, as if some molecules are at a much higher temperature than the mean value applicable to the body as a whole. Of course, a critic will argue that the ions will collide and the heat become dispersed by being shared according to conventional thermodynamic principles and statistics. However, here one must remember that the cyclotron action involves ordering of motion so that collisions are less likely and, furthermore, there is a case for saying that the usual three degrees of freedom applicable to thermal interaction is reduced to two. If that were so then in the ultimate situation, and without adding any heat energy, the effective temperature could rise dramatically by tens of degrees.

We need then to be mindful of the possibility that temperature anomalies can present themselves where ionized aqueous solutions are tested under conditions conducive to resonance. This author has suggested [2] that resonance can involve a band of frequencies, including 50 Hz and 60 Hz, for mixed ion mass conditions such as must always apply because the positive ions are always matched to negative ions and their masses are always different. This, in itself, will make detection of a resonance peak virtually impossible. Looking then for temperature anomalies one could even suspect that weak environmental fields at the laboratory power frequency could excite some very curious effects in water which contains an ionizing agent.

The cold fusion scenario comes to mind here, but one needs also to take note of research on force anomalies discovered by various researchers. Zinsser, for example, using a signal generator of special design [3], found that pressure across the plates of a capacitor having water as a dielectric decayed very slowly when the system was switched off after being primed to resonance by an oscillatory field.

The purpose of this note is to warn against genuine research endeavour becoming polarized by null findings which merely disprove a particular hypothesis. In the cold fusion world, the orthodox nuclear physicist cannot abide the thought that there can be atomic fusion without neutron emission. Since no neutrons are found, the cold fusion discovery is discredited. In the case of cyclotron resonance in ionized liquids, we must not presume that this can be sensed by direct electric fields effects. What matters in cold fusion research is whether there is a true excess of thermal action and what matters in the weak field hazard research is whether there is enhanced action that can damage our body cells.

Theory can also get in the way of the truth. A critic of the cyclotron resonance theme could say that the radii of the ion orbits would need to exceed by far the mean free path of the ions, pointing out then that collisions must occur because positive ions orbit one way and negative ions orbit in the opposite sense.

This brings us to a debatable issue. It could be the ordering of the collective motion of the opposite polarity ions that puts their motion about the magnetic field axis in different planes orthogonal to that axis and in an alternating sequence along that axis. As to the orbital radius involved, that can simply apply to the small arcs traversed by the ion motion between collisions. Whatever the reason, our theory must adapt to the truths of experiment pertaining, not to ion acceleration in a cyclotron as such, but to the activity in an ionized liquid in reacting to a magnetic field. If accepted theory is given a God-like reverence and applied to overrule what we might propose then we cannot progress in our research.

We must therefore begin to take more interest in how resonant cyclotron effects in ionized liquids can be sensed, possibly in terms of such resonance being used as a catalyst in aiding chemical reactions.

Much may depend upon the containing cell and particularly its cross section in relation to the cyclotron ion notion. One may also wonder if this research can be extended to the broader technological fields, where anomalous energy-related actions supposedly occur in aqueous solutions.

This author finds it very difficult to credit the claims of those who try to run car engines on water by using engine power to generate electricity, in turn used to excite resonance by which water molecules are dissociated to yield hydrogen and oxygen to then power the engine by combustion. However, it would be foolish to ignore such claims completely merely on academic principle. After all, someone might well find that there are creative forces in our body chemistry by which the chaotic field energy of our body heat and the environment can produce that dissociation which precedes combination to grow new cell structure.

## References

- [1] C. H. Durney, A. A. Anderson, A. A. Peterson & J. Janata, 'Cyclotron Resonance and the Effect of Low-Level AC-DC Magnetic Fields on Electrical Impedance and Ion Transfer in Bilayer Phospholipid Membranes', Paper in Session A-16 of BEMS Tenth Annual Meeting, Stamford, Connecticut (June 19-23, 1988).
- [2] H. Aspden 'Power Lines, Cancer and Cyclotron Resonance', Electronics World and Wireless World, pp. 774-775, September 1991.
- [3] R. Zinsser, U.S. Patent No. 4,085,384.

## APPENDIX I

The following Research Note dated March 31st 1997 was published in the author's Web pages on Internet.

### BRAINWAVES AND ALPHA RHYTHM

#### Schumann Resonance

Did you know that there are electric field effects in the atmosphere that affect your brain? We need to solve the mystery of why it is that your alpha rhythm, as measured by detectors sensitive to brainwaves, has a frequency equal to that detected by the study of weak electric field oscillations in the atmosphere. The frequency is 7.8 Hz, about one sixth or one seventh of the frequency of electricity supplied to your home. It was Tesla who first discovered those atmospheric oscillations. He even embarked on research to exploit the phenomenon, aiming to transmit power to homes everywhere around the world by low frequency 'radiowaves'. That was deemed to be a venture that could put power companies out of business. How would they be able to charge for the service? So now we have to concentrate instead on the power of our own brainwaves to progress in the world of 'free energy'.

It was Schumann's research reports which gave formal scientific recognition of this physical phenomenon of our atmosphere and so it has the name 'Schumann Resonance'. When I first heard about this from Tom Valone at a conference I attended in Canada in 1988 I was mildly interested. I was there to air my views on how one might be able to generate power using magnetism as a catalyst in tapping aether energy. I was told not to use the expression 'free energy' in the title of my talk as that might destroy my credibility! So I was a little restrained in my pursuit of the technological implications of my 'brain child' and atmospheric resonance effects were not uppermost on my mind - or so I thought!

What I did learn was that the Schumann resonance was deemed to be a phenomenon occurring as electromagnetic waves travelled around the Earth in the concentric spherical cavity between the Earth's surface and the ionosphere. If one takes the circumference of Earth and compares it with the speed of light then one finds that electromagnetic waves travelling around body Earth would set up a kind of standing wave resonance effect at 7.8 Hz. This is the alpha rhythm frequency. So we, meaning our brains, may be phase-locked in some way with body Earth and its atmosphere. The expression 'phase-locked' means that everything in this merry electrical dance is in step and moves at the same frequency.

#### Aspden Resonance

Dare I now put my name on another interpretation of this resonance phenomenon? I leave it to you to judge. Firstly, as background I note that in 1988 my interest in aether theory led to contacts between me

and Dr. P. E. Rowe of Mashpee, Massachusetts, USA . I had a theory which explained how protons were created from the aether. Dr. Rowe had experimental evidence that protons were created inside his electrical discharge tubes which he operated at 50,000 volts and he too believed the aether was the source. It seemed to me that he had found a way of focusing the work done by the aether in creating matter so that, in a sense, he was harnessing the power of Creation! I saw in this also the danger of effects on our bodies if we were near enough to electric power lines to be in the 'proton creation zone', but far enough away not to be electrocuted. I then wrote the 1988 paper 'The Proton Factor and Its Unknown Effects' here reproduced in Appendix IV.

I had forgotten 'Schumann Resonance' because my mind was on my own theory and protons, deuterons, neutrons etc. There was not much I could do anyway, even though I was aware that if protons could be created inside my body in existing atomic nuclei I might suffer some consequences. I wondered about DNA and whether its chemistry took account of isotopes. It may have been A. A. Berezin, an academic researcher in Canada, who pointed out that there were more people in the world than possible DNA combinations of atoms in the DNA molecule but yet we were all different. The implication I saw in this was that there could be different isotopic combinations in the DNA structure. Maybe the odd deuteron replacing the proton in the hydrogen atom in DNA can make a difference! If so, then the odd proton causing a transmutation to a deuteron could make the odd DNA molecule a misfit in our composition. Would that promote cancer? I do not know but I do know that someone somewhere should be researching that possibility.

I may have done no more on this theme if it had not come to my attention that an electric blanket manufacturing company had sought certain assurances from staff members of the Electrical Engineering Department at my local University. They wanted to be assured that the electrical and magnetic fields produced by their blankets were so weak as to be non-harmful to health. I was a Visiting Research Fellow in that Department pursuing my own research on energy from a technological viewpoint, but I was not consulted on that question, nor was there any reason for such consultation. Measuring those electric and magnetic fields is quite straightforward, given the necessary test equipment. In my opinion, thinking about the matter privately, it was not sufficient just to measure the strength of those weak fields and assume that they could do no harm. If the medical world said there was evidence of a problem, then there was a problem!

Now an electric blanket and an overhead power line have something in common. Unlike the cables which come into your home and in which the forward current carrying wire is wrapped around the return current carrying wire, the overhead power line and the electric blanket have these wires well spaced. In one case it is to reduce the risk of bad contacts causing hot spots and so a fire hazard. In the other case it is because the voltages are so high that the wires need to be well spaced to preclude arcing. The point nevertheless is that, if wires are well spaced, they do set up stray pulsating electromagnetic fields at the power frequency. They may be too weak to matter in normal physical terms but they may be too strong to be tolerated in biophysical terms!

The reason for this is 'resonance'. Now, I like to think that I am not stupid. I also have an aptitude for understanding something new, otherwise I could hardly have spent my working life in the world of

invention. As a corporate patent attorney in the high technology world of electronics and power engineering one needs to be able to grasp what is new and find a rational way of describing it in terms meaningful to a patent examiner. So, the obvious question, if resonance is involved, is why electric blankets and overhead powerlines have harmful effects in U.K. and in USA, where the electric power frequencies are 50Hz and 60Hz respectively.

To answer this I asked myself what was different about the human body versus action in a metallic conductor when it came to reaction to a low frequency alternating magnetic field. Now, although I was experienced in patent attorney work, I happen to have a Ph.D. for experimental research on the energy anomalies involved when metal reacts to such fields. I was aware of a kind of resonance in copper or iron when subjected to a magnetic field, what is termed a diamagnetic reaction, which occurs even in a steady d.c. field. In copper or iron there are free electrons moving about and setting up that reaction. In our bodies, in our blood, there are instead relatively-very heavy ions that set up that reaction. If there are two types of reacting ion present then, within a limited range, one can screen the field of the other to the extent needed to adjust the effective field to the optimum resonance of one or other of the ion masses. I knew this could explain the 50Hz-60Hz resonance question.

The expression 'Aspden Resonance' refers to my suggestion that the field oscillations in the Earth's atmospheric cavity, as bounded by the ionosphere, are encouraged by cyclotron resonance involving ionized oxygen or ozone. Now, I say cyclotron resonance here, but I must qualify that statement. In physics there are two Larmor formulae. The first, which is called the 'Larmor formula', is the one applied to the cyclotron. It applies to the effect of fields which pump energy into the ion motion. The second formula, that termed the 'Larmor precession', applies to an action in which the motion in orbit is perturbed, with the result that the plane of the orbit alters the direction of the axis about which the ion moves. This sets up a radiated field disturbance at the precession frequency, which is half that of the cyclotron resonance frequency given by the 'Larmor formula'.

Now, owing to the Earth's magnetic field, the 'Larmor precession' frequency of the ionized oxygen molecule, which comprises two oxygen atoms, would be about three times that attributed to the basic Schumann resonance. Also the ionized ozone molecule, which comprises three oxygen atoms would imply a precession frequency that is about twice the frequency of the basic Schumann resonance. In short, therefore, there would be harmonics of the basic cavity resonance set up and the relative strengths of the components observed in the harmonic spectrum of radiation should tell us whether this interpretation is viable.

To take this further I need to deflect your attention along different routes according to choice. You may choose to follow my account of the basic cyclotron resonance theme, which may hold the secrets of the hazards we risk from using electric blankets or living too close to overhead power lines. Alternatively, you may be more interested in the question of those brainwaves and the Schumann resonance and Aspden resonance topics. The latter has a special interest from the viewpoint of my aether theory. A feature of my theory is that there is a phase-lock throughout domains in space set by the range of gravity force. The phase-lock merely implies that electric charges are all moving in a common rhythm, keeping their separation constant and so not exchanging energy. I predicted long ago that this was an ongoing

state in the aether. As can be seen also from the pattern of electron field cavity resonance illustrated on page 51 of my 1996 book 'Aether Science Papers', the phase-lock action is at work in containing the electron's energy in a way which explains what is known as the anomalous g-factor of the electron. Therefore the Schumann resonance theme, which involves a phase-lock having a much smaller frequency than that of the aether or the electron, has a special significance in defining an enclosing boundary, not just for a weak form of radiation, but also for the aether system which is carried along by body Earth.

Already, in the bulk of this Report we have concentrated on the basic cyclotron resonance theme, which is about the hazard risks that can be avoided. The other theme linked to the Schumann resonance will be discussed further in the following pages in Appendix III.

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## APPENDIX II

The following Research Note dated January 22nd, 1997 was published in the author's Web pages on Internet.

## POWER LINES AND HEALTH

The above is the title of an article in the November 1996 issue of Physics World. Its authors are John Swanson, David Renfrew and Nigel Wilkinson, who belong to the Technology and Science Division of the National Grid Company in U.K.

They conclude that, though it would be arrogant and rash of physicists to argue that, because we have not yet been able to think of a possible physical mechanism, it is impossible for there to be an effect.. however, the absence of a mechanism and reproducible laboratory results inevitably means .. scepticism'.

I note that in their article they say that various resonant mechanisms involving the Earth's static (magnetic) field have been proposed, for example ion cyclotron resonance of the calcium ion. Of this they declare that such cyclotron resonance cannot actually occur in a cell as the orbit of the ion would have to be more than 1 metre (in radius).

This shows that they have not understood the physics of cyclotron resonance as applied to ionised liquids. To pump energy from a pulsating electric field into a system of ions moving in a magnetic field the only governing condition is that the pulsating frequency is in or near to resonance with the natural frequency of the ion in orbit in that field. The cyclotron as used in high energy particle physics pumps energy into an ion by increasing its speed and so its orbital radius. If we are not seeking to put that energy exclusively into an ion output stream, it matters not if there are collisions limiting the mean free path to sub-micron-sized dimensions. There is still energy transfer from that field to the ion system.

To understand this it may be that a mathematician will be required to supplement the "skills of physicists alongside those of biologists, epidemiologists and engineers" (quoted as the last words in the referenced article). You see, if there were no magnetic field, the ions in collision in the fluids in our body cells would merely move in straight lines between those collisions. A straight line is a curve of infinite radius! If, however, a magnetic field is present, then that same rectilinear motion would apply if the system of ions in motion could be viewed from a reference frame rotating about the magnetic field axis at the cyclotron frequency. Each and every positive ion would share a motion as if the whole of the fluid in the cell were rotating at the same angular velocity. Collisions would not cause a clockwise moving ion to take up anti-clockwise motion. It follows therefore that the superimposition of a 50Hz or 60Hz pulsating electric field attributable to an overhead power line will act selectively in pumping energy into those ions moving with the field.

The ions on one side of a cell will gain in speed in their cyclotron orbit (or rather, minute arcs of such an orbit), whereas those on the opposite side of the cell will reduce in speed. However, owing to the

rotation, if there is a match between the cyclotron frequency and the frequency of the pulsating field, the ions on one side of the system which gain energy will have moved around to the other side as the field reverses direction and so will continue to gain energy.

This is an escalating effect in which the ions gaining in speed acquire more energy than is lost by those losing speed. Overall, there has to be energy transfer and a net heating effect concentrated by the cyclotron resonance process. Note further that, if a mathematician amongst those ions were to run around in circles, speeding up on one side of the orbit and slowing down on the other side, but yet keeping a steady angular velocity about a central point, his mean position would have to be displaced in the plane of motion owing to that constraint of a fixed angular velocity. Cyclotron resonance ensures that the angular motion has a constant rate, notwithstanding any changes in kinetic energy. Angular momentum of ions is not conserved in a cyclotron situation, because as the ions are accelerated to faster speeds they spiral outwards.

Now, there is research in new energy physics which points to anomalous energy inflow from the field environment if electric charge can be held displaced in stable concentrations inside an electrically conductive medium. This is found in systems involving rotating magnets and in plasma discharge devices. There is clearly a scientific mechanism by which one can predict the setting up of electric fields in human body cells primed by the pumping of energy by cyclotron action. For my part I have, some years ago, addressed the more difficult question of why there can be similarly-harmful cyclotron resonance in U.K. and U.S.A. where the power frequencies are 50Hz and 60Hz, respectively. Explaining that is the primary question, but there is an explanation based on the dual presence of positive and negative ions of different molecular masses. Understanding how the cyclotron frequency adapts over a limited frequency range in such circumstances raises fascinating questions of basic importance, but directly connected with the gyromagnetic reaction phenomenon found in ferromagnetic substances.

I shall be writing more on this subject in due course, but I emphasize here that the authors of the above Physics World article have not understood the cyclotron mechanism as it can apply to human body cells and they must rethink their views on the way in which weak electric fields from power lines can interact with a weak geomagnetic field to pump energy into the resonant ions in our body fluids.

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The following Research Note dated March 31st 1997 was published in the author's Web pages on Internet.

## APPENDIX III

### IONOSPHERIC RADIATION

It was in August, 1996 that I received a communication from A. G. Callegari of Dane Bridge Nursery, Much Hadham, Herts SG10 6JG, England. It was dated August 2nd and concerned his experimental findings on the measurement of 'Schumann Resonance'.

What he had to say led me to look up the comments expressed by Tom Valone in his paper "Powerline EMF Radiation and Your Health" (Proceedings of United States Psychotronics Association Conference, 1990), my copy being a pamphlet version issued by Tom Valone from the Integrity Research Institute, 1377 K Street NW, Suite 204, Washington, DC 20005, USA.

I began to make sense of a figure (Fig. 2 on p. 15 of that pamphlet) which gave a radiation intensity spectrum of the frequency pattern for the observed Schumann resonance. My concern was that the fundamental frequency component peaking at roughly 8 Hz was about 10 per cent weaker in strength than the second harmonic component which peaked at about 15 Hz, whilst the third harmonic at 20 Hz was about 85% of the strength of the fundamental component. The fourth and fifth harmonics seemed to be at 26 Hz (55% strength) and 33 Hz (30% strength).

Now, this simply should not be, unless there is some factor at work other than the action setting up the fundamental oscillation.

The Callegari communication indicated that he was using a frequency counter model WFC 308 made by Wisher in Taiwan. It specified that no antenna was used, by which I inferred that there was no resonant circuit which could distort the frequency spectrum of the signal to be analyzed. It then stated:

"Frequencies in the range 7.06 to 8.45 Hz have been measured continuously at this site since January 1993, except in February 1996, when values increased suddenly to a temporary range (13.4 to 14.25 Hz) which lasted for about half a minute before falling back to the saturating value. Relaxation from that

value appears to be semi-asymptotic of the order of 15 minutes. Analysis of existing data shows strong correlations with Schumann resonance, atmospheric and Telluric temperature changes and discontinuities, brain-wave frequency band limits (theta to alpha and alpha to beta), .... "

The letter then added the comments:

"I've just acquired a second WISHER 308 counter in which frequencies have displayed mostly (90%) in the range 15.5 to 16 Hz, with occasional jumps (10%) up to about 17 to 19 Hz - rarely below 15.45 or above 19.5 Hz."

This suggested to me that with the newer equipment he was getting a more reliable measure of the stronger signals in this low frequency range, possibly supporting the indication in Tom Valone's paper that the second harmonic of the Schumann resonance was stronger than the fundamental component. I wrote to him, expressing my thought that the oxygen and ozone in the ionosphere might be a radiating source supplementing the basic Schumann resonance, thinking also that variation in concentration of a different mix of O(18) and O(16) isotopes might account for the anomalous frequency shift. At the time, it was on my mind that the London newspaper, The Times, had in their August 8th issue just declared that life had been discovered on Mars, the evidence being a fossil-containing fragment which came from that planet and contained the heavier form of oxygen, O(18).

Then, by letter dated August 26th, Callegari reported his investigations on his new equipment used in a test run between 4.00 pm and 4.11 pm on that same day. He had a reading every 2.56 seconds and the measurements showed little variation about a mean of 15.79 Hz.

Now, based on the Larmor precession formula,  $w = Hq/m$ , the angular frequency resulting from motion of an ion in a magnetic field H of strength 0.5 gauss (the Earth's magnetic field), would correspond to  $768/N$  rev/s, where q is the unitary electromagnetic charge of an ion and m is the mass of the ion, which mass is also N atomic mass units. N is 16 for an isolated oxygen atom, and 48 for ionized ozone. Since  $768/48$  is 16, this tells us that ozone in the ionosphere could be a source of electromagnetic radiation at 16 Hz. Now this is virtually that second harmonic frequency, bearing in mind that the 0.5 gauss Earth's magnetic field strength is only a close approximation.

However, there is the very clear message here that this could explain why there is a dominant second harmonic in the radiation intensity spectrum associated with the Schumann resonance. Going even further, we can look at the oxygen molecule in its ionized condition in the ionosphere and expect that to produce radiation at the frequency  $768/N$  Hz, where N is 32. This would indicate radiation at 24 Hz. This would be the third harmonic frequency associated with the Schumann resonance. A strong fourth harmonic could then arise as a second harmonic of the ozone radiation, but a fifth harmonic of the Schumann resonance is not so easy to explain.

I do, however, feel that I have made out a good case for asserting that the ionosphere, besides providing a cavity for setting up the Schumann resonance, has another way of generating ELF radiation. If tests were

made in polar regions where the ozone layer is absent, then that second harmonic associated with the Schumann resonance should fall off in strength. That would confirm this theory.

In conclusion, identifying this new interpretation of the anomalous strength of that second harmonic by the name 'Aspden resonance', I express the opinion that neither the Schumann resonance nor the 'Aspden resonance' warrant concern from the hazard risk point of view. Unlike cyclotron resonance in our body cells attributable to overhead power lines and electric blankets, there is really nothing we can do in any event by way of a preventive measure.

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The reason this Research Note is dated 31st March 1997, bearing in mind that what has been presented dates from August 1996, is the deferment of its preparation to the time when this Energy Science Report No. 10 is ready for publication.

## APPENDIX IV

The following paper was published in The Toth-Maatian Review at pp. 3725-3734, vol. 7 (1988)

### THE PROTON FACTOR AND ITS UNKNOWN EFFECTS

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#### ABSTRACT:

By speculating on a theme related to the proton, the mysterious appearance of hydrogen gas in high voltage electric discharges and the proton structure of atomic nuclei, it is shown that we have reason to doubt the way in which experts portray atomic nuclear structure. There are uncertainties as to how protons can migrate through solid matter and how they can suddenly appear in a discharge environment and possibly disappear from nearby substance to keep a balance. These uncertainties can cloud our knowledge of how our body cells might be affected in physical environments in which this proton factor is of concern, and particularly the danger to health should one live in close proximity to overhead high voltage electric power lines.

#### INTRODUCTION:

There is a developing concern that people living very close to high voltage overhead power lines can suffer from medical problems related to those specific environmental conditions. This has been the subject of research that does give reason to believe that there are health hazards associated with the near presence of such power lines. The general assumption is that the problems arise from the effect of the magnetic fields that penetrate into the dwellings closely adjacent to these high current sources. However, though there is some evidence that magnetic fields, and particularly weak or low frequency magnetic fields do have some effects on our body chemistry, the general expert opinion is that such fields are not harmful. Furthermore, those who work near powerful electrical power generators or in electro-chemical plants should be equally subject to hazards associated with magnetic field effects.

The difficulty with any investigation on this subject is that it involves several professional disciplines and this makes any objective research dependent upon an interaction between several scientists of very

different skills and training. It takes an exceptional person in any one such field to make any progress in dealing with an unknown phenomenon and the chances of bringing the right people together in the several fields involved are very small. One needs the knowledge of the electrical power engineer, the physical chemist specialist in electrical effects on matter, the relevant medical experts and, perhaps surprisingly, the nuclear or atomic physicist familiar with isotope transitions.

It is the latter proposition that is the basis of this paper, because whilst we think that the magnetic fields account for the hazards of living in proximity to an electric power line, it might well be that there are certain atomic transitions some of which are induced in the atmosphere if not directly in our body cells, so affecting the air we breath and, indirectly, our health.

A general comment that is often made is that the weak magnetic fields set up at tens of metres from an overhead power line can be little different from those arising from power equipment in the home, including fluorescent lamps, and that any electromagnetic radiation effects can hardly be different in intensity from those set up by television tubes. Indeed, they may be little different from the strength of the Earth's magnetic field and there is no escape from that, however far we might live from an overhead power line. This magnetic field consideration does not apply, however, to the chemical effects, such as the action of the corona discharge which occurs continuously around the power line. One well-known effect of this is to convert atmospheric oxygen into ozone in the open air. The gases in a fluorescent lamp and a television set are contained within sealed tubes so even if they are affected by a discharge of current they will nevertheless be contained and so cannot be harmful. However, in making this comparison it should be kept in mind that the voltages employed in such domestic appliances are far below those of the primary transmission lines used by the electrical power industry.

However, the task of investigating the effects of ozone is not seen as a primary problem warranting our attention in this paper. What we wish to discuss is a more `way-out' possibility that stretches our insight into physics to the limit or, as some might say, beyond the limit and into the realm of pseudo-science. Where health considerations are concerned we cannot afford to confine our minds to what, in science, is practical and proven. We know all too little about what it is that causes our bodies to deteriorate with age and if pseudo-science can give us a tentative insight into `aetherial' processes that can have a physical effect on our body cells, then such research can be of value.

The thoughts outlined in this paper are based upon some disconnected observations that might come together to offer us a totally new insight into a more basic cause for the medical upsets that stem from the proximity of the electric power line. It is stressed that what is proposed is speculation and that the views are aired here only so that those who make decisions as to what research should be funded can decide whether to include this subject in their list of options. The general reader can, of course, make his or her own judgement as to whether any such research can possibly be conclusive if it does not extend into the field to be described below.

## THE BASIC PROPOSITION

The activity in an electrical discharge that is powered by some 50,000 volts has been found to lead to the mysterious appearance of what seems to be hydrogen having no clearly determined source. This is an experimental observation in the laboratory and those researching this subject have tended to the view that the hydrogen comes from hydride compositions formed by the metal substances that comprise the electrodes associated with the discharge. There are, nevertheless, problems with this interpretation, problems which have led one experimental investigator Dr. Paul E. Rowe [1] in U.S.A. to urge that the vacuum is itself a source of the protons which, together with electrons can account for the anomalous appearance of hydrogen.

It needs little imagination then to ask how it can possibly be that a proton, which has an intrinsic energy that we know from the formula  $E = Mc^2$  to be equivalent to the power of one electron accelerated through 938 million volts, can be created by the action of a 50,000 volt discharge. One answer to this could be that the proton is not created in isolation. Just as electrons can tunnel through potential barriers which, in theory, they should not cross, so it may be that the proton can be transposed in some way from a position A to a position B by an influence far weaker than that needed to match the rest-mass energy. Protons, like electrons, if left alone have no measured lifetime. They seem to live forever and yet electrons paired up with positrons can be annihilated and recreated in the vacuum field.

Whether such a process is involved in the barrier tunnelling is a matter of speculation but the fact is that electrons can 'tunnel' mysteriously through barriers that should keep them contained. Therefore, given that it is an experimental fact that hydrogen does appear, as it were, from nowhere, it does not seem at all outrageous to suggest that a proton can appear at B accompanied by the demise of a proton at A. Whether the aether is the source of that proton at A is debatable, but if it is not the aether then the source must be the nucleus of an atom of matter in the near vicinity. Therefore, thinking of that medical problem, if a proton can appear mysteriously in the corona discharge close to an electric power line, a proton in matter, possibly in human cells nearby will disappear.

An atomic transmutation, an isotopic transition, may well initiate activity in that human cell that could initiate cancer, but this is where one needs that specialist knowledge. What do we know of the effects of substituting isotopes of the same atom in a living cell? Research on this must have been performed but this author, being more a specialist on electromagnetic actions in the context of physics or engineering has no knowledge of any research literature in this field. In particular, research must have been performed on the effects of consuming heavy water, meaning water in which the hydrogen atoms have atomic nuclei that are constituted by deuterium rather than the proton.

As far as the author is aware it has been suggested by Berezin [2] that different isotopic combinations in a DNA molecule are essential to give basis for our human differences since the number of such possible combinations is vast, whereas the basic molecular chemical composition of DNA does not offer a sufficient variety of human forms. This suggestion comes from an electrical expert rather than a bio-chemist or medical specialist and so it must be viewed as mere speculation. However, if the generation of

DNA involves the replication of the exact isotopic combination in each of our bodies, then any isotopic transmutation that occurs in a spurious way, as by an atom shedding some of its mass to become a different isotope, must initiate a mismatch that could signal trouble medically.

The point of the above discourse is merely to show that a research theme pursued by Rowe, which involves an interest in a fundamental chemical problem, may have relevance to the medical concerns that arise from living close to an electric power line. Yet, no amount of research on the adverse effects of a magnetic field on our bodies can possibly lead to the proton transmutation that has just been suggested. Hence, if there is anything in this proposition, such research effort will be looking in the wrong direction and will not resolve the problem.

## THE UBIQUITOUS NEUTRON

We will next digress into the field of the atomic nucleus to ask whether we really know enough about the composition and structure of such a nucleus to pass judgement on the thoughts expressed above. The idea that a free proton can appear suddenly in an electric arc as an event corresponding to the demise of a bound proton elsewhere is likely to attract scorn from a nuclear physicist. There is the question of the binding energy involved in such a transmutation and such energy is not by any means minute. It certainly involves energy quanta that we associate with powerful gamma radiation, that is, energy far in excess of that of X-rays.

The nuclear physicist would ask how enough energy is fed to the atom in a human being to cause it to release the proton, especially if the only source of energy we are considering is the electric voltage of a power line several metres away from the affected atom.

Now, we must respect the knowledge of the nuclear experts, bearing in mind that they have successfully harnessed the nuclear energy of the atom in their atomic reactors and they have had at their disposal some very powerful tools for probing atomic structure. However, there is something very simplistic in the way the nuclear physicist looks at an atomic nucleus and the non-specialist in these matters should find it interesting to take what could be a rather cynical look at their picture of the atom.

Firstly, the atomic nucleus has an electric charge that comes in units of the positron charge, the positron being like an electron but positively charged instead of negatively charged.

Secondly, the atomic nucleus has a mass which indicates that it is assembled from a number of 'nucleons' that are roughly of mass equal to that of the proton. The proton is, in fact, the nucleus of the most prevalent isotope of hydrogen. Thirdly, the radioactivity of some heavy atoms involve powerful emissions which can induce an artificial radioactivity in other atoms and lead to the appearance of a neutron. This is a very penetrating particle, just a little more massive than the proton. It has a limited mean lifetime of 898 seconds and no electric charge. It is a particle that can have lethal effects and it is, of course, the catalyst that jumps from one atom to another and stimulates fission in atomic reactors.

Now, given the above facts, is it not surprising that our nuclear physicists were satisfied by a very simple algebraic calculation which said that if an atomic nucleus has  $Z$  units of charge and  $A$  units of nucleon mass, it must comprise  $Z$  protons plus  $(A-Z)$  neutrons? Why should we suppose that all matter and, indeed, our very body substance is full of those lethal neutrons that somehow only live for 898 seconds when they escape, but yet, for some reason that no one bothers to explain, are happily enjoying a much longer lifespan as part of our personal atomic substance. One would think that we should be exuding tremendous amounts of radiation if we were so full of neutrons. We should be intensely radioactive.

Moreover, would one not think that, if neutrons have a dominant presence in atomic nuclei, the atomic elements that are naturally radioactive would emit neutrons, rather than the alpha particles. Alpha particles are, in effect, the nuclei of a helium isotope?

Dare we venture to suggest that there are no neutrons in the atomic nucleus of any atom? Let us say, instead, that the neutron is a particular excited form of the antiproton (a proton that has a negative charge) that has an electron-positron entourage that includes a surplus positron to assure overall electrical neutrality. Such a neutron only exists outside the atomic nucleus because it comes into being as an antiproton in the nucleus is driven out.

The reason we are discussing this is simply that we are striving to understand how our body cells can suffer transmutations at the level of the atomic isotope. The word isotope merely signifies the forms of different atomic nuclei that have the same charge ( $Z$  value) but different masses ( $A$  values). If we have to talk about neutron exchange to discuss isotopic transformation then we are not speaking from the same energy criteria that apply if we really should be speaking about proton or antiproton substitution.

The proposition put here in this paper is that there are no neutrons in the atomic nucleus. This is the independent research theme that this author brings to this study for combination with the findings of Dr. Rowe.

## INSIDE THE NUCLEUS

Physicists cannot be sure what there is inside an atomic nucleus. If they bombard it with other particles to see how these scatter then it takes some very powerful particles to detect anything and then they cannot be sure that the energy of those particles has not caused its own transmutations and made the atomic nucleus something different from its natural self.

So let us just consider the options if we look for a different solution to that simple algebra mentioned above. Firstly,  $Z$  could be the measure of the number of positrons that have clustered together to form the core charge of the nucleus and there could be  $A$  neutrons in a surrounding cloud. The problem with this is that the basic hydrogen nucleus is not seen as a positron plus a neutron, but is in fact a proton. Hence the logic of building atoms from protons and adding some neutrons.

Now let us try a second line of argument. This time we will take note of the theory that Dirac advanced

according to which the vacuum itself contains sites occupied by charges that cancel one another. When an electron is removed from such a site, the 'hole' that is left behind is a positron. So, we take out  $Z$  electrons to form a 'hole' of  $Z$  units of positive charge. The electrons go to form the atomic shells of electrons surrounding the nucleus. Then how do we account for the mass number  $A$ ? Well, all we need to do is to substitute  $A$  antiprotons for the negative charges that occupy sites close to the centre of the nucleus. This may sound very speculative and it still does not quite fit our picture of the isolated proton when  $Z = 1$  and  $A = 1$ , but it is a possibility.

Note that in this latter case we avoid the presence of neutrons in the nucleus, but recognize that, if an antiproton escapes as an electron moves in to take over its site, the antiproton can jump into the site vacated by the electron and be seen to move through space in similar successive jumps, just as if it were an antiproton in company with a positron. This is similar to the form of neutron envisaged above.

Still speculation? Well, let us take note of the fact that the neutron might be electrically neutral as judged by its electric field seen from a distance but it exhibits a magnetic moment in spin that implies that it has a negative charge. The model of the neutron advanced above has, in fact, been used as a basis for calculating the neutron mass, the neutron magnetic moment and the neutron lifetime [3]. All three of these quantities were found to be in full agreement with their measured values, even to the precision of the part per million measurements of the magnetic moment and mass.

So there is an extremely good case for saying that the nuclear physicists have got it wrong. Instead, the atomic nucleus with  $Z$  greater than unity does comprise a halo of  $A$  antiprotons neutralized by occupancy of positive sites in the vacuum field. Given  $Z$ , what then determines  $A$ ? Physicists have no answer to this on conventional theory. However, we have a simple argument that develops the link. In developing this argument it is preferable to regard the nuclear charge as a true charge cluster. Firstly, suppose that we have a single spherical shell of  $A$  antiprotons seated at a radius  $r$  around the central positive charge  $Ze$ , where  $e$  is the magnitude of the unit electron charge. The potential energy, according to Coulomb's law, is then  $-AZ(e)^2/r$  for the antiproton-nuclear charge interaction and  $(Ae)^2/2r$  for the interaction between the antiprotons. The sum of these energies is crucial to the stability of the atom. The positive energy term cannot exceed the negative term if the atom is to be stable. The reason is that an additional antiproton coming into the nucleus would sense the full attractive force of the  $Ze$  charge of the core acting along a radial line from the centre of the nucleus, but it would only sense a half effect from the  $2Ze$  repulsive shell of distributed antiprotons. These act from side directions or from a further distance, so weakening their force action, but at the critical threshold even the weakened force can outweigh that of the central core and preclude increase of  $A$ . So far as the action between the antiprotons and the positive 'holes' is concerned, this appears not to affect the stability of the nucleus. It is as if the 'aether' involved at such close quarters cannot set up or withstand the short range forces that are under consideration. In any event, there is an argument that the single shell of antiprotons can contain twice as many units as the central charge core.

Should the atom have a large  $A$  value then the distribution will be more nearly uniform over a solid sphere of radius  $r$ . Then the first term becomes  $(3/2)(AZ)(e)^2/r$  and the second term  $(3/5)(Ae)^2/r$ .

It can be seen from these considerations that the value of  $A$  must increase with  $Z$  over a range from  $A = 2Z$  to  $A = 2.5(Z)$ , excluding  $Z = 1$ . Above this range the atom is unstable. Now, as anyone can see by inspecting the periodic table applicable to atoms, the argument just presented does hold true for actual atoms. Starting with the more abundant isotope of Helium, with  $Z = 2$  and  $A = 4$ , we progress to Bismuth before encountering unstable atoms. Bismuth has a  $Z$  value of 83 and its abundant isotope has an  $A$  value of 209. This is just on the threshold of the 2.5 factor.

This theory of the atomic structure is published elsewhere [4, 5], but it does serve to show that there is a very good case for saying that what appear to be antiprotons form a neutral cloud around a nuclear core charge by occupying positive 'holes' in the vacuum field.

To allay the criticisms of the nuclear physicist, it should be mentioned that there are two atomic elements in the mid range of the periodic table that do not exist naturally on Earth. Technetium ( $Z = 43$ ) and promethium ( $Z = 61$ ) are only identified by the fact that they are created by unnatural processes as by-products of atomic fission reactions in atomic reactors. These two atoms are short-lived for reasons that actually verify the theory underlying the 'aether' physics advocated by the author, as explained elsewhere [6, 7]. Even so, their  $A/Z$  relationship strictly conforms with the theory just presented. It is just that technetium and promethium have an instability that has nothing whatsoever to do with the overloading of the nucleon number  $A$  in relation to  $Z$ .

## PROTONS IN THE BODY

Our next problem, if we are to suppose that protons can be created by transfer from nuclei in our body cells is to explain how the antiproton can possibly become a proton. The answer to this is quite simple. Once the antiproton is free it really has captured a positron to become a neutron and we well know from experiment that a neutron decays into a proton and an electron. These are the ingredients which constitute the hydrogen atom.

Apart from this, however, there is the clear possibility that a source of protons exists by the actual migration of protons or even antiprotons through the metallic conductors that form the electrodes or power lines setting up the arc discharges into which these particles penetrate. A free proton and a free antiproton would annihilate one another but we are not here concerned with a mix of matter of this kind. However, imagine that such annihilation could occur in some limited sense. That would constitute an energy source and set up a neutron field. It may even explain some of the incredible anomalies reported in powerful electric discharges studied with the object of measuring the electrodynamic force reactions involved.

There is reported evidence that the forces on the heavy ions can be several thousand times greater than any expected from conventional electron interaction theory [8, 9 10]. There is definite evidence that protons gain more energy when involved with a powerful electron field than they should, by a factor of thousands of times [11]. Physicists are still researching this subject, but their interest lies in fusion reactors or the star war scenario of powerful railgun accelerators for launching missiles into space. Of

particular relevance is the discovery that the most powerful anomalous forces can be developed by an electric discharge in water, this being a direct indication that the protons in the hydrogen constituent in water can become involved in the process [12].

Surely, there may be some effects triggered by such anomalous power amplification that can cause the 50,000 volt discharge of an overhead power line to induce the sporadic activation of protons to levels which could cause isotopic change in, say, the oxygen atoms in the ambient air or in the moisture of that air. If a free proton is created to produce, with an electron, a hydrogen atom and ultimately a molecule of hydrogen gas, the trade-off could be the demise of a nucleon from an oxygen atom, changing the oxygen-17 or oxygen-18 isotope into oxygen-16. A similar alternative trade-off could involve a hydrogen-2 isotope in a water molecule converting to hydrogen-1 or, in a carbon dioxide molecule, carbon-13 converting to carbon-12 or nitrogen-15 converting to nitrogen-14.

One could think that by breathing such specially activated air the human body could develop a contamination that would manifest itself in due course as the activated atoms reverted to their original state. However, this proposition must be ruled out because the lower-nucleon valued isotopes are by far the most prevalent and, in a sense, one could think that, in normalizing more atoms, this would work beneficially from a health viewpoint.

## THE PROTON CREATION THEORY

However, yet another possibility emerges from the consideration that in space, whether we consider outer space, the space within our body or that close to an overhead power line, there could be certain activity of what is known as the zero-point field that actually is trying to create protons constantly everywhere. The zero-point field is a reality that features in what is known as stochastic electrodynamics. It is an energetic field that exists everywhere even at absolute zero temperature, 273 degrees centigrade below the freezing point of water. According to Dr. Harold E. Puthoff of the Institute for Advanced Studies at Austin, Texas:

"The amount of energy associated with this (usually unobserved) background is conservatively estimated to be of the order of nuclear energy densities or greater. .... One example is a unique zero-point quantum force between closely spaced metal plates, known as the Casimir force, which results from unbalanced pressures in the zero-point energy due to the presence of the plates. .... Now yet another indication of the reality of this ubiquitous energy density has turned up, while at the same time resolving a long-standing mystery from the early development of quantum theory. (Puthoff here refers to his paper in Physical Review [13] which explains why electrons in atoms do not radiate their energy) ... The significance of this observation is the understanding that the very stability of matter itself depends upon, and verifies the presence of, an underlying sea of electromagnetic energy of almost inconceivable magnitude, a vast reservoir of random energy that is universally present throughout space."

With this as the active situation today how can we believe that research on the harmful effects of electric power lines based on the orthodox teachings of electromagnetism, meaning an absence of energy when

no detectable field is present, can possibly focus on the truths of the effects involved?

Suppose that the proposition that the aether is trying to create protons everywhere all the time is true. A full theoretical basis as to why this should be so is given elsewhere [14, 15], but that need not concern this speculative enquiry. The reason that protons are not materializing all the time is simply that there is a limiting energy threshold that has been reached. The aether tries to create protons but any that are created in the zero-point energy field immediately decay. Their existence is very transient, but sufficient to account for the missing matter that cosmologists believe pervades the universe and sufficient to provide the attenuation of radiation that we associate with the Hubble redshift, the basis of the Big Bang theory [16].

Now suppose that we do provide that local stimulus that can momentarily upset the energy balance. Maybe we can create protons and this will lead to that mysterious appearance of hydrogen found by Dr. Rowe in the electric discharges. However, the zero-point energy balance of the vacuum field might reassert itself and cause the overall number of protons (or antiprotons) to be kept constant. Then there would be a proton decay in the near vicinity and possibly in the substance of the human body, especially if the hydrogen atom was the favoured source. Organic substances and water contain hydrogen and so protons with their full unbound rest-mass energy, corresponding to the energy involved in their creation.

Again, a nuclear physicist will say that protons are stable and do not decay, but so he will tell you that electrons also are stable and do not decay. Yet electrons can vanish on one side of a potential barrier and reappear on the other and they can be annihilated with their antiparticle to yield 1.022 million electron volts of energy. So who is to say that a proton cannot behave in much the same way? The fact is that the number of protons in a vast tank full of a special organic chemical can reduce as neutrinos are intercepted, but the protons are upgraded to neutrons which decay back into protons. This does not mean that the protons cannot decay, especially if they can eventually reappear elsewhere inside or outside of that same tank or even appear ab initio by some zero-point energy fluctuation to be followed by a balancing decay. It is only if we make the right assumptions as to what phenomena occur during such events that our means of detection of decay are of any significance.

## THE WAY AHEAD

It has to be conceded that as yet our scientific knowledge, especially on matters of fundamental importance, is incomplete. We have probably encountered all the obvious scientific phenomena by now and, in the main, have theories that are adequate for our practical needs. However, there are surely phenomena that have yet to be discovered and it may be that we are not looking for such discoveries because they do not fit what we regard as obvious patterns based on accepted theory. In these circumstances it is going to be very difficult to make further progress. We cannot, under any circumstances, afford to ignore the occasional and possibly accidental exposure of any unusual phenomenon. Nor should we be too complacent about what is regarded as established theory, bearing in mind that much of the theory evolved very rapidly as a matter of expediency before the fullest facts were assimilated. In particular, we must stand ready to change our theories. Experts on existing facts and

theories are not authorities on what may be future more embracing theory based on new discoveries.

How can we be sure that an atomic nucleus contains  $Z$  protons and  $(A-Z)$  neutrons, especially when we know that neutrons live for an average of 898 seconds and decay into electrons and protons? Why not say that there are  $A$  protons and  $(A-Z)$  electrons in an atomic nucleus, bearing in mind that this gives the atom the same overall condition? The author prefers the  $Z$  group positron core with  $A$  antiprotons occupying positive 'holes' in the structured vacuum field surrounding the core, but the way ahead is to find the true answers.

Also, and of more importance, is the basic question of determining whether those mysterious hydrogen atoms that Dr. Rowe has detected in electric discharges come from the vacuum medium or are fully accounted for by a flow through the metal circuit feeding the electricity. This is straightforward experimental work that needs funding to get at the truth.

If Dr. Rowe is proved correct and the protons and accompanying electrons do come from the vacuum medium, the 'aether', then that will be an Earth-shattering discovery that would penetrate the complacency of our scientists in authority. They would respond to such a discovery, if it were fully verified, and we could expect to see progress on the subject of our discussion.

If, on the other hand, the mysterious hydrogen source is traced to the flow of protons through the metal then we may still need to urge for that extra research. Firstly, we would need to establish whether the flow is a true flow similar to the migration of electrons through the metal conductor. If it were to be a chemical effect of hydride compositions merely exuding hydrogen then there is little basis for any hazardous condition such as we have contemplated.

However, apart from what Dr. Rowe says, it does appear that there is some evidence that there is a true flow of proton-sized charge carriers. Tests by Winchester [17] show that hydrogen gas continues to be produced provided the voltage of the discharge is high enough and the damage to the cathode leaves sufficient cathode to act as an electrode. Winchester's research, therefore, leads us to suspect that there is a flow through the circuit rather than a mere surface effect of release of hydrogen from hydride compositions.

Skinner [18] went further in his research. He confirmed the mysterious appearance of hydrogen and was led to state:

"This experiment repeated at various times since and with different metals showed beyond doubt that the source of gas was solely in the cathode."

This is an intriguing factor because, if we are thinking of positively charged protons being supplied as part of the current flow, these should come from the anode and not the cathode.

Here, then, we have evidence that it is a flow of antiprotons that we are considering.

Skinner then referred to further experiments of which he said:

"Experiments described below indicate that in this case the anode absorbs at the same rate as the cathode evolves hydrogen."

This was further confirmation of a flow that could be taken to involve antiprotons. Skinner's paper then proceeded to show experimentally that the quantity of hydrogen involved obeyed Faraday's law:

"All metals show that the hydrogen is liberated for a time at a rate sufficient to carry, as negatively charged atoms, the whole current between cathode and gas."

Yet, though this was Skinner's experimental conclusion, it is difficult to believe that the full-bodied hydrogen molecule has acquired an extra electron and is literally dragged through the metal circuit in preference to a simple flow of electrons. The antiproton is something else. It is very small in physical size and could well respond with a preferential conductivity in flowing through the interstices of the metal. The antiproton once within the arc discharge would suffer the anomalous energy transfer from the electron gas in the discharge, as already mentioned [11]. It could easily acquire sufficient energy in a 50,000 volt discharge to combine with a positron produced in company with an electron by the zero-point field fluctuations and so form a neutron. The latter survives for an average of 898 seconds before decaying into a proton and an electron. The result is the production of hydrogen and there is still an electron surplus to carry the current to the anode. The energy released by neutron decay will revert to the zero-point field to keep things in balance, but the driving force has been that 50,000 volts.

The neutron can travel quite a distance in that 898 seconds and can find its way into living cells. However, if produced in the open air close to the overhead power line it might decay by combination with nitrogen-14 to produce carbon-14 plus the proton. Carbon-14 has a half life of about 5600 years. It is known to be produced naturally in the atmosphere and has a general equilibrium. Besides this it has found its way into the carbon dioxide of all living plants. Hence the basis for radioactive carbon dating. That equilibrium arises presumably from the neutrons produced by cosmic radiation bombardment that spreads the effects in a weak concentration worldwide.

So, is it unrealistic to suggest that there is a much more intense local creation of carbon-14 owing to the sustained excitation of an overhead power line? Is it unrealistic to suggest then that an excess of radioactive carbon-14 can build up in the bodies of people living close to those overhead power lines? Radioactivity can be harmful to one's health. Maybe if these people are carbon-dated they will be found to have aged prematurely? Maybe too much carbon-14 can distort the DNA cell composition in our bodies via an isotope effect as considered by Berezin [2].

This then is the scenario that we should be examining, especially if our scientists are confident that magnetic fields are not the culprits causing the anomalous health problems of those living in the near proximity to corona-discharging power lines.

The author acknowledges the stimulus for what is reported in this paper provided by information supplied by Dr. Paul E. Rowe of 71 West Way, Mashpee, MA. 02649, USA. Dr. Rowe's opinions on the aether as the source of protons are based on his experiments, as yet unreported in published work, and in reaching this conclusion he is fully cognizant of the prior work of Winchester and Skinner.

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[1997 update concerning the above references: I have no information concerning eventual publication of Rowe's paper [1]. Reference [6] was published at pp. 167-172 of volume 10 of the 1987 Hadronic Journal. Reference [14] appeared at pp. 72-76 of volume 1 of Physics Essays in 1988. Reference [15] appeared at pp. 169-176 of volume 11 in the 1988 Hadronic Journal. All of the 14 author's papers that have appeared in Hadronic Journal and Physics Essays are reproduced in full in the author's book 'Aether Science Papers', ISBN 0 85056 0152, published in July 1996 by the publisher of these Energy Science Reports.]

[Concerning the anomalous effects observed in plasma tube discharges and typically those implicit in reference [11] above, it is noted that Energy Science Report No. 8 in this series concerns a Canadian invention which generates electricity using a plasma discharge tube. There is substantial excess energy produced and one can only infer that its source has to be the aether. Hopefully this technology of the Correa invention which is the subject of U.S. Patents Nos. 5,416,391, 5,449,989 and 5,502,354, granted in 1995/1996 to Dr. Paulo N. Correa and Alexandra N. Correa will now be developed commercially. This author (H. Aspden), in deciding to write these 10 Energy Science Reports, realized that only a major breakthrough by which the existence of a real aether medium can be proved by tapping its energy commercially, can arouse the physics community from their slumbers in their relativistic dream world. This Report No. 10 is the last such report, because events on the New Energy front must run their own course at their own pace and there is little more that this author can do to encourage interest in these matters. Our future health and well being depends upon a sustained source of non-polluting energy and an understanding of how the aether contributes as a creative force. Harold Aspden, March 29th, 1997].



US005151577A

# United States Patent [19]

[11] Patent Number: **5,151,577**

Aspden

[45] Date of Patent: **Sep. 29, 1992**

[54] **ELECTRIC SURFACE HEATING AND APPARATUS THEREFOR**

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5,036,177 7/1991 Pagharini ..... 219/212

[76] Inventor: **Harold Aspden**, Acres High, Hadrian Way, Chilworth, Southampton, SO1 7HZ, England

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[21] Appl. No.: **640,833**

*Primary Examiner*—Teresa J. Walberg

[22] Filed: **Jan. 14, 1991**

### [57] ABSTRACT

[30] **Foreign Application Priority Data**

The harmful effects which build up in the bloodstream and in body fluids owing to cyclotron resonance caused by mains-powered heating appliances such as electric blankets are reduced by powering the appliance through a single-phase full-wave rectifier which converts 60 Hz ac into heating power that is 81% dc and 18% ac at 120 Hz. The rectifier can be incorporated in the blanket or within the housing of a switch, plug or power socket.

Feb. 7, 1990 [GB] United Kingdom ..... 9002718

[51] Int. Cl.<sup>5</sup> ..... **H05B 3/34**

[52] U.S. Cl. .... **219/528; 219/212**

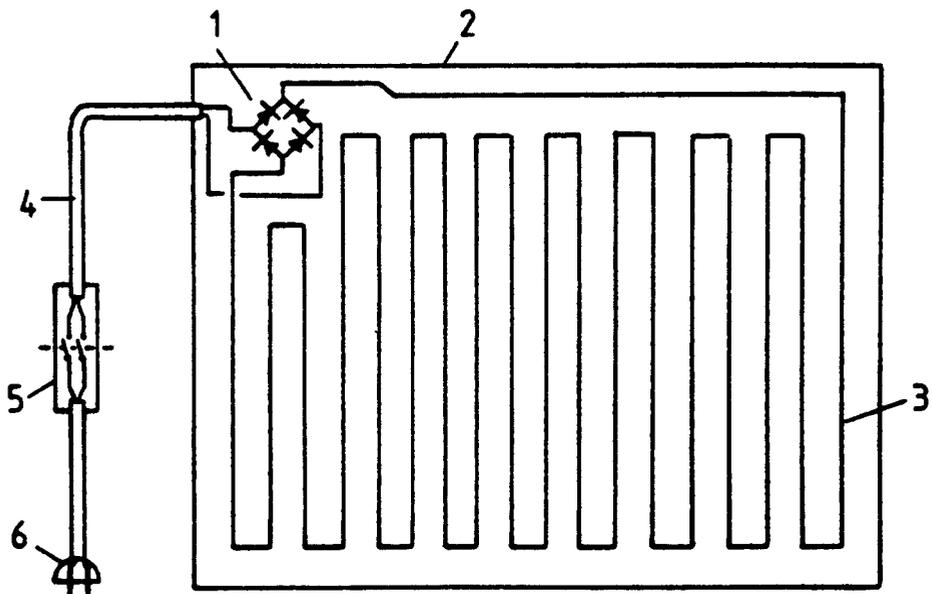
[58] Field of Search ..... 219/211, 212, 528, 529, 219/549; 363/146

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**4 Claims, 2 Drawing Sheets**

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## APPENDIX VI

### LIVING CELLS AND SUPERCONDUCTIVITY

Although unrelated to cyclotron resonance as such, there is another kind of resonance that may intrude upon the workings of cells in the human body. It is best described as 'Supergraviton Resonance', there being a physical mechanism by which molecules or small groups of molecules can, owing to a dynamic interaction with the aether, develop a resonant condition which converts heat into electricity. This is at the very heart of the action which accounts for what is known as 'warm superconductivity'.

In summary, all matter has a quantum jitter motion connected with the Planck's constant of action and this needs to be balanced dynamically. The balance comes from the transient existence of gravitons and a heavy molecule needs to induce the supergraviton form so as to optimize the action. Gravitons and supergravitons are states where a kind of pseudoparticle is created by borrowing energy from the aether. It is the electromagnetic interaction of these graviton forms that accounts for the force of gravitational attraction between particles of matter.

Now, the key point of relevance here is that the supergraviton has a high mass effect, equivalent to 102 atomic mass units and, in performing the dynamic balancing act with a heavy molecule, the spread of the action of several supergravitons can reduce the effective mass value to 101 amu. There is supergraviton resonance when the mass of the molecule is an integer times this 101-102 value. In this state of resonance any collisions between the molecules or between molecules and free electrons, as in electrical conduction through a metal, will result in energy (the random motion we see as heat) being deployed regeneratively into setting up electric fields which can sustain electric current flow without loss. That is the state of superconductivity but the generation of a flow of electricity in organic matter that is non-metallic is also possible and, if heat can convert into electricity in the human body, that should be of interest to those who read this Report.

I do not intend here to present what has not already been published and so the following items may seem disconnected, especially where they are partial excerpts quoted from a longer text. They will, however, serve as a guide to my other work on this subject and be helpful to those wishing to study these ideas further.

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New Energy News is a monthly newsletter published by the Institute for New Energy, P.O. Box 58639, Salt Lake City, UT 84158-8639, USA. On page 2 of the October 1995 issue there is a note entitled 'Cold Fusion is a Live Issue' (author: H. Aspden) which explains how, in April 1989, I had developed a paper, published later that year, about the technological applications of the supergraviton and had extended it to have bearing upon the 'cold fusion' theme. The latter phenomenon is the anomalous generation of heat in the cathodes of electrolytic cells containing heavy water. The 102 factor was the basic feature of that paper. My note on 'Cold Fusion is a Live Issue' followed a item I had entitled 'Eureka-An Energy Echo

from a Cathode' in which I referenced Professor Alec Broers discovery in IBM in 1965 of using lanthanum hexaboride as a cathode which, for example, could make electron microscopes durable. Tungsten cathodes as used in earlier work burned out after a few hours. The point of my note was that the composition of one lanthanum atom and six boron atoms had a molecular mass of 203.78 amu. This is twice 101.89. Heat was being regenerated as electricity and so the burning process was eliminated.

Now, in my note on the live issue, after extending the same argument to show why superconductivity at room temperature accounts for the very powerful permanent magnet properties of samarium cobalt, I reported searching through a commercial listing of chemical compounds based on sodium (for reasons detailed in the note) to find a compound which was recorded as having a molecular mass close to 102 amu. The best one I could find was sodium polyphosphate, recorded as 101.96 amu. Ideally I was hoping to find a compound of which all atoms were of single isotope form. Oxygen was 99.8 per cent pure in this respect and sodium and phosphorus both fitted that requirement.

That led me to write the following: "Now, what has this to do with cold fusion? The answer, very simply, is that sodium is known to transmute into magnesium in living cells and the action is known to involve as a catalyst ATP and ADP, adenosine triphosphate and adenosine diphosphate, which play a major role in energy conversion in living matter! See the mention of ATP by Gerald Lindley at p.17 in the September 1995 issue of New Energy News. It is apparent that the 102 mass resonance seems to hold the key to this mystery in plant life and within our bodies".

Lindley, in that September 1995 issue of New Energy News, drew attention to the biological molecule ATP as having a molecular mass equal to that of 5 supergravitons. He went on to explain how earlier work by Solomon Goldfein in the 1970s had brought the magnesium atom into play as a nucleus about which four ATP molecules were stacked. Lindley argued that the whole complex had a mass that was an integer multiple of 101.846 amu which he said "further supports Aspden's proposal of a supergraviton mass of 101-102."

Responding to that I went in search of more facts about the ATP topic or related research and, from a lead in something written by Solomon Goldfein, I came to read a 1976 paper by Alfred A. Wolf and Ernest H. Halpern (Proc. IEEE, pp. 357-359). In referring to it Goldfein had said that, in theory, cholesterol molecules might form locating channels in which they might combine with a sodium ion to form a structure superconductive at 350 Kelvin. That was speculation, and I was getting out of my depth in trying to understand these curious molecular forms that are outside my technical discipline. I was, however, really surprised when I saw in that IEEE paper that six different bile salts were superconductive, sodium doxycholate having the highest transition temperature of 277 Kelvin.

As I remarked in my note in New Energy News (November 1995, pp. 5-6) "Here was room temperature superconductivity of record in 1976, ten years before the discovery of the 77 Kelvin warm superconductivity was announced! Moreover, the action was in substances in living matter in which sodium is believed to experience cold fusion by transformation into magnesium, the subject discussed by Goldfein!"

My research during the years 1994 through to date has been on efforts to build an electric motor that can extract energy from the thermal background, including the heat condition latent in the aether. However, my interest in the motor theme, the supergraviton and its role in unifying electromagnetism and gravitation, as well superconductivity, caused me to be alert when I read an article in The Times just two days before writing these words. It caused me to send the following communication to the Editor of New Energy News and I present it as the final item in this Report.

### **THE MOTORS THAT KEEP US ALIVE**

On the day (March 24th 1997) I was concluding the final pages of my latest Energy Science Report No. 10, 'Cyclotron Resonance in Human Body Cells', the London newspaper, THE TIMES, published an item on page 15 headed 'Wheel power: The circle of life'.

It was reported, by reference to "the current Nature journal" that each of our body cells houses a tiny motor - "the smallest motor in creation - an enzyme that rotates to do its work and is only five millionths of a millimetre across". "The enzyme consists of seven components - a central axle, and six sub-units wrapped around it to form a collar". "The inner component is free to spin inside the collar". "What is stunning is that it is the very first time rotation has been demonstrated in an enzyme". As the motor turns "the molecules of ATP are produced like sausages from a machine". "Biochemists know how quickly this reaction goes, so it is possible to work out how fast the motors should spin - 20 revolutions per second".

Although this is hardly New Energy Technology it touches upon something reported earlier in the pages of New Energy News and seems worthy of further comment. Energy from the food we eat is converted by the enzyme ATP synthase into chemical energy in the form of ATP. Well, we must now wonder how chemical energy manages to set something rotating. In contributing to our internal body heat it would keep any 'loose' ions in the ATP molecules active in their random thermal motion. It then needs no more than the ever-present geomagnetic field to perform, as it should, according to the Larmor formula, as used in cyclotron theory. The ions are deflected into a reacting orbit and the beauty of all this is that the rotation around those orbits occurs at an angular speed which is the same whatever the speed of those ions. To get 20 revolutions per second in the Earth's field, which approximates 0.5 gauss, those ions need a mass of 39 amu, which identifies potassium.

The motor speed observed by the Japanese researchers who discovered this phenomenon was lower than this 20 rev/s owing to a drag effect imposed by the technique of measurement. We know, however, that the actual speed of a basic d.c. motor is lower under load than it is under no load conditions, so my guess is that these motors in our bodies are trying to run faster than 20 rev/s. 32 rev/s in a 0.5 gauss field would identify magnesium (mass 24 amu).

I then note that on pp. 17-18 of New Energy News, September 1995, Lindley refers to the "stacking" of molecules of ATP around an Mg ion as suggested in the 1970s by Solomon Goldfein who said of biological ATP that it "met the criteria for a microscopic cyclotron".

## **AUTHOR'S CONCLUDING NOTE**

I hope that what I have written will prove of interest to those concerned about the physics which govern our lives and, as this Energy Science Report No. 10 is the last such report I shall be writing, I further note that I will now concentrate for a while on publishing my research findings on Internet, where I plan to provide full references and abstract information concerning all my prior published work. My Internet Web page access address is:

<http://www.energyscience.co.uk>

Information about my books and other Energy Science Reports in this series is provided on those Web pages.

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