

FUSION facts

A Monthly Newsletter Providing Factual Reports On Cold Fusion Developments

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"... the best advice I can give to the National Space Society... is this: despite setbacks and false alarms continue the search for intelligent life in Washington!"

Arthur C. Clarke

A. NEW-ENERGY DISCOVERIES THAT WILL CHANGE THE WORLD

By Hal Fox, Editor *FF*

Written especially for the attendees at the June 19, 1996, **Seventh Annual Energy Efficiency Forum.**

This author was raised on energy efficiency. "Turn out the lights, we don't want to pay more than necessary to Utah Power and Light," was an oft-repeated instruction from my father. My generation was born in the twenties, struggled through the depression, served in World War II and grew to enjoy the world's most dramatic development in technology-based standard of living that the world has ever known. Now this author is dedicated to providing an even higher energy standard of living for our children and grandchildren. This objective can only be achieved by new-energy devices and systems not based on the burning of fossil fuels.

For the past seven years we have been investigating the world-wide development of new-energy technologies. Over three thousand peer-reviewed (or presented in technical conferences) new-energy papers have been obtained, read, and reviewed in our newsletters and placed in our computer database. From our trips and contacts with new-energy scientists and inventors in several countries, we can make some informed comments about the development and commercialization of new-energy systems. That is the purpose of this article.

Four new energy-related technologies are being developed. These four are "new hydrogen energy" (the Japanese name for cold fusion); solid-state electro-magnetic or plasma-type devices; super motors based on super magnets; and low-energy nuclear reactors. All four of these technologies share the same academic fate: **They do not conform to the current physical science models** and therefore are unacceptable to many in the

scientific community. However, only two changes in scientific models are required to embrace all four of these technologies. Those changes are: First, that nuclear reactions in a metal lattice are not the same as nuclear reactions in hot plasma physics. Second, the acceptance of an energetic zero-point energy (also known as aether, space energy, vacuum energy, etc.) [1]. With these two changes, cold fusion is acceptable and other devices no longer appear to be contrary to the Law of Conservation of Energy but are merely **clever energy transformers**. These four technologies are briefly discussed in the following paragraphs.

Cold fusion is being commercialized in Japan (Pons-Fleischmann discovery) and in the U.S. (Patterson Power Cell™). Pons and Fleischmann, working with Japanese funding (from a Toyota affiliate), have made excellent strides in the development of the heavy-water, palladium cathode, electrochemical cells. Operated under pressure, these devices are capable of providing large amounts of thermal power. Licenses for the newer Patterson Power Cell™ are being marketed by Clean Energy Technologies of Dallas, Texas. This device has been independently tested and replicated by several universities, utilities, or corporate research laboratories, but not yet by the U.S. DOE. While the Japanese have added an additional hundred million dollars to the development of cold fusion, the U.S. DOE does not recognize the technology and this mistake is echoed by the U.S. Office of Patents and Trademarks.

Solid-state and plasma-type devices have been patented and are being funded for further development. Five separate devices (two patented, one being publicly revealed in September 1996, two others being patented) are under development. Ken Shoulders' high density charge clusters (U.S. Patent 5,018,180) and Correa & Correa (U.S. Patent 5,449,989) are examples of plasma-type devices that produce from four to thirty times as much electrical power as input electrical power. An electro-magnetic device is scheduled for scientific and media presentation in Germany in September 1996. Two other devices are involved in patent applications and will be announced later. All five of these devices are being privately funded and are expected to provide energy for applications ranging from computer chips to power plants. The patent for the Shoulders' device states that the source of the energy appears to be the zero-point radiation of the vacuum continuum. The plasma device by the Correas was presented at the Third International Symposium on New Energy and is being developed in Canada. The German inventor claims that his device can be scaled up to power-plant size. No publishable information is available on the other two devices. These devices all appear to obtain their excess power from the aether.

Super magnets used in super motors provide excess mechanical power. Two separate super magnets have been developed in Japan. These developments provide magnets at

least twice as strong as previously accomplished. The Takahashi motor, based on the super-strong Takahashi magnets is reported to provide sufficient energy so that a moped can be powered and still charge the battery. Obviously, claiming this type of performance would lead to ridicule in almost any engineering facility. Therefore, the Japanese inventor (with previous patents on magnetic coatings for video tapes) has delivered motor and moped for independent testing in England. Reports are expected later this summer or fall.

Low-energy Nuclear Reactors represent an important new discovery. Although not a source of energy, these reactors are energy-related because they can be used to stabilize radioactive slurries. Obviously, to stabilize a radioactive material it is necessary to change the nucleus so that the resulting new element or new isotope is no longer radioactive. In the currently-accepted scientific models, **only high-energy bombardment of atomic nuclei can affect nuclear stability.** Although these new reactors are energy intensive, they have proven effective in removing radioactivity from naturally radioactive thorium (demonstrated in this author's laboratory). The next step is to build and demonstrate these reactors in such a place as the Hanford Site where over 130 tanks (some of which are not leaking) of radioactive slurry are awaiting the development of adequate means of stabilizing or storing these slurries.

These are the technologies that we predict will dramatically change the way energy will be produced and distributed. Out of hundreds of proposed developments, these are the devices and/or technologies that we have selected as being the most dramatic energy developments that the world has ever seen. In this nation we have progressed from whale oil to "coal oil" to natural gas to electricity for lighting our lamps. We have progressed from wood to diesel-electric generators to move our trains. We have used electricity, steam, and progressed to gasoline-powered internal combustion engines to power our automobiles and trucks. **Now we will move to an abundant, cleaner, and less expensive (essentially fuel-less) source of energy to power our future.**

To our new friends at the **Seventh Annual Energy Efficiency Conference** we suggest your serious consideration of these new technologies. Few believed in the Wright brothers aircraft, or Goddard's rockets but now government facilities have been named after both of them. It is highly likely that these are the types of new technologies that will power our future. We quote Utah's Governor Michael O. Leavitt (who attributed the words to Ray Noorda of Novell), warning us:

**"Fight it and die,
Accept it and live,
Lead it and prosper!"**

You are today's leaders. With proper management of the much-needed transition to these new energy technologies, **you will be the leaders of tomorrow!**

References

[1] Hal Fox, "Four New Discoveries Best Explained by an Energetic Aether," presented at the Southwestern Area Regional Meeting of the AAAS, June 5, 1996, University of Northern Arizona, Flagstaff, AZ.

Hal Fox is just completing the book, Space Energy Impact in the 21st Century. This book reports in more detail the development of space energy devices. In addition, the book reports on the strong impact that new-energy systems will have on a variety of industries. The book will be available through this publication.

B. SEVENTH ANNUAL ENERGY EFFICIENCY FORUM

A conference report by Hal Fox.

Over three hundred invited attendees enjoyed the one-day Seventh Annual Energy Efficiency Forum at the National Press Club in Washington, D.C. Wednesday, June 19, 1996. The attendees were variously from the Department of Energy, energy-interested corporations, major power utilities, and the media. Johnson Controls, Inc. was the co-sponsor of this forum along with the United States Energy Association, which is the U.S. Committee Member of the World Energy Council (WEC).

After a welcome by Barry Worthington, Executive Director, U.S. Energy Association, the first forum was presented: **"What Policies Should the Federal Government Pursue in Changing Energy Markets?"** The moderator was Douglas A. Decker, Government affairs, Johnson Controls, Inc. The presenters were J.D. Hayworth, U.S. House of Representatives, Arizona; Scott Klug, U.S. House of Representatives, Wisconsin; Christine Ervin, Asst. Sect., Energy Efficiency and Renewable Energy, USDOE; and Mary Nichols, Asst. Administrator, Air & Radiation, USEPA.

A summary of comments including the following: Pollution by power plants is deemed to damage the health of 54,000 persons each year. Acid Rain and particulates also cause some premature deaths. A sixteen member advisory committee is studying the transition to new pollution control standards including the abatement of mercury pollution in 44 states. Global warming due to carbon-dioxide emissions is a long-range fossil fuel problem. There is a Presidential Committee on Environmental Quality and a 37-state group which will meet next year. **The goal is to cut emission by an additional 20 percent by the year 2005.**

Based on the successes of the privatization of some government functions, privatization of other government-managed functions is pending. For example, the DOE

manages 132 hydroelectric dams that furnish about 30% of the electric power consumed in the U.S. The TVA has managed to accumulate \$28.5 billion debt. The Northwest has access to much lower government subsidized hydroelectric power. The DOE energy labs have grown far beyond their original mission and now consume 40% of the DOE budget.

In one comparison, a privately run energy installation used 12 employees to produce the same power produced by 95 government employees. However, some types of R&D that will probably not be funded by private industry should be supported by an increase in the government support of R&D. [This reporter would caution against another institution of self-serving one-project advisory committees that have been responsible for advising funds for hot fusion (over \$20 billion spent) and denying funds to new renewable energy projects.) Representative Klug properly advised that **the government does not have the capability to commercialize new technology. Private industry does a far better job. The air traffic control system was used as an example.**

In a plea for more funding for renewable energy, Christine Ervin stated that the budget request was for only \$4 per capita and that any attack on clean energy was an attack on the environment. **The free market is distorted and does not best handle long-term results, and therefore, is not a substitute for leadership. What was lacking in Ervin's presentation was any knowledge of the latest new energy technologies.** Renewable energy is currently limited to wind, geothermal, hydroelectric, biomass, and photovoltaics. No knowledge of, nor funding for, cold fusion, solid-state devices, or super motors was mentioned by any members of this forum. **Of course, the main topic of this conference was on energy efficiency and energy conservation.**

The next forum topic was, **"Global Energy Efficiency, Who will Pay for it?"** This session was moderated by James B. Sullivan, President, World Energy Efficiency Association. The presenters were Mason Willrich, Chairman, EnergyWorks; Jefferson Seabright, Director of Energy, Environment & Technology, US Agency for International Development; Joseph Gilling, Industry and Energy Department, World Bank; Paulo C. Tavares, Director, Electrobras, PROCEL, Brazil.

The question was posed as to how we can accelerate the rate of change in new energy technologies. In the U.S., energy production is characterized by slow growth, aging plants, low-cost natural gas, the world's best energy infrastructure, and high-efficiency new technologies (such as natural-gas-burning turbine generators). Change is stifled by the need to recover old plant costs. **One approach is legislation that permits faster cost recovery for capital investment.** With existing technology there is a market for small, distributed power generation. In the future such installations as natural-gas-fired turbine generators will account for one third of new electrical power production. New power may well be driven by customers influenced by **green power** advocates. In less-

developed countries power is often subsidized, involving poor infrastructure, and as a result these state enterprises are bankrupt. **The answer is in privatization coupled with regulations favorable to business.** The World Bank can help by encouraging better privatization climates in countries being funded.

The U.S. Agency for International Development's budget is under assault. The U.S. is now the fourth largest contributor to international development on a per capita basis. However, international market barriers are coming down; energy markets are poised for growth; private funds will be used to catalyze new developments where business regulation is favorable. There are excellent opportunities developing. Experts from U.S. utilities are serving as international advisors.

The role of the World Bank in energy efficiency involves poverty relief, human resource development, and the building of an energy infrastructure. **A rapid growth rate in energy-use of 6 to 8 percent annually by 2010 is forecast.** The increasing use of energy will be coupled with increasing pollution as the large populations of China and India increase their energy usage. The big problems are the lack of information, the lack of informed financial support, and the lack of funds for infrastructure development. The World Bank has had a policy failure and is now establishing new policies, which are expected to result in reform by borrowers and a shift to privatization. The World Bank is supporting 137 projects with \$53 billion in capital since 1986.

An excellent summary presentation was made by Paulo Tavares of PROCEL in Brazil. With the growth of energy use in Brazil, \$50 billion will be spent in the next 20 years with \$35 billion in investments that must be raised from the international private sector. Plants are being designed with user-group input and with the help of international partners. **A big investment must be made in education where five million students must be trained in the use and conservation of energy.**

Here again, in this session, none of the presenters appeared to be aware of the impending huge changes that will be made by the new-energy technologies now being commercialized in various parts of the world. **There is apparently a huge information vacuum about new sources of energy.**

Casper Weinberger was the luncheon speaker.

Weinberger is currently the Chairman of Forbes, was formerly Secretary of HEW, and also served as Secretary of DOD. Here is a synopsis of some of Weinberger's observations:

We must reduce our reliance on oil imports in an unstable world, but not by selling off our emergency oil reserves. The trade deficit is expected to double to \$100 billion per year. Political considerations will probably prevent any hikes in energy costs. The forecast 8 billion world population by the

year 2,000 will place additional demands on energy. **The use of energy in the Pacific Rim countries is expected to exceed the use of energy in the U.S.** Disruption of oil imports could bring the U.S. economy to a standstill in 90 days. The U.S. cannot afford the large dollar transfers to other nations to support oil imports.

The basis of the national energy policy should include offshore oil development, new methods of oil recovery, and new energy sources. We must continue to support energy efficiency. We cannot reduce the quality of life in the U.S. We have the best life style in the world's history. Our energy policy should encourage incentives, not just in dollars but also in education. Other nations look to the U.S. for leadership and they need our help in building clean, efficient, energy sources. **We must draw a line in the sand and say 50% of our oil and no more will be imported.** Encourage other means of energy production. Continue with this type of forums.

In a short private visit with Casper Weinberger this reporter had the following conversation:

HF: "With three new energy technologies being developed by private companies, what U.S. department do you suggest be informed about these technologies?"

CW: "Well, the Department of Energy would be an obvious choice."

HF: "But they are the ones who have turned thumbs down on funding these new energy developments."

CW: "Perhaps they are concerned about too rapid growth in energy technologies. However, the Department of Defense should be interested."

HF: "Thank you sir. It has been a pleasure to meet you."

The third forum, **"Impacts of Deregulation on Efficiency in a Changing Electric Industry,"** was moderated by Ronald E. Russell, Senior Advisor, Hagler-Bailey Consulting. The presenters were Frederick W. Buckman, Pres. & CEO, PacifiCorp; Girard F. Anderson, Pres. & CEO, TECO Energy, Inc.; William J. Lhota, Exec V.P., American Electric Power; and Robert N. Culshaw, Minister-Counsellor: Trade & Transport, Embassy of Great Britain. Here are some of their comments:

With the changes in energy regulation the American customer now has choices. The wholesale production and marketing of energy is highly competitive and the result has been a reduction in energy costs. Air and water quality have been improved. There will be more ingenuity in energy production and more efficiency in energy transport and distribution. British Columbia can now sell energy to Arizona and the transfer is made by shutting down production in the northwest and increasing production in the southwest **thereby cutting down on-line losses -- the energy is not wheeled.** Regulators have traditionally regulated the entire energy system and that will end as regulatory authority is diminished and transferred to the free market forces.

The consumers know little about the production and distribution of energy. The customers want reliable, efficient, and economical service. The U.S. has the most reliable and lowest cost energy-delivery system in the world. For example, energy costs in the U.K. are about 1.5, Germany two times, and Japan 3 times the U.S. energy costs. Little further reduction in energy costs is expected. The natural gas and some other fuel supply infrastructures are approaching maximal use. With the new Energy Policy Act there will be some cost adjustments (particularly to protect those who wheel the energy to be able to charge suitable costs for such services.) There will continue to be an emphasis on better management of energy use and consumption. **The integration of energy and communications is underway** (it is assumed that the power companies are making use of their rights-of-way to emplace fiber optic cables).

Power companies will be faced with new regulations for wheeling the energy from other power companies. The customers will be sold services from more than one source but the same infrastructure will provide the distribution of services. The customer will expect competition, fair and efficient service, and near parity of costs among suppliers. Subsidies will be eliminated (especially the subsidizing of hydroelectric power), the price will be determined by free market forces of supply and demand and **there will probably be a merging of operating companies into total energy delivery companies.** There will be functional realignment of **Generation - Transmission - and Delivery** of energy.

In this forum there was some mention of unspecified new energy developments that would tend to keep energy costs low. However, there was no recognition of the enormous potential for change of the way in which we will soon produce and distribute energy. **Except for the concept of natural-gas-burning turbine generators, the concept of a pending distributed energy system was entirely ignored.** It is interesting how well protected this group has been from information about pending new-energy technologies. However, it was also interesting that, with only one exception (Casper Weinberger), none of the speakers were mentioning hot-fusion energy development as having any commercial potential.

The final session of the conference was a report by Mark Ginsberg, Director, Federal Energy Management Program, USDOE. Ginsberg's talk was available in printed form and details the great dollar savings that have resulted from energy efficiency and energy conservation used throughout the DOE. It would be interesting to determine how much of the identified energy conservation was achieved by the downsizing of some government projects.

REPORTER'S SUMMARY REMARKS: This reporter was pleased to have been invited to this important Energy Efficiency Forum. The most interesting part of the entire conference was not so much what was said **but the obvious**

almost complete lack of information about the most dramatic energy changes in the history of the world. Not one of the presenters appears to be aware of any practical renewable energy systems except photovoltaics, wind, and geothermal. Except for special cases, none of these renewable energy sources are cost-effective when compared with the latest efficient use of natural gas in turbine generators. **None of the presenters made any reference to cold fusion, solid-state energy devices, nor super motors.** We will try to change this lack of information. We have a list of conference attendees, with their companies and cities.

C. ABSTRACTS FROM JOURNAL

*The following are the abstracts of the papers published in the second issue of the **Journal of New Energy.***

E.E. Antonov, V.G. Dresvyannikov, V.I. Popovich (Scientific-Technical Centre for Coal Energy Technologies, Kiev, Ukraine), "Some Features of H₂O Low-pressure Discharge in Pulse Mode."

AUTHORS' ABSTRACT

Our previous report has been devoted to detailed investigation of plasma-chemical reactions between water molecules and charged particles in stationary low-pressure H₂O discharge plasma. Now we discuss some properties of above plasma in pulse mode. The aim of our research is to investigate the peculiarities of (H, OH, H₂) generation in this regime that is necessary for applied research on water conversion at atmospheric pressure.

J. O'M. Bockris and G.H. Lin (Dept. Chem., Texas A&M Univ., College Station, Texas), and R. Bush (Phys. Dept., Cal. St. Polytec. Inst., Pomona, CA), "The Rediscovery of Cold Nuclear Reactions."

AUTHORS' ABSTRACT

The word transmutation is often associated with medieval alchemy. Nevertheless, the change of one metal into another is a common place of modern nuclear chemistry carried out in nuclear reactors or in high energy cyclotrons. In the last few years a number of pieces of information have arisen which suggest that there is a low temperature way of provoking nuclear changes. There are several titles at present being used to describe the reported phenomena. They are: chemically stimulated nuclear change; lattice assisted nuclear change; low temperature nuclear change; cold nuclear reactions. This latter term will be used in this article. Such reactions embrace also the D + D reactions discussed since 1989, in the so-called cold fusion literature, but include a wider swathe of systems,

characterized by observation of changes in solid systems, not far (e.g., up to 1000°K) from room temperature which seem only explicable on the assumption that a nuclear change has occurred although none such would be expected based on the current theories of nuclear chemistry.

V.I. Kichigin, A.V. Klyuev, S.A. Kurapov, V.F. Panov, G.V. Khaldeev, T.F. Borisova (Perm Univ., Perm, Russia), "Torsional Fields and Electrochemical Processes at Metal-Electrolyte Interface."

AUTHORS' ABSTRACT

A concept about the effect of torsional field on electrochemical (involving charge transfer) reactions of spin-polarized particles is advanced. Effects are found when examining hydrogen permeability of palladium membranes in the system Pd/0.5 M H₂SO₄, Pd/0.1 M NaOH and also in the investigation of the electrode potential changes in the system Cu/x M CuSO₄ + 0.5 M H₂SO₄ (x = 0.01 and 1.0). A hypothesis is put forward that torsional fields alter the potential of interaction in the electrochemical systems in question, and can affect both the crystal's phonon spectrum and spin orientation of reacting particles.

M.H. Miles and K.B. Johnson (Chem. & Matls. Branch, Res. & Technol. Div., Naval Air Warfare Ctr. Weapons Div., China Lake, CA), "Electrochemical Insertion of Hydrogen into Metals and Alloys."

AUTHORS' ABSTRACT

Hydrogen in metals has possible applications in various energy storage devices. For the palladium-deuterium system, excess power production and other anomalous effects have been reported. This study focused on hydrogen and deuterium insertion into palladium and deuterium insertion into various palladium-boron alloys. The condition of the metal surface is a major factor in the insertion of hydrogen or deuterium into palladium or palladium-boron alloys. Cracks or other surface defects prevent high loading levels of hydrogen in metals. The addition of boron to palladium does not affect the initial loading rate but slows further loading to higher levels. The presence of boron in the palladium significantly slows the rate of the deloading process.

T. Mizuno, T. Ohmori (Hokkaido Univ., Sapporo, Japan), and M. Enyo (Hakodate Nat. Col. of Technol., Hakodate, Japan), "Anomalous Isotopic Distribution in Palladium Cathode After Electrolysis."

AUTHORS' ABSTRACT

It was confirmed by several analytic methods that reaction products with mass number ranging from 20 to 28, 46 to 54, and 72 to 82 are produced in palladium cathodes subjected to electrolysis in a heavy water solution at high pressure, high temperature, and high current density for one month. Isotopic distributions were radically different from the natural ones.

Phillip Ozdemir (Smyrna, New York), "The Energy Release Mechanism of Newly-Formed Alpha Bosons in a Quantum Crystal Lattice, (or "Why There are No 23.8 MeV Gamma Rays from D + D = ⁴He Spin-Coherent Cold Fusion Reactions.")"

AUTHOR'S ABSTRACT

This paper provides a description of the physical process by which newly-formed alpha bosons lose the energy of fusion to the metal hydride lattice in a typical stimulated anharmonic fusion. Contrary to popular belief, there is no 23.8 MeV gamma ray. The paper also stands as a correction to the phonon release mechanism of Schwinger. The actual energy release mechanism is more complicated than a single gamma ray. Initially two circularly polarized gammas are emitted from the quark bag collapse of two 4.38 fermi radii deuterons to a single 2.5 fermi radius alpha boson. The intensity of these gamma rays is immediately strong enough, in the Coulomb field of the resultant alpha boson, for intense micro-episodic pair production. The 23.8 MeV energy of fusion allows for 2 electron-positron pairs to be produced in a Dirac-like process out of the vacuum near the charge density of the resultant alpha boson. These electron positron pairs speed out from the point of creation in momentum and energy conserving directions. They are quickly scattered by the lattice and contribute to the enthalpy of the lattice in several distinct ways. The electrons and positrons scattered by the palladium nuclei and the deuterons emit Bremsstrahlung photons. When scattered against the electronic charge distribution of the lattice they emit Cerenkov photons. They may also engage in ionizing and Compton collisions with other electrons. The electrons engage in classical scattering and contribute to Joule heat in the conduction band. The positrons travel a short distance while contributing themselves to Joule heat, being scattered by the Coulomb field of the lattice, and then establish a briefly-lived atom of positronium. They are then annihilated in a matter- antimatter collision with a lattice electron (conduction or valence band). The annihilation radiation of the matter-antimatter leptonic collision (positron annihilation) then is a contributor to the lattice enthalpy. The annihilation radiation results in two oppositely-directed x-rays with an energy of 511,000 electron-volts each. These X-rays are Compton scattered by electrons and ions inside the lattice and are reduced in energy after each Compton collision.

Mitchell R. Swartz (JET Technology, Weston, MA), "Four Definitions of Power Ratio used to Describe Excess Enthalpy in Solid-state Loading Systems."

AUTHOR'S ABSTRACT

The exact definition for the amount of putative "excess heat" or "excess enthalpy" in some possible experiments remains unresolved. This paper describes four of the possible definitions for the power amplification factor (Π) -- which relates the input power to the excess enthalpy actually generated. Issues including the Poynting vector, the thermoneutral potential, and the two types of power amplification factor corrections for gas flow are compared (Π_{Den} , Π_{Num}). Because of the distinctly different possible "definitions" of the power amplification factor and the recombination issue and the reasonable skepticism towards the possible existence of solid state fusion systems, and both for uniformity and simplicity, it is recommended that the absolute (minimum) power amplification factor (Π_{ABS}) should be used to describe the quality of such putative fusion experiments.

T.E. Bearden, "Use of Asymmetrical Regauging and Multivalued Potentials to Achieve Overunity Electromagnetic Engines."

AUTOR'S ABSTRACT

Asymmetrical regauging and multivalued potentials (MVPs) occur widely in nature and may involve fields that are nonconservative, i.e., the free production of excess force fields. Yet conventional electric and magnetic engines are designed with gauge frozen and utilizing conservative fields and single-valued potentials. Self-induced change of potential, as by an MVP, can be utilized to accomplish *asymmetrical self-regauging* (ASR) (A-reguaging) of the engine's stored energy at a certain point or sector. This is equivalent to free **refueling** of the engine, at each regauging position in its cycle, with excess energy furnished from the vacuum. During asymmetrical regauging, the system is an open system receiving excess energy from a known external source, so it can exhibit a COP>1.0 without violating the laws of physics. One or more additional force fields will appear, and they may be used to assist the operation of the system, by deliberate design.

When Maxwell's equations are expressed in (A, ϕ) form, two equations result in which A and ϕ are coupled and the variables are not separated. Electrodynamists then *arbitrarily* alter these equations by making two simultaneous asymmetrical regaugings, designed so that the net regauging is symmetrical -- i.e., the net force fields are unchanged. The variables are separated by this *net symmetrical* transformation. These

regauged Maxwell equations are then widely utilized in the literature, without further regauging. The *net symmetry* of the overall regauging *curtails and closes Maxwell's EM model and the operation of any designed Maxwellian system to further regauging, particularly asymmetrical self-regauging.* In short, it eliminates the system's permissible *free collection and use* of potential energy from the external environment (i.e., the vacuum), by asymmetrical self-regauging.

P. Anastasovski, H. Fox, K. Shoulders, "A New Approach to the Cosmic Red-Shift and to the Cosmic Microwave Sources."

AUTHORS' ABSTRACT

Here is presented the analysis for photon-electron interaction, when the electron is free, and is under action of externally applied electric field. Equations for mass quantization and for quantization of the law of conservation of momentum, obtained by the QMT (quantum mass theory) are applied in the analysis. These equations, initially determined for the atom when its state is defined by the principal quantum number **n**, are applied here to the free electron when its state is determined by the magnitude of the externally applied electric field. The results of the analysis show the possibility to explain the cosmic red-shift by QMT, which can also be used to explain the origin of detected microwaves coming from the universe. The results of the analysis also suggest the possibility for their experimental verification.

Stefan Marinov (Inst. Fundamental Phys., Graz, Austria), "Segner-Marinov Turbine as a Perpetual Motion Machine."

AUTHOR'S ABSTRACT

I devised the historic Segner turbine as a system with a closed energetic circle. If leaving the water in Segner's turbine to have a paraboloidic surface and if pouring the squirted-out water into its centre (in such cases I call it the Segner-Marinov turbine), the system becomes self-accelerating. The energy win comes from the "tunnel transition" of water under the hydrostatic "potential barrier."

H.L. Bonilla (Phil. Aether-Magnetic Inst. Technol., Philadelphia, PA), "On the Illusion Derived from Timeless Systems."

AUTHOR'S ABSTRACT

There is a notion among contemporary physicists that time can be dilated or caused to be longer to stationary observers watching systems in motion. The Italian astronomer and physicist Galileo Galilei, pointed out that if a ship, for example, is moving in a harbor and an object is released from

the mast of the ship, the object falls straight down and hits the deck near the base of the mast, as observed on the vessel. But if such observation is taken from the shore, the object will not appear to fall straight down. According to Galilei, from the shore the object will be seen following a parabolic path. He reasoned that the falling object must maintain its forward motion because the ship is carrying it along, while simultaneously it falls toward the Earth. However, it is well known that regardless of outside observation, the falling object will still hit the deck at the foot of the mast simply because the ship is moving along and keeping pace with the forward motion of the falling object. Yet, if a sailor on the shore and a sailor on the ship were to have identical clocks, the former will "see" that the falling object takes longer to fall, relative to the time measured by the sailor on the ship. This is a classical case demonstrating time dilation as accepted by mainstream physics today. But this author will show that time dilation must be an illusion occurring to a stationary observer watching moving points of interest along static and therefore timeless trajectories or paths.

Howard Hull, "Potential in Space of Compound Curvature."

AUTHOR'S ABSTRACT

In a paper titled "Potential in Space of Negative Curvature" by Laurence Hecht (*Research Communications*, Winter 1992) the geometry and calculus for treatment of the Pseudosphere as a description of Mass-Energy transfer and nuclear particle repulsion was developed. While the paper was cleverly written and stimulating with respect to the disciplines of potential mapping and relational thinking, many things are suggested concerning which further work needed to be done.

In some speculative work regarding possible toroidal geometries as a better solution than pseudospherical geometry for the problems at hand, Ron Kovac pointed out that the Meusnier Transform cited and explained in Hecht's paper was also applicable to toroidal geometry. Kovac cited several other works which effectively used toroidal configurations to depict geometrical approaches to electrodynamic applications. Further, it was noticed by the author of this paper that the toroidal geometry has pseudospherical interior surfaces, and, as Kovac entreated, could be subjected to the same sort of analysis. Indeed, this analysis can be done; this paper develops Hecht's morphology of the pseudosphere in application to the toroid.

Vladimir N. Larin, (Geol. Inst., Russ. Acad. Sci., Moscow), "Rift Zones as an Inexhaustible Source of Hydrogen on Earth (New Perspectives of Ecologically Clean Energetics)."

AUTHOR'S ABSTRACT

A newly identified regularity in the distribution of elements in the Solar System has been used to re-evaluate the primordial composition of Earth; it is argued that it may be possible to discover, in rift zones, oxygen-free alloys and compounds at depths accessible to drilling. Pumping water there must release heat and hydrogen. The most promising are the western USA and Canada, East Siberia, Jordan-Dead Sea region, Rein graben, and Middle Ocean Ridges of Earth.

Paul E. Rowe (Mashpee, MA), "Hydrogen Gas from Vacuum, Parts I and II."

AUTHOR'S ABSTRACT

When explosives containing aluminum powder were detonated in vacuum, much more gas was produced than was expected on a theoretical basis. A literature search revealed that other experimenters (some well known and highly respected) had produced surprising quantities of hydrogen gas in and, apparently from vacuum. Further experimentation revealed that the extra gas produced from explosions was also hydrogen.

The formation of hydrogen gas from vacuum requires energy. Similarly conversion of hydrogen into vacuum may produce energy without violating the laws of thermodynamics. A working hypothesis is that vacuum is not a void but rather a matrix of protons and electrons?

Colin Walker (Vancouver, B.C., Canada), "Is the Redshift a Quantum Effect?"

AUTHOR'S ABSTRACT

The galactic redshift may correspond to the loss from light of a constant, universal quantum of energy per cycle, independent of the wavelength. A gravitational mechanism is considered.

STUDENT PAPERS

Taylor Hartley, "The Future of Rocketry."

AUTHOR'S ABSTRACT

Rocketry, as we know it, could very easily become nonexistent within the next fifty to one hundred years. Today, most rockets are powered by strong chemical reactions. Some people have speculated about using nuclear fission instead, as the propulsion for rockets that will be sent to Mars. In this way, the rockets would get there much more rapidly as compared with the conventional processes currently in use.

But if speed is of such importance, why isn't atomic fusion strongly considered over nuclear fission? It would produce hundreds, if not thousands, of times more energy than a fission reaction would, thus making it possible for greater velocities. Therefore, if the technology of hot nuclear fusion were properly developed, then this form of propulsion would be much more effective than the already intense process of splitting large nuclei. But from recent discoveries, it is evident that future rockets may not require *any* form of combustion, nor any chemicals or elements as fuel. These recent advances may even yield hundreds of thousands of times more power than even nuclear fusion. This ideal form of energy is astonishing because all that is essentially required are magnets; magnets used in such a way as to properly manipulate the zero-point-energy (ZPE) of space, that is, more so than they already do.

LETTERS TO THE JNE EDITOR

Letter from Mitchell Swartz (JET Technology, MA), "The Impact of Asymmetric Stratification of the Air Surrounding Calorimeters."

Although there were several responses to the paper last issue regarding possible positional effects in flow calorimetry ("Potential for Positional Variation in Flow Calorimetric Systems"), a theoretical examination involving a quasi-one dimensional model of heat and mass flow and the Bernard instability, that from Scott Little is perhaps the most interesting. His discussion can be resolved by addressing several questions of significant value.

Letter from Camil Alexandrescu (Romaina), "A Letter about Nicolae Vasilescu Karpen."

As I promised you many "letters" ago, I am now beginning to tell you about Nicolae Vasilescu Karpen and his strange electrical cells. My investigation on this matter is not finished yet, however, I have an important amount of information that is quite ready to be shared with you.

D. NEWS FROM THE U.S.

CALIFORNIA - INDUCED INERTIA & GRAVITATION

Bernard Haisch (Solar & Astrophys. Lab., Lockheed-Martin, Palo Alto, CA), "Zero-Point-Field-Induced Inertia and Gravitation: Questions, Answers and Issues," (J.) *German Assoc. Vacuum Field Energy*, Aussendung (issue) no 34, May-June 1996, pp 97-104, 38 refs.

"During the past year or so I have received numerous queries... concerning the article by Haisch, Rueda and Puthoff in the *Physical Rev. A* on zero-point-field-induced inertia and the related concept of ZPF-induced gravitation proposed by Sakharov... The thought that something useful result from the exercise has recently led to the enclosed document. Please keep in mind that this is merely the current version of a "working document" that is evolving. Further questions will be raised; answers will change. Moreover it is evident that many of the really profound questions have not yet been addressed at all... This should change with the upcoming initiation of a sponsored ZPF research program.

"If these concepts interest you, I would draw your attention to the article "Vacuum Zero-Point Field Pressure Instability in Astrophysical Plasmas and the Formation of Cosmic Voids," by Rueda, Haisch and Cole in the May 20, 1995, issue of *The Astrophysical Journal*.

AUTHOR'S ABSTRACT

Following the publication of "Inertia as a Zero-Point Field Lorentz Force" in *Physical Rev. A*, in February 1994 and the writeups in *Science* (vol 263, pp 612-613), *Scientific American* (vol 270, pp 30-31), *New Scientist* (25 February 1995, pp 30-33), various newspapers and elsewhere, considerable correspondence has been received consisting of questions and other theoretical propositions, some substantive, some not. Colloquia were also presented (at U.C. Berkeley, Stanford Univ., San Francisco State Univ., The Heisenberg Institut - Munich, Max-Planck-Institut für Extraterrestrische Physik - Garching, Oxford Univ., Univ. of London - Queen Mary College, Univ. of Birmingham, Lockheed) and these too led to numerous questions.

The following writeup consisting of "questions and answers" and "outstanding issues" is (1) an attempt to provide responses in a coherent format; (2) a way to explore and develop the ramifications of the zero-point field ideas; and (3) an education process for the author. It should be viewed as a "working document" that will evolve with time and in which the answers may change. Some of the following is of necessity speculative. Moreover, the questions range from the superficial to the profound; a similar range should apply to the answers, though unfortunately not necessarily in proportion.

CALIFORNIA - SEARCHING FOR RADIATION

S. Szpak, P.A. Mosier-Boss, J.J. Smith (Naval Command, Control & Surveil. Ctr. RDT&E Div., San Diego, CA), "On the Behavior of the Cathodically Polarized Pd/D System: Search for Emanating Radiation," *Phys. Lett. A*, vol 210, no 6 (1996), pp 382-390.

AUTHORS' ABSTRACT

Evidence for the emission of low intensity X-rays during cathodic polarization of the Pd/D system(s) is presented. The Pd/D system was prepared by charging with electrochemically generated deuterium either palladium foil or palladium electrodeposited from D₂O electrolytes. Experimental and analytical procedures are described in detail.

CALIFORNIA - METAFUSION BREAKTHROUGH

Adrian A. Joseph (the Metafuse Corp., Los Angeles, CA), "Metafusion: a Breakthrough in Metallurgy," *NASA Conf. Publ.*, (1994), 3249 (*Technology 2003*, vol 1), pp 60-63.

AUTHOR'S ABSTRACT

The Metafuse Process is a patented development in the field of thin film coatings utilizing cold fusion which results in a true inter-dispersion of dissimilar materials along a gradual transition gradient through a boundary of several hundred atomic layers. The process is performed at ambient temperatures and pressures requiring relatively little energy and creating little or no heat. The process permits a remarkable range of material combinations and joining of materials which are normally incompatible. Initial applications include titanium carbide into and onto the copper resistance welding electrodes and tungsten carbide onto the cutting edges of tool steel blades. The process is achieved through application of an R.F. signal of low power and is based on the theory of vacancy fusion.

CALIFORNIA - MICRO-FUSION FUEL CELL

Chuck Bennett (The Fullerene Fusion Group, CA), "The Micro-Fusion Fuel Cell," 8 refs.

Two main problems have nagged the science of cold fusion since Pons and Fleischmann's original discovery in 1989. These are the difficulty to reliably and repeatedly replicate the effect, and the lack of traditional nuclear particles. Developments since then are rapidly converging on answers to these questions. The device described herein answers a third major concern for the deployment of cold fusion, "How do we put a cold fusion energy source under the hood of a Toyota?"

Articles by this author and others have suggested that the cold fusion effect is caused by sonoluminescence in small nano-sized bubbles of molten metal within a solid metal lattice. [1-6] Electrical pulses or spikes that result in high intensity/high frequency energizers act similar to acoustic activation in aqueous sonoluminescence. Very small nano-sized pockets of ionized gaseous plasma form bubbles and are stabilized by "nano-magneto-hydrodynamics." This creates a self-holding

electromagnetic spherical vortex with a toroidal shaped internal flow. The natural flow pattern resembles the constructed shape of the Tokamak shell.

It is the goal of the device disclosed herein to employ an energetic dynamo resulting from nano-magneto-hydrodynamics to create a fuel cell that can power automobiles. This article does not address the issue of the energy source in terms of the specific transmutation or fusion energy release, but rather offers a description of the configuration for a mobile power source. The energy stems from the growth of small nano-bubbles into a large spheroid of charged plasma suspended and levitated in a thickly shrouded housing.

Very finely powdered metal, most likely pure nickel doped with iron, is used in conjunction with a feed of atomized water or steam to create the reaction and the resulting plasma dynamo. Deuterated fullerene has also been proposed to create such a dynamo. [7,8] Electrodes are positioned for the extraction of excess electric charge, thus powering an electric vehicle. This type of fuel cell is called a direct energy conversion device; however, the energy production is purported to result from mass-energy release. Electric energy is required to start the motor. The subsequent production of electric energy begs an analogy to the "piezo-electric" effect. But instead of a pressure-electricity relation, the micro-fusion fuel cell relies on fusion energy release and the term will be coined: The "fusio-electric" effect.

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- [5] C.E. Bennett, "Tiny Bubbles," *Fusion Facts*, vol 7, no 12, June 1996.
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- [7] C.E. Bennett, W.L. Cooley, R.J. Forbyn, "Patent Application for Warm Fusion Electrodynamic Generator," *Cold Fusion*, #12, July 1995, pp 22-24.
- [8] S. Lazarus, C.E. Bennett, W.L. Cooley, "Electrodynamic Cold Fusion," *Cold Fusion*, #16, March 1996, pp 18-20.

FLORIDA - SPACE ENERGY JOURNAL

The following articles are abstracted from vol. III, issue II, June, 1996 of the *Space Energy Journal*:

Jim Kettner, Editor, "Editorial," *Space Energy Journal*, vol 7, no 2, pg 1.

EDITOR'S COMMENTS

Kettner discusses the problems of receiving hundreds of pages of information with very few pages that meet his journal's desire for good experimental information. We can sympathize with Kettner, especially when he writes, "We receive letters from aliens (supposedly translated by people who communicate with them) on new energy solutions for planet earth." We also ignore these unsolicited papers. Kettner also declares that he receives many stories "about the suppression, ideas being bought up, exploded, or inventors disappearing." Kettner counters with the concept that he has met some **free energy inventors** who have used these stories to cover up the fact that they can't produce a product.

Ralph Hovnanian, "On the Matter of Energy," *Space Energy Journal*, vol 7, no 2, pp 2-4, 2 figs.

EDITOR'S COMMENTS

Hovnanian writes about gravity being a **push** rather than a **pull**. He is apparently unaware of the many others before him that have discovered the same idea. The latest published article was presented at the Third International Symposium on New Energy (Denver, Colorado, April 25-28, 1996) by A. Zielinski. A Holland scientist about 40 years ago came up with the same idea (I know because I presented the same concept while employed as a missile system engineer.) However, the idea has been best described by Harold Aspden and later in a long mathematical exercise by Harold E. Puthoff.

Following this paper, several pages are devoted to a review of data and correspondence relating to the gravity drop-test experiments.

Edward Lewis, "Plasmoid Phenomena," and "Plasmoid Phenomena and **Cold Fusion** Phenomena," and "Gorgons, Tornadoes, and Plasmoid Phenomena," *Space Energy Journal*, vol 7, no 2, pp 16-26, 46 refs.

EDITOR'S COMMENTS

Lewis has been writing articles about plasmoid phenomena for some time. These three articles provide a good overview of Lewis' ideas. He does a good job of citing the literature.

Roger Hastings, "Joseph Newman's Theory," *Space Energy Journal*, vol 7, no 2, pp 28-34.

EDITOR'S COMMENTS

This article has some interesting data about the May 1985 demonstration of the Newman motor in Washington, D.C. The motor was operated at 60 and 120 rpm. The 55 miles of wire made a coil weighing 9,000 pounds, used a 700 pound magnet, and the device was operated using six-volt Ray-O-Vac lantern batteries connected in series. The article suggests that the motor charged the batteries. We look forward to the further development of the Neumann motor into a practical source of power.

MASSACHUSETTS - NEUTRON HOPPING

Peter L. Hagelstein (Mass. Inst. of Tech., Cambridge, MA), "New Lattice-Nucleus Coupling Mechanisms and Possible Energy Production," *Seeking a New Energy Era*, proceedings of the Symposium on Fusion Engineering, Champaign, IL (Sept. 30-Oct. 5, 1995), vol 2, pp 1617-1621, 13 refs, 1 table.

AUTHOR'S ABSTRACT

Two new basic physical mechanisms involving lattice-nuclear coupling have been recently proposed: (1) neutron hopping in crystals (in analogy with electron hopping), and (2) anomalous energy exchange by frequency shifting of highly excited phonon modes ($\Delta E = N_{ph} \hbar \delta \omega$). Elastic neutron hopping has been predicted to occur in crystals containing nuclei ^{A+1}Z with an outer s-shell valence neutron and parent nuclei AZ , under conditions where the r.m.s. vibrational motion of these nuclei greatly exceeds the Lindemann rule for melting. Hydrogen and deuterium nuclei in metal hydrides can satisfy this criterion. We propose that neutron hopping to other nuclei can occur under conditions that the lattice dissipates the energy excess via the anomalous energy transfer mechanism. These effects are of interest for their possible application to the problem of nuclear energy generation.

MINNESOTA - PROTON CONDUCTING OXIDE

R.A. Oriani (Corrosion Res. Cntr., Dept. Chem. Eng. & Mat. Sci., Univ. MN), "An Investigation of Anomalous Thermal Power Generation From a Proton Conducting Oxide," to be published in *Fusion Technology* (Nov. 1996 issue).

AUTHOR'S ABSTRACT

A high-temperature Seebeck effect calorimeter, in which the thermoelectric emf across a large-area enveloping thermopile is a measure of the heat from a power source, has been

constructed to examine the claimed generation of excess thermal energy from a proton-conducting oxide immersed in deuterium gas. The claim [of excess thermal energy] has been confirmed in a few experiments out of many unsuccessful ones.

NORTH CAROLINA - NOTES FROM T.T. BROWN

Charles A. Yost, "T. Townsend Brown Notebooks," *Electric Spacecraft Journal*, Apr/May/June, issue 18, June 16, 1997, pp 13-16.

EDITOR'S COMMENTS

Charles Yost, the editor of the *Electric Spacecraft Journal*, provides us with an interesting insight into the works of T.T. Brown. Some excerpts from Brown's journals from 1955-1958 and from 1967-1977 are provided. For example, "April 7, 1956, In a vacuum (10^{-6} mm Hg or less) - a simple vacuum capacitor will appear to flash as the voltage increases. Concurrent with the vacuum spark, an impulse force is notable in the direction from negative to positive. ... Successively higher voltages, starting at 30-40 kV and going up to 150 kV, must be applied to allow flashing spark-over to continue. The anode takes on a reddish glow upon flashing and the cathode has bright starlike points. Impulse forces are on the order of thousands of dynes."

May 31, 1970, Palo Alto, CA. "Brown begins investigating the use of capacitors to detect gravitational waves. He starts with four 1 microfarad, 25 kV capacitors producing loud pops and whistles. Several circuit variations are sketched."

March 10, 1975. "A volcanic rock from Waikiki, 10 cm in diameter, was washed and oven dried at 400 deg F. Copper print electrodes were painted on it after it cooled. The rock output about 60 mV. When connected to the recorder it immediately showed regular pulsations about 1 second apart."

NORTH CAROLINA - CONFERENCE REPORT

Charles A. Yost, "Science Conferences," *Electric Spacecraft Journal*, Apr/May/June, issue 18, June 16, 1997, pp 18-20.

EDITOR'S COMMENTS

Charles Yost reports on his attendance at the International Symposium on New Energy, Denver, Colorado, April 22-28, 1996 and also at the Society for Scientific Exploration on May 22-25, 1996.

NORTH CAROLINA & VIRGINIA - ELECTROSTATIC EXPERIMENTS

R. Steven Hall and Leslee Kulba, "Electrostatic Experiments," *Electric Spacecraft Journal*, Apr/May/June, issue 18, June 16, 1997, pp 21-26.

Richard Hull, "Tesla Coils, Electric Gradients and Electrostatics," *Electric Spacecraft Journal*, Apr/May/June, issue 18, June 16, 1997, pp 27-31.

Charles Yost, "Electrostatic Force Experiments," *Electric Spacecraft Journal*, Apr/May/June, issue 18, June 16, 1997, pp 32-37.

ABSTRACTS

Hall and Kulba performed a series of experiments that would allow direct observation of electrostatic forces. These included levitations, spinning tops, inflation forces and the measurement of ion charge collection on an antenna.

Richard Hull reports the results of the latest experiments of the Tesla Coil Builders of Richmond (TCBOR). These experiments are directed toward studying the dynamic electrostatic fields generated by Tesla coils in an attempt to test Tesla's claims that most of the effects of his coils were electrostatic, not electromagnetic in nature.

Charles A. Yost presents some ideas of how electrostatics might produce propulsion. The only other forces recognized in the paper are those experienced from acceleration and gravity. In other words, this article is limited to the Newtonian forces.

EDITOR'S COMMENTS

Both Yost and Hall's articles provide some interesting experiments using Tesla coils or a Holtz/Wimshurst machine in which small units of aluminum foil are levitated and spun in an electrostatic field. In Hull's article he describes experiments with electrostatic forces provided by a Holtz/Wimshurst generator and shows how to spin a top using the electrostatic forces. Hull experiments with various antennas and measures the effectiveness on transferring power from the Tesla coil to a receiving antenna. Some very interesting discoveries were made involving both inductive and capacitive coupling. Hull also reports on a new record (for this group) of producing a 115 inch spark using their most powerful Tesla Coil.

This issue also included a short note from R.M. James about "Longitudinal Waves" and their mathematical representation. Copies of the *Electric Spacecraft Journal* can be obtained from 73 Sunlight Drive, Leicester, North Carolina, 28748, voice 704-683-0313; Fax 704-683-3511.

NORTH CAROLINA - ON ELECTROSTATICS

Leslee Kulba, " $C = (\epsilon_0 \mu_0)^{-1/2}$," *Electric Spacecraft Journal*, issue 18, June 16, 1996, pp 6-12, 33 refs, 3 figs, 3 tables.

AUTHOR'S ABSTRACT

As the field of electrostatics reopens in the search for a mechanism for large-scale electric propulsion, questions arise which go beyond the scope of undergraduate curricula. Sometimes phenomena are observed which appear to contradict conventional theory. It is therefore necessary to reexamine accepted interpretations and applications of fundamental notions for consistency. This paper examines two constants of proportionality, ϵ and μ , from a philosophical basis; addressing their derivation, arbitrary nature, physical properties, and coincidental interconnectedness with each other and other constants. Examination of the principles underlying elementary physics reveals that, although the science is a great tool for accounting for physical changes, the physical essence of what is really happening is still unknown.

EDITOR'S COMMENTS

This is a good survey article about dimensions, definitions, and especially about permeability and permittivity. Also, the author reminds us of some of the historic background of some of the conventions. For example, did you know that a unit of capacitance was originally derived from the radius of a sphere? In addition, the author reminds us that some of the mathematical expressions are precise statements of scientific laws or facts and others are derived expressions that are difficult to equate with reality. We should all be aware of what it is that we are calculating when we use the numerous equations we find in textbooks and technical papers.

NEW MEXICO - NEW ENERGY ECONOMICS

Robert A. Krakowski (Los Alamos Natl. Lab., Systems Eng. & Integration Group, Los Alamos, NM), "Magnetic Fusion Reactor Economics," Seeking a New Energy Era, proceedings of the Symposium on Fusion Engineering, Champaign, IL (Sept. 30-Oct. 5, 1995), vol 2, pp 1549-1554, 26 refs, 4 figs.

AUTHOR'S ABSTRACT

An almost primordial trend in the conversion and use of energy is an increased complexity and cost of conversion systems designed to utilize cheaper and more-abundant fuels. This trend is exemplified by the progression fossil \rightarrow fission \rightarrow fusion. The present projections of the latter indicate that capital costs of the fusion "burner" far exceed any commensurate savings associated with the cheapest and most-abundant of fuels. These projections suggest competitive

fusion power only if internal costs associated with the use of fossil or fission fuels emerge to make them either uneconomic, unacceptable, or both, with respect to expensive fusion systems. This "implementation-by-default" plan for fusion energy is re-examined by identifying in general terms the fusion power-plant embodiments that might compete favorably under conditions where internal costs (both economic and environmental) of fossil and/or fission are not as great as is needed to justify the contemporary vision for fusion power. Competitive fusion power in this context will require a significant broadening of an overly focused program to explore the physics and symbiotic technologies leading to more compact, simplified, and efficient plasma-confinement configurations that reside at the heart of an attractive fusion power plant.

EDITOR'S COMMENTS

What Krakowski apparently does not understand is that the "New Energy Era" is here and now and is being commercialized in the form of cold fusion; super magnets/super motors; and solid-state new-energy devices. There is no longer any reason to continue with the **hot fusion** approach to new energy systems. We recommend this article to our readers because the article does delineate the economics that must be achieved by any new-energy systems before they can be commercially viable.

PENNSYLVANIA - POROUS HEAT EXCHANGERS

John H. Rosenfeld, James E. Lindemuth, and Mark T. North (Thermacore, Inc., Lancaster, PA), Robert D. Watson and Dennis L. Youchison (Sandia Natl. Lab., Fusion Tech. Dept., Albuquerque, NM), Richard H. Goulding (Oak Ridge Natl. Lab., Oak Ridge, TN), "Evaluation of Porous Media Heat Exchangers for Fusion Applications," *Fusion Technology*, vol 29, no 4, July 1996, pp 449-458, 22 refs, 5 figs, 2 tables.

AUTHORS' ABSTRACT

Several types of porous media heat exchangers are being evaluated for use in fusion applications. Broadly, these devices can be classified as capillary-pumped (heat pipes) or mechanically-pumped heat exchangers. Monel/water thermosyphon heat pipes with a porous metal wick are being evaluated for use in Faraday shields. A subscale prototype has been fabricated, and initial tests at Oak Ridge National Laboratory have shown favorable results. Alkali metal heat pipes have demonstrated absorbed heat flux capability of over 1000 MW/m². An advanced gyrotron microwave cavity is being developed that uses water cooling in a mechanically-pumped copper porous metal heat exchanger. Tests on a prototype demonstrated absorbed heat flux capability in excess of 100 MW/m². Porous metal heat exchangers with helium,

water, or liquid metal coolants are being evaluated for plasma-facing component cooling. Tests on a helium/copper porous metal heat exchanger demonstrated absorbed heat flux capability in excess of 15 MW/m². Applications, conceptual designs, fabricated hardware, and test results are summarized.

UTAH - BRANCHING RATIOS

Hal Fox and Robert Bass (FIC, Salt Lake City, UT), "Cold Versus Hot Fusion Deuterium Branching Ratios," Seeking a New Energy Era, proceedings of the Symposium on Fusion Engineering (Sept. 30 - Oct. 5, 1995), Champaign, IL, vol 2, pg 1622-1625, 12 refs.

AUTHORS' ABSTRACT

Nuclear fusion has been a major source of misunderstanding of the nature of cold fusion, with the expectation that the deuterium branching ratios occurring within a palladium lattice would be consistent with the gas-plasma branching ratios. This misunderstanding has led to the concept of the dead graduate student, the 1989 feverish but fruitless search for neutron emissions from cold fusion reactors, and the following condemnation of the new science of cold fusion. The experimental facts are that in a properly loaded palladium lattice, the deuterium fusion produces neutrons at little above background, a greatly less-than-expected production of tritium (the tritium desert), and substantially more helium-4 than is observed in hot plasma physics. The experimental evidence is now compelling (800 reports of success from 30 countries) that cold nuclear fusion is a reality, that the branching ratios are unexpected, and that a new science is struggling to be recognized. Commercialization of some types of cold fusion devices has already begun.

EDITOR'S COMMENTS

The future of low-energy nuclear reactions: Hot fusion research during the past 20 or more years must be credited with making many advances in nuclear science and nuclear engineering. With the increasing difficulty of finding research funds for highly expensive energy projects that have yet to demonstrate efficiencies over one hundred percent, it is suggested that low-energy nuclear reactions be carefully studied. The latest cold-fusion reactors, although producing minuscule amounts of energy by hot-fusion standards, are showing efficiencies of 200 to 1000 percent.

The scientific and engineering skills of those who are no longer supported by hot-fusion research grants are greatly needed to spur the commercialization of cold fusion. There are now about ten corporations that are involved in cold fusion business activities, ranging from management of intellectual property (such as ENECO), through the development of

demonstration systems to augment their licensing efforts (such as CETI), to companies offering cold fusion systems and affiliated products for sale (such as Jet Technology and Nova Resource Group). Sooner or later there will be an intense U.S. corporate interest in cold fusion as the reality of the commercialization of this new science becomes known.

E. NEWS FROM ABROAD

AUSTRIA - DEUTSCHE PHYSIK

The following important papers have been published in the latest issue of *Deutsche Physik*, edited by Stefan Marinov.

Stefan Marinov, "An Attempt to Make the Siberian Colium Rotors of Permanent Magnets," *Deutsche Physik*, vol 5, no 19, July-Sept 1996, pp 5-16, 5 refs, 8 figs.

AUTHOR'S ABSTRACT

If we shall take a ring magnet to be the rotor of the cylinder SIBERIAN COLIUM magnet, or a cylindrical magnet to be the rotor of a ring SIBERIAN COLIUM magnet, the net torque acting on such a rotor will be null. However, if the rotor axes will be eccentric with respect to the axes of the SIBERIAN COLIUM magnets, possibly there will be a torque. I constructed the concentric and eccentric variations, but in both cases no torques have been observed.

EDITOR'S COMMENTS

Stefan Marinov has been a fervent believer in the possibility of developing a perpetual motion device. In the editorial (page 3 of this issue of *DP*) he announces success: "Finally my self-accelerating machine SIBERIAN COLIUM was run as a perpetuum mobile. The report on this success will be published in the next issue of *DP* after a presentation at a press conference or shortly before the conference."

Christoph Bodner, "Is Segner's Turbine Computable at All," *Deutsche Physik*, vol 5, no 19, July-Sept 1996, pp 17-26 with editor's comments.

AUTHOR'S ABSTRACT

This study should demonstrate that a computational model of Segner's turbine, invented in 1750, is not as easy as it may seem. The main question to the energy balance is how to deal with the Coriolis forces in comparison to the thrust forces. Segner's turbine, also known as **reaction wheel**, is simply a sprinkler where water streams in along the rotation axis and streams out tangentially. There is a sophisticated theory published in our schoolbooks stating that the efficiency of such

a sprinkler wheel is always less than one. But who can follow what our theory wizards try to teach us?

MARINOV'S EDITORIAL COMMENTS

... After studying attentively his [Bodner] paper (and then other publications dedicated to Segner's turbine), I came to the conclusion that if leaving the water in Segner's turbine to have a paraboloidic surface (because of the appearing centrifugal forces) and if pouring the squirted out water into its centre, the system becomes self-accelerating. ... I have to add, however, that nobody has done measurements to see whether the Coriolis force acting in the Segner-Marinov [version] turbine will be the same as when a solid mass moves along the radius of a rotating disk. By the help of simple speculations, I came to the conclusion that the Coriolis torque of water streaming in water, as is the case in the Segner-Marinov turbine, must be less than the theoretical value. Of course, only the experiment can give the definite answer. Which conclusion can we draw after analyzing the physical essence of the Segner-Marinov turbine? Obviously the conclusion is only one: Mankind which during centuries constructed water dams whose dimensions and costs can be compared only with those of the Egyptian pyramids, is nothing else than a herd of blind. The **inutility** of these dams can be compared only with the inutility of the pyramids.

EDITOR'S COMMENTS

Marinov does his usual fine job of analyzing a physical system and writing the equations for the expected results. He concludes that if the torque produced by the streaming water is sufficiently larger than the Coriolis force to overcome frictional forces, **then the Segner-Marinov turbine should be another perpetuum mobile.**

Stefan Marinov, "Wang's First-Order-Effect Prediction is Due to Elementary Calculations Error," *Deutsche Physik*, vol 5, no 19, July-Sept 1996, pp 27-29, 7 refs, 1 fig.

AUTHOR'S ABSTRACT

I show that the first-order effect in the experiment for measurement of the Earth's absolute velocity, predicted recently by Wang, is due to an elementary calculation error.

EDITOR'S COMMENTS

Marinov follows this article with copies of correspondence in which he tries, without success, to get his criticism of Wang's work printed or at least sent to the author for Wang's comments. The referees (probably the same ones who authorized printing of Wang's paper) deemed that Marinov's criticism should not be published. Marinov includes several

exchanges of correspondence with *Nature* in an effort to get another of his article published. All without success.

BELGIUM - SEE PAGE 17

CHINA - SEE PAGE 17

GERMANY - POROUS HEAT EXCHANGERS

Diethelm Schroeder-Richter and Sabiha Yildiz (Technische Univ. Berlin, Institut für Energietechnik, Germany), "Effect of Porous Coating on Critical Heat Flux Removed by Subcooled Water at Low Flow Rates," *Fusion Technology*, vol 29, no 4, July 1996, pp 512-518, 27 refs, 7 figs.

AUTHORS' ABSTRACT

The critical heat flux (CHF) is studied experimentally in vertical tubes heated directly using power current (direct current 2500 A, 15 V) and cooled with water at a low mass flow rate (0 to 0.2 Mg/m²·s) and at low pressure (0.1 to 0.8 MPa). A smooth tube and a tube with a porous coating layer sintered onto the inner surface were used. The tube and the porous coating layer are both made from INCONEL-600. The results (so far at moderate heat fluxes) are compared with each other and with correlations by Katto and by Weber. Enhancement of heat transfer was determined as well as a negative effect of the porous coating below the expected value of CHF.

It seems that a disadvantage of the coated tube corresponds to the apparently annular flow regime alone; whereas, the CHF's can be enhanced by the porous layer as long as the bubbly flow pattern is maintained up to the location of maximum heat flux. Obviously, the latter situation is established during high-heat-flux conditions, i.e., at high subcooling and high flow rate, which are the classical design characteristics of high-heat-flux components in fusion reactors.

HONG KONG - ULTRASOUND & LASER

T.V. Prevenslik (Discovery Bay, Hong Kong), "Ultrasound Induced and Laser Enhanced Cold Fusion Chemistry," *Nucl. Sci. Tech.*, vol 6, no 4 (1994), pp 198-203.

AUTHOR'S ABSTRACT

The standard model of sonoluminescence suggests that the Coulomb barrier to deuterium fusion may be overcome by high bubble gas temperatures caused by compression heating if the bubble diameter remains spherical during bubble collapse. However, in the more likely collapse geometry of a pancake shape, the temperature rise in the bubbles is negligible. But the collapsing pancake bubble is found to significantly increase

the frequency of the IR energy available in the vibrational state of the water molecules at ambient temperature. For a collapse to liquid density, UV radiation at about 10 eV is found. Although the UV radiation is of a low intensity, higher intensities may be possible if the bubble collapse is enhanced by visible and IR lasers. Neither hot nor cold fusion is predicted in bubble collapse, but the UV energy at about 10 eV developed in the bubble is sufficient to provide the basis for a new field of chemistry called ultrasound induced and laser enhanced cold fusion chemistry.

ISRAEL - SEE PAGE 17

JAPAN - SOLID STATE PLASMA FUSION

Yoshiaki Arata, Yue-Chang Zhang (Osaka Univ., Ibaraki), "Achievement of Solid-State Plasma Fusion ("cold fusion")," *Koon Gakkaishi*, vol 21, no 6 (1995), pp 303-306 (Japanese).

AUTHORS' ABSTRACT

The authors detected much helium (10^{20} - 10^{21} atoms/cm⁻³) originating from the deuterium nuclear fusion reaction within the host solid with full reproducibility using a Quadrupole Mass Spectrometer (QMS). When nuclear fusion reactions occur in a deuterated host solid, both large fusion energy and a large amount of helium should be observed simultaneously. The authors have already presented some reports on generation of tremendous excess energy with some hundred MJ for over a period as long as several thousand hours even for a small quantity (3-5 g) of Pd fine powder. Furthermore, it was also observed by QMS that when a high-d deuterated fine Pd-black sample with large excess energy discharged, was heated up at high temperature such as 1000-1500 °K, a lot of helium was released. This means that solid-state deuterium plasma nuclear fusion (cold fusion) was achieved within the Pd host solid.

JAPAN - FUSION AND FOILS

Toshiyuki Lida (Fac. Eng., Osaka Univ., Japan), "Deuteron Fusion Experiments with Some Foils Implanted with Deuteron Beams," *Genshikaku Kenkyu*, vol 40, no 5 (1995), pp 77-83.

AUTHOR'S ABSTRACT

Deuteron beam implantation experiments were carried out with Ti and Pd foils to find out possibility of cold fusion. Possibly a high energy ~6.9 MeV He peak was observed. No temperature change of the target was observed during implantation.

RUSSIA - UNITARY QUANTUM THEORY

Lev G. Sapogin (Dept. Phys., MADI-Tech. Univ., Moscow), Igor V. Kulikov (researcher and free-lance translator of scientific-technical lit., Vienna, Austria), "Cold Nuclear Fusion in the Unitary Quantum Theory," *Chinese J. of Nuclear Phys.*, vol 17, no 4, 1995, pp 360-370, 15 refs, 4 figs.

AUTHORS' ABSTRACT

The interaction of the charged particles in the new Unitary Quantum Theory is considered. It is shown that the distance of approachment of deuterons to each other depends very strongly on the phase of the wave function, and not only upon the energy. This thesis is not discussed in the conventional quantum theory. It can easily explain the experiments on cold nuclear fusion.

AUTHORS' CONCLUSION

All the programs for thermonuclear fusion are defined as "controlled," though in reality, there is no such control. For this reason the provided quantity of reaction material used is extremely small (for instance, a lithium deuteride ball is no more than 1-2 mm in diameter). The direct approach used for the "hot" fusion process is naturally very well understandable, because there are no means to control this process in the classical quantum mechanics. The new Unitary Quantum Theory (UQT) does provide one with such an opportunity: the UQT equations show that the minimum distance to which the deuterons can approach each other depends greatly on the wave function phase.

The future of the really controllable nuclear fusion system is not in primitive squeezing and heating of the material, but in the collision of low energy nuclei with a fine adjustment of wave-function phase. This can be achieved by applying the external controlling electromagnetic field to the reacting system that contains quasi-fixed, ordered deuterium atoms and free (unbound) deuterons. The same properties may also be manifested by the special geometry of atomic frames. The diffractive scattering of deuteron flow in such frames will result in deuteron automatic selection in accordance to their energy and phasing. In this case, the energy of colliding nuclei may be less than 1 eV.

Therefore, from the Unitary Quantum mechanics it follows that certain local phase correlations are a prerequisite for a reaction of cold nuclear fusion in an operational environment. Analyses of experiments made so far in cold fusion produce the impression that the reaction is effective only in the case of, at least, weak phasing, which is determined by either the inner structure of the environment or applied variable external fields. The theoretical analysis of a deuteron's interaction dynamics shows that tritium and/or helium should be predominant over neutrons in reaction products ($N_T/N_n \gg 1$, number of tritons

/ number of neutrons), that also corresponds to experimental facts. Apparently, in the course of their electrochemical experimentation, M. Fleischmann and S. Pons discovered this ordered system and observed occasional incomplete phasing that could explain the experimental results achieved mostly by chance and without any sufficient theoretical basis.

In our reactor model, in contrast to the existing ones, only a very small portion of all deuterons will react simultaneously, their automatic selection being carried out by phase correlations. This will lead to the discharging of small quantities of energy in a prolonged period of time until the reacting light nuclei source is exhausted. Such a kind of nuclear fusion could be rightfully defined as "controllable!"

According to our theory, the solving of nuclear fusion problems is to be reached in an absolutely different way, as it was repeatedly done since 1989 (for example, we do not need any palladium). We expect our cold fusion nuclear reactor to be compact, simple to operate, inexpensive and pollution free — that is, without radioactive wastes!

Apparently, the first reactor will be designed for house heating. The expected overall output of heat: 1 litre of deuterium or lithium containing working substance will produce the same amount of heat as 1.5 tons of gasoline, the heating process itself being extended for two or three years.

Still, we propose that the renowned world laboratories should discuss with us the technology of cold nuclear fusion. By the way, it was already predicted in 1983 and all the above is the development of our old ideas.

AFTERWORD

In August 1994, the group with Dr. Sapogin in Moscow constructed the first small capacity cold nuclear fusion reactor for house heating. The first test was very successful. The connected electrical load is 100 W, and the reactor produces the heat energy of 500 W. One has to stress that in cold nuclear fusion experiments, a large amount of energy is produced, but only a small part of it (in the order of a few percent) is caused by nuclear reactions. The Unitary Quantum Theory explains that phenomenon partly also as sonoluminescence, but these are absolutely new effects that are absent in ordinary quantum physics and will be described in our next article.

F. "ESTABLISHMENT" TRANSMUTATION

What are the non-New Energy researchers doing?

M. Salvatores, A. Zaetta, M. Delpech, C. Girard, I. Slessarev, J. Tommasi (CEA/DRN, Cardarache, Israel), "Nuclear Waste Transmutation: Physics Issues and Potential in Neutron Fields,"

React. Phys. React. Comput., Proc. Int. Conf., (1994), pp 67-78. Edited by Yigal Ronen, and Ezra Elias, Ben-Gurion Univ. of the Negev Press; Beer Sheva, Israel.

AUTHORS' ABSTRACT

Goals, criteria, and realistic scenarios for transmutation in a reactor park (Pu and minor actinide recycling and long-lived fission product transmutation) are considered.

L.H. Baetsle, Ch. De Raedt (Belgian Nucl. Res. Cent., Mol, Belg.), "Limitations of Actinide Recycle and Waste Disposal Consequences: A Global Analysis," *React. Phys. React. Comput., Proc. Int. Conf.*, (1994), pp 49-66. Edited by Yigal Ronen, and Ezra Elias, Ben-Gurion Univ. of the Negev Press; Beer Sheva, Israel.

AUTHORS' ABSTRACT

The paper emphasized the impact of LWR-MOX introduction on the subsequent actinide management and the fate of reprocessed and depleted U. The spent fuel from LWR-MOX contains, in principle, 75% of the initially produced Pu. This new source term has to be considered together with the minor actinides (M.A) from the conventional reprocessing. Subsequent LWR-MOX reprocessing is the first step in a very long term Pu and M.A. management. Recycling of Pu and M.A. in fast reactors to significantly reduce the Pu and M.A. inventory (e.g. a factor of 10) is a very slow process which requires the development and operation of a large park of Actinide Burner Reactors during an extended period of time. The overall feasibility of the P and T option will greatly depend on the massive introduction during the next century of fast nuclear reactors as a replacement of the present LWR generation of NPP's.

R.S. Wang, X.N. Yang, Q.Y. Wu (Dept. Chem. Engr., Tianjin Univ., Tianjin, PRC), "Study of the Immobilization of ^{226}Ra . I. Cement Solidification of ^{226}Ra Waste," *J. Radioanal. Nucl. Chem.*, vol 198, no 2 (1995), pp 281-288.

AUTHORS' ABSTRACT

A study of the immobilization for ^{226}Ra waste was carried out. Cement-based concrete was used as a matrix for the solidification. The experimental results show that the cement mixture with water/cement between 0.46-0.54 has a higher strength (above 20 MPa), and the compressive strength was not reduced by addition of 1% barite or the radium waste (RaSO_4) into the concrete solid.

G. NEW PATENTS

PATENT US 5,502,354, "Direct current energized pulse generator utilizing autogenous cyclical pulsed abnormal glow discharges;" Paulo N. Correa & Alexandra N. Correa, 26 Mar 1996; appl. 19 April 1994; 18 claims, 14 drawing sheets.

AUTHORS' ABSTRACT

A cold cathode vacuum discharge tube is used in a circuit for generating pulsed autoelectronic emissions which are particularly intense and frequent in the abnormal glow discharge region, and involve much lower current densities than predicted by the Fowler-Nordheim vacuum arc discharge region law. The discharge tube is characterized by a large electrode area at least of the cathode, and a large inter-electrode gap. The electrodes are preferably spaced at least 2 cm apart in a parallel relationship. A probe may be introduced between the electrodes to reduce still further the field required to generate the emissions. In another configuration, the probe forms the anode and two plates form cathodes. The circuit is driven from a direct current source of having an impedance sufficient to prevent establishment of a vacuum arc discharge.

RU 2,046,464; "Pulsed electrochemical converter of nuclear fusion energy and its operation;" Alfred N. Arshinov, Aleksey B. Burtsev, Lyudmila K. Grigoreva, Aleksandr L. Lisitsyn, Vitalij Kh. Stankov, Semen P. Chizhik (Tavarishchestvo S Organichennoj Otvetstvennostyu "Kimelektro"); 20 Oct 1995; appl. 24 Nov 1992; (Russian) title only translated.

JP 07,318,672 [95,318,672]; "Electrolysis-type low temperature nuclear fusion reactors;" Yoshito Tanaka; 8 Dec 1995; appl 26 Mar 1992; (Japanese). In a water electrolytic cell, a hydrogen-absorbing metal such as Pd or Ti is used as a cathode, permanent magnets or electromagnets are arranged inside or outside the electrolytic cell so the lines of the magnetic force can pass through the cathode. A small quantity of light water is added to the heavy water or only light water is used for electrolysis. Excess heat can be continuously generated.

H. BOOK REVIEWS

By Hal Fox

THE HYDROGEN-FILLED EARTH

Vladimir N. Larin (Russia), Edited by Warren Hunt (Canada), Hydric Earth, The New Geology of Our Primordially Hydrogen-Rich Planet, c1993 by Polar Publishing, P.O. Box 4220, Station C, Calgary, Alberta, Canada T2T 5N1, 247 pages, illus., 263 refs.

Vladimir N. Larin graduated from Moscow in 1961 with degrees in geology and mineral prospecting. He developed special techniques, as a result of field work, to aid in the search for rare metal deposits. In 1968, he got a revolutionary idea about the earth being formed from a hydrogen-rich plasma. The consequences are reported in this book.

He opens with a new concept of earth formation, starting with a plasma that differentiates on the basis of the Coulomb forces between atoms of various elements that result from their respective ionization potentials. (This is the process that, in a proto-solar system plasma, creates differing plasma groups that later coalesce into various types of planets.) Next, Larin theorizes that the plasma condensed and coalesced into the sun and the known array of planets. Plasma filaments radiating out from the sun are able to distribute the momentum of the central (proto-sun plasma rotation) during this phase into the various proto-planets. Thus, the differentiation of both angular momentum and chemical composition among the newly-formed planets evinces the highly different forms we recognize today. Intense enrichment of hydrogen, the predominant element in the universe, characterizes all of the planetary bodies because of the unique behavior of the hydrogen [as described in the book], and is the essence of this remarkable new view of how planets and their basic core matter are formed. Larin moves from these revolutionary deductions to the consequence they have for the formation of the earth and for its subsequent evolution to the present geological structure.

Larin does an excellent job of discussing the role of magnetic separation of elements in the proto-planet plasma body and shows that our current ideas suffer from lack of suitable correspondence to reality. Further, he discusses the origin and acceptance of the **current dogma** of an "iron core and a silicate mantle." The new geochemical model is for a silicate and oxide crust, a metals mantle, and a core of hydrides surrounded by metals with dissolved hydrogen. Larin has buttressed his theory with experiments in high-pressure to show what happens when hydrogen under near-earth-core pressures is dissolved in metals, it causes the metals to become fluidized.

Larin cites experimental data which "fully substantiates the hypothesis that hydrogen is present in metallic lattices as atomic nuclei, single protons, which have penetrated the outer electron shells of metallic atoms." Or, elsewhere, "became understandable as **proton gas** within metal atoms." Also, "Only hydrogen can enter metals to create structures by penetration or replacement." As a result of his experiments, Larin patented a process by which selected metals, **not otherwise easy to form**, can be fluidized and extruded into desired shapes.

In chapter VII, Larin suggest a solution to the earth's potassium problem (the discrepancy between the relatively high crustal abundance of K and its presumed lesser

abundance in the earth's mantle.) In Chapter IX, **Isotope geochemistry and the new model of the earth**, Larin delves into such exotic topics as the process by which the observed $^{87}\text{Sr}/^{86}\text{Sr}$ ratio is now explained.

Of considerable import to readers interested in energy is the discussion in Chapter XII, **Energy resources on earth and its ecology in the light of the new model**. He writes, "...to obtain clean fuel, we have been compelled to burn a **foul** energy in quantities greater than what we would recover when we burn the produced hydrogen. Tapping intermetallic lodes for hydrogen may produce it [the hydrogen] with no net energy input. This procedure could be a wonderful alternative to the seemingly dead-end contradiction between the need for ...[energy] and the necessity of keeping the environment clean. Larin ends with the suggestion that hydrogen from the earth's interior may be working its way to the surface and **slowly replenish abandoned oil fields**. His last sentence is: "Depleting oil and gas fields may yet see better times in the future."

If you are trained in geology and want to ruin your current concept of the earth, then read **Hydridic Earth**. It may do for you what cold fusion and tapping space energy has done to your concepts of physics. In any rate, we are indebted to Vladimir Larin and C. Warren Hunt for a new picture of hydrogen in our lives and within our world.

REPORT ON AN IMPORTANT NEW BOOK

Peter Graneau & Neal Graneau, **Newtonian Electrodynamics**, c1995, illus., 132 figs, 19 tables, 146 refs, indexed, ISBN 981-02-2681-0, \$58, (paper \$36), World Scientific Publishing Co., Suite 18, 1060 Main Street, River Edge, NJ 07661, USA.

Peter Graneau, Northeastern University, Boston, and Neal Graneau, Oxford Univ., England, have documented the life's work of Peter and the not inconsiderable help and extension of this work by Neal. The book has two important messages: **First**, although the Lorentz force equations and Maxwell's equations provide excellent insight into electrodynamics, there are many cases where the abandoned Ampere equations are superior. **Second**, there are still many experimental anomalies that are not explained by any of the current scientific models and these anomalies deserve the attention of the scientific community.

Ampere's force equations are based on a model of a current element which is the electrical conductor, and on the concepts of Newtonian physics. The Lorentz and Maxwell's equations, although based strongly on Ampere's work, have as the current element the electrical current (now considered to be the discrete electrons) and include **field** forces which make these equations relativistic and non-Newtonian. [The reader who is

not particularly thrilled with equations will want to read **Newton versus Einstein** by these same authors.]

The book is divided into seven readable chapters:

1. Evolution of the Nineteenth Century Newtonian Electrodynamics.
2. Experimental Demonstration of Longitudinal Ampere Forces.
3. Theoretical Developments.
4. The Nature of Current Elements.
5. The Railgun: Testbed of the Newtonian Electrodynamics.
6. Electrodynamics of Arc Explosions.
7. Electrodynamics in the Quest for New Energy.

In reading the book there were many important and new (to me) observations that should be of equal interest to both the professional and the intelligent lay reader. Here are some of them:

"The abandonment of mutual attraction and repulsion between matter elements of electric conductors, and the violation of Newton's third law which this entailed, signalled the end of Newtonian physics. The Grassmann and Lorentz force laws required a new mechanics which was to become that of the theory of special relativity." Page 30.

"That not all electrodynamic forces in a metal are mechanical forces on the lattice must have something to do with the two types of bonds that (a) exist between positive and negative charges and (b) between charges and the solid body. This issue of bonding between charges and ponderable matter has still not been satisfactorily resolved even at the end of the twentieth century." Page 35.

The difference between equations formulated by Weber and those of Ampere were reconciled by a constant which had to have the dimensions of velocity. This constant had to have the value $c = 3 \times 10^{10}$ cm/sec. "This constant became known as the velocity of light and it always emerges when the laws of electrostatics are combined with those of electrodynamics. ... This is how the velocity of light made its first appearance in the literature and Newtonian electrodynamics." Page 36.

The authors discuss the liquid mercury fountain which is an interesting experiment. An insulated cup with a sealed-in bottom electrode and with a copper ring electrode at the top of the cup is filled with mercury until the mercury engages the top conducting ring. When 500 to 1,000 amperes of current is made to flow through the mercury a mercury fountain is created. The results are easily explained with Ampere's law but not with the Lorentz field equations that are almost universally used today. Pages 78ff.

"... mechanical forces arising in electron-lattice collisions are negligibly small and are certainly unable to account for the longitudinal forces predicted by Ampere's law. ... The parallel

existence of both ponderomotive and electromotive forces has become the hallmark of Newtonian electromagnetism." Pages 145-146.

In the chapter on the railgun: "From this example it must be concluded that the magnetic force on the railgun armature cannot be produced by field-energy impact. Here we have a practical example which reveals a serious flaw of relativistic electromagnetism. ... This is the greatest inconsistency of relativistic field theory." Page 169.

While working on a railgun experiment, the authors placed a ferromagnetic rod across the rails: "and observed that it rolled in the wrong direction toward the battery. This surprising behavior was perfectly repeatable. ... If this is correct, then our report here is the first public mention of a railgun armature being driven toward the current source. **While not yet understood, the importance of this discovery cannot be over-stressed.**" Pages 188-189.

The authors quote from a paper that suggested that cold fusion was the first attempt to harness the energy of the sun except for systems that heat hydrogen fuel to high temperatures. "This is not true. Non-thermal fusion research has been in progress for over forty years with support from the U.S. and other governments. The arguments which have been made for and against cold fusion almost all ignore the large body of published information on plasma focus fusion, solid deuterium fiber fusion and capillary fusion." Page 233. The authors further discuss each of these developments.

The most important chapter of the book is Chapter 7: "Electrodynamics in the Quest for New Energy." After laying the groundwork of profession understanding, **including all of the appropriate equations**, the last chapter reviews several research topics ranging from cold fusion to water-arc experiments. The message is that there are still many anomalies in experimental electrodynamics and that these anomalies should be pursued, rather than ignored, by the scientific community.

This reviewer is more of a generalist than a specialist, having spent the last seven years reading, reviewing, and publishing reviews of over 3,000 papers and books covering the areas of cold fusion and other new-energy systems and the relevant literature. With this background, the following comments have been triggered by the challenges of this excellent book:

1. Ponderomotive forces may be the result of an energetic vacuum which couples with the electron flow or is the byproduct of the electron flow in matter in the presence of the energetic vacuum.
2. The **Rowe Effect** (energetics causes the vacuum to spawn proton-electron pairs) may be the source of the anomalous effects in water arc explosions.
3. High-density charge clusters can be considered as a new form of matter that is yet to be thoroughly studied. It is

suggested that high-density charge clusters are formed whenever there are electric arcs. The anomalies of high-density charge clusters (as disclosed in Ken Shoulders' U.S. Patent 5,018,180) may be the source of some of the anomalous observations.

This type of scientific investigation is not devoid of practical applications or limited to railguns and water arc explosions. The knowledge developed in the book has been applied by Dr. Graneau to a very practical metallurgical problem which occurs in the refining of aluminum. The application of some of these concepts developed by the authors can save many millions of dollars a year in electrical power costs in just the aluminum industry. There are and will be many other valuable commercial applications of the study of Newtonian Electrodynamics.

If you are seriously interested in cold fusion and new energy developments, or if you are an electrical engineer, a scientist, or a teacher of science, **this book is a must-read for you.** If you are an intelligent lay person or professional, you will find this book full of interesting insights into the history and practice of electrodynamics. This reviewer wishes to thank these two authors for their contribution to the continued advancements that must be made in electrodynamics if we are to provide a new-energy technology to replace the currently unacceptable pollution of our planet by the burning of fossil fuels.

I. EDITORIAL

ADMINISTER AETHER TO ELECTRODYNAMICS

By Hal Fox, Editor

Maxwell's equations are acknowledged as one of the most ingenious contributions to science. In a similar fashion, the Lorentz equations for electrodynamics are similarly widely heralded as the proper expression for solving electrical current forces. However, did you know that neither of these field force equations can properly explain some of the electrodynamic experiments? Two examples are exploding wires and railguns. However, the older equations using the model of electric current forces developed by Ampere do provide proper solutions.

The Maxwell and Lorentz equations are relativistic and the Ampere equations are Newtonian. The major problem is that none of these equations appear to properly address physical reality. It is proposed that a serious effort be made to devise a more complete model of electrostatics, electrodynamics, and electromagnetism. It is proposed that the basic model consider more carefully the effects of the omnipresent aether.

"What evidence do we have that there is an aether?" is a proper beginning. One of the most famous negative experiments of science was the Michelson-Morley experiment. In an attempt to measure the motion of the earth through the aether, an experiment was devised to measure the change of the speed of light in different directions. The negative result could have been interpreted as showing that the earth-aether interface is similar to fluid flow, where the fundamental concept is that the motion of the fluid at the boundary is zero. Instead, the accepted explanation was that there was no aether.

Among the over 500 peer-reviewed papers dealing with zero-point energy (another name for the aether), there are numerous concepts and experiments that can best be explained by the recognition that there is an energetic aether. Among the various physical concepts that are explained by space energy, (alias zero-point energy, an aether, a luminiferous aether, etc.) are the stability of matter, gravity, inertia, the excess energy of high-density charge clusters, hydrogen from explosions, the creation of hydrogen, helium, and neon in certain experiments, the high coefficient of performance of certain magnetic motors, and possibly the anomalous low-energy nuclear reactions in cold fusion.

It is proposed that the phenomena associated with electrostatics, electrodynamics, magnetism, and electromagnetism are fundamentally the byproduct of the interaction of electricity and magnetism with the aether. Gravity has been unified with electromagnetism by Puthoff by assuming the existence of a zero-point energy. The end result shows that gravity is not **action at a distance** but is the direct result of the interaction of mass with the aether. It is proposed that all electrical and magnetic effects are also the result of the interaction of matter and electrons with the aether. If this supposition is true, then there would be no need for **action at a distance** for either gravity, electric forces, nor magnetism.

There are a few elements and mixtures of elements that are called ferromagnetic (especially iron, nickel, and cobalt). These elements have the property of becoming magnetic (exhibiting magnetic forces of two differing types or **poles**). It is proposed that these materials have the property of modifying the local flow of the aether and that the stronger magnets more strongly modify the aetheric flow. The modification of the flow is considered to be in two modes (perhaps vortical flow), such that a north-seeking pole is formed at one magnetic face and a south-seeking pole is formed at the opposite magnetic face. The end result is a concentration of **aligned** aetheric flow external to and adjacent to the magnet. This aligned aetheric flow diminishes as the square of the distance from the magnet.

When two opposite magnetic poles are placed together there is an attractive force observed. When two alike magnetic poles are placed together there is a repulsive force observed. These forces are due to the **aligned** flow of the aether and the forces

observed are due to the non-isotropic flow of the aether near the magnets. These forces exist within the aetheric fluid just as the forces developed by two opposing fluid jets appear in the fluid of the two jets. **There is no action at a distance in magnetic forces.** There is merely an observed effect in the aligned flow of the aether.

Similar statements can be made concerning the effect caused by an accumulation of electrons (such as in electrostatics) or in the flow of electrons (such as in electrodynamics). Therefore, it is proposed that the basic model from which the equations of electrostatics, magnetism, electrodynamics, and electromagnetics are derived **be based on the existence of and the interaction with an aether.**

One of the most fundamental tools for determining the extent to which an aether is responsible for various electromagnetic phenomena is an aether shield. For example, if I shielded (or partially shielded) a magnet from the aether, then according to the proposed model, the magnetic forces should be removed (or diminished). Just such an aether shield appears to have been discovered. (This discovery was cited by A. Zielinski in his workshop presentation at the Third International Symposium on New Energy, May, 1996.) However, regardless of the reality of an aether shield, it is proposed that there be serious consideration given to the development of a model for all electromagnetic phenomena that is based on the presence of an aether.

J. MEETINGS

CALL FOR PAPERS

The **SECOND CONFERENCE ON LOW-ENERGY NUCLEAR REACTIONS**

will be held at College Station, Texas
on September 13-14, 1996.

Call for Papers: Papers addressing issues of Low-Energy Nuclear Reactions will be presented at the conference. Send **Abstract** to Dr. G. Lin, Dept. of Chem., Texas A&M, College Station, TX 77843-3255, FAX 409-845-4205. Deadline is July 30, 1996. Complete papers must be provided **at the conference** in order to be included in the Proceedings.

Attendance: Conference space is limited. The meeting is restricted first to participants on the basis of their contribution.

Proceedings: Conference papers will be printed immediately after the conference as vol 1, no 3, of the *Journal of New Energy*. This journal is abstracted by *Chemical Abstracts*.

Conference Cost: \$100 per person for conference attendees. For further information contact Dr. Lin at 409-845-3661.

THE GERMAN ASSOCIATION OF VACUUM FIELD ENERGY

plans a conference in the Singapore Hyatt, Singapore, in early **October 1996**. Inquiries may be directed by Fax to Germany (05 11) 31-84-17.

ICCF6

Sixth International Conference on Cold Fusion

will be held 13-17 October 1996

Hotel Apex Toya, Hokkaido, Japan

Conference Secretariat:

Tel +81-3-3508-8901 Fax +81-3-3508-8902

E-mail mac@iae.or.jp

The conference will consist of both oral and poster sessions covering experimental work and theory on the following topics:

- Excess Energy Phenomena in D₂/Metal Systems
- Correlation Between Excess Energy and Nuclear Products
- Nuclear Physics Approaches
- Material Science Studies
- Innovative Approaches (Miscellaneous Phenomena)

Registration fee of ¥40,000 (about \$400) includes a banquet and proceedings. A technical tour to the NHE lab is scheduled on Oct. 18, along with other professional and social events.

Hotel: Deadline for guaranteed accommodation is August 1.

Contact: Hotel Apex Toya Hokkaido

Aza-Shimizu, Abuta-machi, Abuta-gun

Hokkaido 049-56, Japan.

Tel: +81-142-73-1111 Fax +81-142-73-1157

Registration: Final Deadline August 1. Send for application package to Conference Secretariat

c/o NHEI-Center, IAE

Shinbashi TS Building

1-22-5 Nishi-Shinbashi, Minato-ku

Tokyo 105, Japan

(see telephone info above)

INTERNATIONAL SYMPOSIUM ON CONSCIOUSNESS, NEW MEDICINE AND NEW ENERGY

Yomiuri Hall, Tokyo, Japan

November 21-22, 1996

Dr. Shiuji Inomata is organizing a symposium to discuss and present research results in such broad topics as consciousness phenomena, holistic medicine, integration of Western and Eastern medicine, and new energy technology. The sponsor is the Japan Green Cross Society. Paramahansa Tewari has been chosen as the keynote speaker for the conference. Participation fee is US\$ 190.

Contact: Mr. Tetsu Nagano, Japan Green Cross Society

2F Kamon Building

2-7-14 Hamatsu-cho

Minato-ku Tokyo 105 JAPAN

Tel: +81(0)3-3437-2218

Fax: +81(0)3-3437-2808 or +81(0)3-3437-2624

Commercial Column

The following companies (listed alphabetically) are commercializing cold fusion or other enhanced energy devices:

COMPANY: PRODUCT

American Pure Fusion Engineering and Supply: Information and troubleshooting for the fusion research and development industry. Developing "Fullerene Fusion Fuel™." Salem, Oregon. The president, Warren Cooley, can be reached at 1-800-789-7109 or 503-585-6746. Email to: Coolwar@aol.com

CETI (Clean Energy Technologies, Inc.): Developers of the Patterson Power Cell™. Dallas, Texas. Voice 214-982-8340, FAX 214-982-8349.

Clustron Sciences Corp.: New energy research consulting and information. Contact: Ron Brightsen, 703-476-8731.

ENECO: Portfolio of intellectual property including over thirty patents issued or pending in cold nuclear fusion and other enhanced energy devices. Salt Lake City, Utah. Contact Fred Jaeger, Voice 801-583-2000, Fax 801-583-6245.

E-Quest Sciences: Exploring The Micro-Fusion™ process. Seeking qualified research partners for their sonoluminescence program. Contact Russ George, FAX 415-851-8489.

Fusion Information Center (FIC): Research and development of new energy systems. The world's most complete resource depository for cold fusion research information, as well as other new energy research including zero-point energy; space energy research; electronic, electromagnetic, and mechanical over unity devices and more. We are the publishers for *Fusion Facts*, *New Energy News*, and *the Journal of New Energy*. Voice 801-583-6232, Fax 801-583-2963.

Holotec AG, Clean Energy Technology, contact André Waser, Gen. Mgr., Bireggstrasse 14, CH-6003, Luzern, Switzerland. Phone 011 41-41 360 4485, or Fax 011 41-41 360 4486.

Hydro Dynamics, Inc.: Hydrosonic Pump, heat-producing systems using electrical input with thermal efficiencies of 110 to 125 percent. Rome, Georgia. Contact James Griggs, Voice 706-234-4111 Fax 706-234-0702.

International Management Systems Co. (IMSC): Technical project/program management assistance, and technology development and commercialization assistance. Contact Mark Harris or Richard Youngs, Phone 801-583-6232, Fax 801-583-2963, or Phone/Fax 801-255-3000.

JET Energy Technology, Inc.: Design and manufacture of π -electrode systems, calorimeters, and associated equipment and systems. Consulting regarding radiation, materials, and other scientific and engineering issues. Weston, MA. Contact Dr. Mitchell Swartz, Voice 617-237-3625. Fax 617-237-3625.

Labofex, Experimental and Applied Plasma Physics: R&D of PAGD (Pulsed Abnormal Glow Discharge) plasma technology. Applications under development include portable power supplies, electric vehicles and autonomous housing. Licensing. Ontario, Canada. Contact Dr. Paulo N. Correa. Tel 905-660-1040 Fax 905-738-8427

Magnetic Power Inc.: The Joint Venture partner with Sciex (UK) for Takahashi supermagnets and supermotors in North America. Sebastopol, CA. Contact Mark Goldes, Voice 707-829-9391, Fax 707-829-1002.

Nova Resources Group, Inc.: Design and manufacture ETC (Electrolytic Thermal Cell); EG (commercial power cogeneration module); and IE (integrated electrolytic system). Denver, CO. Call Chip Ransford, Phone 303-433-5582.

UV Enhanced Ultrasound: Cold Fusion Principle being used for an ultrasonic water purifier. Hong Kong. FAX 852-2338-3057.

Zenergy Corporation: Founded in 1996 to facilitate the introduction of commercially viable energy alternatives. (formerly Power Cell Technologies) Chandler, AZ. Contact Reed Huish: 602-814-7865, Fax 602-814-7665, e-mail: reedh@indirect.com

Note: The Fusion Information Center has been acting as an information source to many of these companies. We expect to augment our international service to provide contacts, information, and business opportunities to companies considering an entry into the enhanced energy market.

INFORMATION SOURCES

Academy for New Energy (ANE) is a subsidiary organization to the International Association for New Science, which has specific goals directed toward the field of alternative and "New" energy research. 1304 S. College Ave., Fort Collins, CO 80524. Tel. 970-482-3731

ANE Newsletter, quarterly publication of ANE, providing an open forum for discussion, and disseminating newsworthy and inspirational information on invention and new energy. Edited by Robert Emmerich.

Advanced Energy Network Newsletter, quarterly, a reprint of articles and papers from other energy publications, with book reviews and worldwide conference list. Advanced Energy Network, P.O. Box 691, Rondebosch 7700 Capetown, Rep. South Africa.

"Cold Fusion", monthly newsletter, edited by Wayne Green, 70 Route 202N, Petersborough, NH 03458.

Cold Fusion Times, quarterly newsletter published by Dr. Mitchell Swartz, P.O. Box 81135, Wellesley Hills MA 02181. Home Page: <http://world.std.com/~mica/cft.html>

Cycles, a R&D newsletter, published by Dieter Soegemeier, Editor, GPO Box 269, Brisbane, QLD.4001, Australia. Phone/Fax: +61 (0)7 3809 3257.

Electric Spacecraft Journal, quarterly, edited by Charles A. Yost, 73 Sunlight Drive, Leicester, NC 28748.

Fusion Facts monthly newsletter. Salt Lake City, UT. 801-583-6232, also publishes Cold Fusion Impact and Cold Fusion Source Book. Plans on-line database access.

Fusion Technology, Journal of the American Nuclear Society, edited by Dr. George Miley, publishes some papers on cold nuclear fusion. 555 N. Kensington Ave., La Grange Park, IL 60525.

Infinite Energy, new bi-monthly newsletter edited by Dr. Eugene Mallove (author of Fire from Ice), P.O. Box 2816, Concord, NH 03302-2816. Voice: 603-228-4516. Fax: 603-224-5975 E-mail 76570.2270@compuserve.com

Institute for New Energy (INE), organization to promote and help find funding for new energy research. Home Page: www.padrak.com/ine/ contains many important scientific papers and current reports on all areas of research. E-mail: ine@padrak.com Salt Lake City, Utah. Voice 801-583-6232, Fax 801-583-2963.

New Energy News monthly newsletter for INE, highlighting the research and development in the worldwide new energy arena. Edited by Hal Fox.

Journal of New Energy, quarterly, presenting papers representing the new areas of energy research, leading-edge ideas in the development of new energy technology, and the theories behind them. Published by the Fusion Information Center, Inc., for the Institute for New Energy. Editor: Hal Fox.

KeelyNet BBS - Science and health oriented information exchange that specializes in nonstandard research, much of it on new energy. Jerry Decker, 214-324-3501 Internet: www.keelynet.com E-mail: jdecker@keelynet.com

Planetary Association for Clean Energy Newsletter, quarterly, edited by Dr. Andrew Michrowski. 100 Bronson Ave, # 1001, Ottawa, Ontario K1R 6G8, Canada.

Now available: *Clean Energy Review*, a technical and scientific discussion on nuclear fuel wastes disposal. Discusses transmutation as one possible solution. \$5 U.S. and Canadian, \$7.50 other countries.

Space Energy Journal, quarterly, edited by Jim Kettner & Don Kelly, P.O. Box 1136, Clearwater, FL 34617-1136.

21st Century Science & Technology, P.O. Box 16285, Washington, D.C., 20041. Includes cold fusion developments.

The above list of commercial and information sources will be growing. New listings will be added as information is received. Send information to *NEN*, P.O. Box 58639, Salt Lake City, UT, 84158.

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Volume 2

Will be out at the end of July (see abstracts page 5)

Volume 3 to be printed in September 1996, will include the
 Proceedings of the Second Conference on Low-Energy Nuclear Reactions.