FACES OF LENR

Part 4: From Alchemy to Biological Transmutations

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Abstract: *Part 4 concludes the listing of various physical processes (faces) of LENR. All of them are outside of textbook physics. The physics of ether, or akasha, as a spectrum of neutrinos is discussed. Contrary to what textbooks indicate, ether does exist, and some demonstration experiments are shown. In all previous parts, an essential effect was described for transmutation. The introduction of ether completes our understanding of the foundations (faces) of transmutation-related physics.*

Introduction to Part 4

Part 4 completes the list of necessary physical background effects of LENR by adding the ether.

In Part 1 (*IE* #151/152), the extension of electrodynamics was outlined, to introduce a missing symmetry—rotation. It was shown that transient plasma/sparks do generate strange quasi-particles—exotic vacuum objects (Ken Shoulders) or condensed plasmoids (Lutz Jaitner)—which do have rotational symmetries and catalyze transmutations even for high mass nuclei.

The SiC-based Tesla carbon button discharge lamp was the first application of these quasi-stable quasi-particles in history.

In Part 2 (*IE* #153), transmutations in nature were described, that is when rotating charges are involved. These were the charged interstellar dust particles, falling into stars, fueling the corona outside the surface. Thus explained was the longstanding mystery of why the temperature of the solar corona is about 4-5 million°C, while the surface of our Sun is a mere 7,000°C. Further, the 11 year cycle of solar activity was related to the 11 year alignment of our giant gas planets.

In a different field—biology—the rotating protein machine/ATP-ase enzyme was shown to yield nitrogen by fusing carbon and deuterium nuclei.

In Part 3 (*IE* #154), the extension of electrodynamics for Lorentz forces was completed. The weird features of ball lightning were discussed briefly as a four space-dimensional effect. It was shown that the unsolved function of proton pumps in mitochondria is probably related to hyperspace jumps above the inner membrane from the matrix into the intermembrane space.

The side effect of proton pumping is the source of biological transmutation for high mass atoms.

The helical structure of these proton pumps seems to be the cause of electron rotation within a cell membrane. This in turn generates spin and torsion fields, which are necessary conditions for the four-dimensional Lorentz force.

Further, it was shown that chiral material properties are not acknowledged in physics (biophysics) as a shameful mark of ignorance and negligence. Yet all materials in any life form are based on chiral media, and electrodynamics within that medium. This is the primary reason for the appalling ignorance in biophysics, as discussed in Part 3.

Finally, the missing symmetries of electromagnetic wave generation were discussed—that is, the missing longitudinal and torsion waves. This omission is painful, as Nikola Tesla tested and patented longitudinal waves of electrodynamics long ago. Along this line, the pioneering experiments of John Hutchison were analyzed. The physics of teleportation, metal bending and transmutation of metals were discussed. (Anti-gravity and gravity vortexes will be touched upon in Part 6.)

All these parts focused on the importance of fundamental symmetries, like rotation. Recent electrodynamics textbooks might have been written by the Inca-Aztec societies, who never used the wheel, and were unable to comprehend rotation.

Ether: The Superfluid Macroscopic, the Oscillating Microscopic

In this part yet another missing face of low energy transmutation will be discussed—ether. Ether as such doesn't exist in textbook physics, but electromagnetic vacuum fluctuations are a grudgingly accepted fact.

There is a long list of questions in fundamental physics, which students are not supposed to ask from their teachers—because they don't know the answer. No wonder, as they are related usually to the properties of ether—either as a superfluid, permeating the Universe, or an oscillating filed at subatomic distances.

The sensitive questions are the following:

1. What is a force field made of (*e.g.* electric and magnetic, spin field, etc.)? (It is the flow of ether.)
2. Why is charge quantized? (And energy, angular momentum and the magneton...) (Because they are made of ether vortexes.)
3. Why is mass not quantized? (Because inertia depends on the acceleration in ether, but time and distance are not quantized.)
4. What makes the inertia of a mass? Do fields have mass?

(Inertia is resistance to ether flow.)
5. Why is the accelerating force related only to the second time derivative, but not to higher ones? Why does $F = m \cdot \partial^2 x(t)/\partial t^2$, that is $F = m \cdot a$? (Because of resistance to acceleration, the modified ether flow pattern depends only on the second time derivative.)
6. Is there a deeper meaning behind the second time derivative? (The ether flow pattern depends solely on the second time derivative.)
7. Electrons are the source of electric fields, protons are the "sink" of electric fields. Is the source/sink idea just a mere mathematical concept, or has it a real physical meaning? (Yes, electric charges are the pumps of ether flow.)
8. Electrons have electric charge and magnetic dipole, and thus are the source of electric and magnetic fields. However, electrons have spin as well; are they the source of spin fields also? (We know already the answer from Parts 1 and 2: yes!)
9. The age-old unanswered main question of electrodynamics: why don't electrons fall into the nucleus? (Due to the intensive frothing, oscillations, of ether at the sub-atomic scale.)
10. Why is space homogeneous, isotropic and stationary? Is it always so? Can we disturb it, at modest technical parameters? (This homogeneity can be modified with acceleration of mass and with inhomogeneous electromagnetic fields.)

These fundamental, open questions are all related to the ether. It seems that transmutation—that is, fusion and fission—is also related to the very existence of ether, as a seldom acknowledged ingredient of the LENR process.

In the next section the following features of ether will be assumed and described:

1) *Ether consists of neutrinos* of different energies and thus wavelengths. So far physicists have considered neutrinos only of very high energy, thus high penetration capability, not taking part in any chemical, biological or macroscopic interaction. It is not clear whether electron- and muon-based neutrinos are the same, and if they annihilate their own antiparticles. We shall also consider in this paper the low energy neutrinos which make them act as a continuous fluid. This ether is a superfluid but it resists acceleration just like the superfluid He-3. This macroscopic quantum effect is a good analogy of the ether at the time and length scale of classical physics.
2) *Ether flow is generated in all electromagnetic interactions*, and it moves like a superfluid. Forces are mediated by this ether flow, thus *ether is a real physical medium*, with many useful features. Most probably, this flow is not restricted to our 3D physical space, but has a multispace-dimensional flow. Also, the movement of macroscopic bodies does influence the flow of ether.
3) *Ether energy has a distribution function*, just as electromagnetic oscillation frequencies. Thus low energy, higher wavelength neutrinos are also present among them, and they do participate in chemical and physical interactions. Macroscopic bodies do absorb them to a degree. This absorption turns their small kinetic energy into heat. In turn, this might be the cause of static gravity.
4) At the atomic scale (electron shell), *ether oscillates as electromagnetic random fluctuations*, thus in turn, they are the root cause of quantum fluctuations.
5) At the scale of the atomic nuclei, it is a severe destabilizing factor, also working against the binding forces. This random fluctuation is suspected to be the cause of weak interactions and some radioactive decays.

However, not only fission but also fusion takes place with the mediation of neutrinos, due to their spins. Thus ether may also have angular momentum carried by spin fields, shown in Parts 1 and 2.

The reality of *macroscopic ether* is flatly denied in textbook physics, since special relativity has been accepted. As we saw in Part 3, only transverse waves are considered today. Their speed is the maximum speed in physics for any objects. This is incorrect.

Longitudinal and torsional electromagnetic waves are rejected, as they have higher speeds compared to the transverse waves.

Neutrino speeds—having a small rest mass—are also limited by the speed of light, a transverse wave.

The existence of vacuum fluctuations are grudgingly accepted, being responsible for the weak Van der Waals forces (Casimir forces). Some physicists consider this vacuum fluctuation to be responsible for the stability of atoms. After an electron is excited by an external source, *e.g.* heat, the electrons get to an external orbit for a short period. Then vacuum (or ether) oscillations disturb this quasi-stability, by returning it to the stable phase. This model is also grudgingly accepted even at a nucleus scale, responsible for γ radiation of an excited nuclei. We wouldn't even see each other without this fluctuating property of ether,

Note that Hindu philosophy also acknowledges the ether and it has a rich heritage in their view of the universe. This is the all penetrating medium—akasha—which penetrates everything. This cosmic force is marked by the goddess Bhuvaneshwari.

The features of akasha are surprisingly identical to the features of ether described below.

The Detectable Features of Ether, and Its Practical Application

The most obvious field of ether observations comes from applied chemistry—biology. It is known that women have a 28-day long fertility cycle. It is not by chance that the Moon has the same period of cycles. Women, living close to nature, have synchronized their fertility periodicity to the Moon.

However, there is no explanation in textbook biophysics for this fact. In fact clams, living below visible light on the dark bottom of the ocean, also have their sperm activity related to the (invisible) Moon period, too.

However, there is more to the subject of ether/akasha/neutrino sea/space weather subject. The work of S.E. Shnoll's group shows that there is a daily, monthly, yearly and an 11 year variation for the intensities of chemical, biological and nuclear processes.

Shnoll, a professor at Lomonosov Moscow State University and researcher at the Institute of Theoretical and Experimental Biophysics, and his co-workers (V.A. Kolombet, E.V. Pozharskii, T.A. Zenchenko, I.M. Zvereva and A.A. Konradov) recognized an unusual effect.

There are periodic variations of yield or throughput in nearly all processes of nature, for multibody interactions.[1] The surprise for us is that even nuclear decay (radioactive decays) involving β and α emissions were involved.

Until then it was a firm law, set in stone: there is no external effect on nuclear decay. No heat, chemical, mechanical effects influence their decay rate. It is a uniform random process solely within the nuclei. The very idea that celestial processes may influence chemical, biological, even nuclear processes seemed not only counterintuitive, but preposterous. It flew against many established laws of science in distant areas like astronomy and biology. The real threat was the implicit acceptance of astrology in natural science, which is a full-fledged pseudoscience in the eyes of academic research.

Shnoll's group had decades of accumulated experimental evidence for this periodic disturbance, collected from the early 1950s until the end of the 1990s, spanning half a century.

In order to accept this dangerous idea, one may assume an omnipresent flow of an unknown form of matter-energy, which can influence diverse random processes at a fundamental level. Such massive re-evaluation of established dogmas has no precedence in the last one hundred years of science as institution and method. If this ether/akasha effect is true, the reliability of all observations is challenged, a severe blow to the reputation of the academic establishment.

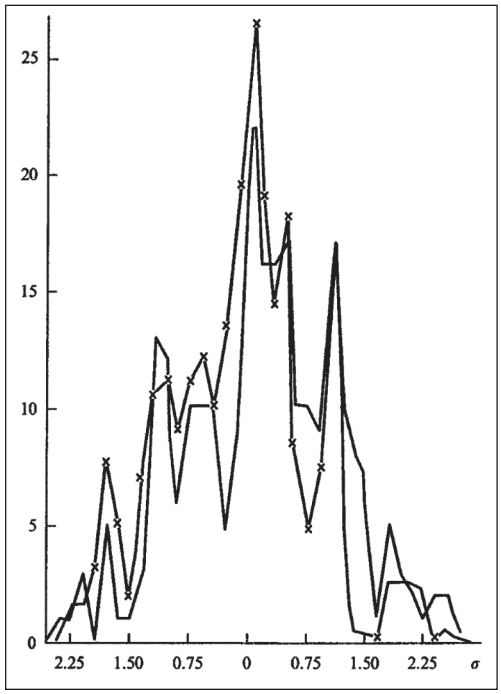

Figure 1. The intensity of the reaction of two different processes. Note the common time dependent pattern of a nuclear and a biochemical process, showing towards an identical cause.[1a,Fig.10]

In Figure 1 (taken from Figure 10 of the Shnoll *et al.* paper[1a]), the correlation between a nuclear and a biophysical process is shown. It is the correlation between the decay rate of ^{14}C (electron emission) and reaction rate between vitamin C and dichlorophenol-indophenol. The reaction activities were measured 250 times in both tests. The time histograms of these tests show a remarkable correlation even for the untrained eye. This can't be a mere accident, or synchronicity; there must be a common casual relation between both phenomena.

For us the influence on the transmutation rate is of interest. If the presence, and intensity, of the ether/neutrino flux/akasha movement influences radioactive decay, then it has a practical application. It can be a catalyst for some (if not all) nuclear processes—transmutations.

So if the neutrino flux and vacuum noise is a "bottleneck" in some fusion/fission transmutation phenomena, thus the reaction rate can be increased or decreased.

Both ways have practical applications. To what degree? There is no clear answer today, though the work of Alexander Parkhomov (to be discussed soon) sheds some light on it, being within the order of about ±50% for weak interactions, the fusion of nuclei.

According to the Shnoll group, there were similar histograms for the decay of tritium and ^{14}C, the above mentioned reaction of vitamin C and DcPIP, α activity of plutonium 239, the electrophoretic activity of latex particles, the transverse relaxation time of protons in water, the time period of a neon discharge lamp in RC oscillations and the chemical oscillation rate of the Belousov-Zhabotinsky reactions. Further, as the sedimentation crystallization rate of organic materials are also modified, this process is suitable for a crude two to three day weather prediction. This "storm glass" was discovered by chance, and used on Darwin's ship en route to the Galapagos Islands. It is used now by thousands of people. Remote winds and electric atmospheric activity disturbs ether, before the weather front arrives. For the same reason, most people have a headache or fatigue *before* the weather front arrives. The disturbance in the ether arrives sooner than the rain.

These are quite diverse reaction types measured by different methods and devices, so the idea of a system error is out of the question. No test bias appears in such uniformity, therefore a common cause is the most plausible explanation behind such synchronous event rates.

These tests require patience, as several years of test result patterns must be collected, smoothed, stored and correlated.

Parkhomov's Results

The above-mentioned work on neutrino flux/ether/akasha has been continued and extended.

While Shnoll's group made no assumption on the nature of this anomaly, apart from noting its obvious celestial origin, Parkhomov did just that.

Though George Gamow speculated on the possible role of astrophysical neutrino flux back in 1941 (in *Phys. Rev.*), it was soon forgotten.

To jump ahead in time, Parkhomov published a theoretical paper[2] based on the concept of neutrino-based ether. In this model heat is needed in order to create neutrino-antineutrino pairs in the order of about 0.1 eV at the minimum. This corresponds to about 1,200°C. In Parkhomov's opinion, based on decades of experience, this is the lowest threshold where locally generated neutrino pairs appear, which in turn catalyze chemical, biological and nuclear reactions.

In other words, high density hot solids generate neutrinos already at this threshold temperature, which have spin but little rest mass. Their spin is the necessary ingredient to processes requiring spinning particles. (It has been shown in Parts 1, 2, and 3 that this is essential in chiral medium, transmutation and magnetic current phenomena.)

This insight removes a final "bottleneck" from transmutation processes. There is an ambient neutrino flux in nature produced by stars, in a thermal energy spectrum of Maxwell-Boltzmann distribution.

This is like phosphorous in biology. It is a rare element; it is the bottleneck element of ATP synthesis. Life grows explosively when phosphorous is dumped into water, as it is a catalyst recycled by life.

Parkhomov argues for the need of dense hot solids in LENR reactions, as *thermal collisions are the source of neutrino-antineutrino pair production*.[3] Electrons move at the speed of

$2 \cdot 10^5$ m/sec at about 2,000K in a lattice, thus a single electron has about $2 \cdot 10^{13}$ collisions per second. There are about 10^{23} free electrons in one cubic cm of metal, thus the number of collisions in a cm^3 is about $2 \cdot 10^{36}$.

When the energy of neutrinos is very high (in β decay and particle accelerators in the order of 1 MeV), the de Broglie wavelength is very small, the length of a nucleon, and thus it is too small for catalytic action between atoms.

However, a thermal neutrino with a de Broglie wavelength of about 5 microns is big enough, thus several interatomic interactions can be catalyzed. This is the essence of Parkhomov's insight.

The thermal neutrino interaction range is large, thus capable of catalyzing, and gives missing spin for interactions between neighboring atoms for chemical and nuclear reactions. High energy neutrinos on the more energetic side of the Maxwell distribution are unable to catalyze nuclear (or biological) interactions.

This is a testable hypothesis. Make a hot incandescent metal, insulate it thermally, and place it near a physical or biological process, and the process will accelerate. (This happens to be known by Vietnamese dragon fruit farmers. They accelerate their growth near the Lunar New Year, when the price is high, being a traditional gift. No discharge lamp does the trick, nor LED lights, only heated tungsten filament lamps. Then crop lands are lighted with thousands of lamps during the 12 hour dark nights.)

So heat, at a min. 1,000 - 1,200°C threshold, is necessary for low energy transmutation processes in Parkhomov's view, but it must be provided by solid materials, not plasma, which yields much fewer neutrinos for the same temperature. See Figure 2,[2] where the thermal neutrino yield is shown as a function of temperature.

We shall return to this issue in Part 5 of this paper, where transmutation-based LENR reactors are analyzed.

Parkhomov wrote a long, fact filled book on this problem[3] with many insightful test results on the physical nature of the ether/neutrino flux/akasha.

András Kovács, Giorgio Vassallo and Francesco Celani[4] argue that neutrinos may turn into magnetic monopoles as light particles, which do catalyze the nuclear (and biological) reactions.

This author saw old, nineteenth century observations where sunshine and heat makes non-magnetic iron needles and nails magnetic after irradiation. This is quite counterintuitive since one may expect quite the opposite based on textbook physics.

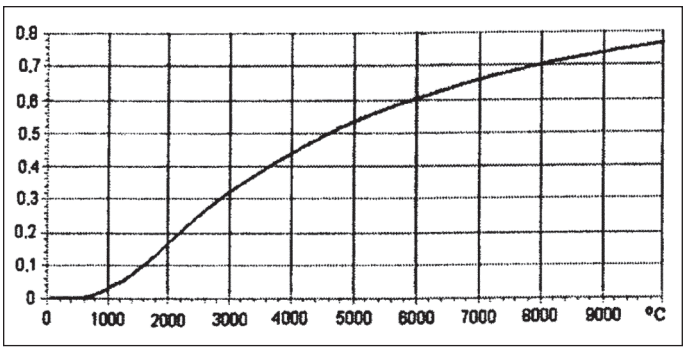

Figure 2. The distribution of neutrino energy as a function of temperature in a solid (Parkhomov's model).[2,Fig.1]

Other Observations of Ether/Neutrino Flux/Akasha

There are a number of barely known observations pointing towards the reality of ether. These involve pyramids, their thermal and electric activity, acceleration anomalies and effects of force fields on reaction rates/time accelerations.

It is interesting that Sir Isaac Newton and yoga tradition have the same definition of the ether/akasha:

> There exists a certain aethereal medium, by far the subtlest of all, which quite freely permeates all the pores and passages of all bodies and that a resistance ought to arise from such a medium flowing through the pores of bodies.

This definition was originally suggested by Descartes, and developed further by Huygens. Faraday, Maxwell and especially Tesla thought along these lines.

The usual interferometry (and the Eötvös torsion balance) based ether research was summarized in a book by Franklin and Laymon.[5]

The interference experiments of Michelson and Morley in 1881 and 1887 gave a null result, which led to the demise of ether as a concept 50 years later. However, they were based on linear movement, with no acceleration.

As usual, physicists had little creativity, as there are a number of other effects where the reality of ether/akasha/neutrino flow appears, when a system accelerates. They assumed a viscous ether that reacts even at steady speed carrying along light (like the Fizeau experiment, when moving water carried light). However, if ether is superfluid, only accelerating movement changes the speed of light, or electrodynamics in general. However, that was not tested. Although, Lev Landau and Lifschitz acknowledged that the electrodynamics of moving and inhomogeneous media was murky.

Even the Michelson experiment, repeated later by Morley and Dayton Miller,[6] cast doubt on the null result in 1933. No new test has been reported ever since, thus ether was pronounced dead by a single flawed experiment.

It is more important that the interference pattern shifts appeared when the same experiment was repeated in a rotating frame (with steady acceleration). That is, two split light beams traveled along the perimeter of a rotating wheel in different directions. The interference pattern emerged as the function of angular velocity (even at low angular velocity). This is the Sagnac effect, used commercially now (instead of gyros) as navigation devices aboard airplanes and rockets. See the review paper of Anderson *et al.*[7] (Most theorists "explain away" the Sagnac effect as an effect of curved spacetime predicted by general relativity.) The Sagnac effect was not performed at very high angular velocity and acceleration with optical fiber cables, which can settle this issue.

The ether/neutrino flux/akasha problem is also related to the fundamentals of inertia and gravitation at the deepest level. Mainstream physics claims that inertial and gravitating mass are fundamentally the same. This is the initial assumption of General Relativity based on the Eötvös experiment.

However, Newton performed the first of such a pendulum experiment, later improved by Bessel, to test this assumption. It was a mathematical pendulum, where both inertial and gravity forces appear. Thus when different materials are used as the bob of the pendulum, the period times must differ depending on the bob material. The period time can be

measured rather accurately as hundreds of oscillations can be measured cumulatively.

Harold Potter repeated this experiment using hydrogen-rich and heavy nuclei pendulum bobs. His test results were the following, when brass was taken as unity oscillation time:[8]

Heavy nuclei acceleration	Hydrogen-rich nuclei acceleration
Lead 0.999992 g	Ammonium Fluoride 1.000005 g
Steel 0.99980 g	Paraffin 1.000013 g
Bismuth 0.999994 g	Mahogany 1.00015 g
Al 0.999992 g	

The difference is less than 1/50,000, but it is systematic. Masses containing hydrogen have longer swing periods, and thus offer less resistance in ether. Physicists assume this is a null result, and never bothered to refine or repeat it.

Gyula Szász, a Hungarian physicist living in Germany, repeated this experiment in free fall, in vacuum. He found definite difference in the acceleration, as a function of mass defect when the height was 110 m, and found a difference of 0.045 g, that is 1%, between the acceleration of Al and Li. The difference was smaller for carbon and Pb, yet not zero.[9] The results for Be and B were inconclusive, as they stuck to the bottom of the falling capsule due to high vacuum.

The tests were immediately banned after publication, as they contradicted the expected null result—the equivalence of inertial and gravitating mass.

This is a very important theoretical/practical issue. If the two masses are not identical, only devilishly close, then there is a way to tame both gravity and inertia. It is to develop devices to reverse gravity (anti-gravity) and reduce mass to accelerate space ships with modest energy expenditure. (We shall deal with gravity and anti-gravity devices later in Part 6.)

If ether exists, it is possible to modify its density, thus its interaction, resistance to acceleration, with different materials. However, these results destroy the fundamental hypothesis of general relativity, the equivalence principle. Gravity then cannot be "geometrized," to model it as the curvature of space-time—a generally accepted fact today.

The rotating platform Sagnac experiment indicated that even uniform radial acceleration modified ether's density, but a non-uniform one including tangential acceleration had an even better prospect.

This experiment was performed by Zoltan J. Kiss, a retired nuclear engineer in Paks, Hungary. He mounted tungsten filament lamps on the perimeter of a 40 cm diameter disc, and started to accelerate it. The lights gradually became weaker and weaker and ceased altogether before reaching the highest angular velocity.

There are a number of open questions: Obviously, the tungsten filaments become longer and thinner due to the centrifugal forces. But the sudden darkness was not due to mechanical failure, since the light came back gradually during deceleration. (The current was supplied via a pair of slip rings from a voltage stabilized power supply.)

The tests were done at a steady torque, at a high tangential acceleration but not with a modest one (see Figure 3). Further, LEDs were not tried, only small, 12 V tungsten filament lamps. (The length of the lamp filament was about 3-5 mm, in a tangential position.)

Using Parkhomov's idea about incandescent filaments as a source of ether/neutrinos and accelerating acceleration influencing ether (the Sagnac effect), this experiment can be a connection between electricity, acceleration and ether/neutrino/akasha flow.

Readers are encouraged to repeat this experiment. Further, it is worth trying the following combination of tests for steady acceleration:

a) dropping rotating objects from a tower in vacuum in a box along with non-rotating identical ones,
b) dropping hot objects as above,
c) dropping rotating/hot objects made of different materials,
d) the combination of the above,
e) testing hot/rotating objects on the pendulum period in the manner of Potter, discussed previously.

All in all, this series of experiments is about the "disturbing of ether flow" by heat and non-uniform acceleration.

The Sagnac type experiments indicate that the homogeneity and isotropy of ether flow can be disturbed. Further, the radioactive decay rate can be influenced (β decay) in this manner, though this is technically challenging.

This author performed a series of experiments with nutating gyroscopes (see Figure 4). A frequency stabilized ~12

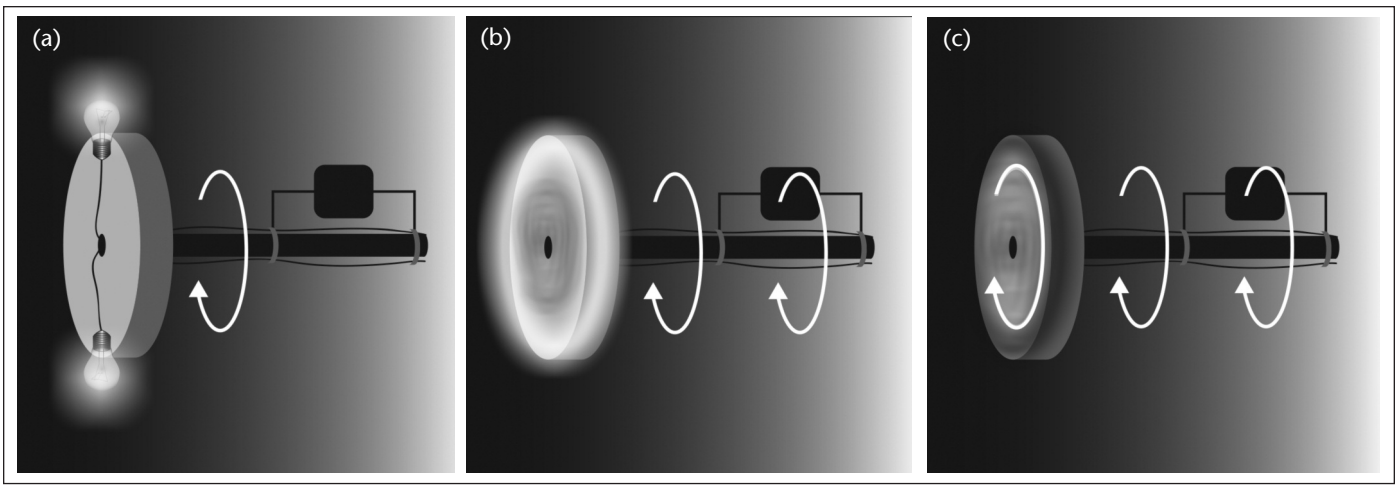

Figure 3. (a) A rotating and accelerating disk. Spatial and temporal acceleration at each point. (b) At a medium angular velocity case, the light dims. (c) At peak acceleration, the light stops. It will shine again when decelerating.

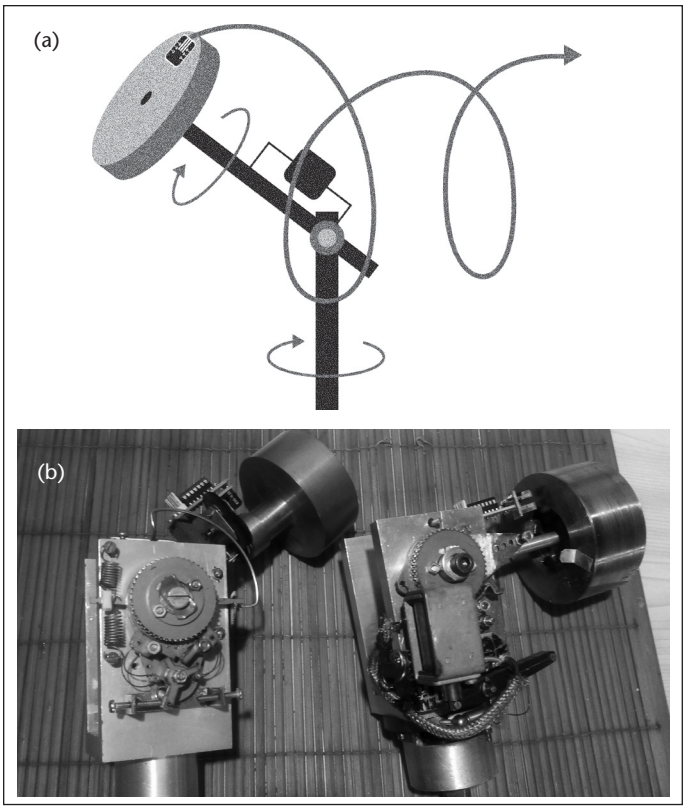

Figure 4. (a) Chip on the nutating gyroscope. Note the uneven acceleration. (b) Photograph of the gyroscopes.

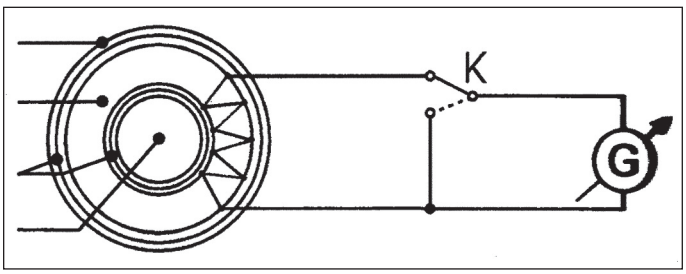

Figure 5. Test arrangement: temperature measurement at the surface of a large mass.

MHz crystal oscillator was mounted on the perimeter of the brass wheel of the gyroscope, and another similar oscillator in the stable axis, with a slightly different frequency. Their frequency difference is easy to measure, a usual method for sensitive tests.

When the gyroscope was precessing at a steady vertical angular velocity Ω, there was no frequency difference. However, with nutation there was a 5-10% difference in the beat frequency of the two oscillators around peak acceleration! This experiment is also worthy of repetition.

The idea of this test came from Janos Szamosközi of Hungary, who compared two stable quartz crystal oscillators embedded in a soft iron casing (screening steady magnetic and electric fields). He found that a strong electric and/or magnetic field would shift the frequency difference between these oscillators.

Note: it is hard to measure the slight shift of a frequency at 10-12 MHz, let's say 10-15 Hz. That is within the range of test error. But the difference of beat frequency is easy (and reliable) to measure between two slightly different oscillators.

The above simple experiment also indicates that external field—electric, magnetic, gravity—acceleration has an effect on ether/neutrino/akasha flow.

The striking similarity between steady-state electric and magnetic fields and fluid vortexes has been previously noted by several authors, but in vain. Analogy is not (yet) symmetry!

Further, there is a noteworthy analogy between inertial and electromagnetic forces![10] Semon and Schmieg note that there are three inertial forces in a rotating frame, and each has an analogy in electrodynamics:

F1 = -mω x (ω x r) centrifugal force; Electric field: E = (m/q) ω x (ω x r)
F2 = 2m(v x ω) Coriolis force; B magnetic field: B = -(2m/q)ω
F3 = -m ω x r transverse force; induced emf: ε = q · A · dB/dt

This points again to a possibility: mechanical pseudo forces in non-inertial frames (rotation) and electromagnetic fields are the consequence of dynamic ether. Thus a remote *connection is suspected between inertia and electrodynamics*, strictly denied today by textbook physics.

It was also noted that Maxwell's equations can be obtained from fluid flow (ether flow) equations[11] as a dynamic interpretation of electrodynamics.

Ether, Pyramids, Transmutation

So far it has been shown that transmutation requires neutrinos, spin and electric fields as catalyzers. In order to improve the efficiency of transmutation, a little more knowledge is required about the physics of ether (neutrino flow, akasha). Briefly, they are the following:

a) Static relation
Bodies (mass) absorb the low energy part of the spectrum of neutrino flow, turning it into heat or electric energy. This is a steady-state process showing a link between static (gravitating and or inertial mass) electric energy and ether flow. In this low energy part of the spectrum the ether flow is not superfluid as it is absorbed by a mass, turning it to heat. The absorption appears like a pressure difference in real viscous fluids, but an electric potential difference appears instead of pressure.

b) Dynamic relations
Ether flow and gravitation have an identical set of equations like electrodynamics, suggested by Oliver Heaviside. This has very little experimental evidence, but it is important because it offers feasible methods to alter or control gravity. These will be discussed only in Part 6, as they are not related directly to transmutation. (This is also relevant in biology.)

Now we concentrate only on experimental proofs of static phenomena. There are only a few experiments, as ether research is a forbidden subject in mainstream physics, and they are performed by private investigators.

Szamosközi has shown that inside a heavy lead ball of about 10 kg, the temperature is always higher than that of the ambient in an insulated environment. A thermally insulated lead ball is shown in Figure 5, and its surface temperature is measured by a series of thermocouples. The lead ball is covered by a conductive layer to eliminate electrosmog as a possible source of external energy. The system was covered by a thick layer of thermal insulation.

Yet the ten serially connected thermocouples have shown a 0.2 mV excess voltage compared to an identical ambient

series of thermocouples, indicating a difference in temperature.

This is too small a difference to have any practical value, but in the case of stars or planets it can be a significant thermal energy source. Aaron M. Meisner *et al.*[12] recently conducted a large scale investigation with about 500 citizen volunteer scientists, who analyzed the infrared spectrum test results of the Spitzer space telescope.[13] They found a number of brown dwarfs with anomalous high temperatures with an unknown energy source. We have the same problem here on Earth. What keeps the core of our planet hot, and thus volcanic activity? Radioactivity is just a guess, since the mantle is not very radioactive.

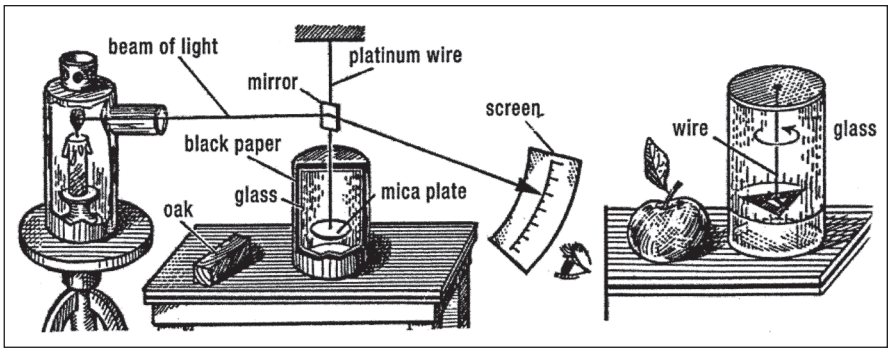

Figure 6. The Mishkin experiments. A hot candle flame, or a living object, gently rotates a mica disc.

Perhaps the earliest quasi-steady-state ether flow experiments were conducted by M.P. Mishkin in Russia (see Figure 6). He noted that a mica disc slowly rotated, following the cycle of celestial bodies, like the Earth, Moon and Sun. The disc was suspended on an annealed, thin platinum wire, and it was surrounded by a protective glass cylinder. A remote candle was used to light a mirror on the platinum wire to track the movement. (A candle near to the mica disc disturbed the test.) Mishkin also noted that a living object, an apple, also caused a slight rotation of the mica disc.

The physical properties of pyramids are also shrouded in mystery. There are observations claiming that germination is accelerated inside them, especially around the full moon.

Zoltan Kiss, mentioned previously, conducted experiments with modest sized, half meter tall, solid pyramids made of heavy concrete, with granite materials. The main ingredients were:

SiO_2 – 72.4%; Al_2O_3 – 14.4%; K_2O – 4.12%;
Na_2O – 3.69%; CaO – 1.82%; FeO – 1.68%;
Fe_2O_3 – 1.22%; MgO – 0.71%; TiO_2 – 0.3%;
P_2O_5 – 0.12%; MnO – 0.05%

This composition makes it watertight, that is, no water is absorbed into its body. The geometry followed the ratio of Kheops' pyramid on the Giza plateau in Egypt.[13] Kiss built thin wires into the top and the bottom, where small diagnostic gauges (voltage, current probe, thermometers) were placed.

Kiss' pyramids were always in the garden, never in thermal insulation. However, as a tendency, he noticed that the internal temperature was usually higher than the external one. This was not due to thermal lag, as the internal temperature was always warmer by 5-6°C even on the bottom for a prolonged period even on long winter nights, when equilibrium sets within two to three hours.

Kiss also recognized that there was a voltage, and current between the tip and the bottom of the pyramid, and a small current as well. The typical values were:

voltage: ~ 1 - 1.5 V current: 350 - 500 µA

This fact is strange for two reasons:

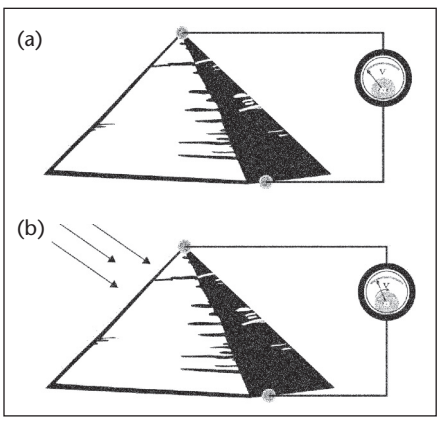

Figure 7a-b. Pyramid experiments of Zoltan J. Kiss. There is a small electric power generation between the top and bottom of the pyramid. Exposure to sunlight immediately increases the output voltage.

1) The concrete is water free, and electrically insulating.
2) There is no known electromotive force-field to drive a current. Further, a metal (copper) cap on the tip of the pyramid (Figure 7) enhances this effect. Sunshine also rapidly enhances it. An oscillating circuit (parallel) shifts its natural frequency inside the pyramid, in the lower test chamber.

Readers are encouraged to check out the above observations; it is not very expensive, only time consuming.

Yet another novelty of this experiment is that two nearby pyramids of the same size communicate with each other. That is, the voltage of secondary pyramid B changes when the primary pyramid A is grounded, short circuited (see Figure 8). All the above test results are impossible according to textbook physics.

Readers interested in the fundamental processes of nature ought to have the inspiration to delve deeper into this type of experiments.

It looks like pyramids act like "lenses" of ether/neutrino flow/akasha. They seem to collect and focus this flow towards the lower chamber. Thus the low energy part of the energy spectrum is transformed into electricity, and the rest into heat. The difference of the dissipated neutrino flux is detected as a force difference—gravity. We shall discuss further details in Part 6. These experiments point toward a connection between gravity, ether and electrodynamics.

Peter Grandics has also made very interesting dynamic pyramid experiments, published in *Infinite Energy*.[14] He used an approx. 1.5 m high pyramid made of copper plates, and measured the dynamic component of the electric field. Indeed, this cavity pyramid has shown resonant properties at certain frequencies. The unexpected test result may have two different causes:

a) External electric fields due to weather storms, or wind.

b) Dynamic parts of ether flow, which solid pyramids cannot detect.

It would also be useful to repeat the groundbreaking Grandics experiments over extended periods, to test the celestial ether variations for daily, 28 day and 365 day variations. Similarly, variations of β decay are worth testing inside the resonant cavity pyramid.

In principle, several further experiments are feasible based on the above observations:

a) Heating metal or ceramics with a plasma torch/electric heater to a white hot state under thermal insulation (like a steel smelter) to check the focusing effect of pyramids on several processes, like radioactivity, electric oscillations, biological growth processes, change in material processes, etc.

b) Check out the physical and biological effects of celestial alignments, like a full moon Sun, Earth, Moon alignment. Buddhist society notes the special biological and mental effect of the full moon.

c) Check the effects of other pyramid ratios, cones and hemispheres. Another ideal material to check these effects is marble or granite. There is no need for a single massive block of material. In Kiss' experience, step pyramids are also useful, made of a series of thick square slabs, provided their surface is smooth and yields a good contact. This "sliced" pyramid is easy to make, since ~5 cm thick stone slabs are commercially available.

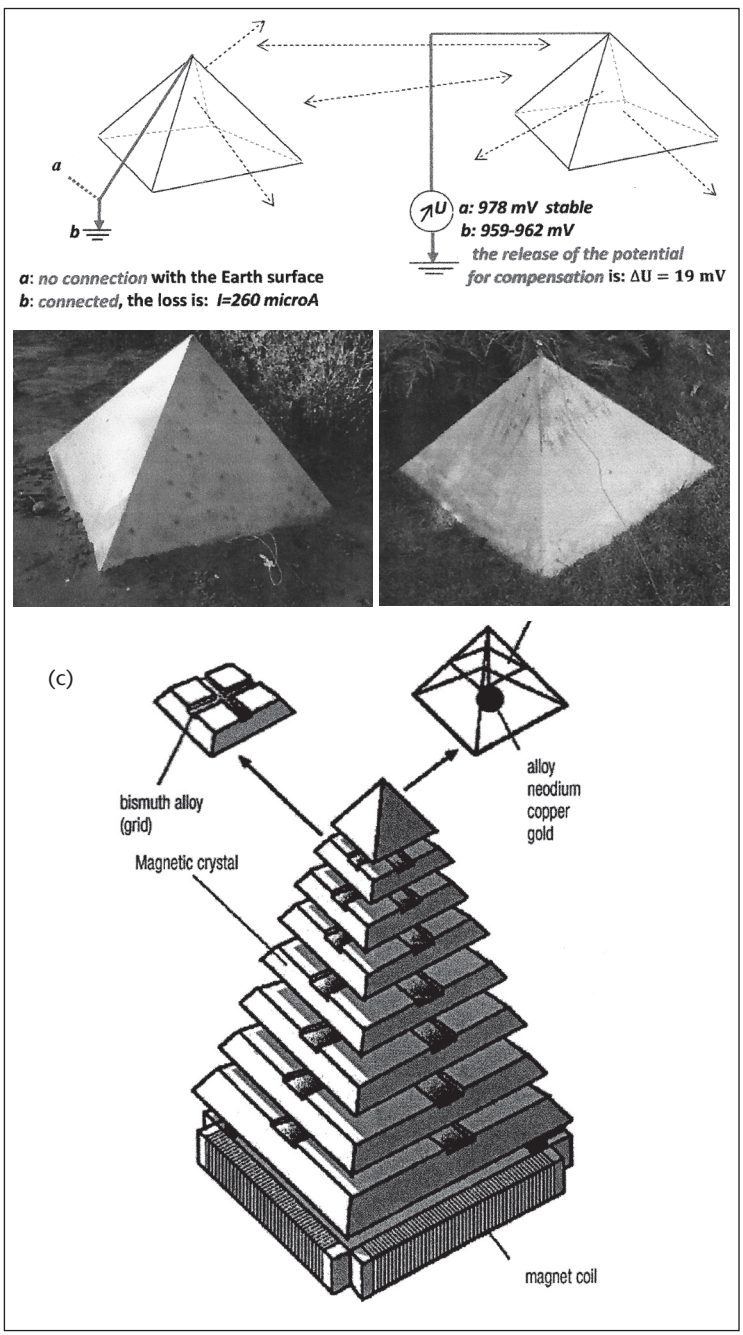

Figure 8. (a,b) There is energy exchange between two pyramids, due to the disturbance of ether. (c) Aso's semiconducting pyramid for enhanced electric power generation. Note the gradual change in conductivity.

Apart from the research of Kiss, Japanese inventor Tetsuhiro Aso also developed pyramids producing electricity, made of home-made semiconductor slabs (see Figure 8). Though not witnessed directly by the author, another Japanese engineer, Tsuyoshi Iwashita, verified the electricity generation of Aso's pyramid.

The static effect alone of generating electricity deserves a more thorough investigation, when the pyramid is made of amorphous semiconducting materials.

Humans, and all other living beings, are made of semiconductors. Semiconductors are usually amorphous and non-rectifiers! (The crystalline rectifying semiconductor is the exception, not the rule!) The Aso pyramid is able to harness both the static and dynamic part of macroscopic ether. Thus semiconductors are the preferred way to tap the universal energy source of ether/akasha. (This effect is termed "Earth Energy" in the yoga tradition. There are special asana postures to enhance this energy extraction process.) There is even a weak hysteresis effect of the ether energy absorption/release, termed "akasha memory." This is apparent when large polarized crystals are formed/dissolved in a solvent, depending on the weather and lunar periods.

Oscillations of the Ether at Atomic Distances

While the above-mentioned ether effects are completely banned or ignored by the mainstream, the "frothing" oscillations of ether are acknowledged—called vacuum oscillations, or zero-point energy. The term zero-point energy is justified. Even if a system is chilled to absolute zero temperature, these oscillations are always there. They are not thermal oscillations, and behave in a strange manner, discussed later. This is legitimate research in itself, and is important for two reasons:

1) It may contain an immense amount of energy available anywhere for free.
2) Fusion of nuclei and elementary particles is made difficult by the frothing oscillations of ether, and this makes nuclei unstable above a threshold size (uranium-238).

Indeed, physicists improperly use the world "vacuum" for these high-energy oscillations. Engineers use the word vacuum simply as "void." In the vocabulary of physicists, vacuum is attained when the void (the complete emptiness) is cooled to absolute zero. Thus this is the lowest energy state, yet it is full of energy.

Opinions differ widely about the unremovable energy

content of this state. (J.A. Wheeler *et al*. claim in their book on gravitation[15,p1202] that vacuum fluctuations have a stellar energy density ~10^{94}g/cm^3, while the mass density of a nucleus is only 10^{14}g/cm^3.) Wheeler notes: "Elementary particles do not form a really basic starting point for the description of nature. Instead, they represent a first order correction to vacuum physics. That vacuum, that zero-order state of affairs, with its enormous densities of virtual photons and virtual positive-negative pairs and virtual wormholes, has to be described properly before one has a fundamental starting point for a proper perturbation-theoretic analysis."[15,p1203]

Wheeler notes[15,p1203] that the shortcoming of the curved space-time model is that it "fails to supply any completely natural place for spin ½ particles in general and for the neutrino in particular."

Wheeler, Misner and Thorne characterized this view with the parable of air and clouds. The density of air is about 10^3g/cm^3, while the cloud has the density of only 10^{-6} g/cm^3. That is, the ether/vacuum/akasha has an enormous energy density, which is apparent at small distances of 10^{-33} cm, the size is a proton, neutron, while the oscillations are calmer at larger distances 10^{-11} cm, or 10^{-13} m.

To compare: a nucleon is about 1 femtometer, or 10^{-15} m in size, the diameter of U-235 is about 1.0 femtometer, or 10^{-14} m, while a hydrogen atom is about $2{\cdot}10^{-14}$ femtometer, or $2{\cdot}10^{-11}$ m, or 10^{-9} cm. (The 10^{94}g/cm^2 energy density is so high that when the energy of one cubic centimeter is converted into matter, it is enough to create the matter of a whole galaxy. Therefore most physicists detest Wheeler's calculations, nevertheless they also consider that the ether/vacuum/akasha oscillations have a very high value.) The calculations are based on the assumption of the highest possible photon frequency—a matter of debate. The higher the ultimate frequency is, the higher the energy density of the vacuum fluctuations is.

Previously the ether was assumed to be a flow of neutrinos, as a superfluid, at the range of macroscopic distances. Now another face of ether/akasha/vacuum is discussed at the range of the atomic scale: the random electromagnetic fluctuations. Together they describe ether, but both faces are important for LENR. The electromagnetic fluctuations involve spin field as well, ignored by textbook physics.

Why Bother with Ether?

We have already seen a reason: ether consists of neutrinos with an energy distribution range, an insight of Parkhomov.[2]

So far mainstream physics has considered neutrinos only as weakly interacting particles of high energy, thus passing through massive planets without any interaction. Indeed, these neutrinos do exist, but at their neglected lower energy range, they *do participate in nuclear reactions*. Moreover, they are absorbed by matter, creating some heat and electromotive force, as shown before in pyramid experiments, heating experiments and energy cell experiments of Szamosközi (discussed in Part 3, along with asymmetric cell membrane oddities).

The cases of vacuum fluctuation effects are shown in Figure 9. In Figure 9a an electron diffuses through an electric field generated by a contact potential of two different metal sheets. Vacuum fluctuations generate a small amount of electric energy at a maximum potential of 0.3 - 0.5 V. Note that this has nothing to do with chemistry; it is a continuous source of energy. (See Figure 9b, showing two such cells

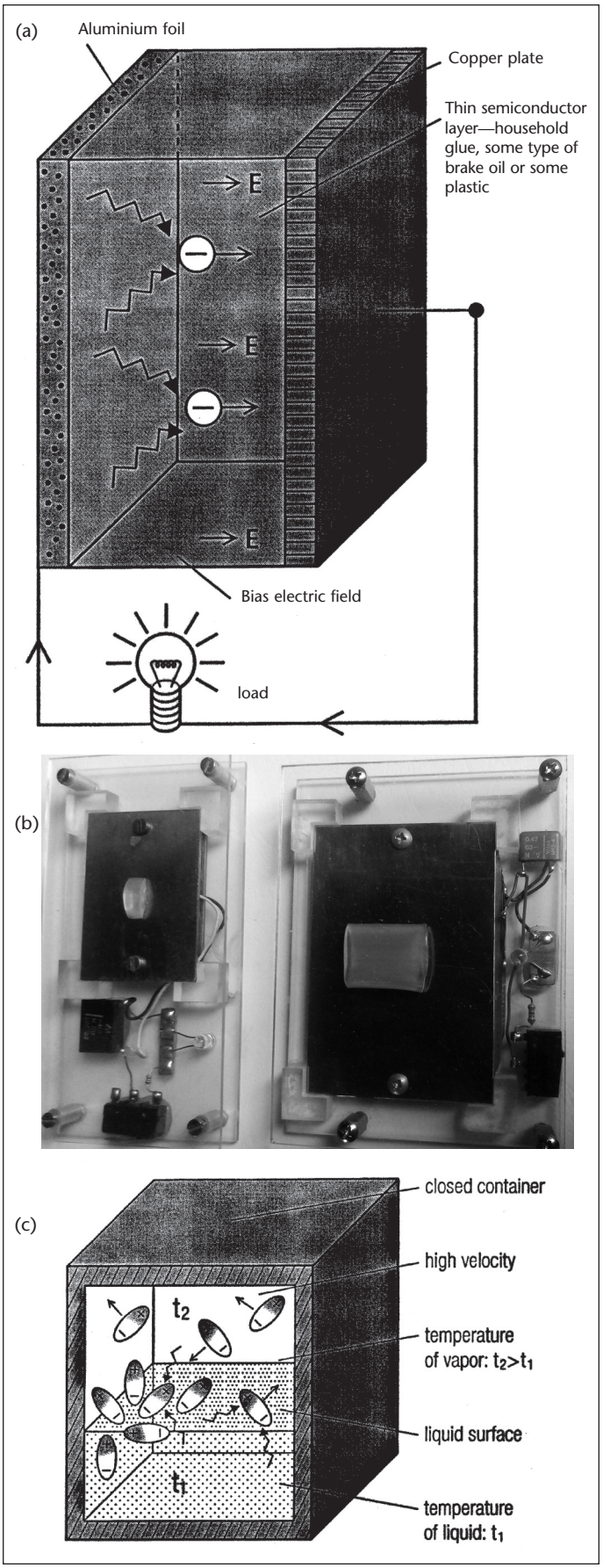

Figure 9. (a) Scheme of the asymmetric cell with semiconducting dielectric. (b) Photograph of two cells. (c) Thermal gradient above the liquid surface of a polarizable medium.

and the energy storing capacitor and the switch to discharge it via a small LED.) Figure 9c shows the scheme of a polarizable electric dipole in a solvent both in the liquid and above it in vapor form. Vacuum fluctuations tear off polarized molecules from the liquid performing work on them. Therefore they are warmer. The point is that *vacuum fluctuations make the vapor warmer* above the liquid, measured by Szamosközi (discussed in Part 3).

There is a small but measurable effect of about 0.1ºC due to the asymmetry of density. When equilibrium thermodynamics was established in the late nineteenth century, this feeble effect was out of the test range of mercury thermometers or thermocouples. The case has not been reopened by the mainstream, and has been considered a "null effect" ever since. In fact, both cases are a sort of Maxwell's demon. Both effects can provide an infinite amount of renewable energy with proper R&D, for example for home heating and electric energy.

Most probably this effect lurks to a small degree behind solid state batteries. A special glass is used as a semiconductor between the different electrodes developed by John Goodenough, the oldest Nobel laureate and co-inventor of lithium batteries.

The vacuum/ether/akasha oscillations have important implications:

1) It is impossible to fully screen or isolate any physical system, since the walls are permeable for energy fluctuations. This statement negates the first law of thermodynamics for systems containing free electrons and polarizable medium. That is, the conservation of energy is valid only for static cases containing no charged particles. It is invalid for any dynamic living system. It becomes valid again after death.
2) This effect also makes the second law of thermodynamics meaningless, because it induces thermal non-equilibrium between two phases of the same medium. Though it can only heat and not cool a polarizable medium, nevertheless the second law is definitely violated. (The second law states that thermal gradient cannot arise spontaneously in an insulated system.)

Thus the testable effects of vacuum fluctuations at very small distances (10^{-15} - 10^{-12} cm) are noticeable. Therefore, our fundamental concept of the structure of space-time in textbooks is plainly wrong again, because it is not homogeneous and isotropic. There is a further twist: the most frequent elementary particles—electrons and protons—can be "manufactured" from the vortices of ether. It is like a smaller or bigger torus as described in Part 1 for the electron. This simply means that there is no matter, only permanent vortices of ether, looking like particles. (This is the pair production from energetic γ rays.)

Thus matter, and its inherent oscillations, are secondary. The primary constituent of our world is a whirling ether/neutrino medium/akasha, with an extreme energy density, and matter (material) is just like bubbles in water, but with less density.

There is a universally accepted experimental proof, the Casimir effect, which proves the reality of the fluctuating vacuum. It has the following simple setup: There is always a pressure between two flat parallel metal plates. This is the consequence of the screening of vacuum fluctuation energy between the plates. Only the range of standing waves is allowed inside the two plates; all other waves of vacuum oscillations are screened and filtered out (see Figure 10). Thus the energy density of the vacuum is smaller between the metal plates than outside of it.

Note that for spheres this is not a compressing force, but an expansion force calculated by Timothy Boyer.[16] (Boyer was the author of several papers related to vacuum oscillation, published mainly in *Physical Review* in the 1970s.)

The second reason we recognize the existence of ether also concerns transmutation, namely the creation of neutrons from an electron and a proton, and the "cold fusion" or muon-catalyzed fusion between the nuclei of liquid deuterium.

However, one of the most perplexing issues in physics, quantum mechanics, also concerns vacuum fluctuations.

The question is: why do electrons not fall into the nuclei? We know that "centripetal forces" do not compensate for the electrostatic attraction between an electron and a nuclei. Textbooks shy away from this important question, simply stating that at atomic scales, macroscopic laws and thinking no longer apply, and the new laws replacing them are those of quantum mechanics. So the rule is: do not ask silly questions, just as in the perpendicular direction of the Lorentz force.

Physics, based on vacuum fluctuations/ether/neutrino flow/akasha, puts this problem in a different perspective: vacuum fluctuations don't let electrons fall into a nucleus.

If the electron is replaced by a *heavier muon* or *even heavier pion*, something weird happens: these fluctuations are seemingly less severe. The same waves are dangerous for a small fishing boat, but barely noticeable for a tanker full of oil.

So a hydrogen atom, made from a proton and a muon, is *much smaller* than a typical hydrogen atom; it is nearly the size of a neutron, due to the charge screening effect (see Figure 11). Indeed, this heavy hydrogen behaves like a neutron. A chain of fusion reactions commences when deuterium liquid interacts with a muon. This is the coldest possible fusion. Figure 11a shows a muon-proton type hydrogen atom with a "force of line" type model. Figure 11b shows the

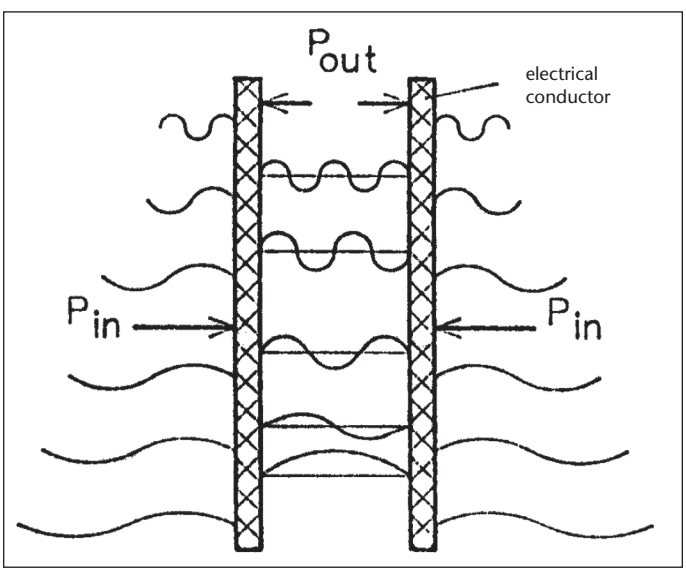

Figure 10. The principle of the Casimir effect. There are less waves of electromagnetic radiations between two metal plates than outside of them.

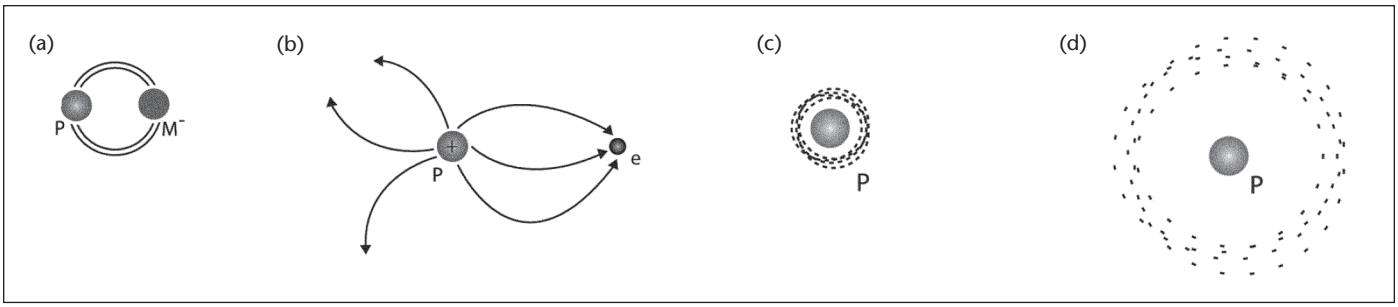

Figure 11. (a) Electric charge screening of a heavy muon. (b) There is no screening with an electron. (c) The muon as a wave, close to a proton. It behaves as a neutron due to its very small size. It catalyzes LENR. (d) The hydrogen atom has much higher volume.

same with a "light" electron, with a much wider radius. If all electrons were replaced by muons in the universe, matter would be immensely dense, and life would become impossible on our planet. The plant leaves would be tiny, unable to absorb enough sunshine, bones would have to carry an enormous mass due to the higher mass of the muon. But most of all, matter can't be stable because a hydrogen atom is so small and heavy that vacuum fluctuations barely affect it. This heavy muon atom behaves as a neutron, so it may fuse into any other nuclei, creating unstable material. Replacing all electrons with muons means eliminating the fluctuations of a vacuum—which keeps electrons away from a nucleus. (In Figures 11c-d hydrogen is shown with a de Broglie model of probabilistic distribution.) Thus, these *vacuum fluctuations are necessary to have stable atoms*. Also, stable nuclei are possible with this level of vacuum/ether, etc. fluctuations. More vigorous fluctuations would tear apart nuclei, and no stable U-238 would exist. Less vigorous fluctuations would even allow stable transuranium isotopes.

This vacuum fluctuation model was the last desperate effort to renew and extend physics, and make sense of the observed stability and occasional instability (radioactivity) of the nuclear isotopes.

If ether is ignored on the macroscopic scale, at least the oscillating nature of ether/neutrino flow/akasha ought to be considered in a much more realistic description of matter. The papers of Boyer and Hal Puthoff *et al*. were not even censured. They were regularly published in *Physical Review*, and other mainstream journals. Nevertheless, this last desperate effort to save the spirit of physics as reality was lost. This view failed to make it into physics textbooks despite its overwhelming experimental and theoretical background.

This is the reason no student is allowed to ask what makes matter stable at an introductory lecture on quantum mechanics. Why are electrons not attracted into a positive nuclei? Students get one answer only: "This is a fact, shut up, don't ask silly questions!"

But when there are no questions, there are no answers…

The Oscillating Vacuum/Ether/Akasha

In popular (esoteric) circles nature is usually described as: "everything is vibrations, matter is just a veil." This is a naïve, but essentially correct, view of perceiving nature at the atomic length scale, but fails at the macroscopic scale. These local oscillations are negligible at a millimeter scale, but ether is important at a large scale, related to gravity (to be discussed in Part 6).

Transmutation is affected by the oscillating vacuum in two ways:

1) An oscillating vacuum occasionally tears apart the bonds of weak nuclei, moving them towards a more stable state. This is done by smashing a neutron against the rest of the nucleus, tearing it apart and causing an electron emission (β decay, weak interaction). Also, an α particle can be torn from the nucleon occasionally due to random vacuum fluctuations. Here strong interaction is concerned, which is a separate interaction of electromagnetic attraction between nuclei described by Nornam Cook and others (to be discussed at the end of this section).

Also, the stability of quasi-particles, condensed plasmoids and surface plasmon waves are adversely influenced by making them fall apart.

2) All fusion processes must also act *against vacuum fluctuations*, not only the Coulomb barrier. While this is a problem, on the other hand it is also an opportunity. Plasmon waves may have enough energy and charge to mimic muons, and thus catalyze the formation of neutrons. This in turn takes place by the fusion of light nuclei, like in the formation of deuterium and tritium.

The fluctuating vacuum makes nature probabilistic at the small scale, causing the Heisenberg "uncertainty relations." This powerful oscillating background noise is the essential feature of nature at the nuclear scale, which obeys a different energy distribution law as a function of frequency.

Vacuum oscillations have markedly different distributions from the familiar thermal oscillations, which makes them difficult to recognize. Since this vacuum fluctuation directly affects transmutation, and low energy nuclear reactions, their behavior will be summed up and compared in Table 1. This partially explains why transmutation is so unusual—because the background energy oscillations are so unusual.

The main difference between the oscillations of ether and a thermal radiation is that the latter has an apparent source: a glow with sensible portion in infrared radiation.

On the other hand, the vacuum fluctuation reaches us from all directions, on a macroscopic scale, in a homogeneous, isotopic manner. This is like a fish in static water, which does not feel the fluctuations of individual molecules.

The energy distribution is shown in Figure 12 for both spectra for an inertial frame.

In a non-inertial (for example, rotating) frame, this cubic spectrum will be distorted, and enhanced. That is, in an accelerating, rotating machine, vacuum fluctuations will become stronger, and thus β emissions will be more

Table 1. Comparison of thermal and vacuum energy spectrum.

Features of thermal energy spectrum	Features of vacuum/zero-point/akasha energy spectrum
a) At a given frequency, only the local temperature determines the energy level.	Energy is the function of frequency alone; the energy source is the whole universe.
b) There is no thermal radiation at absolute zero. There all oscillations stop.	At absolute zero temperature, it is as powerful as at high temperature. Oscillations are not affected by local temperature.
c) Inhomogeneous, anisotrope, easy to detect.	Homogeneous and isotope at microscale, this makes it hard to detect. (The Casimir effect, asymmetric cells, and nuclear instability makes them noticeable.)
d) It marks an inertial frame, not a Lorentz invariant.	There is no reference frame, always a Lorentz invariant.
e) Due to the Doppler shift, the spectrum changes for a different reference frame (steady speed or accelerating frame): $dE_{therm}/d\omega = \hbar\omega^3/c^3\pi^2(1/\exp(\hbar\omega/kT)-1$	There is no Doppler shift for a steady velocity, only with an accelerating frame, like rotation (Sagnac effect): $dE_{zpe}/d\omega = \hbar\omega^3/2c^3\pi^2$
f) In principle, compressible by mirrors.	Not compressible. At a steady speed, this is a superfluid, without friction.
g) There is a radiation pressure at constant velocity.	Not compressible. At a steady speed, this is a superfluid, without friction.
h) The thermal spectrum yields a T/d^3 type of pressure between parallel metal plates.	The vacuum fluctuation yields a b/d^4 type Casimir force, independent of temperature. Only the d distance is a variable parameter for the pressure.

enhanced. The fact that acceleration (higher order derivatives also!) changes the intensity of vacuum fluctuation, thus nuclear stability, is unknown to most physicists. This is the Davies-Unruh effect. The irony is that these authors themselves are also unaware of the practical consequences of this effect distorting spectrum. A sudden "kick" or "jerk" or "hit" may practically tear apart previously stable nuclei!

Readers are encouraged to do this experiment, like making a ribbon of β emitting material on the perimeter of a balanced rotating disk, then measuring the change in radioactivity.

Technically, a set of asymmetric metal layers having a semiconductor between them is able to tap the energy of vacuum fluctuations (as well as the thermal noise), such as the Szamosközi cell discussed in Part 3.

By rotating this cell structure, hundreds of nanolayers may yield a viable source of electric energy.

The unipolar dynamo (Tewari, Kinchelow) yields high-current, low-voltage energy as a consequence of this spectrum shift. However, due to the friction of slip-rings, much of the power gain is turned into heat, making the process uneconomic!

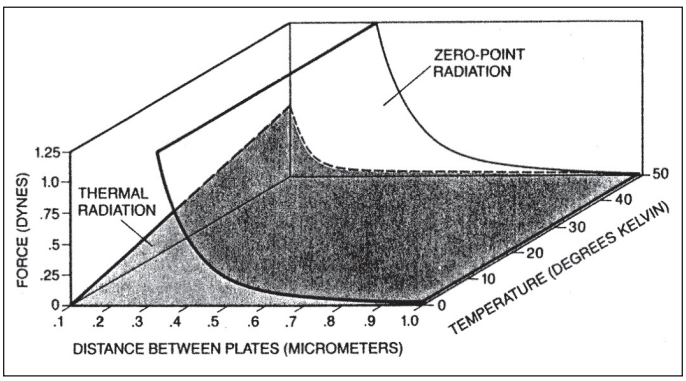

Figure 12. Energy distribution of the vacuum fluctuation as a function of frequency and temperature.

We must close this chapter, to sum up the missing fundamentals of transmutation/LENR.

The two most important missing areas of physics were the lack of rotation in electrodynamics, and the lack of ether at small and large distance scales.

There are still a number of gray and completely unknown white areas on the map of science, to the best knowledge of this author.

The White Areas of Physics

The most important missing fundamental is the structure of a nucleus. Despite decades of concentrated efforts, neither the shell nor the drop model yields a practically seamless description. Textbook physics fails completely, and the research entered into is a dead-end street.

Wigner's 1937 crystal lattice model seems to have the advantages of a full description, presented by Norman Cook.[17] The Cook and Wigner models describe nuclei as closely packed lattices, where neutrons and protons are evenly distributed through the nucleon. This yields a model having a general productive capability, which drop and shell models approximate only in cases of "magic numbers." Fission of heavy nuclei is incorrectly described by drop and shell models.

An important insight of Cook's model (with colleague Valerio Dallacasa) is that it *does away with the strong force*, mediated by mesons, and a number of empirical constants in textbooks.

It has been proved that *simple magnetic forces bind the nuclei*, given by the inherent magnetic fields of nucleons. This explains the upper limit of nuclear mass, the uneven stability of isotopes and the existence of unstable nuclear isotopes. Their altering half-life is a function of their neutron number.

Nucleons thus hold together like a network of tiny magnets. László Sindely also developed his model independent-

ly, where protons occupy the external shell of the nuclei, and neutrons the inner core.

This subject deserves a separate paper on its own, but as the Cook and Wigner lattice models are accessible,[17] I leave it to interested readers.

Another white area is the violation of energy and angular momentum conservation. Fortunately, this is not an immediate concern for us here, because in transmutation processes, energy and angular momentum is conserved. However, when all continuous symmetries are annihilated/violated, this is no longer true. This is the case of tornadoes, spiral galaxies, trout swimming in fast creeks and the flight of some insects, like wasps or bumblebees.

These cases are not seen, as physicists are blind to symmetries, and ignorant of their real power, as shown in all previous parts of this paper. This subject also deserves its own detailed paper, but the primary subject herein is transmutation.

Other Open Cases

It seems that there may be another quasi-particle, similar to condensed plasmoids/strange radiation/exotic vacuum objects. J. Jekkel, a Hungarian inventor, noticed that the pressure of hydrogen dropped suddenly when immersed in a strong magnetic field. Thus it is crystallized in a strange way.

This may happen again for sudden pressure jumps in cavitation.

Japanese inventor R. Ohmasa stumbled onto this effect when he electrolyzed water under cavitation. See U.S. Patent 7,459,071 (2008) and E.P. patent 1460149 (2010).

Readers may come across "Brown's gas," a mixture of H_2 and O_2 capable of transmutation while burning at low temperature.

However, before entering new territory, there is a very annoying invention which can cast doubt on the "sacred" conservation of electric charge, which is a discrete symmetry. Thus all previous and latter discussions must be on a new footing.

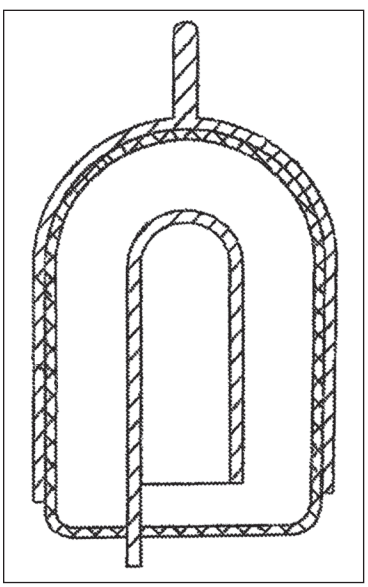

Figure 13. The vacuum diode as a miraculous capacitor. It cannot be explained under textbook physics.

This is a very unconventional battery without an electrolyte. In fact, it resembles a vacuum diode. (See Figure 13.) It is described in a brief two-page patent (U.S. Patent 9,042,083; May 2015 by R.S. Koloshenko, G.V. Kovalenko). The invention is specified to be able to store a huge amount of electric energy at a very high voltage, in the order of kilovolts. The electric energy is not stored in the usual chemical form, nor gained from the trapping of vacuum fluctuations.

There is an indication that somehow topological charges are formed, as there is a short sentence stating that the cathode surface is rough. Nothing more. This seems to be suspicious for us in the sense that perhaps at low pressure gas discharge condensed plasmoids are formed. However, this device is a vacuum diode; there are no protons and neutrons inside this tube. So only a "supercharge" formed from electrons may be the material for this energy storage device.

Based on electrons only, the charge storage is impossible, as several Coulombs of charge ought to be stored here. Of course, this is impossible, as the vacuum diode would explode well before reaching the specified final capacity, due to the stored charge.

If the claim of the inventors is true, conservation of electric charge is violated. This is a far more disruptive claim than proposing hyperspace jumps, as no laws of physics prohibit this jump.

This invention will wreck not only theoretical physics, but the battery and oil industries as well. (However, it would be a welcome change for the green industry.)

There is only very weak circumstantial evidence that this claim is true. This author witnessed a similar effect at Suhas Ralka's lab in Mumbai, India (a crowdfunded visit organized by Robert Greenyer of Martin Fleischmann Memorial Project).

In that experiment a steel rod was treated by pulsed current, under water, heated and immersed in ultrasound. After switching off the power supply, there was a fairly high amount of current coming out from the heated steel rod, which clearly violated electric charge conservation.

Also, the inventor of the LION reactor told Greenyer that a large amount of electric energy (current) had come from his reactor after switching it off.

Certainly this is not yet enough to tear out all the pages of physics textbooks on conservation of electric charge, but the "writing is on the wall."

In theoretical particle physics textbooks, charge conservation alone is not valid. Even charge and parity (CP) cannot be valid. The final word is the CPT conservation, that is, charge-parity-time mirroring. However, this theoretical result has never been turned into a practical device, as it is in the above patent.

Soul Searching

The death of research in physics and the killing of pollution-free energy inventions, including those based on LENR, are the result of simultaneous problems, and each of them is lethal alone. This is my list (though more can be added):

1. Unforgivable lack of knowledge of symmetries. Lack of rotation, longitudinal and torsion waves, chiral crystals and magnetic monopoles, just to name a few missing pieces.
2. Sloppiness. The lack of ether and vacuum oscillations is not strictly forbidden, just "out of fashion." Textbooks on non-equilibrium discharges (home of condensed plasmoids) do not mention quasi-particles, despite several independent discoveries. These authors never bothered to look out for these "details."
3. Brutal censorship. As the novel phenomena discussed in these papers don't fit into the framework of textbook physics, even sharply contradicting them, they are just banned, out of jealousy, ignorance, or financial interests.
4. Inability to reopen cases of known effects, and re-measure with better devices. This hollowed out physics is unable to discover anything new, working within the old paradigm.

Kip Thorne, co-author of the book *Gravity*, completely

ignored vacuum fluctuations in his own book *Modern Classical Physics*. The voluminous book of 1,500 pages contains nothing new, nothing useful, though it is based on some real classical physics.

Road to Reality by 2020 Nobel prize recipient Roger Penrose is devoid of anything testable or new, or any useful effects.

Brutal censorship is apparent in journals, patent office rejections and the deceitful decisions of the Swedish Academy.

Sixty years of censorship will cost us planet Earth. This is the fault of the U.S. DOE, and the editors of mainstream journals like *Physical Review*, *Science*, *Fusion Technology*, etc.

Consequently, physics died in the 1960s, shutting the door to sustainable development. However, the reader will have the opportunity to re-start from scratch.

So far we have visited the fundamentals, the faces of LENR physics. In Part 5 we shall continue with the technical applications of the previously described phenomena. Part 5 will discuss the engineering aspects of LENR with the subtitle "Design and Operation Principles of LENR Reactors." The four previous parts made possible the minimum knowledge to design and operate catalytic LENR reactors. Part 5 will be the longest piece, describing the ultimate aim of this paper.

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