

LENR and "Cold Fusion" Excess Heat: Their Relation to Other Anomalous Microphysical Energy Experiments and Emerging New Energy Technologies

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‘The exception tests the rule.’ Or, put another way. ‘The exception proves that the rule is wrong.’ That is the principle of science. If there is an exception to any rule, and if it can be proved by observation that rule is wrong. (p.16)

The rate of the development of science is not the rate at which you make observations alone, but more important, the rate at which you create new things to test. (p.27)

There is no authority who decides what is a good idea. We have lost the need to go to an authority to find out whether an idea is true or not. We can read an authority and let him suggest something; we can try it out and find out if it is true or not. If it is not true, so much the worse—so the ‘authorities’ lose some of their ‘authority.’ (p.21)

Richard P. Feynman, in April 1963 lectures
at the University of Washington (Seattle)
published in *The Meaning of It All* (1998)

While it is never safe to say that the future of Physical Science has no marvels even more astonishing than those of the past, it seems probable that most of the grand underlying principles have been firmly established and that further advances are to be sought chiefly in the rigorous application of these principles to all the phenomena which come under our notice.

Albert Michelson, 1894

To a man with only a hammer, every problem seems like a nail.

Common folk saying

Abstract

During the past 15 years, indisputable experimental evidence has built up for substantial excess heat (far beyond ordinary chemical energy) and low-energy nuclear reaction phenomena in specialized heavy hydrogen and ordinary hydrogen-containing systems.¹ The primary theorists in the field that is properly designated Cold Fusion/LENR have generally assumed that the excess heat phenomena is commensurate with nuclear ash (such as helium), whether already identified or presumed to be present but not yet found. That was an excellent initial hypothesis. However, the commensurate nuclear ash hypothesis has not been proved, and appears to be approximately correct in only a few experiments. During this same period, compelling evidence— although not as *broadly* verified as data from cold fusion/LENR— has also emerged for other microphysical sources of energy that were previously unexpected by accepted physics. The exemplar of this has been the "hydrino" physics work of Dr. Randell Mills and his colleagues at BlackLight Power Corporation, which was a radical outgrowth from the cold fusion field that emerged publicly in May 1991.² Even more far-reaching is the work in vacuum energy extraction pioneered by Dr. Paulo and Alexandra Correa, which first became public in 1996.³ This vacuum energy experimentation began in the early 1980s and has been reduced to prototype technological devices, such as the patented PAGDTM (pulsed abnormal glow discharge) electric power generator, as well as many published experiments that can be performed in table-top fashion to verify the Correa "Aetherometry" (*non-luminiferous* or *non-electromagnetic* aether measurement science).⁴ In an era when mainstream science and its media is all agog about "dark matter" and "dark energy" composing the vast bulk of the universe, there is a great need to reconcile, if possible, the significant bodies of evidence from these three major experimental and theoretical streams: cold fusion/LENR, hydrino physics, and Aetherometry. The aim of the present paper is to compare the substantial features of each field of investigation and to suggest how to move forward for the benefit of all with openness and a minimum of preconceptions.

1. www.infinite-energy.com and www.lenr-canr.org
2. www.blacklightpower.com
3. *Infinite Energy*, No.7, March/April 1996
4. www.aetherometry.com and www.aethera.org

Introduction

On the surface, all seems calm— at least to the so-called Scientific Establishment, in other words the mainstream scientific media. The latter includes *prominently Science, Nature, Physical Review, Scientific American, American Scientist, The New York Times* "Science Times," and a host of other publications, which alternately ignore, mock, or misrepresent those scientific findings hard-won in laboratory experiments, such as are represented in the better papers that are presented at Cold Fusion/LENR conferences such as ICCF10. And, the major peer-reviewed publications in this Establishment do not accept papers on low-energy nuclear reactions and "cold fusion" phenomena— these are not even given entrance (since the 1989-90 period) into the vaunted peer review process. This fact is neither admitted publicly by the obstructing publications, nor noted by the community of science journalists, who should be among the first to investigate and expose this blatantly anti-scientific publication practice.

To the Scientific Establishment all is calm because there are no phenomena from table-top experiments that are allowed to challenge the basic foundational physics paradigms, which have been laid down to become what can only be described as a church-like "holy writ." It is almost as though we are back in 1894 when the sentiment expressed in the above quote of

Albert Michelson prevailed— all is well with Physical Science and “further advances are to be sought chiefly in the rigorous application of these principles to all the phenomena which come under our notice.” That is essentially the dogma of mainstream physics circa 2003. Moreover, most scientists in the cold fusion/LENR field, whose experimental work is rejected by the mainstream, do not wish to challenge the foundations of physics either; they believe that cold fusion/LENR does not challenge those foundations at all and that their observations can be or will be explained by prevailing quantum mechanics and relativity theory.

Let us examine some fundamental assumptions. What are the paradigms that we have come to learn cannot be questioned, and who is saying that we cannot question them? Let me summarize the sacrosanct fundamental paradigms:

Paradigm 1: It is impossible to transmute elements with ease in experiments performed without the presence of extremely high temperatures (millions of degrees K) or large acceleration voltages. (Natural radioactivity and natural or artificial fission are the only exceptions.)

Paradigm 2: It is impossible to obtain significant *unexplained* excess energy in experiments with an input energy: All energetic balances in *all experiments* must be explained by conventionally understood chemical reactions, conventionally understood nuclear fission, natural radioactivity, or conventionally understood nuclear fusion. If there is any other reported significant excess energy in an experiment that would suggest a new, unknown source of energy, these alleged experiments and claimed processes are *prima facie* to be regarded as mistakes, or worse.

Paradigm 3: The validity of Special Relativity cannot be questioned legitimately. It is such a well-checked theory that it has achieved the status of Fact, not Theory. Space and time cannot exist separately. They are entwined forever as “space-time.” (Witness this from Caltech Prof. David Goodstein, who has also disparaged cold fusion: “...there are theories in science which are so well verified by experience that they become promoted to the status of *fact*. One example is the Special Theory of Relativity— it’s still called a theory for historical reasons, but it is in reality a simple, engineering fact...” — from a video-taped lecture, “Atoms to Quarks” in *The Mechanical Universe* series.

Paradigm 4: The validity of the fundamental structure of Quantum Mechanics cannot be questioned legitimately. QM is open to many interpretations— The Copenhagen interpretation, the Multi-Worlds hypothesis, etc., but QM’s fundamental structure, as already revealed, is not open to revision at its foundations.

Paradigm 5: The so-called vacuum— a region of space-time, a plenum, that is devoid of atoms and molecules and is seemingly “empty”— may be pervaded by “Dark Matter,” “Dark Energy,” “electromagnetic radiation” and “quantum fluctuations,” *i.e.* zero-point energy (ZPE). However, no table-top experiment that has ever been performed can tap this vacuum and obtain technologically useful energies. Remarkably, it is now asserted in mainstream publications, *e.g.* Ref. 1, that Dark Matter comprises 30% of the substance of the universe and Dark Energy comprises 65% of the universe! Though the nature of these two cosmic constituents is entirely unknown— of course, theories multiply about what they are— the Establishment has the chutzpah to claim that a “Theory of Everything” is not far away and that that theory will most likely be found in terra-electron volt particle accelerators costing billions of dollars— and most certainly *never* in cold fusion/LENR experiments.

Paradigm 6: Gravitation is to be understood by General Relativity or its derivatives— *i.e.* by the curvature of 4-dimensional space-time. No other fundamental mode of understanding gravity can be allowed (such as “pushing gravity” theories²), and certainly no theory of gravity that would allow anti-gravity to be demonstrated easily in table-top experiments. This is most ironic because Establishment physicists freely admit that two major foundation paradigms to which they subscribe— Quantum Mechanics and General Relativity— have not yet been shown to be compatible and have not been unified in an acceptable manner to them.

Paradigm 7: The Second Law of Thermodynamics can never be violated in macroscopic systems. One cannot make a “Perpetual Motion Machine of the Second Kind” that would convert ambient thermal energy to useful work, with no heat rejection into a lower-temperature reservoir.

The foregoing is a highly restrictive set of dogmas within which scientists are expected to conduct their work. There can be no doubt that these are the intellectual walls that the Scientific Establishment has erected. True enough, a huge amount has been learned about Nature within the confines of these paradigm restrictions, and much technological progress has occurred too— but there is so, so much more to the universe and to what human beings surely will be able to do and become if they could be liberated from those restrictions! There are other restrictive dogmas in modern science, particularly in the areas of biology and medicine, but these seven enumerated paradigms are the fundamental constraints as they affect physics and chemistry and the topic of ICCF10— “cold fusion” and LENR. Those reporting nuclear phenomena and excess heat phenomena at this meeting are among those who challenge Paradigms 1 and 2 above, and I fully accept that this CF/LENR community has demolished those paradigms very effectively.³

The community of those who accept this general body of evidence, as they well know, are already heretical outcasts from the Scientific Establishment. Nonetheless, most in this community are very uncomfortable with discussing challenges to Paradigms 3, 4, and 5. They have accepted *de facto* the constraints of these three paradigms. It is the object of this paper to suggest that there is substantial evidence that negates those three paradigms, evidence which may be essential to understanding “cold fusion”/LENR. I will not discuss Paradigms 6 and 7, because opening the door to discrediting Paradigms 3, 4, and 5, is quite enough for one paper!— but I will suggest that these two latter paradigms, 6 and 7, are not valid either. In particular as regards Paradigm 7, there has been published an entire Conference Proceedings⁴ (from the AIP no less!), reviewed in *Infinite Energy*,⁵ which examines the extremely shaky foundations of Paradigm 7. This work should be of great interest to those looking ahead to employing excess heat from “cold fusion”/LENR in technological applications. I respectfully disagree with ICCF10 conference chairman Professor Hagelstein (and ENECO) that *all* heat engines will be forevermore fundamentally Carnot-limited.

The Mainstream Cold Fusion/LENR Paradigm: Its Limitations

“Cold fusion” began with the assertion by Martin Fleischmann and Stanley Pons (F&P) that evidence for previously unknown kinds of nuclear reactions and excess heat of large magnitude could be observed in certain electrochemical cells with heavywater-based electrolyte.⁶ They wrote, “...the data on enthalpy generation would require rates for reactions (v) and (vi) in the range $10^{11} - 10^{14}$ atoms s^{-1} . It is evident that reactions (v) and (vi) are only a small part of the overall reaction scheme and that other nuclear processes must be involved.” (Reaction (v) was $D + D \rightarrow T + H$ and reaction (vi) was $D + D \rightarrow {}^3He + n$.) They reiterated this in the discussion section of their controversial paper, “The most surprising feature of our results however, is that the reactions (v) and (vi) are only a small part of the overall reaction

scheme and that the bulk of the energy release is due to an hitherto unknown nuclear process or processes (presumably due to clusters of deuterons).” Indeed, it was very reasonable for them to presume that a class of nuclear reactions might ultimately explain cold fusion— since some nuclear products had already been detected (tritium generation and low-level neutron emission, which were later confirmed in more exacting ways) and the magnitude of the excess energy was far too large to be explained by conventionally understood chemical reactions. This set the stage for the battle that has now waged for 14-plus years, with the critics denying the existence of *any* evidence in support of the F&P nuclear reaction hypothesis— either from excess heat measurements or from measurements of nuclear products. Now, as I have said, the evidence for large magnitude excess heat production in the CF/LENR field is overwhelming, as is the evidence for a variety of nuclear products and emissions. The critics are profoundly wrong. That leaves the hypothesis posed by F&P initially that the “bulk of the energy release is due to an hitherto unknown nuclear process or processes.” Can that hypothesis be adequately defended, as so many in the CF/LENR field maintain?

The first experimental indication that F&P’s hypothesis might be correct came in early-1991, when Miles *et al.* found a correlation between the excess heat from F&P-type cells (or the lack of excess heat thereof in cases that were null) and the presence or absence of ^4He signature in the gas evolved from the F&P cells in their lab.⁷ They reported this formally in the scientific literature in 1994.⁸ But while these remarkable results were being readied for publication, several new directions or offshoots had emerged from and within the CF/LENR field. In the spring of 1991, Dr. Randell Mills *et al.* reported significant excess heat from ordinary water cells with nickel electrodes, an energy which they deemed to be coming *not* from nuclear reactions, but from a new form of catalyzed shrinkage reaction via a drastically remodeled form of the hydrogen atom and a re-write of quantum mechanics, which is now called by Mills “Classical Quantum Mechanics” (CQM).^{9,10} These explanations (and even the claim of excess heat in ordinary water-based electrochemical cells) did not go over well either with the CF/LENR community or the hard-line Establishment critics of table-top anomalous physics. CF/LENR scientists, themselves outcasts from the Establishment, strangely enough have not paid much attention to Mills’ experimental work. This is most unfortunate, because it is compendious and strongly supportive of excess heat but also of non-standard, highly anomalous, spectral anomalies from hydrogen systems. This stance can be explained because of the very strong resistance by CF/LENR theorists to exploring foundational flaws in Standard Quantum Mechanics (SQM). Mills’ CQM work could shed considerable light on the problem of CF/LENR— these are results that cannot and should not be logically separated from efforts to understand CF/LENR results proper.

Randell Mills, for his part, wants nothing to do with the “cold fusion” field, in part because of the bad “PR” that cold fusion has acquired. But Mills, while accepting that his “shrunk” (sub-ground state) hydrogen atoms (“hydrinos”) may well cause nuclear reactions due to their more charge-neutral presentation to other nuclei, does not believe that the excess heat being reported in CF/LENR experiments is of nuclear origin— *i.e.* the direct result of nuclear reactions with a mass-deficit of Dm , with an energy equivalent output found by $E=Dmc^2$. This latter hypothesis within mainstream cold fusion we shall designate for brevity as the MCFH— the Mainstream Cold Fusion Hypothesis.

Though Mills’ CQM theory may itself have significant flaws, it does have two characteristics that recommend it: A. It seems to have very significant predictive power to suggest what hydrogen systems are likely to evolve excess heat, and which ones may not (more such predictive ability than most CF/LENR concepts), and B. CQM is not beholden to the “mainstream cold fusion hypothesis” (MCFH)— *i.e.* at least it allows the possibility that many instances of excess heat are not of nuclear origin per se. In this latter “Point B” Mills is

likely closer to the truth (but possibly for the wrong reasons!) than are champions of MCFH theories. One only has to examine the 100% repeatable excess energy work of Peter and Neal Graneau in water arc explosions and air arc phenomena (see below and Refs. 25-32) to realize this. Neither the MCFH nor Mills is likely to be able to explain these phenomena.

In the early 1990s there also began to be increasing reports of heavy element transmutation phenomena in low-energy experiments; some of the most remarkable initial results came from John O'M. Bockris *et al.* at Texas A&M (see the Bockris story in Ref. 11). I well recall the extreme resistance to accepting these heavy-element transmutation claims in the period 1992-1994, expressed to me by some prominent cold fusion theorists, such as the late Julian Schwinger and Talbot and Scott Chubb. Today, heavy element transmutations are in general very well accepted in the CF/LENR field. Some of the most remarkable and definitive results that support such transmutation phenomena have been published by a group at Mitsubishi Heavy Industries Advanced Technology Research Center.^{12,13} Talbot Chubb, for his part, believes he can explain such transmutations via an extension of his earlier theoretical framework that predicts ^4He formation in or on metal lattices.¹⁴ I believe that this proposal is grasping at straws and represents an *ad hoc* proposal to preserve loyalty to conventional SQM. Talbot admits that his theory in which a "many-body wavelike deuteron system overlaps with a localized cesium-133 atom" to produce praeosdymium may be a stretch. He writes, "I know the above sounds fanciful. It requires that quantum mechanics obey previously unexplored rules when applied to a many-body ion system bound within a multiplicity of shallow wells. These rules are not tested when a many body system is bound within a single potential well." Better that he should consider that SQM just cannot handle this powerful form of blatant "modern alchemy" in which no special electrical energy input or loading is evidently required. To me, the Mitsubishi work strongly suggests that there is something deeply wrong with our understanding of atomic and nuclear structure— *i.e.* SQM has a Big Problem.

Of the many CF/LENR papers that report excess heat as well as nuclear products, one stands out for showing a *quantitative* relationship between excess heat and nuclear products, *i.e.* rough obedience to the MCFH. This is work that was reported first in 2000 at [ICCF8](#) by McKubre *et al.* at SRI International.¹⁵ The group performed multiple tests of Dr. Les Case's "catalytic fusion" process, which employs heated palladium-coated carbon catalysts in deuterium gas atmosphere. The replication team cross-checked its results with two types of calorimetry and it published data which shows the increasing evolution of ^4He on multiple runs. Moreover, the group was able to correlate the quantity of helium produced at different times during each run with the excess energy produced. The regression lines for each form of calorimetry gave: $Q=31\pm 13$ MeV/ ^4He atom (for the gradient calorimetry method) and $Q=32\pm 13$ MeV/ ^4He atom (for the differential calorimetry method). The authors were careful to state: "Although these Q values include that of reaction [1] within their assigned uncertainties, the mean values for the ^4He presented directly to the gas phase for analysis is only ~75% of that predicted by equation [1]." Equation [1] referred to is, of course, $\text{D} + \text{D} \rightarrow ^4\text{He} + 23.8$ MeV (lattice), which corresponds to the hot plasma fusion $\text{D} + \text{D}$ fusion reaction yielding a 23.8 MeV g ray. Error bars aside, it is very tempting to suggest that this data is highly suggestive of a kind of net $\text{D} + \text{D}$ fusion reaction that produces ^4He , but we must be cautious because: A. There isn't highly accurate measurement of the energy-per-atom release and B. Because of the possibility that other nuclear change phenomena connected with alternative fundamental physics theories might eventually be found to yield the same net reaction results.

It is most disappointing that there has not developed more firm evidence to support the MCFH. There is a dearth of other results like the SRI data. There are also prominent

experiments within CF/LENR that cast doubt on the rigor of the MCFH— but *not*, I repeat, against the basic validity of the large-magnitude excess heat and nuclear changes and emissions. To enumerate some of these puzzling results from within CF/LENR:

- Examining several abstracts presented to ICCF10 suggests that uncertainty remains about whether the helium production rate is commensurate with excess energy. One of the very best investigators, Dr. Melvin Miles, writes in his abstract¹⁶: “Furthermore, the rate of helium-4 production was always in the appropriate range of 10^{10} - 10^{12} atoms per second per watt of excess power.” The “yes or no” helium correspondence with excess heat production cannot be denied; he puts the chance that it is in error at 1/750,000— a fantastic experimental accomplishment. But the failure to pin down commensurate ^4He with excess heat within less than two orders of magnitude is troubling. We also have the ICCF10 abstract of A. DeNinno *et al.*, “ ^4He Detection in a Cold Fusion Experiment.”¹⁷ The researchers indeed appear to have found anomalous ^4He (by “a factor of about 20 out of baseline”), but they appear not to have an accurate assessment of its correlation with excess heat for they can only “estimate, at the present time, a lower bound for the produced energy.” Perhaps they will have more accurate results by the time of the conference.
- One of the most paradigm-busting sets of papers to be presented at ICCF10 is by Drs. R.A. Oriani and J.C. Fisher.^{18,19} Using CR-39 particle track detectors immersed in Li_2SO_4 dissolved in heavy or light water, and using Ni and Pd cathodes, they conclude: “There is a causal relationship between electrolysis and energetic charged particles and that neither Pd nor D_2O is essential for the generation of a nuclear reaction.” In John Fisher’s separate theoretical paper concerning this experiment he reports, “A theoretical basis is offered for the remarkable observation by Oriani and Fisher of a shower of about 250,000 energetic charged particles that occurred in the vapor of oxygen and hydrogen evolved from electrolysis. The shower was localized in space and time, originating a few millimeters above the surface of a plastic detector chip and lasting for a few seconds. The responsible nuclear reactions must have been sustained by the vapor.” Fisher’s polynutron theory, which suggests that polyneutrons are omnipresent, has this implication, Fisher says: “The theory suggests that a single polynutron can ignite a chain reaction that is sustained by ^{18}O as fuel.” Sure, we still have the MCFH paradigm here in Fisher’s polynutron theory, but in this experiment we are far removed from the notion of lattice-based nuclear reactions— are we not? Why not then consider even more radical theoretical medicine?
- The work of John Dash and Dan Chicea: The apparent production (enhancement) of ^{235}U from natural uranium foils via either glow discharge in hydrogen atmospheres or in electrolytic production is truly remarkable.²⁰ This high-Z transmutation, if it is validated, shows how “easy” and omnipresent the transmutation phenomenon is.
- In recalling some other papers from the past that may challenge the MCFH, we take particular note of Otto Reifenschweiller’s work, which was performed initially decades before the cold fusion era.^{21,22} In this work, the investigator essentially proves that there is a large— and *reversible*— temperature dependency of the decay rate of tritium. The author postulates that the formation of tritium doublets somehow can change the radioactive emissions of tritium nuclei. To quote the tornado-flung Dorothy in *The Wizard of Oz*, “We are not in Kansas...” To explain this kind of phenomenon will require far stronger theoretical medicine than has heretofore been brought to bear on CF/LENR problems.

- Finally, I take note of the increasing appearance of reported and reproduced transmutations of elements in biological systems. At least one such paper is in fact being given at ICCF10 by an experienced team.²³ This work must be taken very seriously now—the researchers at ICCF10 will be presenting a technique that looks very promising for reducing the radioactivity of nuclear waste. The biological transmutation phenomenon has profound implications for CF/LENR theorists, most all of whom have preferred to ignore it. Dr. Ed Storms, to his credit, embraces it objectively. He wrote in December 2001 in his “Cold Fusion: An Objective Assessment”: “Transmutation is claimed to occur in living systems where the process becomes especially difficult to believe or understand. Indeed, people have advised me not to discuss this subject, as if the potential reader would be too immature to handle the intellectual conflict this discussion might cause.” The research in biotransmutation suggests that biological systems have discovered *something in nature* which they make use of to carry out nuclear changes; and using that “something” most definitely does *not* require the loading of Pd or Ni cathodes or any metallic lattice within a living system, which—apart from prosthetic devices in people—do not exist. Could it be that our basic atomic and nuclear physics models are flawed at their foundations? Could it be, perhaps, that those many researchers—in medicine and in biology, far removed from the CF/LENR field—who have found other kinds of anomalous behavior in biological systems, are in truth observing the signal of a pervasive medium that is ignored not only in medical and biology texts, but in physics as well? Indeed, that seems to me to be the essence of what is befuddling us all—we are ignoring *most of the physical universe* in attempting to explain CF/LENR with incomplete and obsolete physics. And, friends, that will just not work. It may “work” for academic speculators about “dark matter” and “dark energy,” who endlessly bend their theories to conform to the latest fashion and who have no ability or intention to discover world-changing technologies. But for researchers in CF/LENR, ignoring what constitutes most of the universe may be nothing less than suicidal.

This enumeration has been but the tip of the iceberg of the “anomalous within the anomalous”—in other words, this is clear evidence from the CF/LENR field itself that the MCFH paradigm must be reconsidered. Not that that paradigm is completely unworkable in all systems examined to date, but that the current theories cannot constitute a generalized explanation for all the phenomena even within CF/LENR proper.

My colleague Dr. Scott Chubb (the technical chairman of this conference) with whom I have an “agreement to agree to disagree” on matters of the acceptable breadth of the CF/LENR field, was properly frank and up-front in one of his ICCF10 abstracts²⁴ when he wrote: “...it is not at all clear that key features associated with many LENR processes have been identified. For this reason, it is plausible that most ideas associated with LENR’s must be viewed as speculative.” Indeed, the central problem exhibited by CF/LENR theorists—as heroic as they have been—is that they have failed to comprehend or admit two glaring facts: A. The breadth of the CF/LENR evidence proper is so stupendous and Alice-in-Wonderland that there appears little hope for SQM/relativity to deal with it and B. CF/LENR theorists are ignoring—*deliberately so*—excess energy and other phenomena that are right at their doorstep, as we shall see next.

Electrically Stimulated Over-Unity Processes

The MCFH paradigm that has grown so strong within the CF/LENR field, has unfortunately blinded many of its scientists to other anomalous energy phenomena, which appear to be far more repeatable on demand than CF/LENR phenomena have been to this point. This should

be a caution and a warning that all may not be well with the MCFH and that broader theoretical models should be considered in attempting to explain CF/LENR. Not necessarily in the order of their fundamental importance, the following are brief overviews of other experimental data that CF/LENR researchers should examine carefully for their relevance to anomalous excess energy. This list does not exclude other claimed excess energy processes, but these are ones with which I am most familiar and in which I have the highest confidence:

- **Peter Graneau *et al.*:**

Arc Discharges in Water and Air

Peter and Neal Graneau and colleagues have pioneered the measurement of excess energy in very simple water systems, beginning in the mid-1980s.²⁵⁻³⁰ However, their experimental work with excess energy had precursors in work reported in 1948 by F. Frungel. By employing a capacitor discharge to a confined pure water sample, the Graneaus *et al.* achieved what they call a “cold fog” explosion of droplets, which is focused like a gun by a cylindrical confining channel to form an energetic jet. There is no evidence that this jet is from a “steam explosion”— hence the term “cold fog” which they use. They attribute the explosion to electrical repulsion forces among the fractionated water droplets, which are from 1 to 100 μm in diameter. The “slug” of water droplets (about one-third of the water, they say, is converted to droplets of fog or mist) is so powerful that it can easily penetrate 0.25-inch thick aluminum plate! In one set of experiments that involved the release of 25 to 36 joules of electrical energy from a capacitor into a several milliliter volume of water, the investigators calculated there could have been no more than a 6°C rise in temperature of the water— effectively laying the steam explosion theory to rest. Graneau *et al.* (1996) conclude: “Given the fact that thermodynamic and electrodynamic forces are orders of magnitude too small to bring about the arc explosions, we have to conclude that the experiments prove the existence of anomalous forces. Since every force in nature is backed up by a store of energy, the anomalous forces require the involvement of anomalous energy.” They conceive of the energy source in these water arc explosions as previously poorly understood release of “chemical energy”— positing that the inter-molecular bonding energy of the droplet dispersion is less than original bonding energy within the liquid water. Thus, they claim that they are recovering a kind of stored “solar energy”— energy stored in the condensation of water in clouds. They also point to theories by J.-P. Vigier about “tight Bohr orbits” to try to further motivate a search for the energy source. The excess energy that they report is usually in the range 15% to 60%.

From my perspective, the stored “solar energy” theory of the Graneau’s is a desperate attempt to find a somewhat “comfortable” theory to explain their well-established, 100% repeatable excess energy. It should be noted that the experimenters certainly do not entertain any kind of MCFH nuclear explanation, nor is there any reason to employ such an hypothesis in this case. The essential system is electricity passing through water— not hypothetical surface or volume nuclear reactions on electrodes. However, apart from their dalliance with Vigier’s “tight Bohr orbit”-type of explanation (a distant relative of the Randell Mills hydrino theory), the researchers avoid considering whether a vacuum energy (aether energy) explanation might be possible. But those who have compiled considerable *experimental* evidence for a *massfree* (*i.e.* inertialess), *non-electromagnetic* aether have other interpretations to offer.

In reviewing Peter Graneau’s presentation at the Second Berlin Conference on Innovative Energy Technologies (June 13-15, 2002) at which they also presented, Paulo and Alexandra Correa commented on the Graneaus’ work (in their www.aetherometry.com posting):

“Their research in electrodynamic anomalous cathode reaction forces in water and air has had many points of contact with our own work on the PAGD [Pulsed Abnormal Glow Discharge Reactor (see below)], and subsequently on Aetherometry. We have followed the work of Peter Graneau over the years— and concur with much of Peter’s views on the solar origin of the chemical energy that is anomalously stored in water and air molecules. But whereas Peter’s analysis relies upon the conventional transformations of a supposed solar electromagnetic radiation into sensible heat and the thermal drift energy of molecular substrates, and sees the source of the anomalous energy in arcs as a property of covalent bonds, our aetherometric research has laid the basic scientific proofs for the existence of massfree electric radiation of solar origin and proposed an entirely new set of dependences of the electromagnetic frame upon this electric form of aether radiation. Moreover, the existence of fundamental adiabatic processes— responsible for enthalpic balance in basic chemical reactions and for energy transfer in noncovalent interactions— that remain poorly understood, has led our theoretical effort to propose a new functional and conceptual approach to the relation between sensible heat (in all of its manifestations— radiative, convective and conductive) and latent heat. Neither of the Graneaus accepts, in this context, that both of these processes are driven by massfree aether energy— electric and nonelectric— whose understanding requires new mathematical, physical, analytical and experimental tools. As Neil told us, his vision is not compatible with the notion of an Aether, stationary or dynamic; his approach is one tied to classical positivism, and in particular to the atomistic view of the particle world that remains dominant.”

In other words, even the Graneaus, who have such a brilliantly simple demonstration of an excess energy process, studiously avoid the notion that there can be any *massfree anything* in the “void” between what are regarded as “hard particle” atoms. Such is the strength of the dominant paradigms that the Graneaus can conceive of only “poorly understood” latent heat mechanisms to explain the perplexing excess energy they have so well documented.

The Graneau work has proceeded further to show that even air-arc’s— the laboratory version of ordinary lightning— exhibit previously unsuspected energy phenomena. Moreover, this air-arc work has now been published in a mainstream plasma physics journal and it demonstrates an excess *electrical energy* approaching 24%!³¹ Joule heat in a load resistor was found to exceed the energy supplied from the input capacitor bank. This percentage excess is a very conservative figure, the authors point out, because it does not take into consideration the thermal losses in other parts of the circuitry. The real excess power, they say, is more like 30-40%. The air arc excess energy work has now been replicated independently by a prestigious physics group in Belgrade, Yugoslavia, which includes our old cold fusion friend J.-P. Vigier.³²

- **David Wallman and Wilbur Dammann:**

CarboHydrogen™ Gas from Underwater Carbon Arcs

Like the work of the Graneaus, the experiments of Wallman and Dammann at DW Energy Research, LLC shows that simple electrical arc systems can manifest apparent energy anomalies. The intent of Wallman/Dammann initially was to develop a controlled plasma technology that could disintegrate organic waste and at the same time generate a useful combustible gas.³³ Their computer-controlled arc technology using carbon electrodes under water does indeed create an exceedingly clean-burning gas (*nominally* a mixture of H₂ and CO), which can be used and has already been used in automobile and marine applications, as numerous independent tests have shown. Emissions of CO, NO_x, etc. are exceedingly low. But testing the process also gave rise to an unexpected excess energy anomaly of great

significance. Testing of the combustion value of the gas produced compared to the electrical power input and carbon input, reported in *Infinite Energy* in 1996, showed a range in excess power ratios (out/in) of 127% to 144%.³⁴ This was very conservative and did not take into account the heating by the electrical arc of the water solution and test vessel structure.

- **Randell Mills *et al.*, BlackLight Power Corporation:**

Microwave-Generated Plasmas of Hydrogen and Noble Gases

The work of Randell Mills and his colleagues has progressed remarkably since it was first announced in *Fusion Technology* in 1991.³⁵ Mills has long since gone beyond his early work in ordinary water/K₂CO₃ electrolytic cells employing (typically) nickel cathodes and anodes— work which has been reproduced by several other groups, including one at NASA and another high quality reproduction at MIT Lincoln Laboratory (the latter, most regrettably, not yet published). Mills *et al.* at BlackLight Power Corp. in Cranbury, New Jersey have mounted what is one of the most direct threats ever to the entire foundation of Quantum Mechanics, because the compendious experimental data sets— if valid— *prima facie* cannot be explained by Standard Quantum Mechanics (SQM). There is convincing excess energy data of large magnitude and there are spectral emission lines that do not correspond to previously recognized atomic structure.

It should be of more than passing interest to those working in CF/LENR, that the most severe critics of “cold fusion” (*e.g.* P. Zimmermann and R. Park) have been mounting a very strong effort to attack the Mills work, which is increasingly appearing in quality peer-reviewed journals such as the *International Journal of Hydrogen Energy*. As with the pathological skeptics’ attacks on cold fusion, the attacks on Mills’ work consist of perpetually inventive bogus criticisms of the experiments (the skeptics never offer any actual null experiments, of course), combined with self-satisfied arguments that SQM cannot be challenged. Sound familiar? If the past vocal physics establishment critics of CF/LENR have been temporarily focusing most of their firepower against Mills and ignoring cold fusion, it is because they perceive the Mills work, for now, as a greater threat to their theories and ideology. Indeed, Mills is a very severe threat to those air castles: what his teams *predict* will happen in experiments *does* happen. Those in CF/LENR and elsewhere, who may not agree with the Mills’ theory of lower-ground state hydrogen atoms (“hydrinos”) and the electron as an “orbisphere” spherical shell of charge, should *at the very least* examine carefully the repeatability of Mills-type experiments, which are now mostly of the gaseous plasma variety.

BlackLight Power has placed much of its technical output on its website (www.blacklightpower.com). Some calorimetric experiments by BlackLight Power extracted from a summary paper on its site,³⁶ which lists some 76 individual anomalous experimental results that are claimed to falsify SQM, should impress CF/LENR researchers (Note: References in brackets [xx] are from Mills’ bibliography of technical papers.):

- “43.) The observation that the optically measured output power of gas cells for power supplied to the glow discharge increased by over two orders of magnitude depending on the presence of less than 1% partial pressure of certain catalysts in hydrogen gas or argon-hydrogen gas mixtures, and an excess thermal balance of 42 W was measured for the 97% argon and 3% hydrogen mixture versus argon plasma alone [22]”
- “50.) The Calvet calorimetry measurement of an energy balance of over -151,000 kJ/mole H₂ with the addition of 3% hydrogen to a plasma of argon having the catalyst Ar⁺ compared to the enthalpy of combustion of hydrogen of -241.8KJ/mole H₂;

whereas, under identical conditions no change in the Calvet voltage was observed when hydrogen was added to a plasma of noncatalyst xenon [31]"

- "51.) The observation that the power output exceeded the power supplied to hydrogen glow discharge plasmas by 35-184 W depending on the presence of catalysts from helium or argon and less than 1% partial pressure of strontium metal in noble gas-hydrogen mixtures; whereas, the chemically similar noncatalyst krypton had no effect on the power balance [30]"
- "52.) The observation that with the addition of 3% flowing hydrogen to an argon microwave plasma with a constant input power of 40 W, the gas temperature increased from 400°C to over 750°C; whereas, the 400°C temperature of a xenon plasma run under identical conditions was essentially unchanged with the addition of hydrogen [43]"
- "53.) Observations of power such as that where the addition of 10% hydrogen to a helium microwave plasma maintained with a constant microwave input power of 40 W, the thermal output power was measured to be at least 280 W corresponding to a reactor temperature rise from room temperature to 1200°C within 150 seconds, a power density of 28 MW/m³, and an energy balance of at least -4x10⁵ kJ/mole H₂ compared to the enthalpy of combustion of hydrogen of -241.8kJ/mole H₂ [34,35]"
- "54.) The observation of 306±5W of excess power generated in 45cm³ by a compound-hollow-cathode-glow discharge of a neon-hydrogen (99.5%/0.5%) mixture corresponding to a power density of 6.8 MW/m³ and an energy balance of at least -1x10⁶ kJ/mole H₂ compared to the enthalpy of combustion of hydrogen of -241.8kJ/mole H₂ [50,78]"
- "55.) The observation that for an input of 37.7 W, the total plasma power of the neon-hydrogen plasma measured by water bath calorimetry was 60.7 W corresponding to 23.0 W of excess power in 3 cm³ [76]"
- "56.) The observation of intense He⁺ emission and a total plasma power of a helium-hydrogen plasma measured by water bath calorimetry of 30.0 W for an input of 8.1 W, corresponding to 21.9 W of excess power in 3 cm³ wherein the excess power density and energy balance were high, 7.3 W/cm³ and -2.9x10⁴ kJ/mole H₂, respectively [36,63,71,73]"
- "58.) The observation of energy balances of helium-hydrogen microwave plasmas of over 100 times the combustion of hydrogen and power densities greater than 10 W/cm³ measured by water bath calorimetry [34-36,50, 63, 71, 73, 76-78, 84]"
- "62.) The differential scanning calorimetry (DSC) measurement of minimum heats of formation of KHI by the catalytic reaction of K with atomic hydrogen and KI that were over -2000 kJ/mole H₂ compared to the enthalpy of combustion of hydrogen of -241.8 kJ/mole H₂ [25]"

It should be clear to objective evaluators of this brief excerpt, from a much larger multifaceted experimental program from BlackLight Power, that something quite profound is happening—much as profound findings are emerging, albeit of a different but related character, in the CF/LENR field. It is most unfortunate that the external, intellectually bankrupt terrorist-like activities of people such as Park and Zimmermann has created the circumstance where open

communication between the CF/LENR field and the sister area of hydrino science is extremely difficult. But not to assign all blame to Park and Zimmerman: there has been a calculated avoidance of Mills by theorists within CF/LENR. Why? Again, because of excessive and misplaced fidelity to the SQM theory. A curative for this common CF/LENR malady might be a careful reading Mills recent paper, "The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics."³⁷

- **Paulo and Alexandra Correa (Labofex in Toronto):**

Pulsed Abnormal Glow Discharge (PAGD™) Reactor

The work of the Correas in excess energy from arc discharges, which began serendipitously for them in the early 1980s, further expands the universe of what is possible in systems with electrical input into plasmas. It took the Correas many long years to control the explosive releases of energy that destroyed many reactors and power supplies, but now they have the process firmly under control. The Correa PAGD work really puts the nonsense of controlled thermonuclear fusion work into perspective, as CF/LENR has not yet been able to do. Here we have self-financed researchers with a small lab in Canada already producing huge excess power, already in the form of continuous output *electricity*— of which the hot fusioners can only dream, even after having spent circa \$20 billion on their white elephant projects. The Correas are using technologies that are explicitly detailed so far in three U.S. patents covering their PAGD technology.³⁸ They use large glass high-vacuum tubes with aluminum plate cathodes to demonstrate that in a particular negative resistance region of arc discharge, they can create automatic (autogenous) pulses of electrical energy that far exceed input energy. For example, one integrated V-I plot of an output pulse may amount to 42 J of energy in 150 msec, triggered by a 25 msec pulse from the drive pack of only 4.4 J.

Moreover, the Correas show explicitly in their patents how such excess electricity can charge up deep cycle batteries. They have arranged their experiments such that by moving the ~500 V driving battery pack, when it is depleted, to the position of the charging-up (output) pack and moving the charging-up pack to the drive position, they can sustain indefinite electric energy production. They have gone much further: In experiments that this author and others have witnessed in the past few years, they have been able to drive certain flywheel spinner motors at 500 W spin-up power with only 50 W DC input power. (These new developments in motor driving are not yet patent-protected.)

I first had the opportunity to meet Dr. Paulo Correa at the Third International Symposium on New Energy, held in Denver, CO in April 1996. There he spoke about his and his co-investigator Alexandra Correa's PAGD™ reactor. Alexandra was not able to attend that meeting, but Dr. Correa gave an excellent keynote lecture at that time about the PAGD. Dr. Correa's scientific demeanor and explanations were then already impressive. He copiously referenced the work of many others who had earlier found anomalies in arc behavior, and he offered specific praise for Dr. Harold Aspden's work, which I had earlier encountered. (Dr. Aspden is on *Infinite Energy's* Scientific Advisory Board and is a long-time scientific colleague of the Correas. His website is: <http://www.energyscience.co.uk>.) At the 1996 Denver meeting, Dr. Aspden spoke on "Vacuum Spin as a New Energy Source"— and this may indeed be part of the explanation for what is going on in PAGD. Dr. Aspden, with his theoretical background in electrical engineering and the experience of his 20 years as IBM's head of patent operations in Europe, had earlier offered formal assessments of the Correa PAGD work— see the recently posted 1996 Opinion at the Correa website www.aetherometry.com. *Infinite Energy* began publishing the work of the Correas on the

PAGD soon after this Denver meeting;³⁹⁻⁴³ and we also have continued to publish some of Dr. Aspden's pioneering work.⁴⁴⁻⁵¹

The PAGD work and technology originated from studies of low voltage X-ray production in the mid-1980s, but the Correas' joint interest in the work of Wilhelm Reich and Nikola Tesla was of even earlier vintage. Those who would like to know about the Correas' recent work on a host of other "aetherometric" inventions, should read the testimonial letters posted by me, Mr. Uri Soudak (formerly CTO of Israel Aircraft Industries), and Prof. Arthur Axelrad of the University of Toronto. The letters by me in 2001 and 2002 on observations of PAGD and other devices are detailed and self-explanatory. Many of these devices, including the PAGD, can be seen on a scientific DVD available from (www.aethera.org). [Note: The DVD will be shown informally at ICCF10 at the poster session for this paper.]

For now, let us consider the PAGD alone as another example of an electrically-stimulated excess energy process. The primary advantage of this focus is that the technology has been patented and is specified precisely enough in these public domain documents so that others could verify it independently, if they chose to do so. Certainly, any number of plasma physics labs in the hot fusion program would have little difficulty in observing PAGD effects— but judging by their behavior in the cold fusion war, one can understand why these money-sucking, pointless appendages of DoE have no interest in doing so. Perhaps some of the U.S. Navy labs might develop some interest, since they have already carried out a very good effort in the CF/LENR area on a very limited budget.

The Central Importance of the "Third Element"— The Return of the Aether

At the conclusion of [ICCF9](#) in Beijing in 2002, Dr. Mike McKubre in his inimitable style delivered a most wonderful set of remarks.⁵² He admitted his slowness in changing his own paradigm within the CF/LENR field, but then he went on— in a remarkably forward-looking statement— to suggest that it was time for him to change. His words serve as a kind of description of how the overall field of cold fusion has changed and in what directions it must continue to change: "And in general I have resisted the expansion of the field. I resisted the extension of the field into biological nuclear effects, into consideration of the sort of rotating magnetic machines that Gene Mallove's magazine keeps us informed about, and into the concept of 'zero point' energy. I just resist the idea of zero point energy. Nickel/hydrogen studies— the possibility of heat from nickel light water experiments— I have resisted this. And I have resisted the concept of transmutation. That somehow we can change higher mass elements from one isotope to another. It isn't that I think these effects are not well observed or disclosed by able people. My resistance really is— I resented the diversion of focus of attention from what was already a very difficult problem. In general those effects are just too easy for our critics to attack— to use as sticks to beat us with. At least for the heat effect, possibly also tritium production from nickel/light water experiments with small additions of deuterium, and for the yielded evidence of nuclear isotopes— at least for those two things and at least for me, I think the time has come to change. My prejudice must change... We will have common theory to describe these effects."

Indeed, that should be the quest for theorists within the cold fusion/LENR field, "a common theory to describe these effects." But what if something very, very important has been left out? In an additional prescient remark made at ICCF9 in that same talk, Mike McKubre said, "The thing that has really emerged here is what I have called, and what Dr. Iwamura has called, the third element— the important involvement of an element other than palladium and deuterium." In this remark, he was referring of course to the host of other elements— such as

boron, or in the case of the Iwamura et al work¹²⁻¹³ the elements cesium and strontium—which have been used in conjunction with palladium-based cold fusion experiments. But in more liberal interpretation of his remark (which he most certainly did not intend!) the “third element” that has hitherto been ignored may be the energetic aether (EA), that “element” which experiments are showing pervades the supposed “vacuum” of “nothingness” within and between atoms, and which in fact most probably gives rise to their very structure as extended toroidal or other geometric assemblages of flux. This would be the logical continuation of models sought by the great aether theorists of the 19th century, among them Lord Kelvin.

Please examine the varied opinions about the aether/ether, which I have collected in a lengthy Appendix to this paper. It will give you a modest historic perspective that is absent in the post-Einstein literature. Just as it is relatively simple for CF/LENR workers today to see through the B.S. that is produced by the mainstream with their references to cold fusion as “pathological science,” so is it remarkable to observe the “memory hole” effect of establishment figures operating on the important matter of the energetic aether.

Yes, at root the paradigm problem with cold fusion/LENR is that it is still stuck in the morass that mid-to-late 20th Century physics has given us— “hard,” *fixed* elementary particles (such as electrons and quarks), which are further described by a mathematized house of cards known as probabilistic quantum mechanics or any of its variants— the alphabet soup QED, QFT, QCD, and now onto theories about “strings,” “branes,” “dark matter,” “dark energy,” and all manner of other epicycle-like junk. Indeed the hands-on experimentally measurable energetic aether (EA) must now return with a vengeance to replace the older concept of mid-19th Century to early 20th Century physics, the static, luminiferous (electromagnetic) aether— the supposed massfree medium that was transversely vibrated to give rise to what was called electromagnetic radiation.

Einstein’s Special Relativity (1905) was supposed to be a theory that “abolished” any consideration of *this* aether— *any* aether. In truth, it abolished nothing whatsoever— at least it did not do so legitimately. SR became merely a seemingly extremely well-fitting body of equations that most surely does “fit” numerous experiments and some energetic reactions. It is the illegitimate interpretation of these limited equations, which suggests a complete equivalence between mass and energy— with no possibility of any massfree (inertialess) source of energy in space. After all, we are given the famous equation $E = mc^2$, which on its face mandates that if there is no mass, $m, E=0$. And that is again the crux of the problem with the mainstream cold fusion hypothesis (MCFH).

There is an even greater lesson here that theorists within the cold fusion/LENR field should understand, that is if they want to seek the truth about nature, as opposed to merely writing ever more elaborate theory papers with SQM and SR as implied pillars. The philosophical belief in the so-called “Unreasonable effectiveness of mathematics” in describing physical reality⁵³ has proved to be a great hazard— one of the worst imaginable for scientists. Cold fusion people are in some sense already aware of this, but they have not “gone all the way” in ridding themselves of this prejudice. They are aware that in the early days of cold fusion— and continuing— Establishment theorists such as Steve Koonin were fond of “proving” that QM would not allow the possibility of $D + D$ “cold fusion.” But the cold fusion theorists, rightly having more respect for the experiments coming from the lab, accepted the results provisionally (and later whole-heartedly) and began to try to cobble together theories that could hang together and encompass all the cold fusion evidence. In the beginning that evidence was not very broad and not very deep, but it is today. It is time to take stock of new possibilities.

What are some of the effects that can be seen and established that may have relevance to CF/LENR? We have seen that the work of the Graneaus *et al.*, Wallman and Dammann, and Mills' *et al.* at BlackLight Power are revealing phenomena that can be ignored by CF/LENR researchers only at their peril. Then we have glimpsed the Correa PAGD work and can readily see that it is among the most promising directions of all the electrically-stimulated excess energy processes. Apart from Mills' CQM, which will either rise or fall on the correspondence of its spectral predictions to Mills' hydrino models, the only other comprehensive physics theory that is beginning to enter the public arena is the body of work being developed by the Correas and their colleagues. (There is now an internet discussion group that has begun to form, for which application is necessary):

http://aetherenergy.com/mailman/listinfo/asg_aetherenergy.com

The Correas' not yet fully published AToS theory (Aetherometric Theory of Synchronicity) will undoubtedly have many direct predictions about what may really be going on in CF/LENR, but for now it is important to examine some of the already published experimentally-based work for what it shows about a pervading energetic *non-electromagnetic* aether. Given that this pervading aether would not only "fill" the spaces between and within atoms, but also form the flowing, dynamic structure of leptonic and nuclear particles, it is to be expected that such a theory would have much to say about non-standard energies in chemical bonding, as well as unconventional nuclear reaction phenomena. These may all be involved in CF/LENR.

This can only be the most cursory of reviews— full details have been published by the Correas in a series of monographs on www.aetherometry.com. On the Correa website I have earlier (2002) posted a lengthy discussion under the rubric, "The Correa Science and Technology: An Appreciation"(at www.aetherometry.com). In the brief discussion that follows, I will instead simply annotate the Correas' own posted "Milestones" of accomplishments feature. For this purpose, my annotation remarks appear in italic font. References to their posted monographs (downloadable pdfs) are in brackets, *e.g.* [AS2-01]:

[From www.aetherometry.com]

Summary of fundamental discoveries encompassed by the monographs published on the Akronos website.

The fundamental contributions that Akronos has published to date cover three distinct terrains of investigation:

1. A range of new experimental discoveries in basic physics and biophysics:
 - The demonstration of an autogenous pulsation that is auto-electronically triggered from saturated cold cathodes in Paschen vacua [USP# 5,502,354]; (*This is only one of the three PAGD-related patents that I have mentioned above.*)
 - The demonstration of electrodynamic anomalies in open circuits, in particular the development of cathode reaction forces in interrupted vacuum-arcs or autogenously pulsed abnormal glow discharges [LS1-07, LS1-25]; (*Of special interest to CF/LENR people because Aspden's Law of Electrodynamics appears to explain not only the anomalous cathode reaction forces measured in the PAGD, but also the Graneau*

experiment anomalies. Aspden's Law applies to systems— such as electrolytic systems, in which there are charge carriers of different masses, such as ions vs. electrons.)

- The demonstration of basic massfree energy anomalies: antigravitic anomalies of the electroscope, driven by latent heat [AS2-01, AS2-02, AS2-06], the thermal anomaly of specific Faraday-cage-type enclosures [AS2-05, AS2-25, AS2-26], anomalous and charge-asymmetric effect of far and vacuum UV photons in the Halwacks experiment [AS2-08], 'vacuum' contribution of longitudinal electric radiation to the normal and abnormal glow discharges in Paschen's Law [LS1-25]; *(The validation that there really is an energetic massfree aether is possible with careful, often tedious experiments which employ rather simple equipment, such as accurate mercury thermometers, gold leaf electroscopes, hygrometers, and special Faraday cages, which Wilhelm Reich dubbed "Orgone Accumulators"— or ORACS. The "signal-to-noise" in these experiments is much larger than what CF/LENR people are often accustomed to.)*
- The discovery of photo-induced antigravitic work promoted by specific blackbody radiation [AS2-08];
- Identification of the particle ratios for photons, gravitons, electrons, atoms and aether energy units in both the Hallwacks effect and the antigravitic kinetoregenerative effect [AS2-10]; *(The "Hallwacks effect" is the pre-Einstein name for the photoelectric effect.)*
- How to trigger vacuum cathodes into auto-electronic emission in the absence of applied power [AS2-11];
- A formal and experimental demonstration of two different actions of reverse potentials at work in living systems, the ground and water - radiative nonelectric draw versus electric contact draw [AS2-04, forthcoming AS2-28, forthcoming AS2-29]; *(These are most remarkable works. [AS2-04] shows simple experimental means— using electroscopes— to demonstrate the existence of biophysical energies associated with the experimenter's body! AS2-28 has already been published, and is a masterful historical and scientific overview of the errors in biological understanding—in particular those that arose from the Galvani-Volta debate in the 1700s over "animal electricity.")*
- Analytic separation of the massfree and massbound charge currents and field effects of ordinary induction and Tesla coils [AS2-13, AS2-16];
- Formal demonstration that Tesla radiation is not electromagnetic, ionizing or blackbody, but longitudinally radiated massfree electric energy [AS2-13];
- Isolation of the fundamental electric, magnetic and electromagnetic frequencies of induction coils for both massfree and massbound charge fluxes [AS2-13, AS2-14, AS2-15, AS2-16];
- Identification and physico-mathematical isolation of the complete spectrum of longitudinally radiated massfree electric energy and fundamental constituent subspectra [AS2-17A];

- Demonstration and simulation of the main solar mode of longitudinally radiated massfree electric energy [AS2-17A];
 - Induction of high specific latent heat of trapped electron plasmas inside Faraday cages exposed to Tesla radiation [AS2-17A];
2. The basic theoretical foundations of aetherometric science:
- A new analytical theory and classification of the electric and nonelectric functions of the electroscope, where electrokinetic and gravitokinetic components of the action of charges are explicitly differentiated [AS2-02, AS2-04, AS2-10, AS2-27];
 - A new treatment of the Boltzmann constant and new functions and dimensionality for the concept of temperature [AS2-07];
 - A new model for the local production of blackbody photons; identification of the functional limit of the blackbody spectrum and the two contiguous blackbody subspectra with their contrasting physical and chemical effects [AS2-08, AS2-11, AS2-14, AS2-17A];
 - A new model and analytical treatment of leptonic and baryonic gravitons and antigravitons [AS2-10, AS2-27];
 - Identification of the electron-resonant, fundamental nonelectric massfree energy element whose superimposition yields the electron mass-energy singularity [AS2-10];
 - Identification of the standing electric and magnetic wave functions constitutive of the electron mass-energy and its finite geometry [AS2-12, AS2-15, AS2-17A, LS1-25];
 - Identification of the fundamental wave structure and functions of massfree charge and the kinetic energy of massbound charge [AS2-15, AS2-16];
 - Identification of the Duane-Hunt wavelength, and a novel fundamental equivalence for Planck's Law [AS2-12];
 - Identification of a new proportionality constant eta and its relation to the fine structure constant and the production of the microwave Cosmic Background Radiation spectrum [AS2-12, AS2-17C];
 - An original, integrated and consistent theory and physico-mathematical treatment of the basic electric functions and quantities - charge, voltage, current, inductance, capacitance, magnetic flux density, magnetic field intensity, magnetic flux, magnetic wavelength, free and bound current densities, cyclotron frequency and linear velocity [AS2-12, AS2-13, AS2-14, AS2-15, AS2-16];
 - A new treatment of the invariant and variable functions for the magnetic permeability and electrical permittivity of media [AS2-16];
 - Correction to the value of the gauss in light of the value of the tesla [AS2-15];

- An extended physical and chemical treatment of the basic allotropic cycle of the atmosphere that balances its enthalpy [AS2-09] and identifies the specific solar contributions made by longitudinally radiated massfree electric energy [AS2-17B];
 - New model for the structure of the electron in the hydrogen atom [LS1-25] and identification of its two fundamental states, electric and photoinertial [AS2-12, AS2-17A]; (*Needless-to-say, this model of the electron should be of great interest to questioners of SQM, such as Dr. Mills, but also to CF/LENR people who will see that an alternate model of the electron of great physical significance is possible.*)
 - Identification of a cosmic background of longitudinal electric massfree radiation, and prediction of baryonic radio Cosmic Background Radiation spectra [AS2-17C]; (*Others have pointed out that the CBR does not mandate a Big Bang cosmology. Here is another very good reason not to buy into the Big Bang theory, because the CBR has a consistent, experimentally based alternate explanation.*)
 - New cosmological model for the asymmetric generation of light leptonic charge with minimum kinetic energy [AS2-17C];
 - Formation of massfree superlattices in complex Phase Space and Time [AS2-17C];
 - A critique of Special and General Relativity [AS4-01, AS4-02] and a redefinition of the Space and Time manifolds and their properties [AS2-04];
 - Identification of the functional length and wavelength equivalences of mass [AS2-01, AS2-10, AS2-12, AS2-13, AS2-15, AS2-16, AS3-II.1];
 - Critique of Reich's concept of an electroscopic OP, and operational isolation of the org [AS2-03, AS2-07];
3. A series of technological systems and applications that this research has yielded - and that have, to date, remained commercially unexplored:
- A plasma-pulse electromechanical inverter and transmitter [USP# 5,416,391];
 - A plasma-pulse-driven overunity converter operating in the aPAGD and IVAD plasma regimes that charges batteries, drives spinner-type drag-cup motors and flywheels [USP# 5,449,989; WIPO# 9,409,560; CP# 2,147,153; pending patent; forthcoming LS1-23];
 - A gravitoelectric converter that transforms gravitational swings of massbound charges into electric impulses [AS2-11];
 - Operation of Tesla coils under conditions of resonance-loading to produce overunity massfree electric radiation [AS2-16];
 - Basic Aetherscope hardware for the aetherometric study of Tesla coils [AS2-16];
 - Apparatus to passively charge a battery from a vacuum-emission cell exposed to specially filtered Tesla radiation in the biologically-beneficial energy range [AS2-17A];

- Modified Faraday-cage-like enclosures as thermal drives for Stirling engines in daytime and nighttime [AS2-25, AS2-26]; (*This work has also been published in Infinite Energy, Vol.7, No.41, January/February 2002 and Vol. 7, No.42, March/April 2002. By the summer of 2003, such Stirling-hyborac engines had achieved round-the-clock continuous operation exceeding 48-hours. These devices succeeded in capturing much more than the previously understood amount of incident solar energy, as demonstrated by the energy produced by the Stirling engine—with a variety of calibration methodologies.*)
- Passive biofield radiation meter [forthcoming AS2-29, forthcoming AS2-30]; (*This author has extensively tested the response of this remarkable inert device at the Correa lab. It has no active power system, such as a battery, and yet it can produce a voltage response across two terminals from over 3-meters distance with the approach of a human being.*)
- Multi-tap ground-driven battery and capacitor charger [Dr. Mallove's report of demonstration]; (*Indeed, an overnight charging up of a large capacitor from environmental energy.*)
- Aether Motor/Converter driven by extracting massfree energy from Faraday-cage-like enclosures, atmospheric antennas, living beings, the ground, the vacuum state [forthcoming video, forthcoming Vol 3 of Experimental Aetherometry; patent pending]. (*This is, of course, a "Holy Grail" for the "free-energy" field—and, indeed, as far as I am concerned, the demonstrations which I have witnessed with this Aether motor— which involved checking for inappropriate power sources and physically interacting with the device—for me confirms its reality.*)

A New Path for "Cold Fusion"/LENR?

It is obvious from the foregoing that my view is that we should adopt this position: More progress will occur in CF/LENR if it is understood by researchers that the field can't remain contained within its usually defined borders. The discovery of fission in the late 1930s offers a useful analogy: Nuclear fission was serendipitously discovered during an attempt to make transuranic elements via neutron bombardment of natural uranium. The investigators did not realize initially that it was fission fragments, not transuranic elements, that were being observed. When they realized that nuclear fission was occurring with neutron production as well, the path to a new chain-reaction energy source opened. The discovery of fission contains a stark warning to the cold fusion field today, which I had no way of realizing when I wrote the following passages in *Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor* (Wiley & Sons, 1991):

Physicist Emilio Segre, who died at age 84 less than one month after the March 1989 announcement in Utah, the previous December had recounted the discovery of nuclear fission— on its 50th anniversary— before a meeting of the American Physical Society. (Emilio Segre, "The Discovery of Nuclear Fission," *Physics Today*, July 1989: 38-43.) Segre had worked with Enrico Fermi in Rome in 1934 on experiments that bombarded uranium with neutrons to attempt to produce what they thought would be the first artificial element beyond uranium, element 93— one that by prediction would be similar chemically to rhenium. But this strong expectation of a result prevented the discovery of fission for five years before Hahn and Strassman in Germany ultimately recognized it. They too would make the same mistake by expecting what the Fermi group had likewise anticipated. Segre also recalled other lost opportunities: how another scientist had suggested the possibility of fission happening in

their work, but whose writing was ignored; and Swiss researchers who may have seen the fission fragment evidence but who instead thought something was wrong with their detector. But the biggest problem was the expectation of seeing an element heavier than uranium, and not paying attention to the possibility of lower mass atoms that turned out to be the telltale fission fragments.

Segre said of writings by Hahn and Meitner on the road to the discovery of fission, "Their early papers are a mixture of error and truth as complicated as the mixture of fission products resulting from the bombardments. Such confusion was to remain for a long time a characteristic of much of the work on uranium." Segre recalled, "My own feeling at the time was that there was a mystery in uranium." In a remarkable statement printed in the historic December 22, 1938, paper in *Naturwissenschaften* announcing the fission discovery, Hahn and Strassman wrote, "As 'nuclear chemists' working very close to the field of physics, we cannot yet bring ourselves to such a drastic step, which goes against all previous experiences in nuclear physics." When the great physicist Niels Bohr heard of the new insights on fission, he was reported to have exclaimed, "Oh what idiots we have all been! Oh but this is wonderful! This is just as it must be!" As Segre concluded in his talk, "Above all, it seems to me that the human mind sees only what it expects." Scientists who go far afield to explore puzzles and anomalies often bump into obstacles, but every once in a while they run into a remarkable phenomenon waiting to be discovered. It was just so with fission; might it be true also with cold fusion?

The badly mis-named "cold fusion" began its life by attempting to prove the Main Stream Cold Fusion Hypothesis (MCFH), but in my view the field can lead nowhere else but to a realization of profound mistakes that have been made in 20th century physics— and other mistakes that date back to the 19th century. Though the efforts to explain cold fusion/LENR with prevailing paradigms has been a noble and useful quest, my firm expectation is that these will fail to describe the big picture adequately— the full range of CF/LENR phenomena, not to forget the other phenomena that mainstream physics has *no hope* of ever explaining. The consequences will be that relativity theory and standard quantum mechanics will not survive. There will be an increasing awareness of the need for larger *covering theories* to replace these defective paradigms, which— to be sure— *seem* to be correct theories, in that in many/most cases they give correct *quantitative* predictions. But is in the nature of the "unreasonable effectiveness of mathematics" that theories, like Special Relativity, which are deemed by the David Goodsteins of this world to be *facts*, eventually fall as the truth of their fallibility becomes all too evident. The *experimental data* that these theories supposedly "explained," will come under a much larger umbrella. There are and will be different explanations for the data. That is happening right now. Above all, the concept of an energetic aether will almost certainly have to play a central role in explaining how CF/LENR phenomena occur. I recommend to you a series of articles and special issues that *Infinite Energy* has published, if you have not already examined these.⁵⁴⁻⁶⁰

Perhaps I am being too idealistic or optimistic about this, but I would hope that those who have pioneered in the CF/LENR field would re-consider their positions. Let's get back to fundamentals. If there are other measurements outside the mainstream CF "line" (a word our late friend Juliano Preparata was fond of using), let us by all means *step out of line!* We should be paying attention to the work of the Graneaus, BlackLight Power, and the Correias, and other challenging work that comes along. In fact, in the very next issue of *Infinite Energy* ([issue #51](#), out in late September 2003), we will be publishing a comprehensive report on the astonishing history and science behind another physics "miracle" that was inappropriately brushed aside by Richard Feynman, and which has been relatively dormant for decades. This is the "noble gas engine" of Hungarian inventor Joseph Papp. Experimental work going on

today on this engine technology (reproduction of energetic *detonations* in noble gases!) and the record of the past shows that our paradigms will be forced to stretch much further than “mainstream cold fusion” people have been willing to do.

The bridge to an understanding of CF/LENR phenomena can only be a return to where physics was in 1894 when Michelson uttered his famous remark about the unlikely major expansion of Physical Science. Back then we were just beginning to observe and understand transmutation and the aether. Atomic theory was in its infancy. Many good ideas were abandoned for not so good ideas. The discoveries of “Cold Fusion”/LENR may help to bring us back to where such research directions were so unfortunately interrupted. It has brought me back already, and I hope that others will follow at their own speed.

References

1. Charles Seife, *Alpha & Omega: The Search for the Beginning and End of the Universe*, Viking, 2003, p.188.
2. Matthew R. Edwards (editor) *Pushing Gravity: New Perspectives on Le Sage's Theory of Gravitation*, Apeiron (C. Roy Keys, Inc.), Montreal, 2002.
3. See websites www.infinite-energy.com and www.lenr-canr.org as well as past proceedings of International Conferences on Cold Fusion
4. Daniel P. Sheehan, Editor, *Quantum Limits to the Second Law: First International Conference on Quantum Limits to the Second Law*, San Diego California 28-31 July 2002, American Institute of Physics, AIP Conference Proceedings, Vol.643, (507 pages). [Note well: The title is somewhat misleading since macroscopic (non-quantum) violations of the Second Law comprise much of the discussion.]
5. Eugene F. Mallove, Reference 2 reviewed, *Infinite Energy*, No.49, p.46.
6. Martin Fleischmann and Stanley Pons, “Electrochemically Induced Nuclear Fusion of Deuterium,” *J. Electroanalytical Chemistry and Interfacial Electrochemistry*, Vol.261 (10 April 1989), 301-308; Errata: Vol.263 (10 May 1990), 187-188.
7. E. Pennisi, “Helium Find Thaws the Cold Fusion Trail,” *Science News*, Vo.139, March 23, 1991, p.180.
8. Melvin H. Miles, Benjamin F. Bush, and Joseph J. Lagowski, “Anomalous Effects Involving Excess Power, Radiation, and Helium Production During D₂O Electrolysis Using Palladium Cathodes,” *Fusion Technology*, Vol.25, July 1994, pp.478-486.
9. Randell L. Mills, Steven P. Kneizys, “Excess Heat Production by the Electrolysis of an Aqueous Potassium Carbonate Electrolyte and the Implications for Cold Fusion,” *Fusion Technology*, Vol.20, August 1991, pp.65-81.
10. Randell L. Mills, *The Grand Unified Theory of Classical Quantum Mechanics*, (January 1999 edition) The current edition can be orderable in hard copy or downloaded in full from www.blacklightpower.com (1999 edition, 1,022 pages).
11. Eugene F. Mallove, “The Triumph of Alchemy: Professor John Bockris and the Transmutation Crisis at Texas A&M,” *Infinite Energy*, No.32, July/August 2000, pp.9-24.

12. Yasuhiro Iwamura, Takehiko Itoh, Mitsuru Sakano, and Satoshi Sakai, "Observations of Low-Energy Nuclear Reactions Induced by D₂ Gas Permeation Through Pd Complexes," *Infinite Energy*, Vol.8, No.47, January/February 2003, pp.14-18. (Also in *Proceedings of the 9th International Conference on Cold Fusion*, Beijing, China, May 19-24, 2002, Edited by X. Z. Li.)
13. Yasuhiro Iwamura, Mitsuru Sakano, and Takehiko Itoh, "Elemental Analysis of Pd Complexes: Effects of D₂ Gas Permeation," *Japanese Journal of Applied Physics A*, Vol.41, p.4642.
14. Talbot Chubb, "Transmutations and Fusion - Based on Ion Band State Physics," *Infinite Energy*, Vol.8, No.47, pp.19-21.
15. Michael McKubre, Francis Tanzella, Paolo Tripodi, and Peter Hagelstein, "The Emergence of a Coherent Explanation for Anomalies Observed in D/Pd and H/Pd Systems: Evidence for ⁴He and ³H Production," *Proceedings of the 8th International Conference on Cold Fusion*, Lerici, Italy 21-26 May 2000, Italian Physical Society, pp.3-10.
16. M. H. Miles, "Correlation of Excess Enthalpy and Helium-4 Production: A Review," ICCF10 paper, abstract at www.ICCF10.org.
17. A. DeNinno, A. Frattolillo, A. Rizzo, E. DelGuidice, "⁴He Detection in a Cold Fusion Experiment," ICCF10 paper, abstract at www.ICCF10.org.
18. John C. Fisher, "Theory of Low-Temperature Particle Showers," ICCF10 paper, abstract at www.ICCF10.org.
19. R.A. Oriani and J.C. Fisher, "Detection of Energetic Charged Particles During Electrolysis," ICCF10 paper, abstract at www.ICCF10.org.
20. J. Dash and D. Chicea, "Effects of Hydrogen Loading By Aqueous Electrolysis On Radioactivity of Uranium," ICCF10 paper, abstract at www.ICCF10.org.
21. O. Reifenschweiler, "Reduced Radioactivity of Tritium in Small Titanium Particles," *Physics Letters A*, 1994, Vol.184, p.149.
22. O. Reifenschweiler, "Some Experiments on the Decrease of Tritium Radioactivity," *Fusion Technology*, Vol.30, 1996, p.261
23. Vladimir I. Vysotskii, Valerii N. Shevel, Alexander B. Tashirev, Alla A. Kornilova, "Successful Experiments of Utilization of High Activity Waste in the process of Transmutation in Growing Associations of Microbiological Cultures," ICCF10 paper, abstract at www.ICCF10.org.
24. Scott R. Chubb "Concerning the Roles of Theory, Computation, and Experiment in LENR's," ICCF10 paper, abstract at www.ICCF10.org.
25. Azevedo, R., P. Graneau, C. Millett, N. Graneau, "Powerful water plasma explosions," *Physics Letters A*, 1986, Vol.117, p.101.
26. Ruscal, L.J., D. W. Swallom, P.Y. Pappas, P. Graneau, "Electrodynamic water arc gun," *Proceedings of the 4th Symposium on Electromagnetic Launch Technology*, 1988, University of Texas at Austin.

27. Peter Graneau, "Gaining Solar Energy from Ordinary Water," *Infinite Energy*, Vol.2, No.10, September/October 1996, pp.59-60.
28. Peter Graneau, "Extracting Intermolecular Bond Energy from Water," *Infinite Energy*, Vol.3, No.13/14, March/June 1997, pp.92-94.
29. Peter Graneau, "Why Does Lightning Explode and Generate MHD Power?," *Infinite Energy*, Vol.5, No. 25, May-June 1999, pp.9-11.
30. Peter Graneau, Neal Graneau, George Hathaway, and Richard Hull, "Arc-Liberated Chemical Energy Exceeds Electrical Input Energy," *Infinite Energy*, Vol.8, No.44, July/August 2002, pp.39-45.
31. Peter Graneau, Neal Graneau, and George Hathaway, "Evidence of thunder being a chemical explosion in air," *J. Plasma Physics*, 2003, Vol.69, part 3, pp.187-197.
32. R. Antanasijevic, R. Banjanac, A. Dragic, D. Jokovic, D. Joksimovic, Z. Maric, B. Panic, V. Udovicic, J.P. Vugier. "Electrical discharges in air," *Physics Letters A.*, Vol.306 (2002), pp. 88-90.
33. W. David Wallman, "A Letter from DW Research," *Infinite Energy*, Vol.2, No.11, Nov./Dec. 1996, pp.35-36.
34. DW Energy Research, LLC, "Test report of BTU content of Carbo-hydrogen™ (COH₂ gas generated from biomass as compared with propane and acetylene," *Infinite Energy*, Vol.2, No.11, Nov./Dec. 1996, pp.38-39.
35. Randell L. Mills, Steven P. Kneizys, "Excess Heat Production by the Electrolysis of an Aqueous Potassium Carbonate Electrolyte and the Implications for Cold Fusion," *Fusion Technology*, Vol.20, August 1991, pp.65-81.
36. "Lower Energy Hydrogen Experimental Data" available at www.blacklightpower.com (Pdf download, 21 pages).
37. R.L. Mills "The Fallacy of Feynman's Argument on the Stability of the Hydrogen Atom According to Quantum Mechanics," available at www.blacklightpower.com (2003) (Pdf download, 18 pages).
38. Paulo and Alexandra Correa, US Patent #5,416,391 "Electromechanical Transduction of Pulses", May 16, 1995, Filed October 15, 1992 (Re-Printed in *Infinite Energy*, March-April 1996, Vol.2, No.7, pp.27-35). Other patents referenced: Paulo and Alexandra Correa, US Patent #5,449,989 "Energy Conversion System", Sept. 12, 1995, Filed April 15, 1993; Paulo and Alexandra Correa, US Patent #5,502,354 "Direct current energized pulse generator utilizing autogenous cyclical pulsed abnormal glow discharges", March 26, 1996.
39. Paulo and Alexandra Correa, "XS NRG™ Technology," *Infinite Energy*, March-April 1996, Vol.2, No.7, pp.18-21.
40. Paulo and Alexandra Correa, "Other Applications of the PAGD Technology Besides Energy Conversion," *Infinite Energy*, March-April 1996, Vol.2, No.7, pp.22-27.
41. Michael Carrell, "The Correa Invention: An overview and an investigation in progress," *Infinite Energy*, May-June 1996, Vol.2, No.8, pp.10-14.

42. Michael Carrell, "The Correa PAGD Reactor: Errata and Supplement," *Infinite Energy*, July-August 1996, Vol.2, No.9, pp.33-36.
43. Paulo and Alexandra Correa, "Metallographic & Excess Energy Density Studies of LGENTM Cathodes Subject to PAGD Regime," *Infinite Energy*, Dec. 1997-Jan. 1998, Vol.3 No.17, pp.73-78.
44. Harold Aspden, "The Reality of Perpetual Motion," *Infinite Energy*, Vol.2, No.8, p.15.
45. Harold Aspden, "The Adams-Aspden Motor Patent," *Infinite Energy*, Vol.2, No.10, p.50.
46. Harold Aspden, "Supergravitons and Cold Fusion," *Infinite Energy*, Vol.3, Nos.15/16, p.112.
47. Harold Aspden, "Addendum to Supergravitons and Cold Fusion," *Infinite Energy*, Vol.3, No.17, p.7.
48. Harold Aspden, "Cold Fusion: The First Ten Years—Ten Years of Cold Fusion, or Was It Ten Years of Cold War," *Infinite Energy*, Vol.4, No.24, p.15.
49. Harold Aspden, "The Sun is Not a Hot Fusion Reactor," *Infinite Energy*, Vol.5, No.28, p.13.
50. Harold Aspden, "Have We discovered the Neno?" *Infinite Energy*, Vol.5, No.30, p.43.
51. Harold Aspden, "Gravity and Its Thermal Anomaly: Was the Reich-Einstein Experiment Evidence of Energy Inflow from the Aether?" *Infinite Energy*, Vol.7, No.41, p.61.
52. Michael C.H. McKubre, "Closing Comments Summarizing the Status and Progress of Experimental Studies," *Proceedings of the 9th International Conference on Cold Fusion*, Beijing, China, May 19-24,2002, Edited by X.Z. Li. pp.xviii-xx.
53. Eugene P. Wigner, "The Unreasonable Effectiveness of Mathematics," 1959. "The great mathematician fully, almost ruthlessly exploits the domain of permissible reasoning and skirts the impermissible. That his recklessness does not lead him into a morass of contradictions is a miracle in itself. Certainly it is hard to believe that our reasoning power was brought, by Darwin's process of natural selection, to the perfection which it seems to possess." (Quoted by Eugene Mallove in *The Quickening Universe*, St. Martin's Press, 1987, p.215)
54. Many authors. Special "Einstein Reconsidered" issues of *Infinite Energy*, Vol.7, No.38 (July/August 2001) and No.39 (September/October 2001).
55. Paulo and Alexandra Correa, "The Reproducible Thermal Anomaly of the Reich-Einstein Experiment Under Limit Conditions," *Infinite Energy*, July-August, 2001, Vol.7, No.37, pp.12-21.
56. Paulo and Alexandra Correa, "Consequence of the Null Result of the Michelson-Morley Experiment," *Infinite Energy*, July-August, 2001, Vol.38, pp.47-64.
57. Paulo and Alexandra Correa, "The Sagnac and Michelson-Gale-Pearson Experiments," *Infinite Energy*, Sept.-Oct. 2001, Vol.7, No. 39, pp.32-49.

58. Paulo and Alexandra Correa, "A Modified Orgone Accumulator (HYBORAC) as a Drive for a Low Delta-T Stirling Engine, Part-1," *Infinite Energy*, Jan.-Feb. 2002, Vol.7, No.41, pp. 23-29.

59. Paulo and Alexandra Correa, "A Modified Orgone Accumulator (Complete HYBORAC) as a Nighttime Drive for a Low Delta-T Stirling Engine, Part-2," *Infinite Energy*, Mar.-April. 2002, Vol.7, No.42, pp. 41-48.

60. Mallove, Eugene, "Demonstrating Aether Energy," *Infinite Energy*, Vol.7, No.41, January-February 2002, pp.6-8.

Appendix

An Eclectic Collection of Sentiments and Statements About the Aether (Ether), Which Shows the Evolution of this Most Important Concept from Antiquity Through the 19th Century and into the Present Age

Compiled by Eugene F. Mallove, Sc.D.

- **384-322 BC, Aristotle: (views summarized in Isaac Asimov's *Asimov's New Guide to Science* (Basic Books, 1984):**

"*The Shells of Air*—Aristotle supposed the world to be made up of four shells, constituting the four elements of matter: earth (the solid ball), water (the ocean), air (the atmosphere), and fire) an invisible outer shell that occasionally became visible in the flashes of lightning). The universe beyond these shells, he said, was composed of an unearthly, perfect fifth element that he called ether (from a Latin derivative, the name became *quintessence*, which means 'fifth element'). p.207.

"There was no room in this scheme for emptiness: where earth ended, water began; where both ended, air began; where air ended, fire began; and where fire ended, ether began and continued to the end of the universe. 'Nature,' said the ancients, 'abhors a vacuum' (Latin for 'emptiness')." p.207.

"Aristotle thought the heavenly bodies were made of a substance he called *aether* (from a Greek word for 'glowing' or 'blazing'), which was fundamentally different from the materials that made up Earth."p.105.

- **1839, Richard Green Parker, *The Boston School Compendium of Natural and Experimental Philosophy* (Boston), p.106:**

"521. It is not known what light is. Sir Isaac Newton supposed it to consist of exceedingly small particles, moving from luminous bodies; others think that it consists of the undulations of an elastic medium, which fills all space, and which produces the sensation of light to the eye, in the same manner as the vibrations of the air produce the sensation of sound to the ear.* — *The opinions of the philosophers at the present day are inclining to the undulatory theory."

- **1841, Samuel Maunder, in *Maunder's Scientific Treasury* (London)p.15:**

“AETHER, the most subtle of all fluids, which, commencing from the limits of our atmosphere, occupies the firmament which is above the region of the air. The term is used by natural philosophers ancient and modern; but not always in the same signification. According to electricians, it is the electric fluid, or solar light. It may, however, generally be understood to be a fluid that fills all space; in which the stars revolve; and which when impregnated with earthy exhalations, forms the air or atmosphere.”

- **(circa 1840) Michael Faraday in *Experimental Researches*, 3075:**

“For my own part, considering the relation of a vacuum to the magnetic force and the general character of magnetic phenomena external to the magnet, I am more inclined to the notion that in the transmission of the force there is such an action external to the magnet, than that the effects are merely attraction and repulsion at a distance. Such an action may be a function of the aether; for it is not at all unlikely that, if there be an aether, it should have other uses than simply the conveyance of radiations.”

- **1865 (James Clerk Maxwell) in *A Treatise on Electricity and Magnetism* (Dover Edition in Two Volumes, 1954):**

“According to the theory of emission, the transmission of energy is effected by the actual transference of light-corpuscles from the luminous to the illuminated body, carrying with them their kinetic energy, together with any other kind of energy of which they may be receptacles. According to the theory of undulation, there is a material medium which fills space between the two bodies, and it is by the action of contiguous parts of this medium that the energy is passed on, from one portion to the next, till it reaches the illuminated body.

“The luminiferous medium is therefore, during the passage of light through it, a receptacle of energy. In the undulatory theory as developed by Huygens, Fresnel, Young, Green, &c., this energy is supposed to be partly potential and partly kinetic. The potential energy is supposed to be due to the distortion of the elementary portions of the medium. We must therefore regard the medium as elastic. The kinetic energy is supposed to be due to the vibratory motion of the medium. We must therefore regard the medium as having a finite density... our theory agrees with the undulatory theory in assuming the existence of a medium which is capable of becoming a receptacle of two forms of energy.”

- **1875-1889, 9th Edition of *Encyclopaedia Britannica*, article by James Clerk Maxwell:**

“The hypothesis of an aether has been maintained by different speculators for very different reasons. To those who maintained the existence of a plenum as a philosophical principle, nature’s abhorrence of a vacuum was a sufficient reason for imagining an all-surrounding aether, even though every other argument should be against it. To Descartes, who made extension the sole essential property of matter, and matter a necessary condition of extension, the bare existence of bodies apparently at a distance was a proof of a continuous medium between them. But besides these high metaphysical necessities for a medium, there were more mundane uses to be fulfilled by aethers. Aethers were invented for the planets to swim in, to constitute electric atmospheres and magnetic effluvia, to convey sensations from one part of our bodies to another, and so on, till all space had been filled three or four times over with aethers. It is only when we remember the extensive and mischievous influence on science which hypotheses about aethers used formerly to exercise, that we can appreciate the horror of aethers which sober-minded men had during the 18th century, and which probably as a sort of hereditary prejudice, descended even to John Stuart Mill. The disciples of Newton maintained

that in the fact of the mutual gravitation of heavenly bodies, according to Newton's law, they had a complete and quantitative account of their motions; and they endeavored to follow out the path which Newton had opened up by investigating and measuring the attractions and repulsions of electrified and magnetic bodies, and the cohesive forces in the interior of bodies, without attempting to account for these forces. Newton himself, however, endeavoured to account for gravitation by differences of pressure in an aether; but he did not publish his theory, 'because he was not able from experiment and observation to give a satisfactory account of this medium, and the manner of its operation in producing the chief phenomena of nature.' On the other hand, those who imagined aethers in order to explain phenomena could not specify the nature of the motion of these media, and could not prove that the media, as imagined by them, would produce the effects they were meant to explain. The only aether which has survived is that which was invented by Huygens to explain the propagation of light. The same evidence for the existence of the luminiferous aether has accumulated as additional phenomena of light and other radiations have been discovered; and the properties of this medium, as deduced from the phenomena of light, have been found to be precisely those required to explain electromagnetic phenomena."

- **1900 (George Isles) in *Flame, Electricity, and the Camera* (Doubleday & McClure Co.):**

"Huygens advanced the theory of undulations in an ether—now universally accepted as the one satisfactory explanation of the facts...Nevertheless it is held that the ether through which light and heat [radiant heat] take their way is a substance, though of a tenuity so extreme as to be next to nothing. Professor de Volson Wood computed that a mass of it as large as the earth would weigh but 1.7 pounds. Lord Kelvin tells us that in a cubic mile of it surcharged with sunshine there resides but 20,000 foot-pounds of energy, no more than the equivalent of the exertion of a horse during thirty-six seconds"

"Within the limits of a single viewpoint the comparison of gases enables us to approach an explanation of the ether. Hydrogen, which is about one-sixteenth as tenuous as oxygen, transmits sound nearly four times as fast. If we can imagine a gas so much more tenuous than hydrogen as to convey motion with the speed of light, we may form an idea of the ether, and attempt, at least, to include the ether with ordinary matter as making up one continuous scheme of things. The question as to whether ordinary matter has originated from ether or not remains to be considered by the inquirers of the future."

"In bringing the man of science to the knowledge of ether, the study of light and heat has borne its worthiest fruit. An incalculable expansion of human thought has attended the proof that an ocean as wide as the universe bathes every particle of matter, and binds it to every other with bonds more rigid than links of steel. Ether, unseen and unfelt, except to the eye and grasp of reason, explains so many phenomena of light and heat as to be deemed not less real than air or water. And the laws of ethereal motion as manifested in the rays of flame have prepared the philosopher to study electricity aright. Every extension of electrical science only confirms the belief in that universal medium for which Huygens and Young argued when the evidence for it was not one-hundredth part as weighty as it is today. To formulate a theory of the ether, so that from the simplest assumptions may be deduced the facts of electricity, magnetism, and optics, is the chief aim of modern physical philosophy." p.80-82

- **1905 Albert Einstein ("On the Electrodynamics of Moving Bodies"):**

"The introduction of a 'luminiferous ether' will prove to be superfluous inasmuch as the view here to be developed will not require an 'absolutely stationary space' provided with special

properties, nor assign a velocity-vector to a point of empty space in which electromagnetic processes take place.”

- **1906 (Robert A. Millikan and Henry Gordon Gale – copyright 1906, 1913) *Practical Physics* (a revision of the authors’ *A first Course in Physics*), Ginn and Company, 1920, 1922:**

“428. The ether. We have already indicated that if the wave theory is to be accepted, we must conceive, with Huygens, that all space is filled with a medium, called the ether, in which the waves can travel. This medium cannot be like any of the ordinary forms of matter; for if any of these forms existed in interplanetary space, the planets and the other heavenly bodies would certainly be retarded in their motions. As a matter of fact, in all the hundreds of years during which astronomers have been making accurate observations of the motions of heavenly bodies no such retardation has ever been observed. The medium which transmits light waves must therefore have a density which is infinitely small even in comparison with that of our lightest gases.”

“Further, in order to account for the transmission of light through transparent bodies, it is necessary to assume that the ether penetrates not only all interstellar spaces but all intermolecular spaces as well.” p.367

- **1910 (A. Wilmer Duff, Editor) in *A Text-Book of Physics* (P. Blakiston’s Son & Co.):**

“419. The Ether. To account for the transmission of waves through space containing no ordinary matter it seems necessary to assume the existence of a universal medium filling all space and even interpenetrating matter itself, as shown by the existence of transparent substances. That this medium can react on matter is shown by the fact that radiant energy is transmitted from ether to matter in the case of absorption, and from matter to ether in the case of emission of radiation from material sources. This medium appears to be like a jelly in the respect that it will transmit transverse but not longitudinal waves. We can infer its properties only from optical and electrical phenomena, as it is not tangible or visible; but it may be questioned whether, after all, the effect of light waves as they strike the retina is not as direct evidence of the existence of the ether as a blow with a club is evidence of the existence of matter.” p.368

- **1920 (Frederick Soddy) in *The Interpretation of Radium and the Structure of the Atom* (G.P. Putnam’s Sons) (1909 First Edition):**

“Inevitably, when we begin to contemplate radiation phenomena, we are driven to inquire into the medium filling the outer void of space by which by virtue of which this immaterial, but vital entity—*energy*—reaches us from far distant worlds. It is true, we call it *ether*, and try to give it all sorts of material or pseudo-material, characteristics. Lord Kelvin seems to have spent a large part of his leisure time trying as it were to dematerialize matter into ether, that is, trying by all sorts of mechanically ingenious arrangements and analogy from material models— the only possible models our minds can yet grasp—to obtain a possible construction which would simulate the elusive but all-pervading ether. Others, on the well known principle that topsy-turvydom, if only consistent and all embracing enough, results finally in a system no less logical and rational than the original one, have given to the ether inconceivably great density, and to the atoms of matter the character to holes or voids in it. The necessity for the existence of a universal all-pervading medium, or ether, capable of

transmitting energy, no one in these days of wireless telegraphy would deny, but on the question of its real nature opinion is as divided as it well could be.

“The tendency, however, in modern physics today is rather to derive and explain material phenomena from the properties of the ether than to attempt to construct an ether on a material or pseudo-material model. As yet, however, we know little about the properties of the ether itself. One definite thing we do know, for certain, and have known for a very long time, namely the velocity at which influences are transmitted across the ether...”pp.37-38.

“In some ways we know far more about the electron than about the atom of matter. The electron cannot move without disturbing the medium which occupies all space continuously, and which we, not yet knowing too much about its real nature, call the ether. It is the motion and change of motion of the electron which give us light, the X-rays, and the long ether waves used in wireless telegraphy. It is the reaction of ether on the moving electron which gives it its ‘mass.’...”p.56

- **(Albert A. Michelson) in *Studies in Optics*:**

“The existence of an ether seems to be inconsistent with the theory [of special relativity]...But without a medium how can the propagation of light waves be explained?...How explain the constancy of propagation, the fundamental assumption (at least of the restricted theory) if there be no medium?” (quoted by Abraham Pais in *Subtle is the Lord*, 1982, p.115)

- **1938 (Albert Einstein and Leopold Infeld) in *The Evolution of Physics*, Simon and Shuster, Inc.):**

“Thus arose one of the most dramatic situations in the history of science. All assumptions concerning ether led nowhere! The experimental verdict was always negative. Looking back over the development of physics we see that the ether, soon after its birth, became the ‘enfant terrible’ of the family of physical substances. First, the construction of a simple mechanical picture of the ether proved to be impossible and was discarded. This caused, to a great extent, the breakdown of the mechanical point of view. Second, we had to give up hope that through the presence of the ether sea one CS would be distinguished and lead to the recognition of absolute, and not only relative, motion. This would have been the only way, besides carrying the waves, in which ether could mark and justify its existence. All our attempts to make ether real failed. It revealed neither its mechanical construction nor absolute motion. Nothing remained of all the properties of the ether except that for which it was invented, i.e. its ability to transmit electromagnetic waves. Our attempts to discover the properties of the ether led to difficulties and contradictions. After such bad experiences, this is the moment to forget the ether completely and to try never to mention its name. We shall say: our space has the physical property of transmitting waves, and so omit the use of a word we have decided to avoid.” pp.175-176.

- **1947 (George Gamow) in *One, Two, Three...Infinity* (various editions from 1947 through Bantam Books, 1967):**

“As we shall see in the course of the following discussion, the greatest mistake of the physics of the nineteenth century consisted in the assumption that this light ether has properties very similar to those of ordinary physical substances familiar to us. One used to speak about fluidity, rigidity, various elastic properties, and even the internal friction of the light ether. Thus, for example, the fact that light ether behaves on the one hand as a vibrating solid when

carrying light waves, but on the other hand shows a perfect fluidity and a complete absence of any resistance to the motion of celestial bodies, was interpreted by comparing it with such materials as sealing wax." p.92

- **1949 (Wilhelm Reich) in *Ether, God and Devil & Cosmic Superimposition*:**

"It is not our objective here to prove the existence of an all-pervading ether; neither is it intended to prove the identity of the cosmic orgone energy and the postulated ether. All that is to be established at this point is the fact that there exists and all pervading, observable and demonstrable energy. It is filling in gaps in the comprehension of the universe, gaps that many generations of physicists and philosophers tried hard, but in vain, to fill with the concept of an all-pervading 'ether' as the primal substratum of the basic functions in nature.

"The time in which cosmic orgonomic functions have been studied is very short. It comprises not more than a decade. However, all observations within this short period have led to the following conclusion:

THERE IS NO SUCH THING AS "EMPTY SPACE." THERE EXISTS NO "VACUUM." SPACE REVEALS DEFINITE PHYSICAL QUALITIES. THESE QUALITIES CAN BE OBSERVED AND DEMONSTRATED; SOME CAN BE REPRODUCED EXPERIMENTALLY AND CONTROLLED. IT IS A WELL DEFINED ENERGY THAT IS RESPONSIBLE FOR THE PHYSICAL QUALITIES OF SPACE. THIS ENERGY HAS BEEN TERMED 'COSMIC ORGONE ENERGY.'" [Note: This is Reich's original capitalization.]

"First let us summarize the general conclusions that followed from the fact that there is no empty space; and, second, let us summarize the phenomena that have forced upon us the conclusion that the primordial cosmic energy, hitherto postulated as the 'ether,' has been finally discovered in a practical manner, accessible to direct observation and experimentation.

1. All physical theories resting on the assumption of 'empty space' tumble, if and only if, the abstract mathematical structures that were to replace the concrete physical qualities of space cannot be reconciled with the new factual observations.
2. The qualities that characterize 'space' must be of a strictly physical nature, observable and reproducible in high vacuum.
3. The theoretical supposition of an 'ether' continues to be valid. The phenomenon in the 'vacuum' must agree with the qualities that had to be ascribed to the ether in order to explain the functions of field actions in space, such as gravity, light, attraction at a distance, 'transmission of heat from the sun to the earth,' etc.
4. The negative result of the Michelson-Morley experiment, which was designed to demonstrate the ether, must be comprehended."

"The orgonomic potential does not contradict the old mechanical potential. In fact, it explains how it is possible that a higher energy level can exist at all. It is true that, in accepting this function, the 'second law of thermodynamics,' the absolute formulation of the 'law of entropy,' becomes invalid. We know that many physicists feel uncomfortable with this law anyhow. And we have had to abandon many other such beliefs of absolute nature, e.g., the conservation of matter or the unchangeability of chemical elements."

- **1951 (Sir Edmund Whittaker) in *Aether & Electricity: Vol I: The Classical Theories* (Published in 1910 by Thomas Nelson & Sons, London, revised and enlarged in 1951), the Preface:**

“In 1910 I published a work under the title *A History of the Theories of Aether and Electricity, from the Age of Descartes to the close of the nineteenth century*. When the original edition was exhausted, I felt that any new issue should describe the origins of relativity and quantum-theory, and their development since 1900. My opportunities were however not sufficient to enable me to prepare an accurate and fully-documented account of of this very creative period, and I was compelled to lay the plan aside. Retirement from my professional chair has made it possible for me to take up this project again; it will occupy three volumes, of which this, the first, deals with classical theories. The volume of 1910 has been to a considerable extent rewritten, with the incorporation of much additional material; and in the second volume, the story will be continued to 1926.

“A word might be said about the title *Aether and Electricity*. As everyone knows, the aether played a great part in the physics of the nineteenth century; but in the first decade of the twentieth, chiefly as a result of the failure of attempts to observe the earth’s motion relative to the aether, and the acceptance of the principle that such attempts must always fail, the word ‘aether’ fell out of favour, and it became customary to refer to the interplanetary spaces as ‘vacuous’; the vacuum being conceived as mere emptiness, having no properties except that of propagating electromagnetic waves. But with the development of quantum electrodynamics, the vacuum has come to be regarded as the seat of the ‘zero point’ oscillations of the electromagnetic field, of the ‘zero point’ fluctuations of electric charge and current, and of a ‘polarisation’ corresponding to a dielectric constant different from unity. It seems absurd to retain the name ‘vacuum’ for an entity so rich in physical properties, and the historical word ‘aether’ may fitly be retained.”

- **1954 (James A. Coleman) in *Relativity for the Layman* (Signet Science Books):**

“We thus see what the dilemma was. The ether was firmly believed to exist, but all efforts to detect it not only failed but the reasons advanced for the failure were contradictory and insecure. So, did the ether exist or didn’t it? If it did, why couldn’t we detect it? And if it didn’t exist, why didn’t it?”

“It was at this stage of scientific frustration and confusion that the soul-satisfying answer was given, with such a simple explanation that it took a genius to see it—Albert Einstein. And with him the Theory of Relativity was born.” P.42

- **1966 (Anthony P. French) in Part III—“Relativity (An Introduction to the Special Theory),” in *Physics - A New Introductory Course* (MIT Science Teaching Center):**

“The particle theory and the wave theory have been the only clearly defined models by which to describe light and its propagation. For a long time—until the 20th century in fact—the two theories were taken to be mutually exclusive; it seemed obvious that acceptance of the one must imply rejection of the other. From the vantage point of today, we see that both photon and wave aspects of the behavior of light must be accepted— that the facts cannot all be forced into the mold of one or the other of the two theories. We have learned also (thanks largely to Einstein) that we should focus on the bare facts of observation, and should not, through our adherence to a particular theory, read more into them than is there. To be specific, the wave properties of light are undeniable— diffraction, interference, polarization,

etc. But the waves of ordinary experience require a medium. What more natural, therefore, than to build up a detailed specification of the medium that carries light, and then to seek to detect it? Yet it was a quest that led only to frustration. Einstein showed that the search for the medium—the “luminiferous ether”— was sterile and unnecessary. The ether was a red herring—something that diverted physicists into following a false scent. Perhaps in this present discussion we should not introduce the ether at all, knowing that we are going to bury it again in the end. Yet one cannot fully appreciate the emergence of special relativity without some feeling for the importance and the appearance of reality that the ether once enjoyed. In the next section, therefore, we shall briefly discuss this background.”—p.2-2

- **1982 (Abraham Pais) in *Subtle is the Lord: The Science and the Life of Albert Einstein*, Oxford University Press):**

“My actual account of that history [the history of special relativity] is somewhat more elaborate. It begins with brief remarks on the nineteenth century concept of the aether, that quaint, hypothetical medium which was introduced for the purpose of explaining the transmission of light waves and which was abolished by Einstein... Only Einstein saw the crucial new point: the dynamic aether must be abandoned in favor of a new kinematics based on new postulates.”pp.20-21

- **1986 (John Bell) in *The Ghost in the Atom: A Discussion of the Mysteries of Quantum Physics* (Edited by P.C. W. Davies & J.R. Brown):**

Interviewer question: Bell’s inequality is, as I understand it, rooted in two assumptions; the first is what we might call objective reality— the reality of the external world, independent of our observations; the second is locality, or non-separability, or no faster-than-light signaling. Now, Aspect’s experiment appears to indicate that one of these two has to go. Which of the two would you like to hang onto?

Bell’s reply: “Well, you see, I don’t really know. For me it’s not something where I have a solution to sell! For me it’s a dilemma. I think it’s a deep dilemma, and the resolution of it will not be trivial; it will require a substantial change in the way we look at things. But I would say that the cheapest resolution is something like going back to relativity as it was before Einstein, when people like Lorentz and Poincaré thought that there was an aether — a preferred frame of reference— but that our measuring instruments were distorted by motion in such a way that we could not detect motion through the aether. Now, in that way you can imagine that there is a preferred frame of reference, and in this preferred frame of reference things do go faster than light. But then in other frames of reference when they seem to go not only faster than light but backward in time, that is an optical illusion.”

Interviewer: Well that seems a very revolutionary approach!

Bell: “Revolutionary or reactionary, make your choice, But that is certainly the cheapest solution. Behind the apparent Lorentz invariance of the phenomena, there is a deep level which is not Lorentz invariant.”

Interviewer: Of course the theory of relativity has a tremendous amount of experimental support, and it’s hard to imagine that we can actually go back to a pre-Einstein position without contradicting some of this experimental support. Do you think it’s actually possible?

“Well, what is not sufficiently emphasized in textbooks, in my opinion, is that the pre-Einstein position of Lorentz and Poincaré, Larmor and Fitzgerald was perfectly coherent, and is

not inconsistent with relativity theory. The idea that there is an aether, and these Fitzgerald contractions and Lamor dilations occur, and that as a result the instruments do not detect motion through the aether — that is a perfectly coherent point of view.” (There is much more delicious stuff not quoted here!) pp.48-49

- **1998 (Harold Aspden) from his Energy Sciences website (www.energyscience.co.uk):**

DISCOURSE NO. 4, THE HERESY OF THE AETHER
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‘Ether’ (also Aether): a substance formerly believed to fill all space and to be responsible for transmitting electromagnetic waves.

INTRODUCTION

The above is the definition of the word 'ether' to be found in Chambers dictionary, 1998. A 1934 Edition of the Concise Oxford Dictionary defines the ether as ‘the subtle elastic fluid permeating space and filling the interstices between particles of air and other matter, a medium through which light-waves are propagated.’ In these web pages I use the spelling ‘aether’ to distinguish it from the chemical (anaesthetic) meaning of the word 'ether'.

These dictionary meanings are ambiguous. The aether is best defined as ‘that which fills space devoid of matter.’ If you say there is ‘nothing’ in that space, meaning that space itself is ‘nothingness,’ then ‘space,’ which the dictionary defines as ‘a continuous extension viewed with or without reference to the existence of objects in it,’ is something you view when there is nothing there to see. With its other meaning you are viewing something that is not there by looking at what is there. ‘Nothingness’ means ‘non-existent.’ The word ‘aether’ has to mean something and the physicist should accept it as meaning ‘that which fills space devoid of matter,’ even though he or she may try then to prove that what does fill that space is so subtle as to be ignored for all practical purposes.

There are then three scientific perspectives that one can consider. Firstly, it can be declared by way of assumption that the aether has a specific property of determining the constant speed of light relative to an absolute universal frame of reference. Alternatively, one can say that the aether is a ‘subtle elastic fluid permeating space,’ a medium so subtle that it can adapt to ensure that the finite speed of light as measured in the presence of matter takes its reference on a frame determined by the matter present. The third perspective is to say that the aether is ‘that which fills space devoid of matter,’ ‘that’ being a sea of energy, the deployment and reorganization of which accounts for the creation of matter and then go on to supplement that with the second definition.

The history which led to the conflict between the Chambers 1998 dictionary definition of ‘aether’ as a ‘former belief’ and the 1934 Oxford dictionary definition as a ‘subtle elastic fluid’ is that of Einstein’s theory in assuming, quite falsely, that, if the aether exists it defines the light propagation frame as an absolute single frame of reference. Such history has meant that scientists have turned their thoughts away from the study of the properties of aether proper, a study which nevertheless can lead us to the prospect of harnessing its energy and understanding its true regulating effect on light propagation, particularly the scaled frequency

loss implicit in the Hubble constant, which has been misinterpreted as an orderly progressive expansion of the universe in a sea of nothingness.

If you really wish to follow the path of the heretic then read on. You will learn all about the aether and see that I must be right in making these statements.

DOES THE AETHER HAVE A TEMPERATURE?

At this point you may wonder how I can jump from Maxwell's demon and the practical world of thermodynamics and move into the depths of the hidden underworld I have chosen to call the 'aether.' Well, Maxwell himself did that when he addressed the mysteries of that Second Law of Thermodynamics and evolved a theory for the manner in which the aether transports electromagnetic waves.

However, I will go directly to the question I have just posed. Does the aether have a temperature? Well, if you are a conformist and believe Einstein then you must say that, since the aether does not exist in any tangible form, and has been replaced by the mathematics of space-time, it cannot have a temperature any more than a mathematical equation can have a temperature.

Given that verdict, suppose I now say that I accept that energy has mass and that mass can gravitate and, furthermore, that there is a sea of energy filling space, then you will conclude that if I am right the aether is subject to gravitational forces. You may conclude that I have to be wrong as I have gone far beyond the notion that the aether has a temperature. Indeed, what value could that temperature be?

I ask now if you have heard of the 'cosmic background temperature,' a quantity measured in the locality of Earth as being 2.7 K? Orthodox scientists cannot explain that other than by declaring it to be the heat residue of the Big Bang, implying that it is the temperature of whatever residue of matter there is out there in so-called empty space.

I say that that temperature is the temperature of the aether. It is determined by the gravitational properties of the aether and it is a temperature which the aether shares with matter dispersed in space.

Now I do not want here to get involved in too much physics, because I shall cover the details of this subject in the specialist PHYSICS section of these web pages. So, for the immediate purpose I will just say that, though the aether has a mass density, that density is kept uniform, but we can still say that there is what is called a 'gravitational potential' acting between aether and material bodies such as the sun. This potential implies that energy has been released, as energy of motion, typically heat. The reason is that gravitational potential is negative as it implies release of energy by the coming together of two masses.

Suppose I say that the aether owes its gravitational mass to the presence of a system of aether particles each having a specific mass, then the gravitational potential as between the sun and one such particle will be a measure of the heat shed to the particle and retained by the particle, inasmuch as the aether itself does not radiate energy from itself. It follows that I can then be guided by the way heat energy is shared by particles in a gas or in solid matter. There is a constant in physics known as Boltzmann's constant. It connects the particle's heat energy and temperature and so, if say that the energy shed by the gravitational potential of the aether is retained by it as heat, using that 2.7 K temperature we measure as the cosmic background temperature, I can work out the mass of each such aether particle.

I have done such calculations. Indeed, I derived the mass of the aether particle in the 1950s and reported it in a book I published in 1960. The book, or rather booklet as it was only 48 printed pages, was entitled 'The Theory of Gravitation.' It was some 30 years later that I did those aether temperature calculations using the theoretical aether particle mass I had derived in that 1960 publication and I obtained a temperature that did, indeed, confirm the value measured as the temperature of the cosmic background. See [1993d]. There was no Big Bang argument in my theory!

CONCERNING MAXWELL'S THEORY

I must now just mention one feature of the aether, one overlooked by Clerk Maxwell and all those who did pursue their 19th century models of aether. The aether conveys electromagnetic waves. Those waves have a lateral oscillation, meaning that they wriggle sideways in their forward progress as does a snake. To sustain such waves the aether had to behave as if it were a solid and yet we move through it as if it were a fluid devoid of mass. The 1934 dictionary said it was 'a subtle elastic fluid.' That was before the 1998 dictionary got around to saying it was nothing other than something 'formerly believed to fill all space.' Well, how can the aether be fluid and solid at the same time and sustain the passage those lateral electromagnetic oscillations?

The answer is that it has the form of a fluid crystal and, further, that those lateral waves need something other than the structure of the fluid crystal to provide a lateral dynamic balance. In a fluid crystal the local presence of electric fields can cause the fluid to develop its crystal form in the locality of those fields. A material system such as body Earth which comprises, at its ultra microscopic atomic level, electric charges and their attendant fields can move through the aetherial fluid crystal and carry a kind of aether crystal with it, whilst surrounding aether has its own separate crystal form. The structure can dissolve at the forward boundaries, dispersing into the background fluid, only to reappear as new crystal structures forms behind the aether structure that is 'dragged' along by body Earth.

Why, one may well wonder, has the fluid crystal not been adopted by aether theorists as their model for the aether? Am I really alone in seeing this as the answer? What is wrong with physics if it cannot see the good sense of at least examining the possibilities opened up by the knowledge that there are liquid crystal displays in our pocket calculators. If you read the 19th century history of ideas concerning the aether, as being something impossible, both a fluid and a solid, and you have such a calculator before you, then you have under your control something that can exhibit the properties of both a liquid or a solid. You cannot then say there is no aether because there is an unresolved conflict as between its liquid and solid properties. You might as well say that the liquid crystal display of your calculator is an illusion, rather than a technological reality.

Just understand that the aether has properties akin to those of a fluid crystal! Or are you so sure that Einstein is right in turning away from the aether notion, that you accept his viewpoint, rather than respecting the memory of so many great 19th century physicists by reviewing their efforts constructively and taken account of today's knowledge of the fluid crystal?

Let us get back to the question of that lateral vibration of propagating electromagnetic waves. Believe it or not, there is a kind of unseen 'snake' wriggling along side-by-side with the wave we eventually sense. It is an electrical component of the aether, a dual displacement feature, and it not only keeps the aether in balance dynamically, but it preserves the continuity of the wave oscillations when minor impediments are encountered in its transit through space. Those

impediments, however, take their toll on energy and, as my theoretical analysis shows, the effect is that the wave energy can be depleted in transit and with that the frequency. This accounts for what cosmologists call the redshift and interpret as the mutual recession of all stars in the universe, the phenomenon they say is the expansion of the universe.

I can derive from this argument and pure theory based on detailed analysis of aether structure, the observed value of what is termed the Hubble constant and that is why I am certain about what I have just said. It is all reported elsewhere in these Web pages and in my scientific papers of public record. See, for example, [1984e]

At this point, however, since these are just words, I think I should share with you a picture of what the aether looks like, if you really could see it. My insight into that and its portrayal will emerge when you press the link to the 'NEXT PAGE.' I certainly do not regard the aether as 'nothingness' and my task ahead is to educate you, the reader, on the aether topic, whilst applying my heresy also to more important topics, such as how we can extract energy from that aether as well as from new kinds of heat engine that tap ambient source of low grade heat. First, however, I must try to guide you along the channels of thought that led me to my aether belief. Foremost in this quest is the need to understand something your textbooks cannot begin to address, which is how energy fed into a solenoid, a wound coil of wire, can store energy in that 'nothingness' I call aether and then allow us to recover that energy when we switch the current off. Yes, your physics textbooks will tell you about Faraday's discovery of induction and about magnetic fields and lines of force, but though they tell you how to calculate the energy stored in unit volume of space, they will not tell you how a magnetic field actually stores that energy and holds it ready for our recovery. To be sure, no textbook can ever explain that without coming to terms with the reality of the aether. (Harold Aspden, September 10, 1998)

- **2000 (Lawrence Kraus) in *Quintessence: The Mystery of Missing Mass in the Universe* (a revised edition of *The Fifth Essence*), Basic Books:**

"A decade ago I coined the term 'fifth essence' to refer to the dark matter we inferred to dominate the density of mass and energy in the universe. This was inspired by Aristotle's quinta essentia, the material of the heavens complementing the four elements earth, air, fire, and water. Aristotle's essence became the more modern aether, the material that was thought, right until the last century, to permeate empty space. A decade ago, it seemed to me that dark matter was a sort of modern 'fifth essence.' But even closer in spirit to Aristotle's heavenly aether or 'quintessence' is the currently favored possibility that nonzero energy exists throughout empty space." p.xix

"Since that time [1887] Einstein's special theory of relativity has been tested innumerable times. Today, many predictions of his theory, including the slowing of time for moving observers, are observed daily in the high-energy accelerators built by particle physicists to study the fundamental structure of matter. Since this theory is incompatible with the requirement that light travels in an aether, no large-scale effort has been exerted to extend the work of Michelson and Morley in probing for such a medium. One might thus date 1905 as the end of the aether story." p.22

- **2000 September (Paulo and Alexandra Correa) in their "Overview of the Aurora Biophysics Research Institute (ABRI) Effort" at www.aetherometry.com:**

"More than 75 years after Einstein began the first of his several unsuccessful attempts to unify Physics by proposing a field theory that would integrate electrodynamics and gravitation,

existing Physics remains unable not just to complete this task but, still more fundamentally, impotent to understand such basic functions as the nature of heat, mass, charge, inertia, potential, or electric, magnetic and gravitational fields or wavefunctions. In other words, the XXth century promise of a Physics of Energy never quite materialized, Physics having remained prisoner of poor mixtures of XIXth century determinism with XXth century stochastic probabilism. In fact, modern Physics is not even cognizant of the universal structure of energy, let alone of the fine structures of mass-energy or kinetic energy. Without such breakthroughs in very basic science, any prospect of a unification of Physics will remain a meaningless task.

“Our new science of Aetherometry permits for the first time in the history of humanity a complete decoding of all the natural functions of Physics, including mass, charge, inertia, potential, field, etc, because it is the first and only exclusively energetic theory of physical, chemical and biological interactions, that accounts for how all the fundamental constants of nature are generated. Aetherometry is an interdisciplinary approach to BioPhysics that relies upon the micro-functionalist methodology and physical discoveries embodied by our Aetherometric Theory of Synchronicity (AToS). AToS presents a complete mathematical reformulation and unification of Physics based upon a breakthrough understanding of massfree (aether) and massbound (matter) energy functions, as specifically derived from the synchronous superimposition of waves and momenta. AToS has replaced de Broglie's theory of matter waves with a new, non-relativistic and functionalist theory of wave energy functions, where the wave and particle duality is directly integrated.

“The first critical contribution of AToS is the rediscovery of aether energy in massfree form as encompassing four distinct primary manifestations - gravitational, electric and thermal, whether sensible thermal or latent thermal. The fine structure of these distinct aether energy forms has been entirely decoded by AToS, as well as the structures they acquire when they associate with mass-energy in the form of kinetic energy - be it gravitokinetic, electrokinetic or thermokinetic.

“The second critical contribution of AToS is the discovery of the dual fine structure of mass-energy for leptons (eg electrons) and hadrons (eg protons), including their volumetric geometries. By properly understanding the electric and the photoinertial momenta and wave functions of mass-energy and, by coupling to this a novel understanding of kinetic energy and the determination of velocity functions, AToS enunciated a new Law of Electrodynamics that takes into account not just the difference in mass between diverse charge carriers (eg leptons vs hadrons), but also the interaction between massbound and massfree charges.

“The third critical contribution of AToS is the discovery of the cogenesis of mass-energy and corresponding graviton energy, from massfree aether energy. This eventually permitted elucidation of the natural functions of gravitational energy and an entirely new understanding of the relationship between negative gravity and latent heat. AToS has also succeeded in formulating the gravitation constant G as a simple and elegant quantum function employing only fundamental quantities. This then opened the way for the integration of electric and gravitic interactions.

“The fourth critical contribution of the theory is the discovery of the physical process whereby blackbody photons are produced from the electric interaction between massbound and massfree charges. In this respect, AToS places electromagnetic energy in a new light, where photons are viewed solely as local productions and the excitation responsible for their production can propagate independently from the limit posed by the speed of light. This work has, amongst other added benefits, already permitted investigation of the heretofore unknown

spectrum of solar massfree energy radiation. A parallel analysis of the cosmic background microwave radiation has also been carried out.

“AToS allowed precise determination of the value of the fine structure constant, and this has permitted generation of a revised hydrogen spectrum that now matches exactly the observed data (including one subfractional line), something which no quantum-mechanical model can do to this day.

—Immediate outgrowths of this experimental and theoretical work, for which patent protection is currently being sought, have been:

—a new method to tap the latent and sensible heat energy of atmospheric and vacuum environments, which, by thermoelectric conversion, can be employed to drive motors or charge batteries.

—a new method to experimentally achieve zero-gravity, that will lay the foundations for negative gravity lift and propulsion systems, as well as for control of positive gravity.

—ongoing development of new instrumental software and hardware that will perform an array of novel parametric measurements in electrodynamic, magnetodynamic, thermodynamic, kinemassic and gravitic interactions, with direct applications for engineering, basic and advanced sciences, as well as control and manufacture systems.

“The Aurora Biophysics Research Institute (ABRI) is geared to take advantage of the multiple breakthroughs of Aetherometry by creating a nexus of distinct efforts targeting the further development of all the disciplines of Aetherometry (with respect both to education and research) concomitantly with the development of its various technological embodiments. The ABRI's complex research process is placed at the merger of Physics and Biophysics. When Leo Szilard learned that biological clocks were not affected fundamentally by temperature, he commented - "if there is an undiscovered principle of physics, it seems likely that the biosphere will have employed it". The ABRI's research aims precisely at teasing out the Physics of the Aether which are responsible for the functions and genesis of both mass-energy and living systems, since the dynamic Aether - or at any rate a fundamental portion of it - is precisely that energy principle which the biosphere employs to control its synthetic machinery and which Physics is only now vaguely awakening to. The foundation provided by Aetherometry enables thought to seize the entirety of nature, whether animate or inanimate, as being energetically alive. Since the present development of Aetherometry permits and demands a series of linked basic research projects in the domains of bioelectricity and biological clocks, microbial biogenesis, electrogravitation, thermoelectric conversion and the utilization of high-frequency, high-potential 'alternating' currents to perform work and transmit power; and since AToS predicts specific fine structure for both massbound and massfree charge, the hard core of the ABRI's 'mission' will consist of those theoretical and experimental research efforts that aim at exploiting our basic findings and testing the aetherometric predictions. Surrounding the nexus of these basic projects, there is another level of projects having an applied nature and aiming at the benign technological exploitation of the existing and forthcoming discoveries in basic science. These range from hardware and software design and development to construction of prototypes and the design of autonomous housing utilizing the new energy technologies.”

- **2001 (Stephen Hawking) in *The Universe in a Nutshell* (Bantam Books):**

“Toward the end of the nineteenth century, scientists believed they were close to a complete description of the universe. They imagined that space was filled by a continuous medium called the ‘ether.’ Light rays and radio signals were waves in this ether, just as sound is pressure waves in air. All that was needed for a complete theory were careful measurements of the elastic properties of the ether. In fact, anticipating such measurements, the Jefferson Lab at Harvard University was built entirely without iron nails so as not to interfere with delicate magnetic measurements... Einstein had overthrown two of the absolutes of nineteenth-century science: absolute rest, as represented by the ether, and absolute or universal time that all clocks would measure....(I still get two or three letters a week telling me Einstein was wrong.) Nevertheless, the theory of relativity is now completely accepted by the scientific community, and its predictions have been verified in countless applications.”pp.4-11.