

Information document for the general public, scientists, engineers, decision makers, and wealthy and truly benevolent personalities

Presentation of entirely novel and environmentally friendly energy technologies & Funding call for their advancement

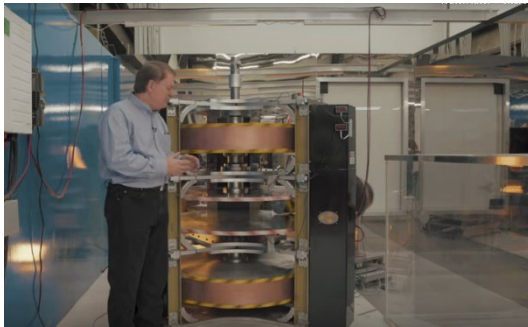


Image from previous website <https://ie.energy>



Image from a screenshot on 21 January 2024 of <https://www.spacefed.com>



Image copied on 10 Sept 2023 from <https://ecatthenewfire.com>



Image from www.borderlands.de/net_pdf/NET0516S6-9.pdf



Image source: Screenshot on 7 April 2023 from the website <https://holcombenergysystems.com>

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<https://novam-research.com>

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This presentation comprises 68 pages, a content overview,
and can be downloaded as pdf via the following link
(file size about 1 MB):

<https://novam-research.com/resources/information-document.pdf>

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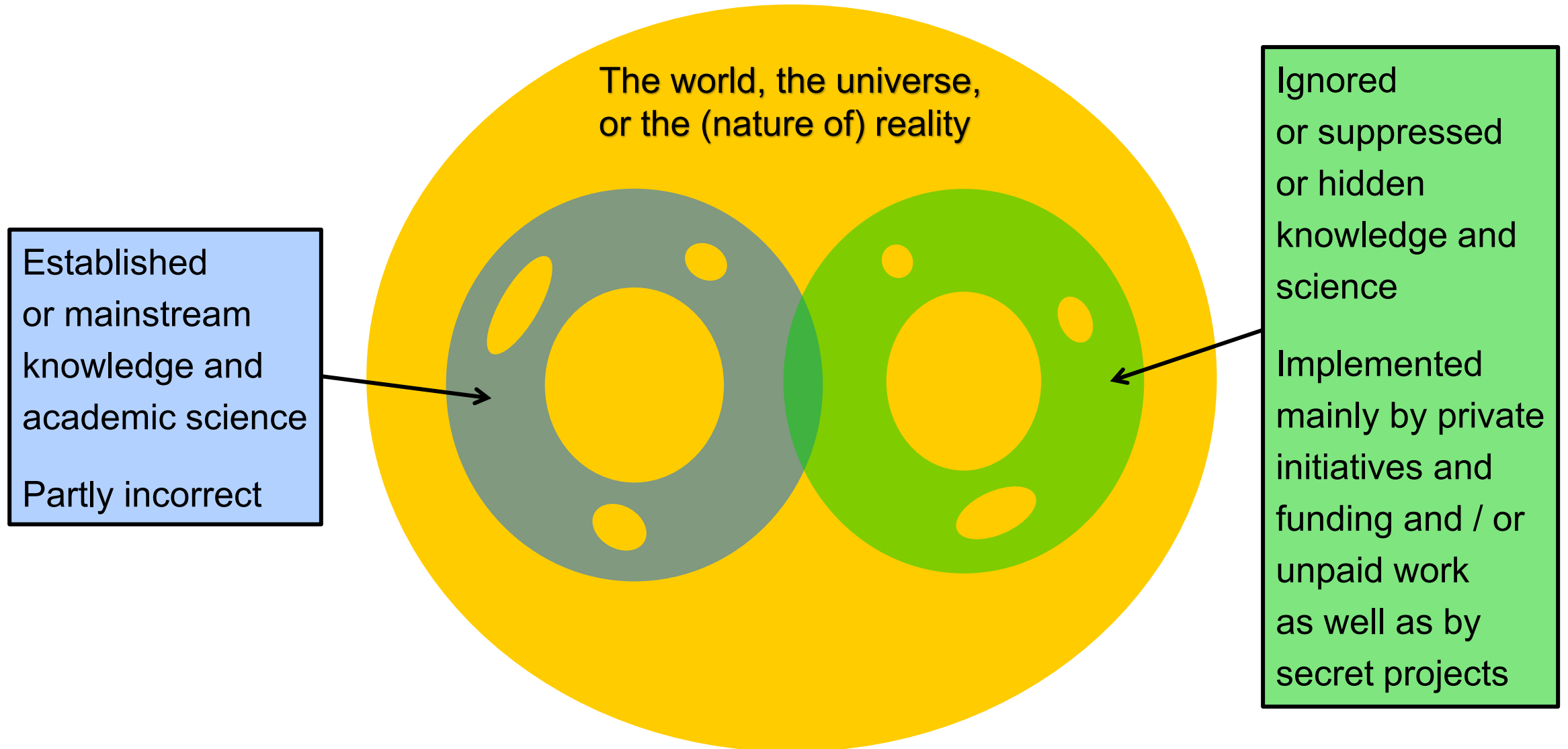
Introduction ...

It has become more and more evident that several non-mainstream scientists, researchers and inventors have achieved significant results which are relevant for an enjoyable evolution of mankind. The frontiers of the established academic science are already crossed and the doors for fundamentally new developments are open, even if this is still little known in public. The situation of knowledge and science is sketched on the following page ...

Introduction

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A sketch of the situation of knowledge and science



There are many remarkable results from non-mainstream science. For example, nowadays we can proceed from the assumption that there are entirely novel and environmentally friendly energy technologies ...

Entirely novel and
environmentally friendly
energy technologies ...

Self-running systems, generators, and power plants

This type of fundamentally new energy technologies does not need anything from the outside and can provide nevertheless permanently usable energy. The existence of these technologies and other considerations indicate that there is a hitherto unexplored form of energy. We can proceed from the assumption that there is everywhere on earth and in the universe an abundant form of energy which is called space energy, vacuum energy, ether energy, or space-time energy. Energy technologies which tap this form of energy do not need any fuels, are emission-free and provide usable energy at any place and time ...

They are able to replace all conventional energy conversion devices like combustion engines, nuclear power plants, wind power, hydroelectric energy, and solar power. The entirely novel energy technologies allow a decentralized and emission-free power supply for dwelling houses, buildings, factories, cities and villages. Thus long transmission lines are not needed anymore and they can be removed from the landscape. Cars, trains, ships, airplanes and space ships, which are equipped with these entirely novel energy or propulsion technologies, do not need any fuels and produce no exhaust gases. Electric trains do not need contact wires anymore ...

The recognition of the existence of these fundamentally new energy technologies and their physical foundations may represent an intellectual or psychological challenge, for laymen as well as for professional scientists and engineers. It represents a paradigm shift in science, technology and consciousness.

To substantiate the statements on this page and the previous pages we present in the following some examples of significant achievements which are emerged from non-mainstream science ...

Entirely novel and
environmentally friendly
energy technologies:
Examples of devices,
systems, and concepts ...

Self-running and zero emission power plants from the company Rosch Innovatons

The company Rosch Innovations (<https://rosch.ag>) has developed so-called kinetic or buoyancy power plants which generate usable electric energy. These self-running and zero-emission power plants consist of a water column which contains a chain drive, fillable containers which are attached at the chain drive, a valve system which can fill the containers with air, an electrically-operated compressor which produces compressed air, a generator, and a control unit. Rosch offers industrial size power plants with an output power of 200 kW - 100 MW. Such a power plant does not yet exist at a publicly known and visitable customer site. However, potential industrial customers or potential licensees can visit and inspect an operating 100 kW and 500 kW power plant, provided that they provide a letter of intent and a proof of funds. The 100 kW and 500 kW power plants are located at a Rosch site in Thailand where they power that site and feed electricity into the grid. An inspection by an engineer team of the potential customer or potential licensee allows a verification of the genuineness of the power plant and rule out possible objections such as a hidden power source. The author of this presentation assumes that these power plants extract via the earth's gravitational field and via the electromagnetic fields within the generator usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy. For further information see the following report:

<https://novam-research.com/rosch-gaia-kinetic-power-plant.php>



Image from
www.borderlands.de/net_pdf/NET0516S6-9.pdf

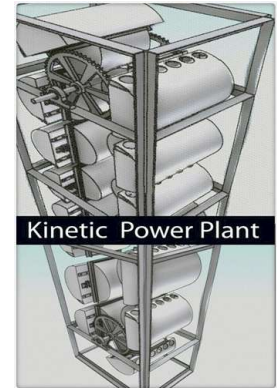


Image from <https://rosch.ag>

Self-running and zero emission magnet motor / generator systems from the company Quantum Energy (Inductance Energy) Corporation

The company Inductance Energy Corporation has developed a magnet motor, called Earth Engine, with a mechanical output power up to 25 + kW which can propel a mechanical device or an alternator with a maximal electrical output power in the range from 7 to 25 kW. To control the magnet motor an electrical input power of about 300 W is required. If the magnet motor propels an alternator, then these about 300 W can be provided by the alternator which results in an overall self-running and zero-emission energy technology. In the United States these systems are already in production and use on a small scale. Various interesting information are presented on pages 25 - 53 in a German-language [slide set](#) (61 pages, 5 MB pdf) from a talk by Adolf Schneider about magnet motors on 3 October 2020 at a conference about novel energy technologies in Germany: Meanwhile the activities of the Inductance Energy Corporation are transferred to the company Quantum Energy Corporation. In their website (<https://qree.energy>) there is under Magnet a webpage called Magnetic Propulsion which is at the beginning of January 2024 still under construction. The former website <https://ie.energy> of the Inductance Energy Corporation is at the beginning of January 2024 still existing but displays no content. The author of this presentation assumes that these systems extract via electromagnetic fields and the spin of the electrons usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy. For further information and references see the home page of <https://novam-research.com>



Image taken on 6 October 2019 from a video in the previous website <https://ie.energy>

Zero emission Holcomb Energy Systems: Power amplifiers and self-running generators without moving parts

Dr. Robert Holcomb and co-workers from the company Holcomb Energy Systems have developed power-magnifying and self-running electromagnetic generators without moving parts. Examples are self-sustaining AC power amplifiers which generate at least a doubled output power with respect to the input power. They are called in-line power generators (ILPGs) and the already existing systems generate an output power in the range from 3 kW to 40 kW. A 100 kW and 1 MW ILPG are under construction. Another example is a self-running or stand-alone generator with an output power of 15 kW. To decouple the AC input of the integrated AC power amplifier from its AC output the self-running 15 kW generator comprises an AC / DC converter, a battery or supercapacitor, and a DC / AC converter. The specified input and / or output power of various Holcomb Energy Systems was confirmed by established certification companies such as SGS. The technology of the Holcomb Energy Systems is protected by several patents and patent applications in many countries. See e.g. [WO2023118149A1](#)

(4 MB pdf) which was published on 29 June 2023 and about it a [paper](#) from Adolf Schneider in German but with many citations in English. The company Astra Energy Inc. promotes the Holcomb Energy Systems and there is an [article in the Financial Times](#) about it which was published on 4 October 2023: The author of this presentation assumes that the Holcomb Energy Systems extract via electromagnetic fields and the spin of the electrons usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy. For further information and references see the company website <https://holcombenergysystems.com> and the homepage of <https://novam-research.com>



Image source: Screenshot on
7 April 2023 from the website
<https://holcombenergysystems.com>

Intermediate comment about the term zero emission and electromagnetic pollution

Most systems presented on the previous and following pages are called zero emission devices.

The term zero emission usually means that the system does not generate exhaust gases, small exhaust particles, nuclear radiation, and radioactive waste.

Usually not considered but nevertheless significant are electromagnetic fields and radiation which are generated by most systems. This is also called electromagnetic pollution or electrosmog which is often harmful for humans and other life forms. Harmful are e.g. wireless communication technologies like 5G, smartphones, WLAN / Wifi, Bluetooth, small battery chargers which convert e.g. 230 V AC into a small DC voltage, power saving lamps, fluorescent tubes, and various kinds of converter such as DC / AC (which are e.g. used at photovoltaic systems), AC / DC, and DC / DC. Such converter are sometimes part of the entirely novel energy technologies.

There are several types of mainly non-mainstream technologies which can neutralize or harmonize the negative biological effects of electromagnetic pollution.

For references and further information see for example

- German company Florian König Enterprises GmbH (also available in English): <https://www.fk-e.de>
- Webpage <https://novam-research.com/electrosmog.php>

The self-running magnet motor of the Turkish inventor Muammer Yildiz comprises a special array of permanent magnets. A self-running prototype was for example presented in the Netherlands at the Eindhoven University of Technology in April 2009 and at the University of Delft in May 2010:

<https://www.youtube.com/watch?v=mHW6b1aFPfU>

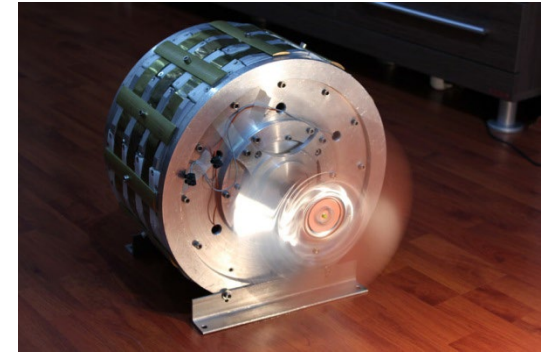


Image:from www.hmsbturk.com

Two papers by Dr. J. L. Duarte from the Department of Electrical Engineering of the Eindhoven University of Technology:

"Introducing the Yildiz Motor" and "Modeling the Yildiz Motor" from 2010 and 2012

https://novam-research.com/resources/Introducing-and-modeling-the-Yildiz-Motor_v01.pdf

The author of this presentation assumes that these magnet motors extract via magnetic fields and the spin of the electrons usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy.

Several attempts to advance this concept towards commercial applications were not successful because discussions between Muammer Yildiz and potential investors did not result in mutual agreements.

For further information and references see the homepage of <https://novam-research.com>

Examples of papers or reports about related magnet motor concepts

German-language report by Adolf Schneider about various magnet motor concepts on pages 35 - 38 in the November / December 2022 issue of the NET-Journal (www.borderlands.de/inet.jrnl.php3) (ISSN 1420-9292) (in German)

Paper “Essay on Magnetic-Wind Mills - Part 1: Analysis and Design* from 2019 by Dr. J. L. Duarte from the Department of Electrical Engineering of the Eindhoven University of Technology: <https://doi.org/10.6100/94FC4756-AC0A-4A9C-A1DD-58530E694BB8> . “Part 2: Staying Power from Spacetime” from 15 Nov 2022, can be downloaded via the following link: https://novam-research.com/resources/Essay-on-Magnetic-Wind-Mills_Part2_J-L-Duarte_v4_15-Nov-2022.pdf

Design and Simulation of Self-Running Magnetic Motor from 2017 by Abdul Halim Ali and Ahmad Najmuddin Che Ismail <https://www.researchgate.net/publication/335257538> . Or download it as pdf via the following link: https://novam-research.com/resources/Design-and-Simulation-of-Self-Running-Magnetic-Motor_A-H-Ali-and-A-N-C-Ismail_2017.pdf

Design and Simulation of Free Energy Permanent Magnet Motor (FEPMM) from 2016 by Amel Ridha: <https://www.researchgate.net/publication/307513635>

The following paper from 2015 presents in its introduction various types of magnet motors and reports about an own concept: Design of open source straight permanent magnet motor, Amel Ridha and Haider H. Jabbe, Kufa Journal of Engineering, Volume 6 (2015), pages 24 - 38: <https://doi.org/10.30572/2018/KJE/621146> . Also published via <https://www.researchgate.net/publication/307513641>

A review on how a Perpetual Motion Machine generates electrical power, M. N. Hidayat, S. P. Chairandy, and F. Ronilaya IOP Conference Series: Materials Science and Engineering 1098 (2021) 042063 <https://doi.org/10.1088/1757-899X/1098/4/042063>

Self-running and zero emission cryogenic magnet motor of Walter Thurner

The cryogenic magnet motor of the German engineer and inventor Walter Thurner is a nice example of a self-running system because its operation principle is published and comprehensible at the macroscopic scale. It can be understood just by considering the acting forces which operate in its design. The author of this presentation assumes that this magnet motor extracts at the microscopic scale via magnetic fields usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy. The magnet motor of Walter Thurner is described in the **appendix**. It is called cryogenic magnet motor because its design comprises besides permanent magnets also superconductors which have to be cooled with liquid nitrogen. Walter Thurner died on 12 February 2021.



Images from

https://novam-research.com/resources/Walter-Thurner_Kryo-Magnet-Motor.pdf



Reactionless electromagnetic generator of Paramahansa Tewari

The Indian engineer and researcher Paramahansa Tewari has developed a reactionless electromagnetic generator, the Space Vortex Theory, and has written several papers and books.

Website about him and his work: <https://www.tewari.org>

Paramahansa Tewari passed away on 27 November 2017 in India.

An obituary is published in <https://www.tewari.org>

and by the Austrian association GAIA:

<https://gaia-energy.org/obituary-paramahansa-tewari/#more-110681>

So far a generator with 1,7 kW input power and 4,4 kW output power was constructed and tested (3 phase 220 V AC, 50 Hz). The next intended step was the development of a self-running 10 kW or 15 kW generator and / or a commercial 50 kW machine starting with 250 % efficiency.

Presentation from Paramahansa Tewari and Toby Grotz, lectured by Toby Grotz in 2016 in Germany (file size 4 MB pdf): https://novam-research.com/resources/Tewari-generator_Physics_Teslas-prophecy_P-Tewari-and-T-Grotz_2016_v2.pdf

The author of this presentation assumes that the Tewari generators extract via electromagnetic fields usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy. For further information, references, and links see <https://novam-research.com/tewari.php>



Image from <https://www.tewari.org>

EBM (Energy by Motion) – Self-running and zero emission generators of L. I. Szabo 1 / 2

Note in advance: After December 2017 the EBM website <https://www.gammamanager.com> was no longer available and in January 2024 it was noticed it is online again but it is not known since when.

In the period from 1980 to 2005 overall 108 different generators with an unconventional design were constructed and tested (see also [page 57](#)). Finally it was discovered that a specific type of design resulted in an electric plus thermal output power which was larger than the electric input power.

A scaling law was found which predicts the ratio

electric output power / electric input power versus the size of the generator.

That scaling law indicated that self-running systems were only possible for big and heavy machines with an output power in the MW range. Then it was

intended to establish - together with customers - such self-running industrial size generators.

In February 2007 the author of this presentation was a member of a group who visited for 2 days the main inventor of this technology, Leslie I. Szabo, at his laboratory and company in Budapest in Hungary. There several models of generators were available but no self-running system. The author of this presentation got the impression that the research and development, the testing of the generators, and the obtained scaling law are sound and genuine. At the same time the author of this presentation got in Budapest in February 2007 and in the following years the impression that the overall project should have been communicated in another way. Potential customers wanted to see a self-running generator before they finance or co-fund a self-running power plant in the MW range.



Image from previous website
gammamanager.com

EBM (Energy by Motion) – Self-running and zero emission generators of L. I. Szabo 2 / 2

Later (concepts for) smaller self-running generators were developed. In the previous content of the EBM website self-running generators with an output power from 50 kW to 20 MW were offered and it was mentioned that smaller / larger systems down to 2 kW / up to 75 MW are under development. In January 2024 EBM units with a projected size from 25 kW to 1 MW are specified in the EBM website. The author of this presentation assumes that the EBM generators extract via electromagnetic fields usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy.



Image from previous website
gammamanager.com

For references and further information see <https://gammamanager.com> and

- Report on pages 4 - 14 in the issue January / February 2007 of the NET-Journal (in German): www.borderlands.de/net_pdf/NET0107S4-14.pdf
- Report in German on pages 25 and 26 in the issue November / December 2009 of the German-language NET-Journal (www.borderlands.de/inet.jrnl.php3) (ISSN 1420-9292)
- Abstract of a talk by Leslie Szabo at the congress “Neue Technologien im Einsatz“ in November 2009 (in German): <https://novam-research.com/resources/EBM2.pdf>
- Report in German on pages 23 and 24 in the issue March / April 2010 of the NET-Journal
- The EBM website gammamanager.com is cited in the following paper: www.aias.us/documents/miscellaneous/SpaceEnergy.pdf

ECAT - Self-running and zero emission electricity generators

The so-called ECAT technology provides large amounts of thermal and / or electrical energy from very small amounts of hydrogen and nickel. The electrical power which is required to control an ECAT system is much less than the generated output power. Until 2020 the development and testing of heat generators and heat-generating power plants was the main focus. Meanwhile there is another intended and pre-orderable ECAT product, namely a small self-running electricity generator which is called Ecat SKLep NGU 100 W with an output power (voltage) of 100 W (12 V DC) and an expected operational lifetime of 11 years. Also intended and pre-orderable are even smaller 10 W generators as well as much larger 1 MW power plants which are based on the small 100 W units. The ECAT technology was / is considered as a LENR-based technology. LENR stands for Low Energy Nuclear Reactions which usually imply no harmful and radioactive byproducts. Meanwhile a paper by Andrea Rossi considers the underlying physics in terms of dense electron clusters, electron-proton aggregates at picometer scale, and their formation via vacuum polarization and zero point energy, see <https://dx.doi.org/10.13140/RG.2.2.28382.48966/11> . For further information see the official ECAT website <https://ecatthenewfire.com> , the website <https://e-catworld.com> , and the report <https://novam-research.com/ecat.php>

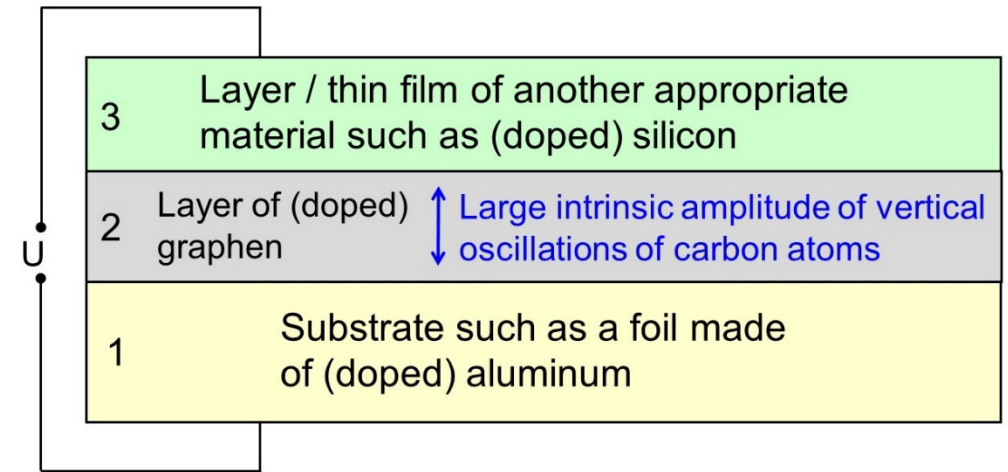


Image copied on 10 September 2023
from <https://ecatthenewfire.com>

So-called neutrino voltaic - Self-running and zero emission electricity generators

The foundation of the so-called neutrino voltaic is a special physical phenomenon which is observed by several researchers and inventors, namely that a proper metal foil with an appropriate coating generates a small and permanent DC voltage and power. The company Neutrino (<https://neutrino-energy.com>) is focussed on the research, development, and

advancement of the sketched arrangement of materials. The currently achieved power density of such coated foils is 50 W per square meter and several of them can be stacked. The company Neutrino and their partners are working on the development of a self-running and zero emission propulsion for electric cars and self-running and zero emission electrical generators which can power a home for example. The author of this presentation assumes that neutrinos do not play a role in the underlying (and still unknown) physics how the electricity is generated. Instead he assumes that the sketched arrangement of materials extracts usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy. For further information see the report <https://novam-research.com/neutrino-inc.php>



Self-running and zero emission electricity generators based on autonomous hydraulic oscillations

This self-running and zero emission energy technology is based on specific type of constructions which are operated with water or another fluid, or under water, or under a high internal water / fluid and gas pressure. These systems are also called self-running ram pumps and generate usable mechanical, electric and / or thermal energy via autonomous hydraulic oscillations. The self-running ram pumps mentioned here were constructed and advanced by the Russian inventor Dr. V. Marukhin and his co-workers. There are various kinds of constructions and sizes. For example, a steel tube design with a height and diameter of 42 cm and 15 cm that is operated with an internal fluid and gas pressure and oscillation frequency of about 3000 bar and 3000 Hz, respectively, generates a permanent electric output power up to 1 MW. The mechanical energy of the hydraulic water / fluid and gas oscillations is converted into electric energy by piezoelectric transducers. The transformation of the generated DC electricity into a convenient form of AC electricity requires a DC / DC and a DC / AC converter. The author of this presentation assumes that these generators extract via the earth's gravitational field and / or the electromagnetic fields in and between the fluid / gas / steel atoms usable energy from an everywhere present form of energy which is called space energy, vacuum energy, or ether energy. These types of generators are already in use at some undisclosed industrial customers. Demonstration generators which can be viewed and inspected on request do so far not exist and attempts to make such devices available are stuck because of the imposed sanctions against Russia. For further information see



Image from Ref. 1

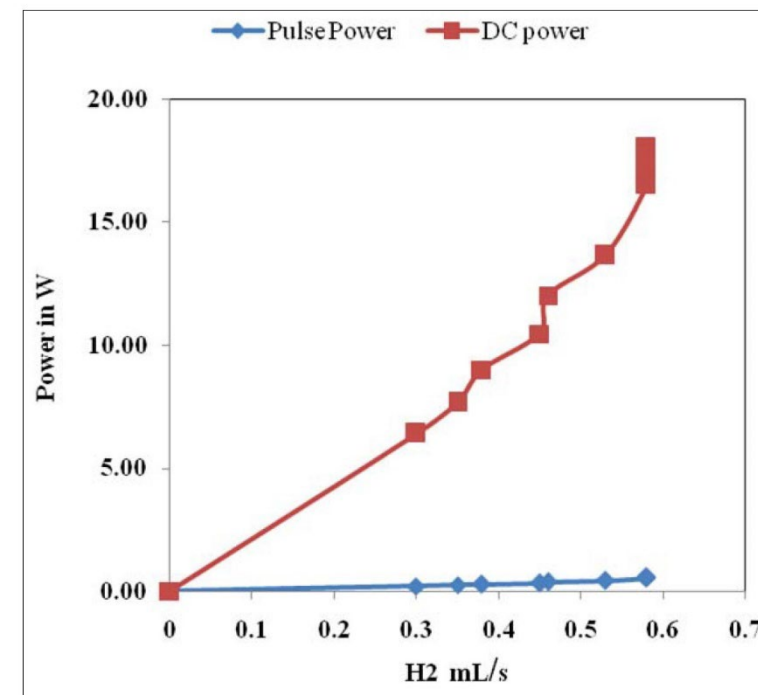
[1] Presentation by Adolf Schneider from May 2021 (40 pages, 3 MB pdf):

https://novam-research.com/resources/HEG-Presentation-English_May-2021.pdf

[2] Report <https://novam-research.com/ram-pumps.php>

Water splitting by pulsed electrolysis 1 / 3

In established physics / chemistry / science it is assumed that the modulus of the energy which is required to split a water molecule (electrolytically) into hydrogen and oxygen is always equal to the modulus of the energy which is released when hydrogen and oxygen recombine into a water molecule. This is because the two hydrogen atoms and the one oxygen atom in a water molecule are bound together by electric or electromagnetic forces which are considered as so-called conservative force fields, i.e. a closed loop motion of a particle in such a force field can never result in a gain of usable energy. However, many researchers and inventors have claimed that under specific conditions it is possible to split water into hydrogen and oxygen with much less energy than usual. In this case usable energy can be generated when the created hydrogen and oxygen recombine into water with a release of the usual amount of energy.



This figure displays the effect of a conventional DC electrolysis and a pulsed electrolysis on the hydrogen production rate.

Image source: Figure 6 in a paper by C. H. Dharmaraj and S. AdishKumar, International Journal of Energy and Environment 3 (2012) 129 - 136

Water splitting by pulsed electrolysis 2 / 3

The following work is a published example how water can be split into hydrogen and oxygen with much less energy than usual, namely by a special pulsed electrolysis:

Economical hydrogen production by electrolysis using nano pulsed DC

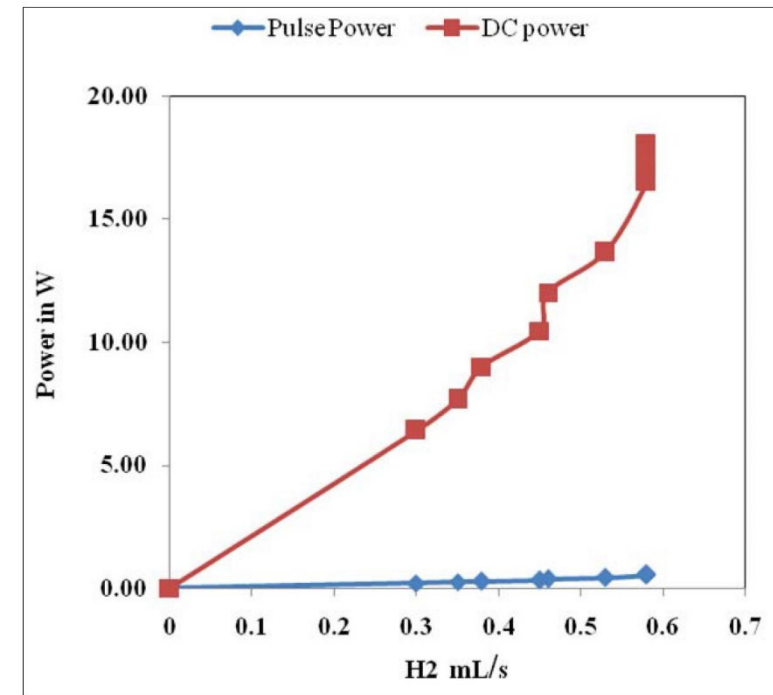
C. H. Dharmaraj and S. AdishKumar

International Journal of Energy and Environment 3 (2012)
129 - 136

www.ijee.ieefoundation.org/vol3/issue1/IJEE_13_v3n1.pdf

or

https://novam-research.com/resources/Water-splitting-by-pulsed-electrolysis_2012.pdf

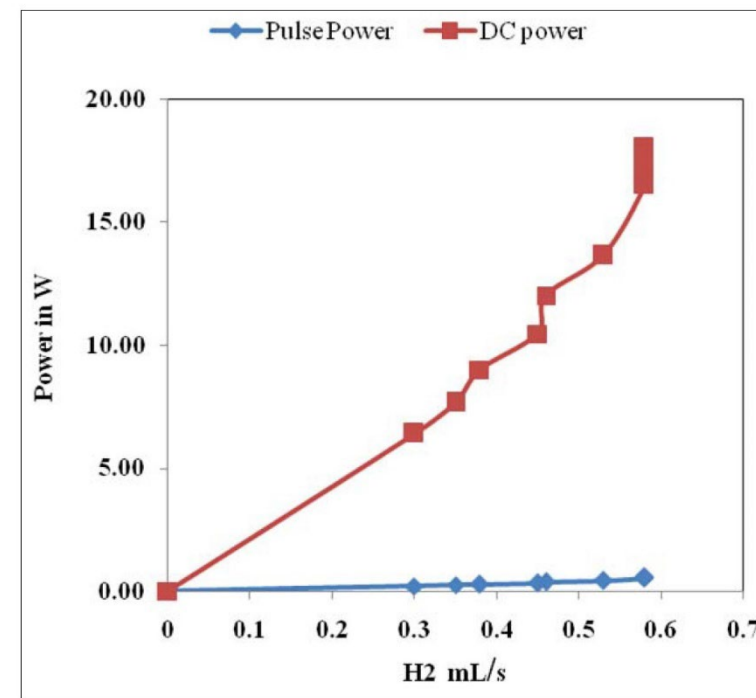


This figure displays the effect of a conventional DC electrolysis and a pulsed electrolysis on the hydrogen production rate.

Image source: Figure 6 in a paper by C. H. Dharmaraj and S. AdishKumar, International Journal of Energy and Environment 3 (2012) 129 - 136

Water splitting by pulsed electrolysis 3 / 3

The authors of this paper have not discussed the potential physics behind this remarkable phenomenon. The author of this website assumes that any physical process can be performed / modified / designed in such a way that it taps an everywhere present and hitherto unexplored energy source which is called space energy, vacuum energy, or ether energy. From this perspective it is assumed that a specifically pulsed electrolysis results somehow in an assisted water splitting where a large part of the required splitting energy is provided by an usable inflow of space / vacuum / ether energy.



This figure displays the effect of a conventional DC electrolysis and a pulsed electrolysis on the hydrogen production rate.

Image source: Figure 6 in a paper by C. H. Dharmaraj and S. AdishKumar, International Journal of Energy and Environment 3 (2012) 129 - 136

Patent DE3501076A1 from 1986 by Dr. Wolfgang Volkrodt: Energy converter having a magnetic-core intermediate store

1 / 2

See e.g. <https://patents.google.com/patent/DE3501076A1/en>

Original German-language patent specification including figures:
<https://novam-research.com/resources/Patent-DE3501076A1.pdf>

According to the description the energy which is stored in a ferromagnetic material after its magnetization is significantly larger than the energy which is necessary to magnetize the ferromagnetic material, at least under certain conditions. This phenomenon can be used to construct an electromagnetic device which provides at its output an amount of usable electric energy or power which is significantly larger than the energy or power which is fed into its input.

Citations from the patent specification (Note from the author of this website: The text in the patent specification is a translation from German into English and there are sometimes translation errors) ...

Patent DE3501076A1 from 1986 by Dr. Wolfgang Volkrodt:
Energy converter having a magnetic-core intermediate store

2 / 2

" ... Let us briefly summarize the current state of knowledge: The necessary energy to magnetize or reverse magnetize a magnetic core store is considerably smaller than the energy content that can be measured afterwards in the permanent magnet ... Those to be expected according to previous theories of energy technology Alternating hysteresis losses are a multiple of what is actually required for reversal of magnetization supplied electrical energy. The theory does not agree with either the law of conservation of energy still match experimental experience ...

... Up to now, conventional physics has only known the real components of electricity, magnetism and gravity. In order to interactions between the aforementioned quantities To be able to describe it in terms of vibrations and eddies, however, is more complex Sizes. According to more recent theories, imaginary quantities must also be in our space as are assumed to be present, from which, under certain conditions, a transformation is possible in forms of energy known to us ...

... According to the above hyperenergy theory, one understands by ferromagnetism the alignment of unpaired electrons (they are small hyperspace vortices) around it to establish the resulting magnetic vector field ...

... Apparatus and machines that use hyperspace as an energy source use are not perpetual motion machines, but rather energy converters in the conventional sense ..."

International Space Federation (ISF)

Website <https://www.spacefed.com>

YouTube Channel

<https://www.youtube.com/@intlspacefed>

Swiss corporation with headquarters in Geneva and laboratories in France

Research and development in the field of (quantum) vacuum, gravity and unified physics which also includes entirely novel and environmentally friendly energy technologies. Research director is Nassim Hamein

Significant paper "The Origin of Mass and the Nature of Gravity" by Nassim Hamein, Cyprien Guernonprez, and Olivier Alirol - published on 26 September 2023 via zenodo.org:
<https://doi.org/10.5281/zenodo.10125315>

The ISF did arise from a previous history comprising 30 years research, publications, and designs as well as the Resonance Science Foundation, education, and a few related smaller companies

Possibility to invest into the ISF / support the ISF via a participatory perpetual bond. The ISF issues in two stages maximal 200 Million notes denominated at 1 CHF per note. The minimum investment is 1000 CHF



Image from a screenshot on 21 January 2024
of <https://www.spacefed.com>

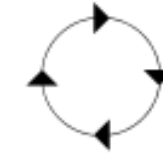
ECE Theory and the Alpha Institute for Advanced Studies (AIAS)

The AIAS is an affiliation of several physicists who have created a large number of papers and books about the so-called ECE Theory which provides evidence for energy technologies which extract usable energy from space-time. The ECE Theory and the AIAS was established by the British Civil List physicist Prof. M. W. Evans. The ECE Theory represents an unified field theory which was and is advanced by him and other scientists on a mainly voluntary basis. Among others, the ECE Theory implies

- that gravitation is related to the curvature of space-time
- that electromagnetism is related to the torsion of space-time
- a coupling between gravitation and electromagnetism
- an extended or advanced electrodynamics which involves the possibility to extract usable energy from space-time

For further information see

- an introduction into the ECE Theory H. Eckardt and L. G. Felker:
www.aias.us/documents/eceArticle/ECE-Article_EN.pdf
- Paper “How Do Space Energy Devices Work” by Dr. Horst Eckardt:
www.aias.us/documents/miscellaneous/SpaceEnergy.pdf
- the official AIAS website www.aias.us



$$R q_{\mu}^a = -k T q_{\mu}^a$$

Evans Field Equation

Images from
www.aias.us

**Physical concepts for entirely novel energy technologies: Examples of papers
which are published with a doi address in established physics journals,
an academic institution, or Research Gate, or zenodo.org**

1 / 4

Classical Electrodynamics without the Lorentz Condition: Extracting Energy from the Vacuum

P. K. Anastasovski et al., Physica Scripta 61 (2000) 513 - 517

<https://doi.org/10.1238/Physica.Regular.061a00513>

Published also via www.aias.us/documents/mwe/omniaOpera/omnia-opera-563.pdf

Extracting Energy and Heat from the Vacuum

D. C. Cole and H. E. Puthoff, Physical Review E 48 (1993) 1562 - 1565

<https://doi.org/10.1103/PhysRevE.48.1562>

Published also via www.earthtech.org/publications/PREv48_1562.pdf

Increased voltage phenomenon in a resonance circuit with unconventional magnetic configuration

Osamu Ide, Journal of Applied Physics 77 (1995) 6015 - 6020 <https://doi.org/10.1063/1.359520>

Published also via www.intalek.com/Index/Projects/Research/jap77.pdf

A review on how a Perpetual Motion Machine generates electrical power

M. N. Hidayat, S. P. Chairandy, and F. Ronilaya

IOP Conference Series: Materials Science and Engineering 1098 (2021) 042063 (1 - 7)

<https://doi.org/10.1088/1757-899X/1098/4/042063>

Physical concepts for entirely novel energy technologies: Examples of papers which are published with a doi address in established physics journals, an academic institution, or Research Gate, or zenodo.org

2 / 4

Measurement of Impulsive Thrust from a Closed Radio-Frequency Cavity in Vacuum

H. White et al., Journal of Propulsion and Power 33 (2017) 830 - 841

<https://doi.org/10.2514/1.B36120>

Citation from page 840: "... This suggests that the idea of treating the quantum vacuum as a dynamic medium capable of supporting oscillations might be valid. If a medium is capable of supporting acoustic oscillations, this means that the internal constituents were capable of interacting and exchanging momentum. If the vacuum is indeed mutable and degradable as was explored, then it might be possible to do / extract work on / from the vacuum, and thereby be possible to push off of the quantum vacuum and preserve the laws of conservation of energy and conservation of momentum ..."

Explanation of the motionless electromagnetic generator with $O(3)$ electrodynamics

P. K. Anastasovski, T. E. Bearden et al. , Foundation of Physics Letters 14 (2001) 87 - 94

<https://doi.org/10.1023/A:1012085429802>

Physical concepts for entirely novel energy technologies: Examples of papers which are published with a doi address in established physics journals, an academic institution, or Research Gate, or zenodo.org

3 / 4

This paper presents in its introduction various types of magnet motors and reports about an own concept. Design of open source straight permanent magnet motor, Amel Ridha and Haider H. Jabbe Kufa Journal of Engineering, Volume 6 (2015), pages 24 - 38

<https://doi.org/10.30572/2018/KJE/621146>

Paper about a discussion of the calculation of magnetic fields of permanent magnets and arrangements of permanent magnets which lead to a self-running motion.

Essay on Magnetic-Wind Mills - Part 1: Analysis and Design, J. L. Duarte (2019)

<https://doi.org/10.6100/94FC4756-AC0A-4A9C-A1DD-58530E694BB8>

This paper presents some physical concepts or models which allow the overcoming of the Coulomb repulsion of the electrons when atoms such as hydrogen H (1) and nickel Ni (28) merge to copper Cu (29) by Low Energy Nuclear Reactions (LENR). The paper refers to the so-called ECAT technology (device type E-Cat SK) which generates large amounts of thermal and / or electrical energy from very small amounts of hydrogen and nickel.

E-Cat SK and long-range particle interactions, Andrea Rossi (2019) (last update 21 October 2022)

<https://dx.doi.org/10.13140/RG.2.2.28382.48966/11>

Physical concepts for entirely novel energy technologies: Examples of papers which are published with a doi address in established physics journals, an academic institution, or Research Gate, or zenodo.org

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Significant paper about the physics of the (quantum) vacuum and its title speaks for itself

The Origin of Mass and the Nature of Gravity

Nassim Hamein, Cyprien Guernonprez, and Olivier Alirol

Published on 26 September 2023 via zenodo.org

<https://doi.org/10.5281/zenodo.10125315>

Are entirely novel energy technologies and self-running systems really genuine and why does it take so long to make them tangible and commercially available ? ...

Are entirely novel energy technologies and self-running systems really genuine ?

Some are really genuine and some are not. The author of this presentation assumes to the best of his knowledge and belief that the previously presented systems are real.

In case of systems which are not really genuine there are two cases:

- Fraud – i.e. the communicated or presented specifications of the system were never achieved and are intentionally wrong
- The researchers / developers / inventors were convinced that the created system is really working, e.g. because the measured electric output power is larger than the electric input power. Later it was revealed that this was a fallacy and the previous conclusion had to be withdrawn, e.g. because the power measurement was not correct

Often it requires intuition, an ability to discriminate, or a careful and time-consuming inspection in order to decide if a system works really as specified or assumed.

Why does it take so long to make entirely novel energy technologies and self-running systems tangible and commercially available ?

1 / 2

Examples of reasons why it takes so long or longer than expected

- The number of people who are aware of / work in the area of / support / believe in these technologies is still relatively small - but constantly growing
- Lack of appropriate or continuous support and funding and no official teaching in schools, universities, and other academic institutions
- Specific lobbies and the global political power structure have suppressed the emergence of these technologies
- Disagreement between researchers / inventors and investors
- Sometimes inventors do not want to spread their invention (for various reasons) or have unrealistic financial expectations
- Inappropriate communication of the invention or project

Why does it take so long to make entirely novel energy technologies and self-running systems tangible and commercially available ?

2 / 2

Another examples of reasons why it takes so long or longer than expected

- The time needed for
 - research and development
 - the development of a prototype which is suitable for serial production
 - establishing a serial productionis often underestimated
- Long-term performance and safety tests may reveal some issues which require some modifications of the system or even may reveal its non-suitability for commercial applications
- In several cases the customer, facility, or company where an entirely novel energy technology is installed does not communicate that publicly (for various reasons)
- In several cases the customer does not want to purchase but wants to lease a power plant. Then it has to be discussed if the manufacturer is willing and able to establish such an option

About the potential physics
behind entirely novel
energy technologies and
self-running systems ...

About the potential physics behind entirely novel energy technologies and self-running systems

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Maybe the following model considerations are helpful to gain a better understanding of this type of entirely novel energy technologies.

We assume that the so-called empty space or vacuum is by no means empty but comprises a huge amount of energy and potentialities. It should be noted that all manifestations of matter, such as the earth or the human body, consists more than 99,9 % of vacuum. This because the atoms, the building blocks of all material manifestations, are constituted more than 99,9 % of vacuum. The building blocks of the atoms are particles which are called electrons, protons and neutrons, but they occupy only less than 0,1 % of the atomic volume ...

About the potential physics behind entirely novel energy technologies and self-running systems

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The features and true nature of the so-called empty space, vacuum, or space-time are mainly unexplored by mainstream science. Nevertheless, it seems to be the very basis, source, root, substratum or medium on which our universe or world depends. This substratum or medium was / is also called ether. Let`s assume that the energy content of the space / vacuum / ether / space-time is incredible large and that the energy needs of mankind is tiny compared to that.

Let`s suppose that all particles and thus all atoms and manifestations of matter arise from the space / vacuum / ether, i.e. they are special oscillation, resonance, or vortex states of the space / vacuum / ether [1] ...

[1] See for example

- the Space Vortex Theory of Paramahansa Tewari, see [pages 23 and 50](#)
- statements of Noberto Keppe, see [page 51](#)
- papers by Paul A. LaViolette about subquantum kinetics such as <https://doi.org/10.1080/03081070802367457> which is also published via www.starburstfound.org/downloads/physics/nucleon.pdf
- Global Scaling, see <https://novam-research.com/global-scaling.php>
- paper “The Origin of Mass and the Nature of Gravity” by Nassim Hamein, Cyprien Gueronprez, and Olivier Alirol, published on 26 September 2023 via zenodo.org: <https://doi.org/10.5281/zenodo.10125315>

About the potential physics behind entirely novel energy technologies and self-running systems

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Then all material manifestations such as technical devices are intimately interwoven with the space / vacuum / ether / space-time. Also conventional energy technologies are devices which are intimately interwoven with the space / vacuum / ether / space-time but in total they do not extract usable energy from it. In total they convert the energy of a supplied fuel (matter, kinetic energy of moving matter, or radiation) into another form of energy.

However, under special conditions, which are realized in some unconventional devices, it is possible to convert or extract usable energy from the space / vacuum / ether / space-time. In this case the supply of any fuel is not needed anymore ...

About the potential physics behind entirely novel energy technologies and self-running systems

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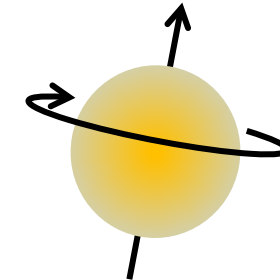
Many or perhaps all physical processes which usually imply in total no gain of energy can be designed or modified in such a way that they provide usable energy from the space / vacuum / ether / space-time. Examples of such physical processes are the mutual motion of magnets or magnetic fields, oscillating and rotating mechanical movements of masses within the earth's gravitational field, the splitting of water H_2O into hydrogen H_2 and oxygen O_2 and their recombination into water H_2O , and the splitting of hydrogen molecules H_2 into hydrogen atoms H and their recombination into molecular hydrogen H_2 . For these examples and other physical processes we assume that usable energy can be extracted from the space / vacuum / ether / space-time via magnetic, electromagnetic, electric, and / or gravitational fields but not from the fields. In established physics the gravitational, electric, electromagnetic, and magnetic fields are termed as so-called conservative force fields, i.e. a motion in a closed loop does not lead to a gain of energy. An unconventional device which extracts usable energy from the space / vacuum / ether / space-time can be considered as a system which implies a closed-loop motion in a non-conservative force field.

About the potential physics behind entirely novel energy technologies and self-running systems

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Perhaps the intrinsic angular momentum or spin of particles such as the electron plays an important role at the extraction of usable energy from the space / vacuum / ether / space-time. Possibly the space / vacuum / ether / space-time itself comprises an intrinsic angular momentum, torque, or spin so that the spin of particles such as the electron is driven by or associated with the spin of the space / vacuum / ether / space-time [2].

Also the so-called ECE Theory [3] implies something like that. It is called torsion of space-time and predicts the possibility of extracting usable energy from space-time ...



[2] See, for example, the following video from The Resonance Science Foundation / Nassim Hamein
https://www.youtube.com/watch?v=QJOBnoqk_0Q

and the following paper from Nassim Hamein and Elizabeth A. Rauscher

<https://www.scribd.com/document/38637585/Nassim-Hamein-The-origin-of-spin>

[3] www.aias.us , see also **page 35**

About the potential physics behind entirely novel energy technologies and self-running systems

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The previous considerations are, for example, supported by Paramahansa Tewari and his Space Vortex Theory (see also [page 23](#)). The following statements are cited from <https://www.tewari.org>

“A century from now, it will be well known that: the vacuum of space which fills the universe is itself the real substratum of the universe; vacuum in a circulating state becomes matter; the electron is the fundamental particle of matter and is a vortex of vacuum with a vacuum-less void at the center and it is dynamically stable; the speed of light relative to vacuum is the maximum speed that nature has provided and is an inherent property of the vacuum; vacuum is a subtle fluid unknown in material media; vacuum is mass-less, continuous, non viscous, and incompressible and is responsible for all the properties of matter; and that vacuum has always existed and will exist forever.

Then scientists, engineers and philosophers will bend their heads in shame knowing that modern science ignored the vacuum in our chase to discover reality for more than a century.”

Paramahansa Tewari

Note: The author of this presentation does not agree with the statement that the speed of light relative to vacuum is the maximum speed that nature has provided

About the potential physics behind entirely novel energy technologies and self-running systems

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Another supporting statements and related considerations are the following, cited from the concepts or new physics of Dr. Noberto R. Keppe, see <https://keppemotor.com> and <https://novam-research.com/keppe.php>

In N. R. Keppe's terminology the space energy is called Essential Energy. It is an organizing energy which forms and keeps the universe on all levels and is constituted of two components, attraction and repulsion. According to N. R. Keppe, energy does not come from matter, the process is actually the opposite, meaning that matter comes from the Essential Energy which is infinite and exists everywhere in the entire universe. Matter is created by a resonance of space energy and atoms are considered as vortices. If electricity is generated by conventional technologies, then this corresponds only to one component of the Essential Energy. This is the cause of the low efficiency and heat losses (entropy) in conventional electric systems. From the perspective of the Essential Energy the common AC current does not represent a real alternating current. Both AC and DC correspond only to one direction or component of the Essential Energy. The "real" AC current is found in a pulsed DC current which comprises two components of the Essential Energy, namely action and complementation (instead of action and reaction).

The concepts of N. R. Keppe lead to the development of a novel, highly efficient, relatively cool running, and brushless electric motor. This so-called Keppe Motor is used in some commercially available fans and has received several awards.

About the potential physics behind entirely novel energy technologies and self-running systems

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So far we have considered the hypothesis that self-running systems are based on an extraction of usable energy from an assumed and everywhere present form of energy which is called space energy, vacuum energy, ether energy, or space-time energy. Researchers, scientists, and authors often use also the term “zero point energy”. The terms “vacuum energy” and “zero point energy” are also known and used in established physics. However, in this presentation the terms “space / vacuum / ether / space-time energy” mean or imply much more than the terms “vacuum / zero point energy” in established science, see for example the considerations on the previous pages. Of course, much more research is necessary to clarify the many open questions in this field.

It is also conceivable that self-running systems are based on a hypothetical internal process that converts matter into energy according to the Einstein's mass-energy equivalence $E = m c^2$. However, the author of this presentation considers this scenario as less likely.

Entirely novel and environmentally friendly energy technologies

Subpages of novam-research.com with links to further information:

- Papers, books, and concepts
- Associations, institutes, foundations, individuals, specific devices, and projects
- Companies with various technologies and concepts ...

Entirely novel and environmentally friendly energy technologies

Subpages of novam-research.com with links to further information:

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Associations, institutes, foundations, individuals, specific devices, and projects:

<https://novam-research.com/energy2.php>

Companies with various technologies and concepts:

<https://novam-research.com/energy3.php>

See also the home page of <https://novam-research.com>

Funding call for the advancement of entirely novel and environmentally friendly energy technologies and other topics, concepts, and results of non-mainstream science ...

Funding call for the advancement of entirely novel and environmentally friendly energy technologies and other topics, concepts, and results of non-mainstream science

1 / 2

The topics and results presented in this document and <https://novam-research.com> embody the beginning of a new era in science and technology. To make the entire potential of these little-known areas beneficial for all of humanity, more

- research, development, and manufacturing
- advancement
- education

is required. Until now there is no appropriate support in this field. Furthermore it is desirable

- to support also some existing technologies and initiatives and their advancement
- to make already available technologies tangible. For example, a self-running and zero emission 200 kW power plant from the company Rosch Innovations (see **page 16**) should be purchased, paid, and installed at a location / customer where it can be visited and inspected by others and where the generated electricity can be used

Funding call for the advancement of entirely novel and environmentally friendly energy technologies and other topics, concepts, and results of non-mainstream science

2 / 2

For the aims, intentions, and tasks which are described on the previous page any amount of donation / funding is useful. However, to create a significant impact an amount of the order of several 100 Million EUR / CHF / USD seems to be reasonable for the start-up and the first few years.

For comparison:

- 400 Million USD were spent over 20 years for research and development to create and test unconventional electromagnetic generators. This project was directed by Leslie I. Szabo and lead to a novel energy technology called EBM, see pages **24 and 25**
- The Perimeter Institute for Theoretical Physics was founded in 2000 by a donation of 100 Million CAD from Mike Lazaridis. In 2008 he added a further donation of 50 Million Canadian Dollar.

For further information see <https://perimeterinstitute.ca>

Also bestowals of non-monetary things such as properties and buildings are welcome and useful.

Acknowledgement
&
About the author
&
Closing Words ...

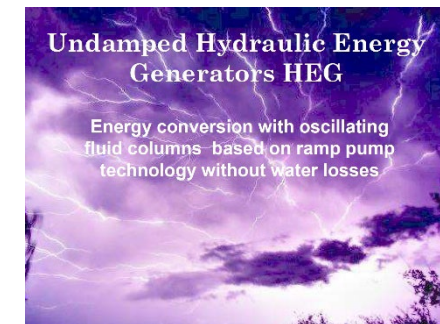
Acknowledgement

The author of this presentation thanks Adolf Schneider and Inge Schneider from the

- [Swiss Association for Space Energy](#) (SVR) (in German)
 - German-language journal [NET-Journal](#) (ISSN 1420-9292)
 - publisher [Jupiter-Verlag](#) (in German)
 - German-language website [Borderlands of Science](#)
- for
- their relentless work in the area of entirely novel and environmentally friendly energy technologies and related topics
 - the organization and implementation of many conferences, events, and meetings
 - the publishing of the German-language journal [NET-Journal](#) (ISSN 1420-9292)
 - many talks, reports, presentations, and papers
 - several private communications and discussions



April 2016: Inge Schneider and Adolf Schneider in front of a self-running and zero emission 60 kW power plant / pilot plant at the company Rosch Innovations in Germany. Image from www.borderlands.de/net_pdf/NET0516S6-9.pdf



[Presentation](#) (40 pages, 3 MB pdf) from May 2021 by Adolf Schneider about ram pumps and generators based on self-running hydraulic oscillations

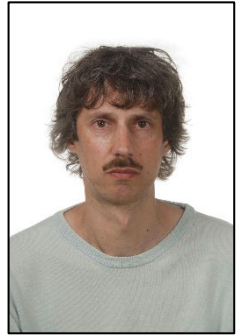
About the author

Name: Frank Lichtenberg

Born **1962** in Bremen (Germany)

1983 – 1989: Study of physics at the University of Heidelberg (Germany)

1989 – 1992: Doctoral thesis in the division of Dr. J. Georg Bednorz at the IBM Zurich Research Laboratory (Switzerland). Doctorate / PhD at the University of Zurich in 1991. **Field of work:** Synthesis of oxides - especially in crystalline form via the melt - and study of their physical and structural properties



1992 – 1997: Research scientist in the nickel metal hydride technology department of Dr. Uwe Koehler at the research center of the battery company VARTA (Germany). Two months stay as guest scientist in Tokyo (Japan) at the TOSHIBA Battery Company within a collaboration between VARTA und TOSHIBA. **Field of work:** Hydrogen storage alloys and nickel metal hydride batteries

1997 – 2007: Research scientist in the department of Prof. Dr. Jochen Mannhart at the Institute of Physics of the University of Augsburg (Germany). **Field of work:** Setting up a new laboratory and synthesis of oxides - especially in crystalline form via the melt - and study of their physical and structural properties

2005: Participation in an 13 - day course in Global Scaling lectured by Hartmut Mueller in Germany

2007 – 2010: Freelance work, autonomous occupation with subjects in the area of physics and science. Creation of several presentations and papers and the website <https://novam-research.com> about entirely novel and environmentally friendly energy technologies and other new or little-known topics of science

Since 2011: Research scientist in the division of Prof. Dr. Nicola Spaldin at the Department of Materials of the ETH Zurich (Switzerland). See [personal ETH webpage](#) and <https://theory.mat.ethz.ch/lab.html> . **Field of work:** Setting up and maintenance of a new laboratory, synthesis of oxides - especially in crystalline form via the melt - and study of their physical and structural properties, and teaching

Secondary employment: **Since 2015** consulting activities for the R & D company [Quantum Power Munich](#)

Closing words

An enjoyable evolution of mankind and earth does not come about solely by scientific and technological progress, but requires rather the development of spiritual qualities such as compassion, peace, dignity, freedom, tolerance, wisdom, ...



Appendix

The cryogenic
magnet motor of
Walter Thurner ...

The cryogenic magnet motor of the German engineer and inventor Walter Thurner is a nice example of a self-running system because its operation principle is published and comprehensible at the macroscopic scale. It can be understood by considering the acting forces which operate in its design.

Walter Thurner died on 12 February 2021 and meanwhile his former German-language website www.walter-thurner.de no longer exists and his former German-language pdf document www.walter-thurner.de/magnet.pdf is no longer available via his former website. However, his original pdf document is still available via

https://novam-research.com/resources/Walter-Thurner_Kryo-Magnet-Motor.pdf

The author of this presentation thanks Walter Thurner for his remarkable work and his former pdf document whose essential parts are presented in English on the following pages.

A German-language obituary is published on pages 63 and 64 in the May / June 2021 issue of the German-language NET-Journal (www.borderlands.de/inet.jrnl.php3) (ISSN 1420-9292).

Another German-language article about Walter Thurner:

www.borderlands.de/net_pdf/NET0308S4-10 . This article is published on pages 4 - 10 in the March / April 2008 issue of the German-language NET-Journal. The cryogenic magnet motor is described on pages 8 and 9.

An example of an embodiment of Walter Thurner's idea is sketched on the following page in Fig. 1 and Fig. 2. His concept implies a linear or especially a circular array of magnets. One of such a magnet (1) is sketched in Fig. 1 and Fig. 2. Another magnet (3) is attached to a rod (4) which is connected with a shaft (5) so that the magnet (3) can move above (1). The sketched arrangement of the magnets (1) and (3) results in a motion of (3) towards the edge of (1). A repulsion arises between (3) and (1) when (3) approaches the edge of (1) and an attraction occurs when (3) goes away from (1). Thus at the edge of (1) the magnetic forces act against the direction of motion of (3). That corresponds to a conventional or conservative system without any self-running motion.

Sketch of an example of an embodiment of Walter Thurner's idea from https://novam-research.com/resources/Walter-Thurner_Kryo-Magnet-Motor.pdf (in German)

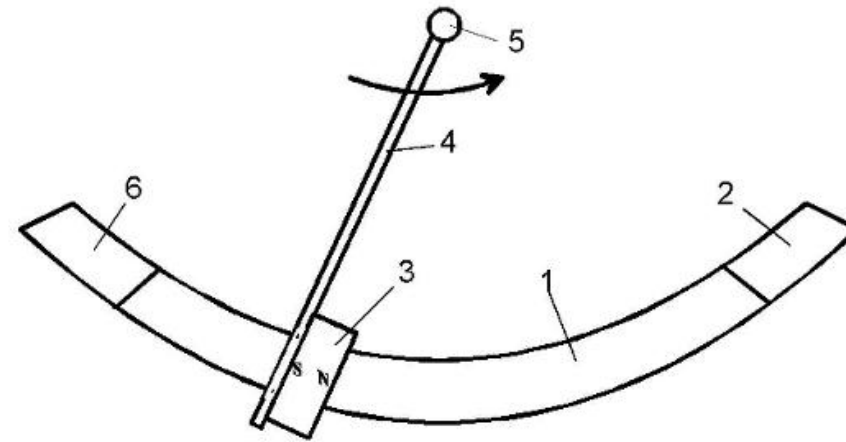


Fig. 1

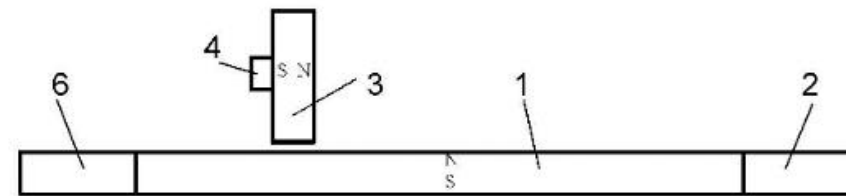


Fig. 2

Image from https://novam-research.com/resources/Walter-Thurner_Kryo-Magnet-Motor.pdf

Walter Thurner's concept enables a self-running motion of the movable magnet (3) because strong diamagnets (6,2) are placed at the edges of the magnet (1). The strong diamagnets (6,2) are realized by high- T_c superconductors such as $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ which is superconducting at the temperature of liquid nitrogen (77 K). Thus Walter Thurner's device requires a cooling by liquid nitrogen. The strong diamagnet, for example (2), generates an induced magnetic field whose direction is opposite to the external field of the magnets (1) and (3) and thus it attenuates / shields / modifies the magnetic fields / forces of and between (1) and (3) at the edge of (1). Therefore (3) can leave the edge of (1) in a non-decelerated way. If (3) approaches then the edge of another magnet of the type (1), then the strong diamagnet (6) attenuates or shields the repulsive force between (3) and (1) so that (3) crosses the edge of (1) in a non-decelerated manner. Thus a circular array of several units of the type (6)(1)(2) leads to a self-running and self-accelerating motion of the movable magnet (3) from one magnet (1) to another. An increase of the effect can be achieved when not only one but more movable magnets of the type (3) are used. For example, several magnets of the type (3) can be placed on or in a rotating disc. The self-running and self-accelerating motion implies a generation of usable energy. For example, the rotating shaft (5) can propel an electric generator.

Important safety note: If the described device is constructed properly, then it is self-running and self-accelerating. Without appropriate measures the speed of rotation can increase continuously until the device does fly apart ! That is of course very dangerous and indeed it did happen with a constructed prototype ! Fortunately nobody was injured during that event. Pictures from components of the prototype before its self-destruction are shown on the right. The visible holes in the lower picture allow a supply of liquid nitrogen. A renewed construction of this device requires the development of appropriate measures which limit and control the speed of rotation !



Images from https://novam-research.com/resources/Walter-Thurner_Kryo-Magnet-Motor.pdf



The cryogenic magnet motor of Walter Thurner represents a nice example of a self-running system which can generate usable energy. Its operation principle appears comprehensible. Once it is understood one has an idea how a self-running system can work concretely, at least at the macroscopic scale. Devising a self-running system by considering the existing macroscopic forces does not require to know the source of the generated energy. Nevertheless, it is of course an interesting question from where the generated energy comes from. The author of this presentation assumes that self-running devices imply at the subatomic level an extraction of usable energy from the everywhere present space energy, vacuum energy or ether energy via physical fields such as magnetic fields