

FUTURE ENERGY ***Annual*** ***2007***

featuring

Highlights from Future Energy eNews

&

IRI Annual Report for 2006

Thomas Valone, Editor



CREDITS

Integrity Research Institute wishes to acknowledge the following sources for this IRI Member's Annual Report

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IRI OFFICERS AND DIRECTORS - 2007

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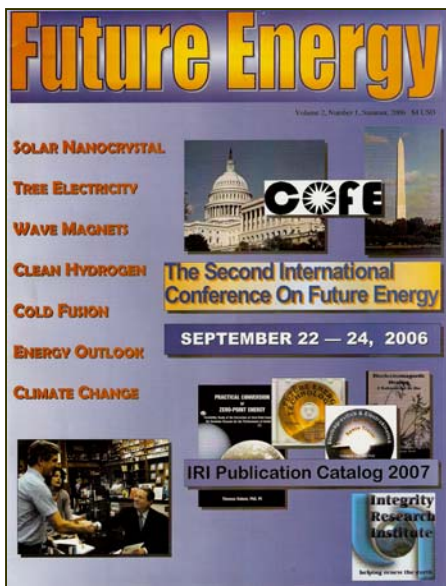
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President's Letter

While the accomplishments of IRI for 2006 in this *Future Energy Annual Report 2007* are impressive, the most memorable for us has to be the Second International Conference on Future Energy. Bringing together the energy experts from academic, government, and private industry, IRI was honored to have such an array of presentations that pushed the envelope of the energy choices for our future. In addition, the conference brought speakers such as Chelsea Sexton, the star of the movie "Who Killed the Electric Car?" an expert on tidal wave power, Martin Burger, two world class experts on zero point energy, Thorsten Ludwig and Fabrizio Pinto, and John Thomas Jr., and for the first time in public, the world's expert on the electrogravitic crafts of John R. R. Searl.



In 2006, we also developed the new format of the *Future Energy* magazine, which includes energy news and our *IRI Publication Catalog*. Also a first in 2006 was my trip to the Space Technology Applications International Forum in Albuquerque NM to present my review of electrogravitics and electrokinetics research of T. Townsend Brown with the insight gained from an electrokinetic equation by Professor Oleg Jefimenko in his book, *Causality, Electromagnetic Induction and Gravitation*. This was a good opportunity to meet with scientists from around the world all of whom were interested in sharing their research results in energy developments and propulsion theories.

We furthered the mission of IRI in 2006 by researching scientific integrity in the area of emerging energy sciences.

Sincerely,

Thomas Valone, PhD, PE
President

INTEGRITY RESEARCH INSTITUTE HIGHLIGHTS 2006

Conferences and Presentations: Our Institute had an extremely busy year in 2006. Chief among many conferences was *“The Second International Conference on Future Energy, COFE II”*. Our second conference following the theme of the one in 1999 featured 14 speakers from all over the world, who are recognized as leaders in the field of emerging energy science. IRI sponsored a special screening of the Sony Pictures Classics documentary: *“Who Killed the Electric Car”* with the appearance of the movie’s star Ms. Chelsea Sexton, who gave a 2 hour lecture afterwards at the evening reception. We had an



exhibit area, free to the public that featured publications, dvd’s and demonstrations of emerging energy technology devices and products.. For more details, see our article in page 9. Exciting for IRI directors was meeting the Nobel Laureate, **Al Gore** and sharing our Institute’s mission with him that are in line with his new book *“An Inconvenient Truth”*. Our Presentation at the *Space Technologies Applications Forum, STAIF*, sponsored by the

University of New Mexico and the APS, was the lecture: *“Electrogravitics and Electrokinetic Developments, benefiting an attendance of 1000+.* Our annual presentation at *the USPA*, in Laughlin, Nevada, regarding *“Energy and Propulsion Technologies of UFOS”* was groundbreaking to the attendance of 300+. Lastly our Presentation at the *National Space Society Local Chapter Meeting, in Orem Utah*, was an exciting lecture on Electrogravitics and Electrokinetic Propulsion Technologies.

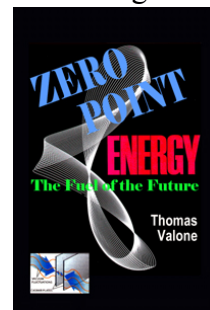


Future Energy News Program: We continue to research new emerging technologies and document them in our free newsletters, brochures, and reports *“Future Energy eNews”* is sent via email, monthly to over 8000 recipients worldwide, free of charge. Also publication of the Quarterly *“Future Energy Magazine”*, is available to members for free and contains all the latest papers and articles relating to emerging energy technologies. Our Future Energy Catalog was sent via regular mail worldwide to over 6000 recipients, free of charge.



Permanent Magnet Motor Program. This program is researching the capability of a totally permanent magnet motor design for mechanical torque production. Our Institute secured a grant, which covered the costs of building and assembling a replica of the popular Perendev Motor. Measurements and data were recorded. This photo shows Dr Valone demonstrating the unit to Penn State University Scientists.

Zero Point Energy Program. Our layman's version of "*Zero Point Energy, the Fuel of the Future*" was completed. This edition includes 260 pages of the latest findings on Zero point Energy and has become an instant classic and bestseller. A second edition is underway and a Hardcover Deluxe Color Edition is due for 2008



Bioenergetics Program. This program is designed to research bioenergy, and electrotherapy. Includes research on equipment, therapy machines and providers of electrotherapy. The preserving of the invaluable, Puharich Laboratory Notes by Dr. Andrija Puharich started in 2004 will continue to 2008. Supporting the work of Dr Glen Gordon, IRI now sells the EM Probe, a bioelectromagnetic device that has been helpful in illness and injury including soft tissue trauma, fractures, arthritis, heart disease, stroke among many others. New projects like Antioxidant producing clothing and EM fields shielding are being researched for development next year.

Electromagnetic Earthquake Prediction Program. Recently this program has gone forward in two fronts: One is the book manuscript that Prof. Elizabeth Rauscher has entrusted to IRI for editing and publishing and the second is Dr Rauscher's milestone in completing the electronic circuitry prototype in cooperation with a California Engineering Firm, which has enabled her to continuously report measurements of the earth's Extremely Low Frequency Seismic Electromagnetic Fields.

IRI New headquarters. Thanks to your generous donations and increased yearly revenue, we have moved into our new headquarters, which is conveniently located from all areas of the Washington DC Metro area. IRI envisions a future world where pollution is a thing of the past and abundant energy is generated on site in every home, business and vehicle.



ENERGY INVENTIONS ADVOCATED BY INTEGRITY RESEARCH INSTITUTE

- 1) **Proton Boron Fusion** – Controllable hot fusion project that is compatible with electricity extraction. Makes the Tokamak obsolete. Eric Lerner has already achieved the necessary billion-degree threshold demanded by nuclear physics while funded by a small NASA grant. An environmentally safe, abundant energy source: decaborane. Hydrogen-boron fusion uses a plasma focus device. A recent simulation confidently predicts the LPP reactor can reach break even at 1.5 MA (MA = megamps = million amperes) and produce net energy at 2 MA. Low risk and high payback. Contact: Eric Lerner, Lawrenceville Plasma Physics, 973-736-0522, email: elerner@igc.org www.focusfusion.org Also, Dr. George Miley, U of Illinois has tested it.
- 2) **Pre-Seismic Earthquake Predictor & Triangulator** – Patented invention (US Patent #4,724,390) by a university physics professor, provides days of advance warning before a major earthquake or volcanic eruption. Published in several journals, texts and conference proceedings, the T-1050 has had several trials and successful predictions of earthquakes. Contact Dr. Elizabeth Rauscher, 480-982-2285 email: FlyingWG@msn.com
- 3) **Magnetic Energy Converter (MEC)** – A robust power-generating device that can produce electricity and a propulsive force. Business plan brings this amazing invention to market within three years. The MEC converts a known energy source that quantum physicists call zero point energy (ZPE), into conventional electromagnetic energy, which can be harnessed as electricity, used to turn wheels, turbines, etc. Inventors Godin and Roshchin (US patent #6,822,361) have published several journal articles, with proof-of-principle prototypes to their credit. Contact Ivan Kruglak, 818-681-0091 email: ivan@ionsky.com, website: www.ep-systems.net
- 4) **Wireless Electric Power Transmission** – Over 10 years of experimental and theoretical work by university professor that confirms all aspects of this revolutionary invention, pioneered by Nikola Tesla. Two articles reprinted in Valone's *Harnessing the Wheelwork of Nature* by the inventors describe more details of the safe and highly efficient (95%) electricity transmission method. Contact Dr. James Corum, 304-291-0466 email: jcorum@ieee.org
- 5) **Electrotherapy Teslatron** – Installation in a CA clinic of a successful million volt Tesla coil therapy machine in a room-size treatment protocol for stubborn and terminal disease patients. Several medical doctors routinely work with this inventor and send patients for treatment. 10-patient study ongoing. Contact Guy Obolensky, 845-753-2782 email: soliton@optonline.net
- 6) **EM-Probe.com** – Pocket-size magnetic pulser cured inventor of congestive heart condition. Endorsed by doctors and the subject of a NASA four-year study. Contact Glen Gordon MD, 360-297-8736 email: DrGordon@em-probe.com website: www.em-probe.com
- 7) **Transformative Energy Projects:** (1) *Spiral Magnetic Motor* which uses a magnetic gradient to achieve torque. The motor can be configured into a car motor which will use voltage without current to spark each cycle. The finished prototype will be incorporated into a Bitterly Flywheel vehicle for a follow-up Phase II project. No fuel is required since the increasing magnetic attraction (gradient) performs useful work. A microturbine powered by magnets is another spinoff project. (2) *Electricity-Generating Shock Absorber* for electric cars that can be prototyped within an 18-month period. (3) *Zero Point Energy* solid-state diode electricity generator rectifying vacuum fluctuations, which can be mass-produced into panels similar to LED panels for TV and video. (4) *Planetary Protector* for incoming meteors, tsunami amelioration, and tornado/hurricane dispersion, uses a Podkletnov projectable gravity impulse device. Journal articles published on collimated beam experimental results. Contact Dr. Thomas Valone, 301-220-0440 email: iri@erols.com Integrity Research Institute, 202-452-7674, 800-295-7674

Review of the Second International Conference on Future Energy



By Elliott Maynard and Jacqueline Panting

Our September 22- 24, 2006 conference followed in the footsteps of our 1999 COFE. For three days, scholarly coverage of a wide array of new-energy technologies included zero-point energy, magnetic motors and carbon sequestration along with conventional ones like tidal and solar power. All speakers were either in government positions: Dennis Bushnell, Jim Dunn; University professorships: George Miley, Tania Slawecki, Ted Loder or have publicly trading companies: Glen Gordon, Russ George, Fabrizio Pinto and Martin Burger. Hugely successful, this conference was also entertaining and useful to all attendees, as well as to government, military, scientists, energy advocates and inventors.

The Conference was opened on Friday evening with a welcoming address by Dr. Tom Valone, Founder and President of the Integrity Research Institute, and was followed by a special screening of “Who Killed the Electric Car?” the Sony Pictures Classics award winning documentary. We were very pleased that Chelsea Sexton, the star of the documentary agreed to come all the way from California to introduce the film and after the Wine and Hors’ d oeuvres reception, (open to the public as well) conducted a question and answer session for 2 hours. The movie documents the crushing and shredding by GM of all but one of



Ms.Sexton with Dr Panting and Dr Valone

their nearly 1,100 EV-1 cars that should have marked a shift away from oil-dependence. The parties identified as guilty for stomping out this new direction included the U.S. Government, and the Oil and Automobile industries. as well as the California energy commission which endorsed the fuel-cell concept instead, which is years – if not decades – away from being practical. Moreover, the film points out that the hydrogen used in these cells will still be mostly derived from petroleum in the foreseeable future. She said that the indicted parties have actually complimented the balanced reporting provided in the documentary. Her activist work

continues at PlugInAmerica.com, which features past, present, and future electric vehicles, as well as companies that specialize in converting fuel-driven vehicles into electric, and hybrids into plug-in. We applaud Ms Sexton’s tireless advocacy of clean vehicles and support her wholeheartedly.

The opening speaker on Saturday morning was Dr. Dennis Bushnell, Chief Scientist at NASA, who gave a brilliant overview of the need for clean energy solutions, a time-line for implementation, and possible alternative solutions in case CO2 emissions are not curbed. Dennis also outlined the emerging new Paradigm of “Seawater Aquaculture” as a win-win methodology for Food Production and Environmental Stabilization for extensive desert regions of Earth – especially in the Middle East. This process, when combined with related technologies such as large-scale Solar Desalination, offers bright new pathways for the eventual restoration of vegetation to many of the desert landscapes of our Global Biosphere. Bushnell's list of possible last-resort interventions included detonating super volcanoes, such as the Yellowstone Caldera, in order to provide a cooling shield from the long-lasting soot in the atmosphere. The purpose would be give the planet’s inhabitants more time to get things straightened out. Such would be an absolute last resort and with evacuations to prevent loss of life, and would only to be done if a less drastic turn-around method has not been successful to prevent total earth ecosystem meltdown. Our next speaker Dr. George Miley spoke about dense plasma focus technology, which is one of the oldest proposed approaches to fusion power. He has also worked some years on cold fusion which he presented at our first COFE back in 1999. . Dr. Miley is a



Dr. Dennis Bushnell, Chief Scientist at NASA Langley, VA Beach.

Professor at the Department of Nuclear, Plasma and Radiological Engineering at the University of Illinois, Urbana-Champaign. He is also the Director of the Fusion Studies Laboratory. He has been awarded multiple grants and Honorary distinctions. He is highly recognized and respected in the field of physics and was honored at our conference with the *Integrity In Research Award* during our Saturday evening banquet for all his accomplishments in the field of emerging energy research.



Dr. Miley receiving from Dr Valone the “Integrity In Research Award”

Dr.Glenn Gordon, CEO of EM-Probe, Inc., presented his paper: “Nanosecond Pulsed EMF Advances for Electrotherapy,” which discussed new possibilities for the use of



Glen Gordon, MD

Electrotherapy Devices for healing in both civilian and military battlefield applications. Dr Gordon a pioneer in Electrotherapy holds the only patent on Nanosecond Pulsed EMF. He discussed a breakthrough understanding in EM fields transduction by paramagnetic/diamagnetic oscillators into phonons that directs protein conformational adaptive response, Gordon has designed a Nanosecond Pulsed Electromagnetic Field technology that has been in the marketplace for several years now. Bolstered by the recent NASA study that found db/dt critical to efficacy he speaks widely on the electrogenomic and electrochemical efficacy of this technology Used with much success in all kinds of injuries, as well as pain management, the latest accomplishments include successful treatment of erectile dysfunction (ED) in men.

dysfunction (ED) in men.

The afternoon session started with James Dunn, Chief Technical Director of NASA’s Center for Technology Commercialization, who delivered a comprehensive and incisive overview of “The Hydrogen Challenge,” which delineated the complex problems associated with the use of Hydrogen Fuel Cells and Fuel-Cell-powered vehicles with regard to their potential in light of the impending fossil fuel energy crisis. Jim is very active in the renewable energy field and has participated in the Annual “Tour de Sol since 1996 sponsored by the NE Sustainable Energy Association. In 2005 he co-chaired the event .He also is a hybrid car enthusiast and has collected several models.



Jim Dunn, CTO of NASA’s CTC Center.



Dr. Thorsten Ludwig

We were very honored to have Dr. Thorsten Ludwig, president of the German Space Energy Association (GASE) to present the latest findings on Zero Point Energy The major significance of his presentation was that ZPE has become an Emerging Science in Europe, as indicated by several university and commercial research programs within the European Union, which are actively supported by several million dollars of research funding. To facilitate the advancement, a team of university scientists is preparing experiment to demonstrate how to tap into the quantum mechanical space energy. torsion fields combined with heavy ion vortices in a cavity to find out its viability as a ZPE mechanism.

From a Global Ecology perspective, one of the highlights of the Saturday Conference session was “Tidal Power for Electricity Generation” by Martin Burger, President and

CEO of Blue Energy Canada (www.bluenergy.com). Martin, a native of British Columbia, presented a provocative overview of his 17 years of involvement in pioneering Ocean Tidal Power, and his mission to develop a series of innovative technologies, including 20 MW Vertical Axis Ocean Turbines designed to operate off the coast of Nova Scotia. He has also been involved in numerous innovative mega-scale projects, including what has been described as “The World’s Largest Renewable Energy Project,” a four kilometer Tidal Fence across the San Bernardino Strait in the Philippines. This massive project incorporated 276 generators, each designed to produce 2.2 gigawatts of electrical power. Excess power can be utilized to run a desalination plant, or to produce hydrogen fuel for the string of caissons which support the turbines.



Martin Burger, CEO Blue Energy

Our President, Dr. Valone wrapped up the afternoon session with an incisive overview of “Future Energy Technologies,” which included his success in bringing Russian and American Scientists together for collaborative research in selected areas of New Energy Technologies. He gave an overview of various promising alternative technologies. Two thirds of the energy transferred via the present grid, for example, is wasted. Wireless transmission, originally introduced by Nikola Tesla, is a feasible alternative that should be pursued.



Dr. Pinto and his lovely daughters Minerva and Dianna

Following the evening banquet and social interchange, the keynote speaker was Dr. Fabrizio Pinto CEO of Interstellar Technologies (www.interstellartech.com), who gave a scintillating presentation on “Progress in Quantum Vacuum Engineering: Nanotechnology and Propulsion.” Perhaps the most significant aspect of this event was the fact that Quantum Vacuum Engineering has finally emerged from the purely theoretical realm, and moved into the realm of Applied Sciences, as witnessed by Dr. Pinto’s pioneering efforts to research and patent new commercial applications in the areas of Nanotechnology and Propulsion. His talk explored the technology revolution that will be enabled by the tight integration of intelligent semiconductor nanodevices capable of both computation and quantum vacuum based actuation

in the near future. Also the intriguing effects of the curvature of spacetime on dispersion forces. He showed that the presence of a gravitational field causes changes in the effective weight of atoms interacting via the Van DerWaals force, which represents the foundation for a propellantless propulsion system based on quantum vacuum engineering.

The Sunday Session began with a presentation by Professor Tania Slawecki, of Penn State University. Tania, a talented and brilliant physicist who is part of the forward-minded Materials Research Department provided conference attendees with an outstanding overview of “Bio-advances with Electromagnetic Fields.” This presentation was exceptional, in that the many Electromagnetic Healing Technologies, formerly regarded as “fringe science” have subsequently been scientifically validated in precise laboratory studies, mainly due to the array of new evaluative technologies which are sensitive enough to provide recorded data that can be used to either validate or invalidate the scientific claims for these cutting edge technologies. She also explained some of the testing methods, which include infrared (IR), near-IR, and Raman spectroscopy, which look for vibrational changes in water molecules Her COFE2 DVD is recommended for you to learn more about her fascinating biological research.



Dr. Tania Slawecki, Professor,
Pennsylvania State University

Ted Loder, Ph.D., Professor Emeritus at the University of New Hampshire presented a unique new paradigm shift in technology: “Experiments with Spiral and Wankel Motors.”



Dr. Ted Loder from University of New
Hampshire

This presentation depicted a new twist for Future Energy, in that it combined existing Wankel Motor Technology, with Magnetic (i.e. rail-gun) Technology. This type of “hybrid thinking” is of paramount importance if we are bring twentieth century science and technology into a new third millennium context, with the objective of establishing entirely new platforms from which to develop advanced scientific theories and practical applications.

Russ George, CEO of D2 Fusion and Planktos, Inc. (www.planktos.com) delivered a presentation which highlighted new advances in Cold Fusion, as well as what might be considered the most significant ongoing project in Planetary Management – *The Planktos Project* - which involves seeding selected areas of the world’s major oceans with finely powdered iron to generate massive blooms of phytoplankton,



Russ George, CEO of Planktos, Inc.

which Russ metaphorically refers to as “Ocean Forests.” This project is unique in that, in addition to several concurrently ongoing terrestrial re-forestation projects (with which George is also involved), the Planktos Project is well underway, and has already completed several pilot runs, clearly demonstrating the feasibility of Oceanic-Scale Environmental Enhancement. The use of powdered iron to stimulate blooms of phytoplankton will have the doubly positive effect of initially boosting the basic food chain to increase in Ocean Fisheries Stocks. When the plankton falls below the photosynthetic zone, it will effectively function as an agent for sequestering Carbon



Pal Asija, JD, Founder, Our Pal

Dioxide in the ocean depths. Thus, millions of tons of atmospheric carbon dioxide could conceivably be removed from Earth’s atmosphere through international applications of this technology. One of the fascinating offshoots of this new Environmental Management Paradigm would focus on stimulating phytoplankton growth in strategic areas in Antarctic waters, where krill populations (the primary food source for the baleen whales) have fallen by as much as 80 percent. Russ suggests that this approach to ocean fertilization could help in restoring much of the global whale population to the levels, which existed two centuries ago. Related studies suggest that the North Atlantic Cod Fishery (a critical and severely endangered major food resource) might also be restored through selected applications of this

innovative technology, which sets a new standard for Global Mega-Projects, and establishes a new scientific benchmark for Planetary Security in terms of Biospherical Remediation.



John Thomas of DISC

Pal Asija JD, gave an incisive review on 3 strategies for international intellectual property protection including patents, trademarks, copyrights and trade secrets, as well as their relationship with each other as applied to controversial emerging energy technologies. His advice was invaluable for inventors and investors in the audience. A well-seasoned lawyer born in India, Pal was educated in England and came to America in 1970. He is a registered professional engineer as well as a inventor and patent attorney. He writes regularly for Infinite Energy Magazine as well as assist and advises many inventors of emerging energy technologies in the difficult path to take in obtaining a Patent.

Our last speaker was John Thomas Jr., one of the selected few to have personally worked with J.R.R. Searle. John gave an overview of Prof Searle’s technology as well as to demonstrate a model on the controversial antigravity and energy-generating device. He studied this technology under Professor Searle from 1990 until present. He is the author of “Antigravity The dream made Reality” and cofounder of DISC, with Prof Searle in 1995 to develop the technology, based on the Law of the Squares.



Dr Ludwig and Dr Panting exchanging ideas during the banquet



Dr and Erika Monteith

Besides all the excellent presentations our social events were very well attended. The Friday evening reception had a record attendance by the public at large to view the movie and also hear Chelsea Sexton’s talk.

Our Saturday evening banquet had also a record attendance highlighted by the lovely musical accompaniment provided by Erika Monteith Her beautiful and peerless playing permeated the ambiance and added a wonderful melodic touch to our events. Her profession includes teaching the therapeutic value of music. Erika also played during breaks providing a lighthearted soothing atmosphere to all. She and her mathematical metaphysician husband, Dr. Henry

Monteith, have been friends and supporters of IRI for years and are co-authors of a book titled [*Soulmate Cosmological Action*](#). The primary concept is that of duality and oneness of a male and female component in all things. Another musician was Michael Riversong who provided incredibly beautiful music with his harp.



Tim Wilson CEO of Science Formulas, Inc.

Sunday, after a lunch that was provided by the Integrity Research Institute, each of the groups with tables in the exhibit hall was given the podium to present. In our lively Poster Session Tim Wilson, CEO of Science Formulas, an oral chelator health product discussed, along with information about heavy metal poisoning extant in the Western world today, such as through mercury in dental fillings. He also has developed a heavy metal detection device which they will be introduced to the medical field in the near future. Patrick Bailey reviewed the present status of the [Institute for New Energy](#), announcing that now that other entities are filling the news and directory and classification roles he once provided with the INE, he is now focusing his attention on matching significant funding with significant technologies. Eddie Sines of [Potomac Energy LLC](#) gave a very brief overview of his patent and patent-pending technology that proposes to use superconductors and photons to extract kinetic electrical energy from static magnetic energy by opening and closing the superconductivity, imposing flux in a solid state arrangement.. Michael Riversong spoke



Dr. Pat Bailey, INE



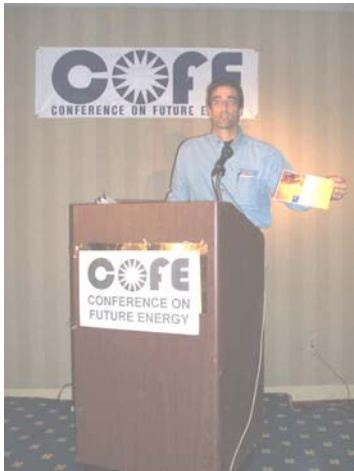
Joel Garbon of NEM

briefly about [TeslaTech](#), which is essentially the continuation of the International Tesla Society founded by Steve Elswick. Stoyan Sargonavich, PhD, introduced his theoretical work on the zero point energy.. Sterling Allan, pioneer of the PES_Wiki and Future Energy news website gave a brief overview of the [New Energy Congress](#), whose purpose is to review various energy technology claims and weigh them against a set of fixed criteria, including renewable, clean, affordable, reliable, credible, and safe. The idea is to showcase those technologies that hold the greatest promise for resolving the worlds energy problems Joel Garbon gave a quick overview of the [New Energy Movement](#) (NEM),who co hosted the conference with us, whose purpose, in addition to providing support for cutting-edge energy technology, is to

Michael Riversong spoke briefly about [TeslaTech](#), which is essentially the continuation of the International Tesla Society founded by Steve Elswick. Stoyan Sargonavich, PhD, introduced his theoretical work on the zero point energy.. Sterling Allan, pioneer of the PES_Wiki and Future Energy news website gave a brief overview of the [New Energy Congress](#), whose purpose is to review various energy technology claims and weigh them against a set of fixed criteria, including renewable, clean, affordable, reliable, credible, and safe. The idea is to showcase those technologies that hold the greatest promise for resolving the worlds energy problems Joel Garbon gave a quick overview of the [New Energy Movement](#) (NEM),who co hosted the conference with us, whose purpose, in addition to providing support for cutting-edge energy technology, is to



Sterling Allan of PES



Kevin Higgins of Solar Hybrid Energy

convey awareness of the most promising technology to the mainstream public, so that support for the technology can increase, and its implementation can be expedited. Kevin Higgins of Solar Energy Solutions presented his company's work on Solar advances and solutions for lower starting costs. Jim Girard, inventor of the BELS high voltage healing machine, from which all other high voltage machines are derived from, presented his clinical studies and advances in the past few months. Jim is an extremely talented inventor whose machine has had repeatable results



Jim Girard and Paul Begany of BELS Tech.

in healing of many diseases. His machine is currently being documented by Dr. Slawecki at the Materials Research Department of Pennsylvania State University.

We are forever grateful to our sponsors: Tim Wilson of Science Formulas, Elliott and Sharon Maynard of Arcos Cielos Research , Dorothy Lamb of the Lamb Foundation and Ivan Kruglak of Energy and Propulsion Systems, for making this conference possible with their generous donations We also want to thank the Electric Vehicles Chapter of Maryland especially Chip Gribben for connecting us with Ms Sexton and helping boost the attendance of our Friday evening event with their showcase of Electric vehicles. Also thanks to Joel Garbon and Steve Kaplan of the New Energy Movement for co-hosting this event Last but not least we want to acknowledge our wonderful volunteers who tirelessly worked and helped make this event a great success: Pat Bailey, Dwight Beckford, Craig Fatzinger, Tony and Carolyn Kao, James Newburn, Wendy Nicholas and Phoebe Pfaehler .



MOST OF ALL THANKS TO ALL WHO ATTENDED AND MADE THIS EVENT A COMPLETE SUCCESS!!!!



Dr Gordon discussing his EM Probe device with attendees



Dr Bushnell, Dr Loder and Dr Ludwig discuss their theories with the crowd.



Journalists Jeanne Manning and Remy Chevalier conversing during break



Several attendees browsing through the book table.



Dr Monteith, Dr Valone and Dr Gordon share a moment at banquet



Jackie and Craig helping at the Registration Table

IN MEMORIAM

SHARON TANEMURA MAYNARD



From right to left, Elliott, Sharon Maynard, Jackie, Tom Valone during COFE II
Photo courtesy of Remy Chevalier.

We were deeply saddened that shortly after our conference, our dear friend and dedicated IRI supporter, Sharon Maynard passed away. Wife of IRI board adviser Dr Elliot Maynard, she was a joyful, lovely and unique soul and will be deeply missed. Born Sharon Tanemura in Canada, she held an ARCT Degree from Toronto's Royal Conservatory of Music. and studies in Communications at Simon Frasier University in Vancouver. She also earned a Bachelor of Arts in Communications from the University the Trees Consciousness Research Institute. Her unique gifts in the areas of Financial and Creative Structuring were passed on to her from her grandfather, who was a Buddhist Priest. Sharon and Elliott founded the Arcos Cielos Research Center, a non-profit created for the development of New Paradigms in Science, Education, Fine Arts, Global Ecology, Human Potential Development, and Future-Science Technology

Sharon your beautiful soul's joy will always be with us " From joy I came, for joy I live, in sacred joy I melt".¹

¹ Except from Paramahansa Yogananda's poem "Samadhi"

ARTICLES & PAPERS

Including

Highlights of

Future Energy eNews

South African Solar Research Eclipses Rest of the World

Willem Steenkamp, February 11 2006, *Saturday Weekend Argus*,
http://www.int.iol.co.za/index.php?set_id=1&click_id=143&art_id=vn20060211110132138C184427#

Power to the people: Professor Vivian Alberts and his team have achieved a solar scientific breakthrough after 10 years of research.

In a scientific breakthrough that has stunned the world, a team of South African scientists has developed a revolutionary new, highly efficient solar power technology that will enable homes to obtain all their electricity from the sun.

This means high electricity bills and frequent power failures could soon be a thing of the past.

The unique South African-developed solar panels will make it possible for houses to become completely self-sufficient for energy supplies.

The panels are able to generate enough energy to run stoves, geysers, lights, TVs, fridges, computers - in short all the mod-cons of the modern house.



Nothing else comes close to the effectiveness of the SA invention

The new technology should be available in South Africa within a year and through a special converter, energy can be fed directly into the wiring of existing houses. **New powerful storage units will allow energy storage to meet demands even in winter.** The panels are so efficient they can operate through a Cape Town winter. While direct sunlight is ideal for high-energy generation, other daytime light also generates energy via the panels.

A team of scientists led by University of Johannesburg (formerly Rand Afrikaans University) scientist Professor Vivian Alberts achieved the breakthrough after 10 years of research. The South African technology has now been patented across the world.

One of the world leaders in solar energy, German company **IFE Solar Systems**, has invested more than R500-million in the South African invention and is set to manufacture 500 000 of the panels before the end of the year at a new plant in Germany.

Production will start next month and the factory will run 24 hours a day, producing more than 1 000 panels a day to meet expected demand.

Another large German solar company is negotiating with the South African inventors for

rights to the technology, while a South African consortium of businesses are keen to build local factories.

The new, highly efficient and cheap alloy solar panel is much more efficient than the costly old silicone solar panels.

International experts have admitted that nothing else comes close to the effectiveness of the South African invention.

The South African solar panels consist of a thin layer of a unique metal alloy that converts light into energy. The photo-responsive alloy can operate on virtually all flexible surfaces, which means it could in future find a host of other applications.

Alberts said the new panels are approximately five microns thick (a human hair is 20 microns thick) while the older silicon panels are 350 microns thick. the cost of the South African technology is a fraction of the less effective silicone solar panels.

Alberts said in Switzerland it was already compulsory for all new houses to include solar technology to lessen energy demands on national grids.

"And that was the older, less effective technology. With our hours of sunlight, we will on average generate twice as much energy than, for instance, European countries."

While South African scientists developed and patented the new, super-effective alloy solar panels, other companies have developed new, super-efficient storage batteries and special converters to change the energy into the power source of a particular country (220 volts in South Africa).

Eskom spokesperson Carin de Villiers said any new power supply that lessened the load on Eskom was to be welcomed.

She said Eskom was also doing its own research on solar energy.

"In fact, we are currently investigating building what will probably be the largest solar power plant, in the Northern Cape - a 100-megawatt facility."

She added that Eskom was also researching wind and fuel-cell technology as alternative energy sources.

Vanadium Redox Instead of Batteries

Thomas Valone, Integrity Research Institute, March 3, 2006, www.vrbpower.com
(Thanks to Jim Dunn of www.ctc.org for letting me in on this discovery)

An electrochemical energy storage technology now being successfully used with wind systems, an oxidation-reduction reactive liquid made from vanadium is **far superior to battery storage of electricity**, according to Mark T. Kuntz, Vice President, Marketing & Business Development, at VRB Power Systems Inc.

Headquartered in Vancouver, B.C. Canada, **VRB Power Systems Inc.** is an **energy storage** technology developer, manufacturer and systems integrator utilizing the patented **VRB Energy Storage System** ("VRB-ESS") and has acquired the intellectual property rights and assets to the Regenesys **Energy Storage System** ("RGN-ESS"). The VRB-ESS and RGN-ESS can effectively store large amounts of electricity on demand and provide direct economic benefits to utilities and end users in terms of improved power quality, reliability and energy efficiency. The VRB-ESS and RGN-ESS are particularly well suited to load leveling (peak shaving), electrical power arbitrage, grid stability enhancements, capital deferral and Remote Area Power Supply (RAPS) applications. They are focused on stationary power sources such as utility substations, commercial buildings, production facilities, telecommunication operations, cellular radio sites, and renewable resource generation such as wind farms and solar applications - creating the ability to provide "firm" capacity.

As a "**green**" technology, the VRB-ESS is characterized by the lowest ecological impact of all **energy storage** technologies and is unlike most other conventional **energy storage** systems that rely on toxic substances such as lead or cadmium.

The VRB-ESS uses a Vanadium based electrolyte and is intended for applications from 2.5kW's to 10MW's with durations of 2 hours and greater. The RGN-ESS uses electrolytes of concentrated solutions of sodium bromide and sodium polysulphide. The RGN-ESS is intended for applications from 10MW's to 100 MW's with durations of 8 to 12 hours.

Benefits include:

- An electrochemical *energy storage system*
- A flow battery, based on Vanadium
- Based on the reduction and oxidation of different ionic forms of Vanadium
- Energy (electricity) can be stored indefinitely in a liquid – very low self-discharge
- Energy can be recovered instantaneously (< 1ms)

Other advantages are that Vanadium Redox Energy Storage Systems (ESS) have:

- High-energy efficiencies: 70% round trip.
- Storage capacity can be easily increased by adding electrolyte.
- Designed for unattended operation with very low maintenance costs (\$0.001/kWh).
- Ambient/Low operating temperature.
- Can be discharged and charged >10,000 times without performance degradation.
- Intelligent, programmable PCS provides four-quadrant control and simultaneous real and reactive energy (VARs).

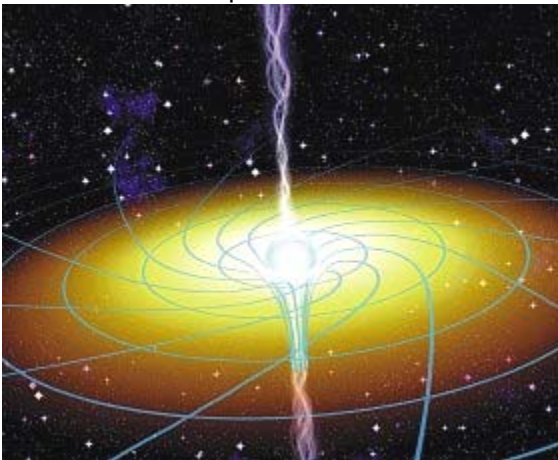
ESA Announces Gravity-Modification Breakthrough

Tim Ventura, March 20, 2006, American Antigravity,
<http://www.americanantigravity.com/articles/498/1/>

Gravitomagnetic London Effect Found in Rotating Superconductors

This week the European Space Agency announced the results of an experimental test in which a superconductor rotating at 6,500 rpm is shown to gain weight as the result of what is believed to be a gravity-modification effect. As reported by the ESA, "The experiment demonstrated that a **superconductive gyroscope is capable of generating a powerful gravitomagnetic field**, and is therefore the gravitational counterpart of the magnetic coil. Although just 100 millionths of the acceleration due to the Earth's gravitational field, the measured field is a surprising one hundred million trillion times larger than Einstein's General Relativity predicts."

The results were presented March 21st at the ESA's **European Space and Technology**



Research Centre (ESTEC), in a paper entitled "Experimental Detection of the Gravitomagnetic London Moment". The paper predicts the presence of a large gravitomagnetic field within a rotating superconductor, and describes the experimental detection of this phenomenon as an extra-gravitational acceleration on the superconductor on the order of 100 μg .

The experiment was performed by Dr's **Martin Tajmar & Clovis De Matos** at ARC Seibersdorf, Austria's largest independent research laboratory. Tajmar, the Head of Field Space Propulsion Business for ARC, was

quoted as stating that these results, while preliminary, were nonetheless rigorously reviewed before publication, "We ran more than 250 experiments, improved the facility over 3 years and discussed the validity of the results for 8 months before making this announcement. Now we are confident about the measurement." Dr. Tajmar previously commented on this continuing research study during a video-interview with American Antigravity at STAIF 2006.

While the announcement of these initial test-results is highly promising, Tajmar suggested that more experimentation is required before the results can be considered fully conclusive. In a statement Saturday, Tajmar remarked, "Of course, this effect needs further confirmation with other sensors, setups, etc. As an experimentalist, it is always very hard to release such data knowing that the claims are extraordinary, so I really want to be very cautious."

Tajmar's experimental results follow in a long thread of anecdotal claims & theoretical predictions from scientists such as Dr's Ning Li, Evgeny Podkletnov, Douglas Torr, Robert Baker, Raymond Chiao, and David Maker. While Li & Podkletnov have described seeing remarkable large-scale experimental results, other experiments have produced no results whatsoever, creating a general uncertainty in the scientific community as to whether gravitomagnetic effects do in fact exist in superconductors.

Dr. Clive Woods of Iowa State University addressed the issue of gravitational-coupling in

superconductors in a recent publication entitled "High-Frequency Gravitational Wave Optics". His research revisits earlier calculations by Li & Torr showing that gravitational waves inside a Type-II superconductor propagate with a phase-velocity 300 times slower than in free-space, and leading to the hypothesis that a superconductor may require focusing in order to correctly absorb & re-radiate gravitational waves. This notion may explain in part at least some of the difficulty found in obtaining consistent experimental results, as illustrated by the experimental failure of Dr. Raymond Chiao's "gravity-radio" experiment in 2003.

While Woods' publication certainly seems to provide new insight into manipulating gravitational force using superconductors, Tajmar believes that Woods' research is not applicable to this latest experiment, "As you have probably seen in the experimental paper, we found the effect in Nb and Pb (Type-II and Type-I) - so it's not specifically related to Type-I or II superconductors. Moreover, Clive based his focusing requirements on the speed of gravity equation from an old Li & Torr paper - after calculating through her paper, I believe that this specific equation is not correct."

Another startling aspect of Tajmar's reported experimental results is the scale, which demonstrates a coupling many orders of magnitude higher than both Relativity Theory and earlier research into High-Frequency Gravity-Waves (HFGW's) would predict. HFGW researcher & STAIF Session-Chairperson Gary Stephenson commented on this by noting that the difference in scale of the reported effects may be the result of Tajmar's experimental implementation, which he described as a "DC static gravitomagnetic field, potentially bound by different coupling efficiencies than those predicted by the wavelike AC-nature of traditional High-Frequency Gravitational Waves."

If the gravitomagnetic coupling coefficient is in fact higher for rotating-superconductors than for HFGW experiments, it could mean new life for the experimental research of Dr. Evgeny Podkletnov, best-known for a highly-publicized 1996 claim to have created a 2% decrease in the weight of a YBCO Type-II superconductor rotating at 5,000 rpm. Podkletnov has since then also described creating a powerful "force-beam" apparatus by passing a high-energy electrical discharge from a Marx-Generator through a superconducting spark-gap during experimentation at the Moscow Chemical Research Institute in Russia.

Gary Stephenson commented on the similarity between the 1996 experiments and Tajmar's results, stating, "Tajmar's experiment seems highly analogous to Podkletnov's experiment, but based on a firmer theoretical foundation. In essence, they are spinning a superconductor, which is exactly what Podkletnov claimed produced an identical -- albeit larger-- result."

STAIF Conference Section-F Chairman Paul Murad made a more direct comparison, stating, "Is this truly the first time that we've seen this effect, or has it perhaps already been documented under different manifestations? Is this the same as Podkletnov's gravity-shielding effect? I can't help but wonder if these results have been seen in the past in other experiments, and perhaps were either not reported or instead attributed to other causal factors..."

With Tajmar's recent publication raising more questions than answers, there seems to be only one point of clear consensus -- the need for additional research. Paul Murad summarized the views of many with the statement, "For the moment, I'm taking a wait and see attitude to see how this research further develops. We also have to see the experimental setup, possible environmental & terrestrial sources of error, and a variety of successful experimental replications before making a determination. We need to see this reproduced by others before making a final decision."

Links: ESA: http://www.esa.int/esaCP/SEMOMQ374OD_index_0.html

ESA: Towards a New Test of General Relativity?
http://www.esa.int/esaCP/SEM0L6OVGJE_index_0.html

Interviews: Martin Tajmar Video Interview (STAIF 2006), Eugene Podkletnov
 Audio Interview #1, Eugene Podkletnov Audio Interview #2
www.americanantigravity.com

Publications: Tajmar, Martin and Clovis J. de Matos. 2006b. Local Photon and Graviton Mass and its Consequences. Submitted to International Journal of Modern Physics D
<http://forum.physorg.com/index.php?showtopic=5584>

Related: High-Frequency Gravitational-Wave Optics, Weak gravitational shielding properties of superconductors, Investigation of HV discharges through large ceramic superconducting electrodes, Superconductor Impulse Gravity Generator, Unified Field theory available at: www.aias.us and www.atomicprecision.com

ESA News:
<http://www.esa.int>
 23 March 2006

"Towards a new test of general relativity?"

Scientists funded by the European Space Agency have measured the gravitational equivalent of a magnetic field for the first time in a laboratory. Under certain special conditions the effect is much larger than expected from general relativity and could help physicists to make a significant step towards the long-sought-after quantum theory of gravity.

Just as a moving electrical charge creates a magnetic field, so a moving mass generates a gravitomagnetic field. According to Einstein's Theory of General Relativity, the effect is virtually negligible. However, Martin Tajmar, ARC Seibersdorf Research GmbH, Austria; Clovis de Matos, ESA-HQ, Paris; and colleagues have measured the effect in a laboratory.

Their experiment involves a ring of superconducting material rotating up to 6,500 times a minute. Superconductors are special materials that lose all electrical resistance at a certain temperature. Spinning superconductors produce a weak magnetic field, the so-called London moment. The new experiment tests a conjecture by Tajmar and de Matos that explains the difference between high-precision mass measurements of Cooper-pairs (the current carriers in superconductors) and their prediction via quantum theory. They have discovered that this anomaly could be explained by the appearance of a gravitomagnetic field in the spinning superconductor (This effect has been named the **Gravitomagnetic London Moment** by analogy with its magnetic counterpart).

Small acceleration sensors placed at different locations close to the spinning superconductor, which has to be accelerated for the effect to be noticeable, recorded an acceleration field outside the superconductor that appears to be produced by gravitomagnetism. "This experiment is the gravitational analogue of Faraday's electromagnetic induction experiment in 1831.²

"It demonstrates that a superconductive gyroscope is capable of generating a powerful gravitomagnetic field, and is therefore the gravitational counterpart of the magnetic coil. Depending on further confirmation, this effect could form the basis for a new technological domain, which would have numerous applications in space and other high-tech sectors," says de Matos. Although just 100 millionths of the acceleration due to the Earth's gravitational field, the measured field is a surprising **one hundred million trillion times larger than Einstein's**

² This is a reference to Michael Faraday's homopolar generator that he discovered in 1831. See *The Homopolar Handbook* by Thomas Valone for more details about this related invention. – Ed. Note

General Relativity predicts. Initially, the researchers were reluctant to believe their own results.

"We ran more than 250 experiments, improved the facility over 3 years and discussed the validity of the results for 8 months before making this announcement. Now we are confident about the measurement," says Tajmar, who performed the experiments and hopes that other physicists will conduct their own versions of the experiment in order to verify the findings and rule out a facility induced effect. In parallel to the experimental evaluation of their conjecture, Tajmar and de Matos also looked for a more refined theoretical model of the Gravitomagnetic London Moment. They took their inspiration from superconductivity. The electromagnetic properties of superconductors are explained in quantum theory by assuming that force-carrying particles, known as photons, gain mass. By allowing force-carrying gravitational particles, known as the gravitons, to become heavier, they found that the unexpectedly large gravitomagnetic force could be modelled.

"If confirmed, this would be a major breakthrough," says Tajmar, "it opens up a new means of investigating general relativity and its consequences in the quantum world."

The results were presented at a one-day conference at ESA's European Space and Technology Research Centre (ESTEC), in the Netherlands, 21 March 2006. **Two papers** detailing the work are now being considered for publication. The papers can be accessed on-line at the Los Alamos pre-print server using the references: gr-qc/0603033 and gr-qc/0603032 or use **links below**:

<http://lanl.arxiv.org/abs/gr-qc/0603033> <http://lanl.arxiv.org/abs/gr-qc/0603032>

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Related links

* ESA's General Studies Programme
<http://www.esa.int/SPECIALS/GSP/index.html>
* ARC Seibersdorf research GmbH (German)
<http://www.space-applications.at/>

In depth

* Possible gravitational anomalies in quantum materials (pdf)
http://esamultimedia.esa.int/docs/gsp/Experimental_Detection.pdf

IMAGE CAPTIONS:

[Image 1:
http://www.esa.int/esaCP/SEM0L6OVGJE_index_1.html
 Experiment in ARC Seibersdorf research

Overall picture of the experimental apparatus where the Gravitomagnetic London Moment in rotating superconductors has been detected.



[Image 2:

http://www.esa.int/esaCP/SEM0L6OVGJE_index_1.html#subhead2
 Gravitomagnetic induction of gravitational fields

An angularly accelerated superconductive ring induces non-Newtonian gravitational fields in its neighbourhood.

Credits: ESA

SHEC Labs Hydrogen Process - How it Works

Solar Hydrogen Energy Corporation, December 7, 2005, <http://www.shec-labs.com/process.php>

SHEC LABS and the City of Regina Saskatchewan are pleased to announce the world's first Solar Hydrogen production station from landfill gas

SHEC Labs has developed advanced solar thermo chemical generators. These generators can extract hydrogen from water and hydrocarbons.

The unit produces hydrogen with solar energy as the primary energy input and has the following general chemistry:



1. Methane (CH_4) and carbon dioxide (CO_2) are reacted to form hydrogen gas (H_2) and carbon monoxide (CO)
2. The carbon monoxide is reacted with water to produce more hydrogen and carbon dioxide

Carbon dioxide (CO_2) and methane gas (CH_4) are fed into a reactor heated by a solar mirror array. The intermediate products from Reaction 1 feed into a water gas shift reactor (WGSR), controlled at near atmospheric pressure. The resulting gas stream is H_2 and CO_2 and is saturated with water.

Solar energy provides the driving force for the endothermic Reaction 1. A water cooled iris dilates to control the amount of radiant energy directed to Reaction 1. Reaction 2 is exothermic and requires cooling to maintain the optimum temperature.

Gas Production

SHEC's solar hydrogen generator has now operated for approximately 1,200 hours with no noticeable coking or degradation of the catalysts. Hydrogen production is near the theoretical maximum at approximately 66% in the product gas stream with a 98.2% mol conversion of the feed methane.

Energy Balance

The system does not produce more energy than it receives. It does, however, produce more energy in the form of hydrogen than the energy input in the form of methane.

When energy is converted from one form to another, a great deal of energy is typically lost (i.e. 10 kW of methane produces approximately 3 kW of electricity in a reciprocating engine). With the SHEC process, there are two sources of hydrogen (methane, CH_4 and water, H_2O). The process of SHEC Labs uses "free" solar energy to produce hydrogen from both methane and water.

In bulk terms, every 1 m^3 of methane feed produces approximately 3.9 m^3 of hydrogen in the process. Put in common energy terms at 1 bar pressure and 25°C, 1 m^3 of methane equals approximately 40 MJ of thermal energy and 3.9 m^3 of hydrogen equals approximately 45.7 MJ of thermal energy, which is a net energy gain of over 14% for the demonstration unit.

Considering the total energy (from the sun and from the methane), the overall energy balance has a less than 100% conversion efficiency and obeys the laws of thermodynamics.

What's next?

The next stage of development is anticipated to be a commercial-scale demonstration at a landfill gas site in Canada using 40,000 kg per year hydrogen production modules. This one project (a small-to-medium sized landfill gas project) will prevent more than 1.6 million tonnes of carbon dioxide equivalent (CO_2e) from entering the atmosphere over the next twenty years and will significantly improve local air quality and reduce smog.

The next generation of solar hydrogen involves direct water splitting with only water as the primary feed component. According to SHEC, six of the ten steps needed for this process are already integrated into the current system.

It's no secret that fossil fuel supplies are dwindling and will eventually be depleted. At the same time, fossil fuel consumption continues to increase leaving in its wake destructive cumulative effects, which began during the industrial revolution. Scientists, governments, and industries are witnessing the long-term consequences of energy consumption and foresee catastrophic outcomes if alternative methods of energy production are not developed and utilized to meet the needs of our global economy. Hydrogen is the most abundant element in the universe. SHEC labs understands this need and is continuing its develop of processes for the production of hydrogen fuel.

Forecasts about the abundance of oil are usually warped by inconsistent definitions of "reserves." In truth, every year for the past two decades the industry has pumped more oil than it has discovered, and production will soon be unable to keep up with rising demand. Reference: Campbell, C.J and Jean H. Laherrère. "The End of Cheap Oil." Scientific American, March, 1998

For More Information

THE END OF CHEAP OIL

by Colin J. Campbell and Jean H. Laherrère

Recent News Articles http://www.shec-labs.com/press/articles_recent.php

Independent Validation <http://www.shec-labs.com/validation.php>

Historical Milestones http://www.shec-labs.com/historical_milestones.php

Internal Combustion Retrofit <http://www.shec-labs.com/applications/combustion.php>

Fuel Cell Cars <http://www.shec-labs.com/applications/cars.php>

Power Plants <http://www.shec-labs.com/applications/plant.php>

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Solar Power - Seriously Souped Up

Herb Brody, *New Scientist* Print Edition, 31 May 2006

<http://www.newscientist.com/channel/earth/energy-fuels/mg19025531.600-solar-power--seriously-souped-up.html>

IF YOU want efficient solar power, Victor Klimov has a deal for you. Give him one photon of sunlight, and he'll give you two electrons' worth of electricity.

Not impressed? You should be. In all solar cells now in use - in everything from satellites to pocket calculators - each incoming photon contributes at most one energised electron to the electric current it generates. Now Klimov, a physicist at **Los Alamos National Laboratory** in New Mexico, has broken through this barrier. He has shown that by shrinking the elements of a solar cell down to a few nanometres, or millionths of a millimetre, each captured photon can be made to generate not one, but **two or even more** charge carriers.

Producing this multiplicity of electrons - an achievement that has been replicated by a group at the **National Renewable Energy Laboratory (NREL)** in Golden, Colorado - is a remarkable piece of physics. If the effect can be harnessed, it could change the whole energy debate by making solar power much more efficient and economical. While there are many ongoing efforts to improve solar efficiency - by concentrating sunlight, for example, or by making it easier for electrons to move around within a cell - the new approach is unique in that it gets to the very root of the process and also complements other methods.

For decades, photovoltaics have been stranded on the effete fringe of energy technologies - ideal for niche applications such as satellites, but not economically competitive here on Earth. Made from semiconducting materials, most often silicon, solar cells convert a dismayingly small fraction of the sun's energy into electricity. Radically improving efficiency could give solar energy a boost at a time when it is sorely needed and funding decisions hang in the balance. "If this could be translated into a robust system that could generate multiple carriers, it could be revolutionary," says Eric Rohlffing, acting director of the chemical sciences, geosciences and biosciences division in the **Office of Basic Energy Sciences** at the US Department of Energy.

The latest results trace back to 1982, when materials scientist Alexander Efros at the **Naval Research Laboratory** in Washington DC showed it was theoretically possible for a photon to generate multiple charge carriers in certain semiconductors. Over the next two decades, researchers learned to control the properties of tiny semiconducting structures called nanocrystals, or quantum dots. Then in 2002, physical chemist Arthur Nozik of NREL predicted that the production of multiple carriers should be enhanced in nanocrystals relative to bulk semiconductors. It wasn't until 2004 that Klimov's group - interested in developing lasers as well as photovoltaics - showed that such behaviour could be reliably detected ([Physical Review Letters, vol 92, p 186601](#)).

The benefits of multiple carriers arise from the way photovoltaic devices interact with the solar spectrum. When an electron in a semiconducting material becomes free to move about and conduct current, it leaves behind a vacant site in the crystal, called a hole; the electron-hole pair is called an exciton. The amount of photon energy needed to create an exciton in a particular material is called the band gap (the term refers to the difference in energy levels between a fixed electron in the so-called "valence band" and one that is part of the sea of freely moving electrons in the "conduction band"). Sunlight consists of a variety of wavelengths, which we see as colours, and the photons of each colour carry a characteristic amount of energy: lower at the infrared and red end of the spectrum, and higher towards the blue, violet and ultraviolet end.

To make an efficient solar cell, you need to match the photon energy to the cell material's band gap. Silicon has a band gap that corresponds to wavelengths in the near-infrared region of the spectrum. Incoming photons with less energy than that will not have the quantum oomph to create even a single exciton. A photon with exactly the band-gap energy will create one exciton and have no energy left over, so the solar cell will make perfect use of the energy from photons in that part of the spectrum.

Most of the light streaming down from the sun, however, has a shorter wavelength than infrared, so its photons have higher energy than the silicon band gap. Each of these packets of electromagnetic energy, no matter how potent, can still liberate only one electron. Anything left over will dribble away as heat and contribute exactly zero to the device's electrical output. Klimov's technique taps this otherwise wasted energy and turns it into electricity.

The key, he says, is the small size of the quantum dots used to absorb photons. When structures shrink to the size of a few thousand atoms, their physics takes a turn for the weird. The multi-exciton phenomenon, which can barely be made to occur at all in conventional silicon, becomes possible in specially fabricated nanocrystals. In his latest series of experiments, Klimov claims to have produced as many as 7 excitons per photon in crystals of lead selenide 4 to 8 nanometres in diameter ([Nano Letters, vol 6, p 424](#)). "They're very cheap and only take a few minutes to grow," says Klimov. "It's like making new atoms, to go beyond what nature provides."

Precision timing

To detect these multiple excitons, the nanocrystals' behaviour needs to be measured at excruciatingly precise time intervals. Klimov and his colleague Richard Schaller illuminated samples of lead selenide with laser pulses lasting only 5×10^{-14} seconds - that's 50 millionths of a nanosecond. They then shone another laser beam to probe the crystal, monitoring how much light it absorbed over the next few thousandths of a nanosecond. Single excitons are stable, so if just one is present, absorption remains constant during that period. If multiple excitons are created, however, that is no longer the case: the excitons rapidly disappear, causing the crystal's absorption properties to change in a characteristic way that can be picked up by sensitive optical detectors. Of course, the ability of a photon to generate multiple charge carriers has its limits. The fundamental laws of physics dictate that the total energy of the excitons cannot exceed the energy of the photons striking the cell. "We are still constrained by the conservation of energy," Klimov says.

Or are they? How the multiple excitons are produced remains a bit of a mystery. According to Klimov, when an energetic photon strikes the material, the electron jumps to what he calls a "virtual" state in which it has actually gained more energy than was carried by the photon; this seeming contradiction is permitted because the virtual state lasts for such a brief time. The hyper-excited electron will transfer some of its energy to another, unexcited electron essentially by bumping into it. The result: two energised electrons from a single photon.

Nozik suggests a different model. There is a "coherent superposition" of energy states, he says - a quantum mechanical effect that defies concrete analogy. Following the absorption of a high-energy photon, an electron will inhabit two different energy states: one of them consistent with the formation of a single exciton, and one consistent with multiple excitons. In effect, says Garry Rumbles, a member of Nozik's team, "you prepare a mixture of states - one state looks like three excitons, and another state looks like a single exciton with very high energy". This superposition holds for a very brief period, until the electron makes a decision, says Rumbles.

However it works, a solar cell does no good unless the electric charges created can be drawn into a circuit. And therein lies the major obstacle to building a real-world device. "To produce current, you need to separate electrons from holes, and that's a big problem," Klimov says. The difficulty is that multiple excitons are extremely short-lived, lasting only tens of picoseconds, or trillionths of

a second, before the holes and electrons recombine; in ordinary photovoltaic devices, electrons and holes remain apart for much longer, closer to a microsecond.

This means that practical applications of Klimov's work are still some way off. "We can take this as a proof of principle," says chemist Paul Alivisatos of the **University of California**, Berkeley, but figuring out how to separate and harvest the multiple charge carriers produced in a nanocrystal remains a puzzle. "It's worth spending time on this," he says, because if it works it is bound to yield an increase in photovoltaic efficiency.

Nathan Lewis, a chemist at the **California Institute of Technology** in Pasadena who led a recent US **Department of Energy** workshop on research needs for solar energy, takes a similar view. The work is an "important confirmation of theoretical predictions", he says. "It's like knowing that there's nuclear fusion happening on the sun," he explains. "Doing it on Earth is another story."

The first step is to reliably separate the multiple electrons and holes. That requires finding materials with electronic energy characteristics that match those of the quantum dots. One approach uses a conductive polymer to extract the holes. Klimov's group is collaborating with Anvar Zakhidov, a physicist at the **University of Texas at Dallas**, on a prototype that blends the lead selenide crystals with such a polymer. After a photon creates an electron-hole pair, the holes migrate into the polymer and travel through it to an electrode; the energised electrons, meanwhile, hop from nanocrystal to nanocrystal until they reach the other electrode.

The work has encountered its share of technical difficulties, however. "We are at the very beginning of experimental demonstration," Zakhidov says. One issue is that the nanocrystals must be in "intimate contact" with the polymer. Moreover, the conduction of electrons through the array of nanocrystals is very inefficient. "There are lots of dead ends," he says.

An alternative method for collecting the solar-induced charges has been proposed by Peidong Yang, a chemist at Berkeley who is also an expert in nanomaterials. Instead of requiring electrons to hop from one nanocrystal to another, Yang is testing nanowires - highly conductive filaments with a diameter of only a few nanometres. In principle, Yang says, the electrons and holes could zip through an array of nanowires straight to a pair of collecting electrodes "like cars on a freeway with no stop lights". Whether nanowires could harvest multiple excitons in the short time they are available, however, is anyone's guess.

Another area for progress is in the material used for making the quantum dots. The lead selenide used so far is less than ideal. First, it is toxic, making its fabrication a tricky business. Second, its band gap is large. For a photon to produce multiple excitons, its energy must equal at least twice the band gap of the material, and with lead selenide only photons at the high-energy end of the spectrum are powerful enough to achieve this.

Big is beautiful

There may be a way around this. The smallest crystals have the largest band gaps, as the confinement of electrons to a very tight space ratchets up the energy levels. The way to generate the largest number of excitons would be to engineer the crystal so that its band gap is small. One way to do this, says NREL physicist Randy Ellingson, would simply be to grow the nanocrystals larger. That would make it possible to use the abundant photons in the middle of the solar spectrum to generate multiple excitons. The trade-off, Ellingson points out, is that a lower band gap means a lower voltage across the electrodes, which may limit the total power output of the cell.

The researchers are also exploring alternative materials. Both Klimov and Nozik have observed multiple-exciton generation in other semiconductors, including lead sulphide, lead telluride and cadmium selenide. What's more, Klimov says his group has identified two new materials that are

less toxic and have band gaps better matched to the solar spectrum than lead selenide, though he will not identify the materials as he has yet to publish the work.

If each photon can generate multiple charge carriers, the overall power efficiency of solar cells could be dramatically increased. The world record for a ground-based cell is 24.7 per cent, achieved by a device made in Australia at the University of New South Wales. Klimov predicts that the multiple-carrier generation could one day yield a cell with **double that efficiency, approaching 50 per cent**. Ellingson is slightly more conservative, but he still projects efficiencies around 45 per cent. With more work, the chips cranking out extra electrons in New Mexico and Colorado could one day bring a bright solar future for us all.

Solar fuel

Electricity is not the only useful form of energy that ultra-efficient solar cells might generate. They could also be used to induce a chemical reaction that creates fuel. While this approach is not strictly dependent on a cell in which each photon yields more than one current-carrying electron, the additional charge carriers would help by accelerating the reaction.

In one compelling scenario, nanocrystals could be immersed in water, and the current flowing out of the solar cell would break down the water molecules into hydrogen and oxygen. As with direct production of electricity, the benefit of a multiple-exciton solar cell would come through more efficient exploitation of the solar energy that hits it, says chemist Nathan Lewis of the **California Institute of Technology** in Pasadena.

Hydrogen is the basis for fuel-cell vehicles that would operate emissions-free and require no gasoline. Oxygen from the air would react with hydrogen in the presence of a catalyst to produce electricity, with water as a by-product. Calls for a move to a hydrogen economy, however, tend to gloss over the fact that producing hydrogen requires energy - and if that energy comes from fossil fuels the environmental benefit of hydrogen power is questionable. Using solar energy to generate the hydrogen would overcome this objection.

What's more, there are other ways of putting a solar fuel generator to work. "I'd rather do like the plants do," says Lewis. "Use sunlight to convert water and carbon dioxide into ethanol or methanol." These liquids are more compatible with existing fuelling stations than hydrogen. Whatever the product, Lewis says, "making a multiple-exciton-per-photon solar cell for any purpose would be a major tour de force".

For more information

Diagram of Nanosolar Cell:

<http://www.newscientist.com/data/images/archive/2553/25531601.jpg>

Nano Letters photon article: <http://pubs.acs.org/cgi-bin/abstract.cgi/nalefd/2006/6/i03/abs/nl052276g.html>

Physical Review Letters article:

<http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=PRLTAO000092000018186601000001&idtype=cvips&gifs=yes>

Theorists Devise World's Smallest Fridge

Belle Dume, 12 June 2006, *Physics Web* and IOP Nanotechweb
<http://nanotechweb.org/articles/news/5/6/4?alert=1>

Two theoretical physicists say it is possible to build a tiny refrigerator that is powered by Brownian motion, the random movement of small particles caused by collisions with surrounding molecules.³ The concept, which is counterintuitive because such fluctuations normally hinder cooling, has been proposed by Chris Van den Broeck from Hasselt University in Belgium and Ryoichi Kawai of the University of Alabama at Birmingham in the US. If realised, the molecular-sized device would be the world's smallest refrigerator and could be used to cool down future nanoscale machines (*Phys. Rev. Lett.* 96 210601).

Van den Broeck and Kawai recently made a microscopic motor consisting of a single chiral, or asymmetrical, molecule. When placed between two reservoirs at different temperatures, this motor automatically moves in one direction to "rectify" the thermal fluctuations. In this way, it transfers heat from the high-temperature reservoir to the low-temperature one.

In their latest work, the researchers propose using an external force to drive the Brownian motor in the opposite direction so that it does the reverse - that is, causes heat to flow from the colder region to the warmer one and so acts as a refrigerator. This is much the same way that a household heat pump cools a room.

The researchers' theoretical model of the new fridge makes use of a chiral rod - which has flat paddles (like those on a paddle-wheel boat) at one end and wedge-shaped paddles at the other - piercing an insulating membrane. If the molecules surrounding the wedges have more kinetic energy than those surrounding the paddles the rod will spin, thereby moving heat from the warm side of the device to the cooler side. If a force is then applied to the rod, the motor runs "backwards" and moves heat in the opposite direction.

Such a fridge could, for example, be used to cool down semiconductor chips, channelling energy away from the centre of a chip to a cooling port by applying a torque to the molecules. It could also be used to cool down nanoscale machines.

"Advances in nanotechnology will eventually bring machine sizes down to the limit where thermal fluctuations dominate," states Kawai. "Our Brownian machine magically exploits this random motion of molecules rather than fighting against it."

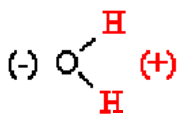
A Fuel Tank Full of Water

David Adam, *New Scientist* Print Edition, 01 August 2006,
<http://www.newscientisttech.com/channel/tech/mg19125621.200.html>

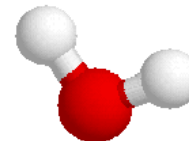
Zero-emission transport system

³ This is very similar to the conversion of nonthermal motion by rectifiers proposed in the new book, *Zero Point Energy: The Fuel of the Future* by Thomas Valone – Ed. Note

Forget cars fuelled by alcohol and vegetable oil. Before long, you might be able to run your car with nothing more than water in its fuel tank. It would be the ultimate zero-emissions vehicle.



While water, plain old H₂O, is not at first sight an obvious power source, it has a key virtue: it is an abundant source of hydrogen, the element widely touted as the green fuel of the future. If that hydrogen could be liberated on demand, it would overcome many of the obstacles that



till now have prevented the dream of a hydrogen-powered car becoming reality. Producing hydrogen by conventional industrial means is expensive, inefficient and often polluting. Then there are the problems of storing and transporting hydrogen. The pressure tanks required to hold usable quantities of the fuel are heavy and cumbersome, which restricts the car's performance and range.

Tareq Abu-Hamed, now at the **University of Minnesota**, and colleagues at the **Weizmann Institute of Science** in Rehovot, Israel, have devised a scheme that gets round these problems. By reacting water with the element boron, their system produces hydrogen that can be burnt in an internal combustion engine or fed to a fuel cell to generate electricity. "The aim is to produce the hydrogen on-board at a rate matching the demand of the car engine," says Abu-Hamed. "We want to use the boron to save transporting and storing the hydrogen." The only by-product is boron oxide, which can be removed from the car, turned back into boron, and used again. What's more, Abu-Hamed envisages doing this in a solar-powered plant that is completely emission-free.

Simple chemistry

The team calculates that a car would have to carry just 18 kilograms of boron and 45 litres of water to produce 5 kilograms of hydrogen, which has the same energy content as a 40-litre tank of conventional fuel. An Israeli company has begun designing a prototype engine that works in the same way, and the Japanese company **Samsung** has built a prototype scooter based on a similar idea.

The hydrogen-on-demand approach is based on some simple high-school chemistry. Elements like sodium and potassium are well known for their violent reactions with water, tearing hydrogen from its stable union with oxygen. Boron does the same, but at a more manageable pace. It requires no special containment, and atom for atom it's a light material. When all the boron is used up, the boron oxide that remains can be reprocessed and recycled.

Abu-Hamed and his team are not the first to investigate hydrogen-on-demand vehicles. The car giant **DaimlerChrysler** built a concept vehicle called Natrium (after the Latin word for sodium, from which the element's Na symbol is drawn), which used slightly more sophisticated chemistry to generate its hydrogen. Instead of pure water as the source of the gas, it used a solution of the hydrogen-heavy compound **sodium borohydride**. When passed over a precious-metal catalyst such as ruthenium, the compound reacts with water to liberate hydrogen that can be fed to a fuel cell. It was enough to give the Natrium a top speed of 130 kilometres per hour and a respectable range of 500 kilometres, but DaimlerChrysler axed the project in 2003 because of difficulties in providing the necessary infrastructure to support the car in an efficient, environmentally

friendly way.

Engineuity, an Israeli start-up company run by Amnon Yogev, a former Weizmann Institute scientist, is working on a similar strategy, but using the reaction between aluminium wire and water to generate hydrogen. In Engineuity's design, the tip of the metal wire is ignited and dipped into water to begin splitting the water molecules. The liberated hydrogen is piped into the engine alongside the resulting steam, where it is mixed with air and burnt. Engineuity is looking for investors to pay for a prototype, and claims it will be able to commercialise its idea "in a few years' time". The US company **PowerBall Technologies** envisages a hydrogen-on-demand engine containing plastic balls filled with sodium hydride powder that are split to dump the contents into water, where it reacts to produce hydrogen.

Abu-Hamed says the generation of hydrogen for his team's engine would be regulated by controlling the flow of water into a series of tanks containing powdered boron. To kick-start the reaction, the water has to be supplied as vapour heated to several hundred degrees, so the car will still require some start-up power, possibly from a battery. Once the engine is running, the heat generated by the highly exothermic oxidation reaction between boron and water could be used to warm the incoming water, Abu-Hamed says. Alternatively, small amounts of hydrogen could be diverted from the engine and stored for use as the start-up fuel. Water produced when the hydrogen is burnt in an internal combustion engine or reacted in a fuel cell could be captured and cycled back to the vehicle's tank, making the whole on-board system truly zero-emission.

Hydrogen-on-demand, whether from water or another source, could address two of the big problems still holding back the wider use of hydrogen as a vehicle fuel: how to store the flammable gas, and how to transport it safely. Today's hydrogen-fuelled cars rely on stocks of gas produced in centralised plants and distributed via refuelling stations in either liquefied or compressed form. Neither is ideal. The liquefaction process eats up to 40 per cent of the energy content of the stored hydrogen, while the energy density of the gas, even when compressed, is so low it is hard to see how it can ever be used to fuel a normal car.

Hydrogen-on-demand would not only remove the need for costly hydrogen pipelines and distribution infrastructure, it would also make hydrogen vehicles safer. "The theoretical advantage of on-board generation is that you don't have to muck about with hydrogen storage," says Mike Millikin, who monitors developments in alternative fuels for the **Green Car Congress** website. A car that doesn't need to carry tanks of flammable, volatile liquid or compressed gas would be much less vulnerable in an accident. "It also potentially offsets the requirements for building up a massive hydrogen production and distribution infrastructure," Millikin says.

There is a potentially polluting step that has to be tackled. "You'll need an infrastructure to produce and distribute whatever the key elements of the generation system might be," Millikin warns. While Abu-Hamed's scheme still requires a distribution network and reprocessing plant, he has devised an ingenious plan that will allow the spent boron oxide to be converted back to metallic boron in a pollution-free process that uses only solar energy (see Diagram). Heating the oxide with magnesium powder recovers the boron, leaving magnesium oxide as a by-product. The magnesium oxide can then be recycled by first reacting it with chlorine gas to produce magnesium chloride, from which the

magnesium metal and chlorine can then be recovered by electrolysis.

Solar source

The energy to drive these processes would ultimately come from the sun. The team calculates that a system of mirrors could concentrate enough sunlight to produce electricity from solar cells with an efficiency of 35 per cent. Overall, they say, their system could convert solar energy into work by the car's engine with an efficiency of 11 per cent, similar to today's petrol engines.

Experts are sceptical that we'll be seeing cars running on water any time soon. "It's not the kind of thing you're going to see appearing in a car in five or even ten years' time," says Jim Skea, research director at the UK Energy Research Centre in London. For example, DaimlerChrysler is now focusing its efforts on cars running on compressed hydrogen because filling stations that supply it already exist in some places.

Proponents of cars that run on water are banking that long term the idea will win out. Engineuity's Yogev claims the running costs will be comparable to those of today's petrol engines and expects to have a prototype built within three years.

My other car runs on water? Don't bet against it.

EEStor Capacitors- "This Could Change Everything"

Lloyd Alter, Toronto, March 6, 2006 www.treehugger.com/files/2006/03/eestor_capacito_1.php

Tyler Hamilton of the *Toronto Star* and website *Clean Break* has been digging around a very secretive company. Asking them for information they said: "EEStor is not making public statements at present time," company co-founder and chief executive Richard Weir replied when the *Toronto Star* requested an interview via email. "EEStor would also like to have you and your paper not publish any articles about our company and the *Toronto Star* is certainly not authorized to publish this response." which of course he published instantly in Canada's biggest newspaper, *BoingBoing* style. . What they are doing in Austin with their Kleiner Perkins Caufield & Byers money is developing a "parallel plate capacitor with barium titanate as the dielectric" or supercapacitor as John recently coined. Says Tyler: "BusinessWeek reported an interesting comment from Kleiner's John Doerr, who recently spoke at a California event where tech VCs gather to make their predictions for the year. Doerr reportedly referred to an investment in an energy storage company he declined to name, calling it Kleiner's "Highest-risk, highest-reward" investment." Tyler's source describes it: (warning: if you continue reading you have to eat this post)

The batteries fully charge in minutes as opposed to hours.

Whereas with lead acid batteries you might get lucky to have 500 to 700 recharge cycles, the EEStor technology has been tested up to a million cycles with no material degradation.

EEStor's technology could be used in more than low-speed electric vehicles. The company envisions using it for full-speed pure electric vehicles, hybrid-electrics (including plug-ins), military applications, backup power and even large-scale utility storage for intermittent renewable power sources such as wind and solar.

Because it's a solid state battery rather than a chemical battery, such being the case for lithium ion technology, there would be no overheating and thus safety concerns with using it in a vehicle.

Finally, with volume manufacturing it's expected to be cost-competitive with lead-acid technology.

"It's the holy grail of battery technology," said my source. "It means you could do a highway capable electric city car that would recharge in three or four minutes and drive you from Toronto to Montreal. Consumers wouldn't notice the difference from driving an electric car versus a gas-powered car."

From his *Toronto Star* article:

Energy storage has long been the bottleneck for innovation, holding back new energy-sucking features in mobile devices and preventing everything from the electric car to renewable power systems from reaching their full potential. Build a radically better battery at lower cost, experts say, and the world we know will be forever transformed.

"There's been nothing big or disruptive, and we're due for it," says Nicholas Parker, chairman of the Cleantech Venture Network, which tracks investment in so-called clean technologies. He says energy storage is one of the hottest areas for venture capital funding right now. "Right across the board, better energy storage is essential."

Among EESstor's claims is that its "electrical energy storage unit" could pack nearly 10 times the energy punch of a lead-acid battery of similar weight and, under mass production, would cost half as much.

It also says its technology more than doubles the energy density of lithium-ion batteries in most portable computer and mobile gadgets today, but could be produced at one-eighth the cost.

If that's not impressive enough, EESstor says its energy storage technology is "not explosive, corrosive, or hazardous" like lead-acid and most lithium-ion systems, and will outlast the life of any commercial product it powers. It can also absorb energy quickly, meaning a small electric car containing a 17-kilowatt-hour system could be fully charged in four to six minutes versus hours for other battery technologies, the company claims.

According to patent documents obtained by the Star, EESstor's invention will do no less than "replace the electrochemical battery" where it's already used in hybrid and electric vehicles, power tools, electronic gadgets and renewable energy systems, from solar-powered homes to grid-connected wind farms.

"If everything they say is true, then that's pretty amazing," says MacMurray Whale, an energy analyst at Sprott Securities and a former professor of mechanical engineering at the University of Victoria. "To do all of that is unheard of when you look at any other battery technology out there."

Tyler Hamilton does not impress easily- he was not impressed with us for falling head over heels in love with the magenn turbine Don't bother googling for a website for EESstor- you will get a clothing site. But do read ::*Clean Break* and ::*The Toronto Star* before they send in the lawyers or break his fingers.

For more information

Full Collection of EESstories at <http://www.rexresearch.com/weir/weir.htm>

US Patent # 7,033,406 - April 25, 2006 - "Electrical-Energy-Storage Unit (EESU) Utilizing Ceramic and Integrated-Circuit Technologies for Replacement of Electrochemical Batteries" [[PDF Format](#)]
<http://www.rexresearch.com/weir/us7033406.pdf>

Ultra-Long Life Battery

Sebastian Rupley, *PC Magazine* <http://www.pcmag.com/article2/0,1895,1988193,00.asp>

After years of advances in battery technology, many of our mobile gadgets still peter out before sunset on any given day. Several high-profile efforts are under way to fix this pesky problem, but one of the least pursued and yet most profound developments in energy technology is the battery that virtually never needs a recharge. Known as the BetaBattery, this little powerhouse could provide continuous power for years.

For now, the technology is just for offbeat applications such as sensor networks for monitoring traffic and for communication satellites, not for consumer electronics. "The initial applications will be for remote or inaccessible sensors and devices where the availability of long-life power is critical," says Larry Gadeken, a researcher at Houston-based **BetaBatt**, a company that's pioneering the technology with funding from the National Science Foundation and assistance from several universities.

The BetaBattery is not based on chemical reaction. Instead, it relies on the decay of the hydrogen isotope tritium. This continuous emission of electrons is the key to the ever-present charge in BetaBatteries. Tritium has a half-life of 12.3 years, so after 12.3 years, its output is half its original charge. At 40 years, it has one-tenth its original charge. That kind of longevity is much longer than conventional batteries can muster.

BetaBatt is also designing battery casings that are extremely resistant to heat and cold, so that the batteries can power sensors and electrical equipment in the most hostile environments—even in space. Now all we need are batteries that can power our laptops and cell phones for years.

One of the problems with [spreading environmental sensors far and wide](#) is the need to power them. While most of these sensors are designed to use as little power as possible, few can be run solely on photovoltaics; batteries, therefore, are a necessary component. So what can provide the best power over an extended period?

[It may be tritium.](#) [Tritium](#) is an isotope of hydrogen and, yes, it's radioactive. But before you click the comment button, read on.



Tritium batteries work by absorbing beta-decay electrons in a silicon panel similar to traditional photovoltaics. The concept isn't new, but earlier designs were unable to capture a sufficient number of electrons to provide a significant amount of power. The new design, figured out by researchers from the University of

Rochester, the University of Toronto, Rochester Institute of Technology and [BetaBatt](#), Inc. of Houston, Texas, uses a 3D porous silicon matrix which gives it vastly increased surface area. Tritium batteries can last for at least 12 years (the half-life of tritium) of continuous use up to over a century, depending upon battery design -- a significant improvement over traditional chemical batteries.

But what about the safety?

There were a number of practical reasons for selecting tritium as the source of energy, says co-author Larry Gadeken of BetaBatt - particularly safety and containment.

"Tritium emits only low energy beta particles (electrons) that can be shielded by very thin materials, such as a sheet of paper," says Gadeken. "The hermetically-

sealed, metallic BetaBattery cases will encapsulate the entire radioactive energy source, just like a normal battery contains its chemical source so it cannot escape."

Even if the hermetic case were to be breached, adds Gadeken, the source material the team is developing will be a hard plastic that incorporates tritium into its chemical structure. Unlike a chemical paste, the plastic cannot not leak out or leach into the surrounding environment.

(The beta-decay electrons from tritium are [incredibly weak](#); a layer of dead skin is sufficient to block their entry from external sources. Swallowing tritium poses marginally more risk, but even so, tritium is typically flushed from the system within a couple of days or weeks, and even large doses amount to at most a couple of years worth of natural background radiation -- or one [round-trip transatlantic flight](#).)

There are undoubtedly some readers who will oppose this, no matter how limited the actual danger; that's understandable. But in this case, the potential risk -- even in the worst-case scenario, consumption of material from a breached container -- is so slight, and the potential rewards -- long-life sensor and monitoring equipment -- so significant, it seems a highly worthwhile research path. I anticipate an interesting discussion in the comments.

[For more information](#)

Unlocking the Code – Science, Systems and Technological Breakthroughs | [Jamais Cascio](#) <http://www.worldchanging.com/archives/002725.html>

See Image of Beta Battery: http://www.pcmag.com/images/pcm_enlarge.gif

Casimir Force Good for MEMS Design

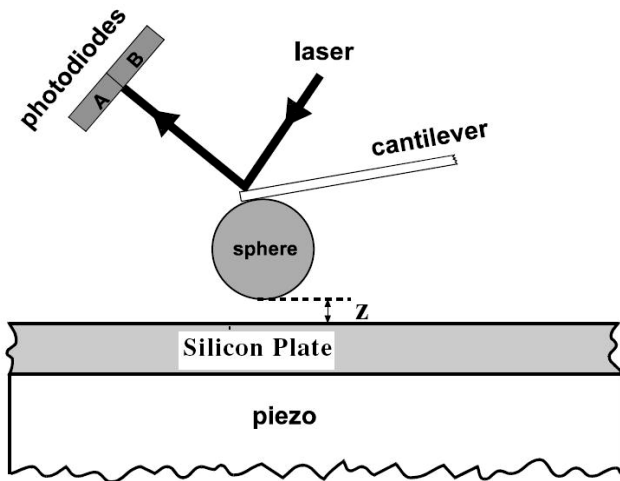
2 November 2006, *Phys Rev Lett* 97 170402,
<http://link.aps.org/abstract/PRL/v97/e170402>

Researchers in the US and Russia have demonstrated that the Casimir force between two conducting surfaces can be controlled by modifying the density of charge-carrying particles within the surfaces. The result could have positive implications for the design of novel microelectromechanical systems, or MEMS.

The mysterious attraction between two neutral, conducting surfaces in a vacuum was first described in 1948 by Henrik Casimir and cannot be explained by classical physics. Instead it is a purely quantum effect involving the **zero-point oscillations of the electromagnetic field** surrounding the surfaces. These fluctuations exert a "radiation pressure" on the surfaces and the overall force is weaker in the gap between the surfaces than elsewhere, drawing the surfaces together.

The Casimir force can be both a help and a hindrance in the design of the micrometre-scale mechanical components used in MEMS. It can cause trouble by causing components to stick to one another, but it has also been exploited to control the movement of conducting plates in MEMS devices. As a result, the precise control of the Casimir force would be an important tool for MEMS designers.

Now Umar Mohideen of the **University of California, Riverside** and colleagues have



made an important step towards Casimir control by demonstrating that materials with higher charge-carrier densities are subject to greater Casimir forces than those with lower densities. The researchers came to this conclusion by using a contact-mode atomic force microscope (AFM) with a gold-coated polystyrene sphere of diameter 0.6 microns attached to the microscope's cantilever. The sphere was placed near to a

silicon plate and the Casimir force between the two was measured. Two plates were studied – a control plate and a plate that was doped with impurities to boost its charge-carrier density by a factor of about 20 000. The Casimir forces differed by as much as 17 pN at 70 nm separation between ball and plate, which is about 7% of the total Casimir force on the ball and plates.

About the author

Darius Nikbin is a freelance science writer based in the UK

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[Umar Mohideen at UC Riverside](#)

Restricted Links

[Phys Rev Lett **97** 170402](#)

Related Stories

[The Casimir effect: a force from nothing](#)

“Progress in Future Energy Technologies” – DVD Giveaway

Thomas Valone, *Future Energy eNews*, Dec. 4, 2006 www.IntegrityResearchInstitute.org

WASHINGTON -- Dec. 4. As the future shock from the recent, technology-packed [Conference on Future Energy](#) rebound throughout the media, what better way than to obtain a souvenir DVD of the presentation by Dr. Valone on “Progress in Future Energy Technologies.”

COFE DVDs Available

In conjunction with their free access, good-will gesture, Integrity Research Institute announces a public service educational program, for a limited time, designed to share the latest developments in emerging energy technologies and to create an interest in the DVDs of all of the 13 presenters. Visit the IRI Order Page <http://users.erols.com/iri/orderform14.html> and scroll down to the **AUDIO/VIDEO TAPES, CDs, DVDs** section. The entire 14 DVD set of COFE2 presenters' DVDs are on sale for only \$99.

Free Future Energy DVD

As a FREE sample offer, the recent presentation by President Tom Valone at the Second International Conference on Future Energy entitled, "*Progress in Future Energy Technologies*" is now available on a miniDVD for **FREE** to anyone in the world upon request by email, mail, or fax.

It is a highly entertaining, humorous, fast-paced 35 minute slide show which reveals the summary of MITs 400,000 year summary of the earth's climate, temperature, sea level and CO2 levels, lots of new energy discoveries, and also a short video clip of the amazing "Air Car" which runs on compressed air. The presentation was well received with periodic laughs and applause, by about 150 attendees.

Three Access Routes

- 1) Fax request for "**Free Future Energy DVD**" to 301-513-5728 with the mailing address.
- 2) Email subject "Free Future Energy DVD" to iri@erols.com with postal address, or
- 3) Snail Mail request for "Free Future Energy DVD" on postcard to the new office of Integrity Research Institute, 5020 Sunnyside Ave., Suite 209, Beltsville MD 20705 and include your return address.

Bring the LED Power to the People

EarthTech 2006 Press Release <http://www.earthtechproducts.com/led-campaign-.html>

Earthtech Products is on a mission

Our mission together with each and everyone of you is to **reduce 2000 megawatts of power** produced by nuclear generating power plants by simply replacing as many energy sapping 60 watt incandescent bulbs with LED light bulbs.

Our Bring the Power to the People campaign gives the people the power to drive change by

taking the power away from the power energy efficient LED light bulbs. If world-changing make a one 60 watt incandescent bulb bulb. Join us in counting down

companies literally by using less power with you want to be involved with something commitment to replacing at least with an energy efficient LED light 2000 megawatts!



Can we really do this?

megawatts is alot of colleges, friends and is DOABLE and we technology is innovation

Now we realize that 2000 power but if we could all get our local organizations involved this are very excited that LED letting us do more with less as always does.

What else

can you do to get involved?

* Send this Page to a Friend, College, Influential Organization, or Community Leader <<http://ui.constantcontact.com/sa/fp.jsp?plat=i&p=f&m=mrqddwbab>> and help us spread the word.

* Bloggers: Use your influence to help us spread the word and share your ideas with us.

* Customers: Share with us how you have used your LED light bulb and send us your photos...we'll follow up with a featured photo page.

* Link to us and lets reach far with this!
To learn more about the benefits of LED light bulbs see our charts below. To learn more about which LED light bulb suits your needs and application please see our LED Light Bulb product detail pages
Shop LED Light Bulbs Now <energy-saving-led-light-bulbs.html>

How much money will I save by switching to LED light bulbs?

Life Span & Energy Saving Benefits of LED Light Bulbs vs. Incandescent Light Bulbs

Total Savings: Money saved by installing one Earthtech LED Light Bulb Total Savings: \$348.21 per bulb!

Incandescent 60 Watt Light Bulb	Earthtech 2 Watt LED Light Bulb
1,000 hours lifespan	60,000 hours lifespan
\$40.20 (60 bulbs at .67 cents each)	\$39.99 total cost
3600 kWh total energy usage for 60,000 hours	only 120 kWh
60,000 hours at 10¢ per kWh \$360.00	Cost of electricity \$12.00
After 60,000 hours total cost \$400.20	\$51.99

LED Light Bulb Benefits

- Save money in electricity costs
- Instant on/off
- Light the color of daylight

Works in cold weather
 Use only 2-10 watts of electricity (1/3rd to 1/30th of Incandescent or CFL)
 Can sustain moderate power surges
 Long lasting - up to 60,000 hour bulb life
 Durable bulbs with no fragile filaments to break from shaking and rattling
 Cool running (warm to the touch) - little heat compared to standard bulbs
 Directional lighting generates less wasted light
 Works with sensor activated lights
 Works with most dimmer switches

For more information <http://www.earthtechproducts.com>

Progress in Electrogravitics and Electrokinetics for Aviation and Space Travel

Presentation (**excerpt below**) by Thomas F. Valone, *Integrity Research Institute, Washington DC 20005*, iri@erols.com at STAIF (Space Technologies Applications International Forum), Feb. 12-16, 2006, Albuquerque, NM <http://www.unm.edu/~isnps/staif/2006/index.html>

(NOTE: Complete paper (pdf) with all illustrations and equations is online at <http://users.erols.com/iri/ElectrograviticsElectrokineticsValone.pdf> which is also Chapter 1 of the new book, *Electrogravitics II*, by the same author.)

Abstract. An analysis of the 87-year old science of electrogravitics (or electrogravity) necessarily includes an analysis of electrokinetics. Electrogravitics is most commonly associated with the 1928 British patent #300,311 of T. Townsend Brown, the 1952 Special Inquiry File #24-185 of the Office of Naval Research into the “Electro-Gravity Device of Townsend Brown” and two widely circulated 1956 Aviation Studies Ltd. Reports on “Electrogravitics Systems” and “The Gravitics Situation.” By definition, electrogravitics historically has had a purported relationship to gravity or the object’s mass, as well as the applied voltage. It also was tested recently by the Honda Corporation which published experimental results and proposed theory of a correlation between electricity and gravity. Electrokinetics, on the other hand, is more commonly associated with many patents of T. Townsend Brown as well as Agnew Bahnson, starting with the 1960 US patent #2,949,550 entitled, “Electrokinetic Apparatus.” Electrokinetics, which often involves a capacitor and dielectric, has virtually no relationship that can be connected with mass or gravity. The Army Research Lab has recently issued a report on electrokinetics, analyzing the force on an asymmetric capacitor, while NASA has received three patents on the same design topic. To successfully describe and predict the reported motion toward the positive terminal of the capacitor, it is desirable to use the classical electrokinetic field and force equations for the specific geometry involved. This initial review also suggests directions for further confirming measurements.

Keywords: electrogravitics, electrogravity, electrokinetics, gravity, high voltage electricity, asymmetric capacitor, gravitator, dielectrics

PACS: 89.40.Dd; 41.20.-q; 03.50.De

ELECTROGRAVITICS VS. ELECTROKINETICS

Eleven years ago, my first volume on the subject, *Electrogravitics Systems: A New Propulsion Methodology “Volume I”*, introduced the subject by reprinting the Aviation Studies reports from 1956 as well as an in-depth analysis of the B-2 bomber by Paul LaViolette. The second volume, *Electrogravitics II* both predates and postdates the first volume, thus giving a wider historical perspective. Volume II also contains further information on the Army Research Lab and Honda

Corporation experiments, as well as the electrokinetic equation discovery presented in this paper. A short review of the history of electrogravitics has recently been published by Theodore Loder.[1]

When asked, “What is electrogravitics?” a qualified answer is “electricity used to create a force that depends upon an object’s mass, even as gravity does.” This is the answer that perhaps should still be used to identify true electrogravitics, which also involves the object’s mass in the force, often with a dielectric. This is also what the “Biefeld-Brown effect” of Brown’s first patent #300,311 describes. However, we have seen T. Townsend Brown and his patents evolve over time which Tom Bahder emphasizes. Later on, Brown refers to “electrokinetics” (which partly overlaps the field of electrogravitics), that requires asymmetric capacitors to amplify the force. Therefore, Bahder’s article discusses the lightweight effects of “lifters” and the ion mobility theory found to explain them. Note: electrogravitics (EG) and electrokinetics (EK) are related but different.

To put things in perspective, the article “How I Control Gravitation,” published in 1929 by Brown,[2] presents an electrogravitics-validating discovery about very heavy metal objects (44 lbs. each) separated by an insulator, charged up to high voltages. T.T. Brown also expresses an experimental formula in words which tell us what he found was directly contributing to the unidirectional force (UDF) which he discovered, moving the system of masses toward the positive charge. He seems to imply that the equation for his electrogravitic force might be $F \approx Vm_1m_2/r^2$. But electrokinetics and electrogravitics also seem to be governed by another equation (Eq.1) when higher order pulsed voltages are utilized.

Zinsser Effect versus the Biefeld-Brown Effect

To gain a perspective, there is an invention which has comparable experiments that also involve electrogravity, called “gravitational anisotropy” by Rudolf G. Zinsser from Germany. Zinsser presented his experimental results at the Gravity Field Conference in Hanover in 1980, and also at the First International Symposium of Non-Conventional Energy Technology in Toronto in 1981.[3] For years afterwards, all of the scientists who knew of Zinsser’s work, including myself, regarded his invention as a unique phenomenon, not able to be classified with any other discovery. However, upon comparing Zinsser to Brown’s 1929 article on gravitation referred to above, there are striking similarities.

Zinsser’s discovery is detailed in The Zinsser Effect book by this author.[4] To summarize his life’s work, Zinsser discovered that if he connected his patented pulse generator to two conductive metal plates immersed in water, he could induce a sustained force that lasted even after the pulse generator was turned off. The pulses lasted for only a few nanoseconds each.[5] Zinsser called this input “a kinetobaric driving impulse.” Furthermore, he points out in the Specifications and Enumerations section, that the high dielectric constant of water (about 80) is desirable and that a solid dielectric is possible. Dr. Peschka calculated that Zinsser’s invention produced 6 Ns/Ws or 6 N/W.[6] This figure is twenty times the force per energy input of the Inertial Impulse Engine of Roy Thomson (report available from IRI), which has been estimated to produce 0.32 N/W.[7] By comparison, it is important to realize that any production of force today is less efficient, as seen by the fact that a DC-9 jet engine produces *about 20 times less*: only 0.016 N/W or 3 lb/hp (fossil-fuel-powered land and air vehicles are even worse.)

Let’s now compare the Zinsser Effect with the Biefeld-Brown Effect, looking at the details. Brown reports in his 1929 article that there are effects on plants and animals, as well as effects from the sun, moon and even slightly from some of the planetary positions. Zinsser also reports beneficial effects on plants and humans, including what he called “bacteriostasis and cytostasis.”[8] Brown also refers to the “endogravitic” and “exogravitic” times that were representative of the charging and discharging times. Once the gravitator was charged, depending

upon “its gravitic capacity” any further electrical input had no effect. This is the same phenomenon that Zinsser witnessed and both agree that the pulsed voltage generation was the main part of the electrogravitic effect.[9] Both Zinsser and Brown worked with dielectrics and capacitor plate transducers to produce the electrogravitic force. Both refer to a high dielectric constant material in between their capacitor plates as the preferred type to best insulate the charge. However, Zinsser never experimented with different dielectrics nor higher voltage to increase his force production. This was always a source of frustration for him but he wanted to keep working with water as his dielectric.

Electrically Charged Torque Pendulum of Erwin Saxl

Brown particularly worked with a torque (torsion) pendulum arrangement to measure the force production. He also refers the planetary effects being most pronounced when aligned with the gravitator instead of perpendicular to it. He compares these results to Saxl and Allen, who worked with an electrically charged torque pendulum.[10] Dr. Erwin Saxl used high voltage in the range of +/- 5000 volts on his very massive torque pendulum.[11] The changes in period of oscillation measurements with solar or lunar eclipses, showed great sensitivity to the shielding effects of gravity during an alignment of astronomical bodies, helping to corroborate Brown’s observation in his 1929 article. The pendulum Saxl used was over 100 kilograms in mass.[12] Most interesting were the “unexpected phenomena” which Saxl reported in his 1964 Nature article (see reference 10). The positively charged pendulum had the longest period of oscillation compared to the negatively charged or grounded pendulum. Diurnal and seasonal variations were found in the effect of voltage on the pendulum, with the most pronounced occurring during a solar or lunar eclipse. In my opinion, this demonstrates the basic principles of electrogravitics: high voltage and mass together will cause unbalanced forces to occur. In this case, the electrogravitic interaction was measurable by oscillating the mass of a charged torque pendulum (producing current) whose period is normally proportional to its mass.

Electrogravitic Woodward-Nordtvedt Effect[13]

Referring to mass, it is sometimes not clear whether gravitational mass or inertial mass is being affected. The possibility of altering the equivalence principle (which equates the two), has been pursued diligently by Dr. James Woodward (patent cover sheets in Volume II). His prediction, based on Sciamia’s formulation of Mach’s Principle in the framework of general relativity, is that “in the presence of energy flow, the inertial mass of an object may undergo sizable variations, changing as the 2nd time derivative of the energy.”[14] Woodward, however, indicates that it is the “active gravitational mass” which is being affected but the equivalence principle causes both “passive” inertial and gravitational masses to fluctuate.[15] With barium titanate dielectric between disk capacitors, a 3 kV signal was applied in the experiments of Woodward and Cramer resulting in symmetrical mass fluctuations on the order of centigrams.[16] Cramer actually uses the phrase “Woodward effect” in his AIAA paper, though it is well-known that Nordtvedt was the first to predict noticeable mass shifts in accelerated objects.[17]

The interesting observation which can be made, in light of previous sections, is that Woodward’s experimental apparatus resembles a combination of Saxl’s torsion pendulum and Brown’s electrogravitic dielectric capacitors. The differences arise in the precise timing of the pulsed power generation and with input voltage. Recently, 0.01 μ F capacitors (Model KD 1653) are being used, in the 50 kHz range (lower than Zinsser’s 100 kHz) with the voltage still below 3 kV. Significantly, the thrust or unidirectional force (UDF) is exponential, depending on the square of the applied voltage.[18] However, the micronewton level of force that is produced is actually the same order of magnitude which Zinsser produced, who reported his results in dynes (1 dyne = 10^{-5} Newtons).[19] Zinsser had activators with masses between 200 g and 500 g and force production of “100 dynes to over one pound.”[20] Recently, Woodward has been referring to his transducers as “flux capacitors” (like the movie, Back to the Future).[21]

Jefimenko's Electrokinetics Explains Electrogravitics

Known for his extensive work with atmospheric electricity, electrostatic motors and electrets, Dr. Oleg Jefimenko deserves significant credit for presenting a valuable theory of the electrokinetic field, as he calls it.[\[22\]](#) A W.V. University professor and physics purist at heart, he describes this field as the dragging force that electrons exert on neighboring electric charges, which is what he says Faraday noted in 1831, when experimenting with parallel wires: a momentary current in the same direction when the current is turned on and then a reverse current in the adjacent wire when the current is turned off.

He identifies the electrokinetic field by the vector E_k

(See Eq. 1 in Electrogravitics II (Volume II))

It is one of three terms for the electric field in terms of current and charge density. Equations like $F = qE$ also apply for calculating force. The significance of E_k , as seen in Eq. 1, is that the electrokinetic field simply the third term of a classical solution for the electric field in Maxwell's equations (see eq. 2 in Volume II):

This three-term equation is a causal equation, according to Jefimenko, because it links the electric field E back to the electric charge and its motion (current) which induces it. (He also proves that E cannot be a causal consequence of a time-variable magnetic field $\partial B/\partial t$ but instead occurs simultaneously.) This is the essence of electromagnetic induction, as Maxwell intended, which is measured by, not caused by, a changing magnetic field. The third electric field term, designated as the electrokinetic field, is directed along the current direction or parallel to it. It also exists only as long as the current is changing in time. Lenz' Law is also built into the minus sign. Parallel conductors will produce the strongest induced current.

The significance of Eq. 3 is that the magnetic vector potential is seen to be created by the time integral which amounts to an electrokinetic impulse "produced by this current at that point when the current is switched on" according to Jefimenko.[\[23\]](#) Of course, a time-varying sinusoidal current will also qualify for production of an electrokinetic field and the vector potential. An important consequence of Eq. 1 is that the faster the rates of change of current, the larger will be the electrokinetic force. Therefore, high voltage pulsed inputs are favored.

However, its significance is much more general. "This field can exist anywhere in space and can manifest itself as a pure force by its action on free electric charges." All that is required for a measurable force from a single conductor is that the change in current density (time derivative) happens very fast (the c^2 in the denominator is also equal to $1/\mu_0\epsilon_0$ unless the medium has non-vacuum permeability or permittivity).

The electrogravitics experiments of Brown and Zinsser involve a dielectric medium for greater efficacy and charge density. The electrokinetic force on the electric charges (electrons) of the dielectric, according to Eq. 1, is in the opposite direction of the increasing positive current (taking into account the minus sign). For parallel plate capacitors, Jefimenko explains that the strongest induced field is produced between the plates and so another equation evolves.

Electrokinetic Force Predicts Electrogravitic Direction

Can Jefimenko's electrokinetic force predict the correct direction of the electrogravitic force seen in the Zinsser, Brown, Woodward as well as the yet-to-be-discussed Campbell, Serrano, and Norton AFB craft demonstrations?

1) Starting with Zinsser's probe diagram (Fig. 2) from Prof. Peschka's article, it is purposely put on its end for reasons that will become obvious. Compare it with an equivalent parallel plate capacitor (the plates are x distance apart) from Jefimenko's book:[\[24\]](#)

We note that the current is presumed to be the same in each plate but in opposite directions because it is alternating. Using $E = -\partial A/\partial t$, Jefimenko calculates the electrokinetic field, for the AC parallel plate capacitor with current going in opposite directions (see Eq. 3 in Volume II), where j is the unit vector for the y-axis direction seen in Fig. 3. It is clearly seen that the y-axis points upward in Fig. 3 and so with the minus sign of Eq. 3, the electrokinetic force for the AC parallel plate capacitor will point downward. Since Zinsser had his torsion balance on display in Toronto in 1981, I was privileged to verify the direction of the force that is created with his quarter-wave plates oriented as they are in Fig. 2. The torsion balance is built so that the capacitor probe can only be deflected downward from the horizontal. The electrokinetic force is in the same direction.

2) Looking at Brown's electrogravitic force direction from the Fig. 1 in his 1929 article "How I Control Gravitation," we see that the positive lead is on the right side of the picture. Also, the arrow below points to the right with the caption, "Direction of movement of entire system toward positive." Examining the electrokinetic force of Eq. 1 in this article, we note that the increasing positive current comes in by convention in the positive lead and points to the left. Therefore, considering the minus sign, the direction of the electrokinetic force will be to the right. Checking with Fig. 4 of the 1929 Brown article, the same confirmation of induced electrokinetic force direction.[25] Thus, with Zinsser's and Brown's gravitators, the electrokinetic theory provides a useful explanation and it is accurate for prediction of the resulting force direction.

It is also worthwhile noting that T.T. Brown also indicates in that article,

"when the direct current with high voltage (75 – 300 kilovolts) is applied, the gravitator swings up the arc ... but it does not remain there. The pendulum then gradually returns to the vertical or starting position, even while the potential is maintained...Less than five seconds is required for the test pendulum to reach the maximum amplitude of the swing, but from thirty to eighty seconds are required for it to return to zero."

This phenomena is remarkably the same type of response that Zinsser recorded with his experimental probes. Jefimenko's theory helps explain the rapid response, since the change of current happens in the beginning. However, the slow discharge in both experiments (which Zinsser called a "storage effect") needs more consideration. Considering the electrokinetic force of Eq. 3 and the +/- derivative, we know that the slow draining of a charged capacitor, most clearly seen in Fig. 1 of Brown's 1929 article, will produce a decreasing current out of the + terminal (to the right) and in Eq. 3, this means the derivative is negative. Therefore, the slow draining of current will produce a weakening electrokinetic force but in the same direction as before! The force will thus sustain itself to the right during discharge.

3) It is reasonable at this stage to also suggest that the electrokinetic theory will also predict the direction of Woodward's UDF but instantaneous analysis needs to be made to compare current direction into the commercial disk capacitors and the electrokinetic force on the dielectric charges. In every electrogravitics or electrokinetics case, it can be argued, the "neighboring charges" to a capacitor plate will necessarily be those in the dielectric material, which are polarized. The bound electron-lattice interaction will drag the lattice material with them, under the influence of the electrokinetic force. If the combination of physical electron acceleration (which also can be regarded as current flow) and the AC signal current flow can be resolved, it may be concluded that an instantaneous electrokinetic force, depending on dI/dt , contributes to the Woodward-Nordtvedt effect.

4) The Campbell and Serrano capacitor modules seen in their patented drawings in Figs. 5 and 6, as well

as the Electrogravitic Craft Demonstration unit (Norton AFB, 1988).[26] can also be explained with the electrokinetic force, in the same way that the Brown gravitator force was explained in

paragraph (2) above. The current flows in one direction through the capacitor-dielectric and the force is produced in the opposite direction. The Norton AFB electrogravitic craft just has bigger plates with radial sections but the current flow still occurs at the center, across the plates. The Serrano patent diagram is also very similar in construction and operation. Campbell's NASA patents include #6,317,310, #6,411,493, and #6,775,123.

Electrokinetic Theory Observations

For parallel plate capacitor impulse probes, like Zinsser, Serrano, Campbell, the Norton AFB craft and both of Brown's models, the electrokinetic field of Eq. 3 provides a working model that seems to predict the nature and direction of the force during charging and discharging phases. More detailed information is needed for each example in order to actually calculate the theoretical electrokinetic force and compare it with experiment. We note that Eq. 3 also does not suffer the handicap of Eq. 1 since no c^2 term occurs in the denominator. Therefore, it can be concluded that AC fields operating on parallel plate capacitors should create significantly larger electrogravitic forces than other geometries with the same dI/dt . However, the current I is usually designated as $I_0 \sin(\omega t)$ and its derivative is a sinusoid as well. Therefore, a detailed analysis is needed for each specific circuit and signal to determine the outcome.

Eq. 3 also seems to suggest a possible enhancement of the force if a permeable dielectric (magnetizable) is used. Then, the value for μ of the material would normally be substituted for μ_0 .[\[27\]](#)

A further observation of both Eq. 1 and Eq. 3 is that very fast changes in current, such as a current surge or spark discharge has to produce the most dynamic electrokinetic force, since dI/dt will be very large.[\[28\]](#) The declining current surge, or the negatively sloped dI/dt however, should create an opposing force until the current reverses direction. Creative waveshaping seems to be the answer to this obvious dilemma. Fortunately, a few similar inventions use pulse power electric current generators to create propulsion. The Taylor patent #5,197,279 "Electromagnetic Energy Propulsion Engine" uses huge currents to produce magnetic field repulsion. The Schlicher patent #5,142,861 "Nonlinear Electromagnetic Propulsion System and Method" predicts hundreds of pounds of thrust with tens of kiloamperes input. The Schlicher antenna current input is a rectified current surge produced with an SCR-triggered DC power source (see Fig. 7). The resulting waveform has a very steep leading edge but a slowly declining trailing edge, which should also be desirable for the electrokinetic force effect.[\[29\]](#) Furthermore, if this waveform is continued into the negative current direction below the horizontal axis, all of that region reinforces the electrokinetic force, with no opposite forces. Therefore, a complete sinusoidal wave, with Schlicher-style steep rise-times is recommended for a signal that contributes to a unidirectional force during 75% of its cycle.

Another observation that should be mentioned is that this electrokinetic force theory does not include the mass contribution to the electrogravitic force which Saxl, Woodward, and Brown's 1929 gravitator emphasize. A contributor to Electrogravitics II, Takaaki Musha offers a derived equation for electrogravitics that does include a mass term but not a derivative term. His model is based on the charge displacement or "deformation" of the atom under the influence of a capacitor's 18 kV high voltage field and his experimental results are encouraging. He also includes a reference to Ning Li and her gravitoelectric theory.[\[30\]](#)

A final concern, which may arise from the very nature of the electrokinetic force description, is the difficulty of conceptualizing or simply accepting the possibility of an unbalanced force creation pushing against space. This author has wrestled with this problem in other arenas for years. Three examples include (1) the homopolar generator which creates back torque that ironically, pushes against space to implement the Lorentz force to slow down the current-generating spinning disk.[\[31\]](#) Secondly (2), there is the intriguing spatial angular momentum

discovery by Graham and Lahoz.[32] They have shown, reminiscent of Feynman's "disk paradox," that the vacuum is the seat of Newton's third law. A torsion balance is their chosen apparatus as well to demonstrate the pure reaction force with induction fields. Their reference to Einstein and Laub's papers cites the time derivative of the Poynting vector $S = E \times H$ integrated over all space to preserve Newton's third law. Graham and Lahoz predict that magnetic flywheels with electrets will circulate energy to push against space. Lastly, for (3), the Taylor and Schlicher inventions push against space with an unbalanced force that is electromagnetic in origin.

Eye Witness Testimony of Advanced Electrogravitics

Sincere gratitude is given to Mark McCandlish, who has suffered personal trauma for publicizing this work, offers us one of the most conclusive rendition of a covert, flat-bottomed saucer hovercraft seen by dozens of invited eye-witnesses, including a Congressman, at Norton Air Force Base in 1988. When I spoke to Dr. Hal Puthoff about Mark's story, shortly after the famous Disclosure Event[33] at the National Press Club in 2001, he explained to me that he had already performed due diligence on it and checked on each individual to verify the details of the story. Hal explains,

"All I was able to determine by my due diligence was: (1) to independently interview the source of the story and verify that, indeed he did tell the story to the individual who had passed it on to me, and (2) to independently interview yet another individual who had heard a similar story from a separate source. BUT, I was never able to verify that the story itself was true, only that there were two individuals who said it was true. I then corrected you with my statement (exact quote): '... the story remains in my 'gray basket' only as 'possibly' true.'"

Since Dr. Puthoff used to work for the CIA for ten years as a director of Project Stargate, this was quite an endorsement, even if only cautiously optimistic. In analyzing the Electrogravitic Craft Demonstration unit (Norton AFB 1988) diagrammed in Fig. 8, it can be compared to Campbell's and Serrano's patented design. A lot can be learned from studying the intricacies of this advanced design, including the use of a distributor cap style of pulse discharge and multiple symmetric, radial plates with dielectrics in between. (See footnote 26 for Mark's details.) It also remains in my 'gray basket' as possibly true.

References

- [1] Loder, Theodore, "Outside the Box Space and Terrestrial Transportation and Energy Technologies for the 21st Century" AIAA-2002-1131
- [2] p. 71, Electrogravitics II (Click on http://www.amazon.com/gp/product/0964107090/sr=8-1/qid=1139542081/ref=pd_bbs_1/104-0596475-8452744?%5Fencoding=UTF8 to see Vol. II on Amazon.com)
- [3] Zinsser, R.G. "Mechanical Energy from Anisotropic Gravitational Fields" First Int'l Symp. on Non-Conventional Energy Tech. (FISONCET), Toronto, 1981. Proceedings available from PACE, 100 Bronson Ave #1001, Ottawa, Ontario K1R 6G8
- [4] Valone, Thomas The Zinsser Effect: Cumulative Electrogravity Invention of Rudolf G. Zinsser, Integrity Research Institute, 2005, 130 pages, IRI #701
- [5] Cravens, D.L. "Electric Propulsion/Antigravity" Electric Spacecraft Journal, Issue 13, 1994, p. 30
- [6] Peschka, W., "Kinetobaric Effect as Possible Basis for a New Propulsion Principle," Raumfahrt-Forschung, Feb, 1974. Translated version appears in Infinite Energy, Issue 22, 1998, p. 52 and The Zinsser Effect.

[7] Valone, Thomas, “Inertial Propulsion: Concept and Experiment, Part 1” Proc. of Inter. Energy Conver. Eng. Conf., 1993, See IRI Report #608.

[8] See “Pulsed Electromagnetic Field Health Effects” IRI Report #418 and Bioelectromagnetic Healing book #414 by this author, which explain the beneficial therapy which PEMFs produce on biological cells.

[9] Mark McCandlish’s Testimony (p. 131 of Volume II) shows that the Air Force took note in that the electrogravitic demonstration craft shown at Norton AFB in 1988 had a rotating distributor for electrically pulsing sections of multiply-layered dielectric and metal plate pie-shaped sections with high voltage discharges.

[10] See Saxl patent #3,357,253 “Device and Method for Measuring Gravitational and Other Forces” which uses +/- 5000 volts.

[11] Saxl, E.J., “An Electrically Charged Torque Pendulum” Nature, July 11, 1964, p. 136

[12] Saxl & Allen, “Observations with a Massive Electrified Torsion Pendulum: Gravity Measurements During Eclipse,” IRI Report #702.(Note: 2.2 lb = 1 kg)

[13] Graph of Fig. 1 from Woodward and Mahood, “Mach’s Principle, Mass Fluctuations, and Rapid Spacetime Transport,” California State University Fullerton, Fullerton CA 92634

[14] Cramer et al., “Tests of Mach’s Principle with a Mechanical Oscillator” AIAA-2001-3908 email: cramer@phys.washington.edu

[15] Woodward, James F. “A New Experimental Approach to Mach’s Principle and Relativistic Gravitation, Found. of Phys. Letters, V. 3, No. 5, 1990, p. 497

[16] Compare Fig. 1 graph to Brown’s ONR graph on P.117 of Volume I

[17] Nordtvedt, K. Inter. Journal of Theoretical Physics, V. 27, 1988, p. 1395

[18] Mahood, Thomas “Propellantless Propulsion: Recent Experimental Results Exploiting Transient Mass Modification” Proc. of STAIF, 1999, CP458, p. 1014 (Also see Mahood Master’s Thesis www.serve.com/mahood/thesis.pdf)

[19] For comparison, 1 Newton = 0.225 pounds

[20] Zinsser, FISONCET, Toronto, 1981, p. 298

[21] Woodward, James “Flux Capacitors and the Origin of Inertia” Foundations of Physics, V. 34, 2004, p. 1475. Also see “Tweaking Flux Capacitors” Proc. of STAIF, 2005

[22] Jefimenko, Oleg, *Causality, Electromagnetic Induction and Gravitation*, Electret Scientific Co., POB 4132, Star City, WV 26504, p. 29

[23] Jefimenko, p. 31

[24] Jefimenko, p. 47

[25] Brown’s second patent #2,949,550 (see Patent Section: two electrokinetic saucers on a maypole) has movement toward the positive charge, so the same electrokinetic theory explained above works for both.

[26] McCandlish, Mark, “Testimony of Mr. Mark McCandlish, December 2000,” Electrogravitics II, Integrity Research Institute, 2005, p. 131

[27] Einstein and Laub, Annalen der Physik, V. 26, 1908, p.533 and p. 541 – two articles on the subject of a moving capacitor with a “dielectric body of considerable permeability.” Specific equations are derived predicting the resulting EM fields. Translated articles are reprinted in The Homopolar Handbook by this author (p. 122-136). Also see Clark’s dielectric homopolar generator patent #6,051,905.

- [28] Commentary to Eq. 2 states an electrokinetic impulse is produced when the “current is switched on,” which implies a very steep leading edge of the current slope.
- [29] See the Taylor and Schlicher patents in the Patent Section. – Ed note
- [30] Ning Li was the Chair of the 2003 Gravitational Wave Conference. The CD Proceedings of the papers is available from Integrity Research Institute.
- [31] Valone, Thomas, *The Homopolar Handbook: A Definitive Guide to Faraday Disk and N-Machine Technologies*, Integrity Research Institute, Third Edition, 2001
- [32] Graham and Lahoz, “Observation of Static Electromagnetic Angular Momentum in vacuo” *Nature*, V. 285, May 15, 1980, p. 129
- [33] See the authoritative book by Dr. Steven Greer, *Disclosure: Military and Government Witnesses Reveal the Greatest Secretes in Modern History*, Crossing Point, 2001. It provides the testimony of each witness who participated in the event, plus many more. (Available from Integrity Research Institute)

IRI Financial Report 2006

Figures from IRS Form 990

Revenue and Expenses: Fiscal Year Ending December 31, 2006

Revenue	
Contributions	\$197,000
Program Services	\$0
Investments	\$0
Special Events	\$19,008
Sales	\$30,070
Other (Memberships)	\$2,840
Total Revenue	\$234,867
Total Expenditures	\$50,332
NET GAIN/LOSS	\$188,849

Balance Sheet: Fiscal Year Ending December 31, 2006

Assets	Jan 1, 2006	Dec 31, 2006
Cash & Equivalent	\$1,237	\$181,163
Land and Buildings	\$0	\$0
Other	\$5,981	\$4,221
Total Assets	\$7,674	\$191,909
Liabilities		
	Jan 1, 2006	Dec 31, 2006
Total Liabilities	\$3,360	\$3,060
FUND BALANCE	\$4,314	\$191,909