Société Française de la Science Nucléaire dans la Matière Condensée (SFSNMC)
French Society for Condensed Matter Nuclear Science

Bergamo Conference
March 23rd – 26th, 2026

17th International Workshop on Anomalies in Hydrogen Loaded Metals

Hosted at Kilometro Rosso under the sponsorship of Prometheus

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IWAHLM-17

ABSTRACTS OF THE ORAL AND POSTER PRESENTATIONS

17th International Workshop on Anomalies in Hydrogen Loaded Metals
IWAHLM-17

Program and Abstracts

CONTENT

Welcome on behalf of the SFSNMC

The SFSNMC *(Société Française de la Science Nucléaire dans la Matière Condensée*) is pleased to welcome you for the IWAHLM-17 Workshop at Kilometro Rosso, located near the beautiful city of Bergamo in Italy.

The organization was made possible thanks to the efficient support of the company Prometheus, which is a local research player committed to the study and promotion of new energy sources. Prometheus, which has been working in this field for several years and observes the recent progress on a global scale, has decided to communicate widely on the subject of LENR energy sources in order to raise awareness among the public and decision-makers about the birth of this new branch of industry, which will offer tremendous opportunities, but also require a considerable increase in the research effort. We were invited by Prometheus to add our voice to theirs to reinforce the message, hence the choice to hold the IWAHLM-17 Workshop at Kilometro Rosso.

Prometheus is taking care of all local organizational aspects of the workshop. This help is immensely valuable and the SFSNMC thanks Prometheus a lot for the flawless cooperation during the preparation of the event as well as during the conference days.

The IWALM-17 workshop from March 24 to 26 follows a one-day public conference organized by Prometheus on March 23. The participants of the IWAHLM-17 workshop are gracefully invited to attend the March 23 meeting, and it is an additional reason to thank Prometheus.

In parallel to the conferences an exhibition will give the opportunity to observe objects related to our science and to discuss face-to-face with the exhibitors.

When the time comes to leave, what will remain will be the presentations we have listened to and the debates that will have nourished the discussion. The success of the conference will be mainly due to the contributions of the participants. I warmly thank all the authors of the oral presentations, posters and exhibitions.

I hope that these meetings will meet your expectations. The recent progress made by the various research teams around the world suggests that reactors capable of providing abundant and environmentally friendly energy will soon be developed. I am sure that all of you share this hope.

Welcome to Bergamo
Truly Yours,

Jacques Ruer
President SFSNMC
Chairman IWAHLM-17

Conference venue

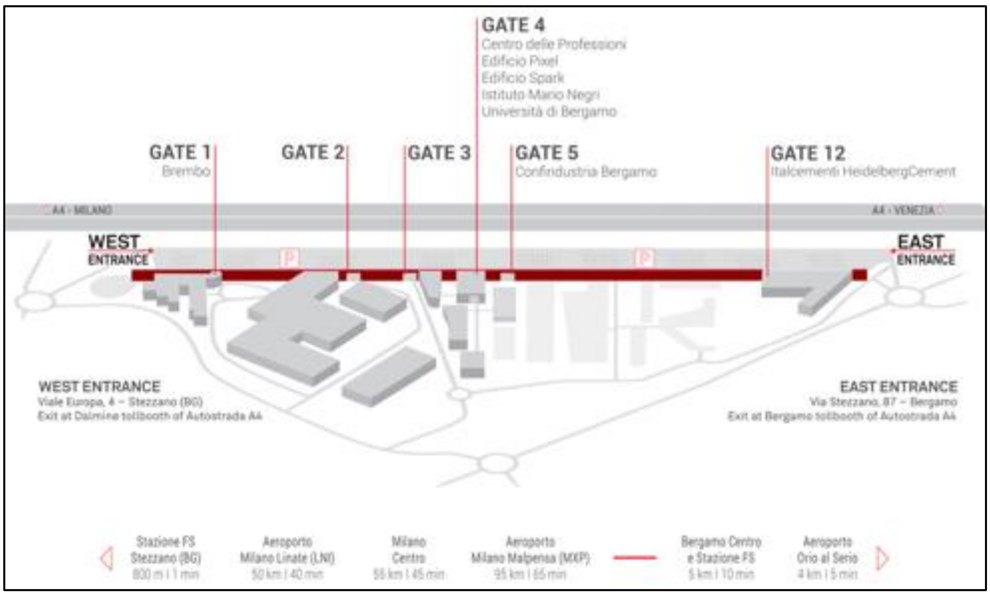
Kilometro Rosso Innovation District – Gate 4 – Via Stezzano 87, Bergamo

The venue of the meeting is located at **Kilometro Rosso, a Science and Technology Park** that houses companies, high-tech production activities, research centers and laboratories.

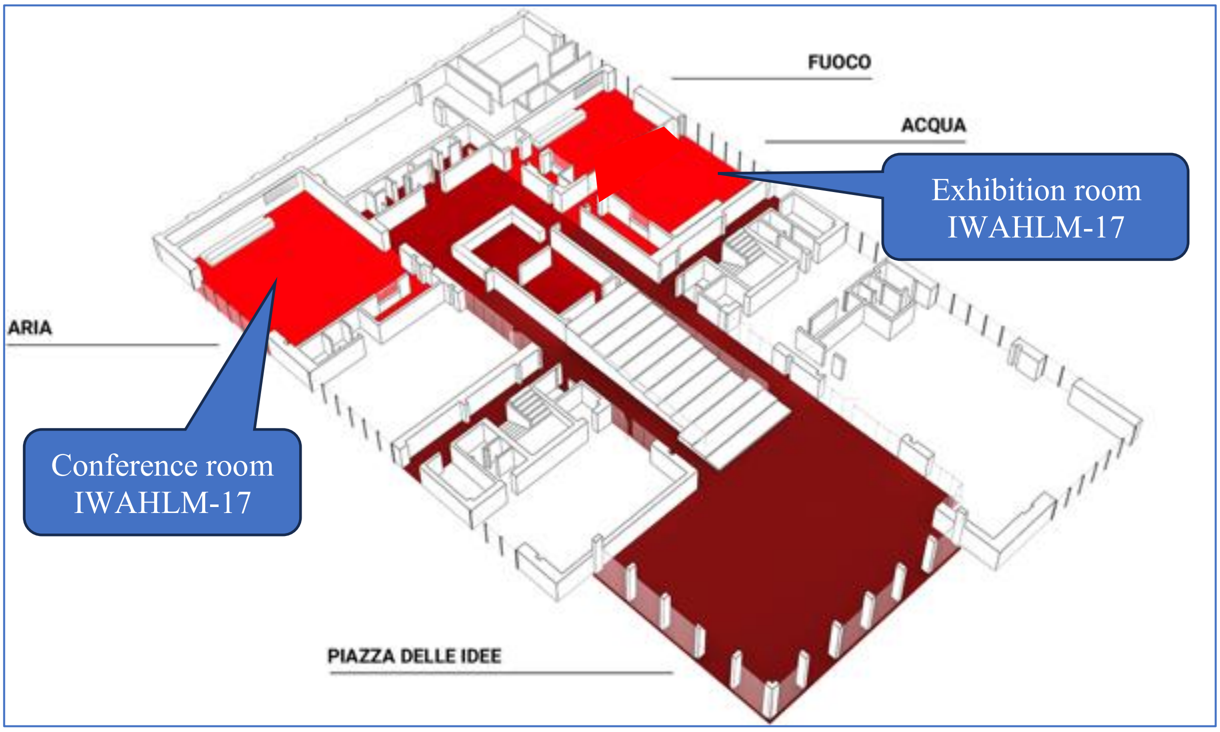
Kilometro Rosso is located close to the beautiful city of Bergamo, rich of many historical places, and 40 kms from Milan the major city in Northern Italy.

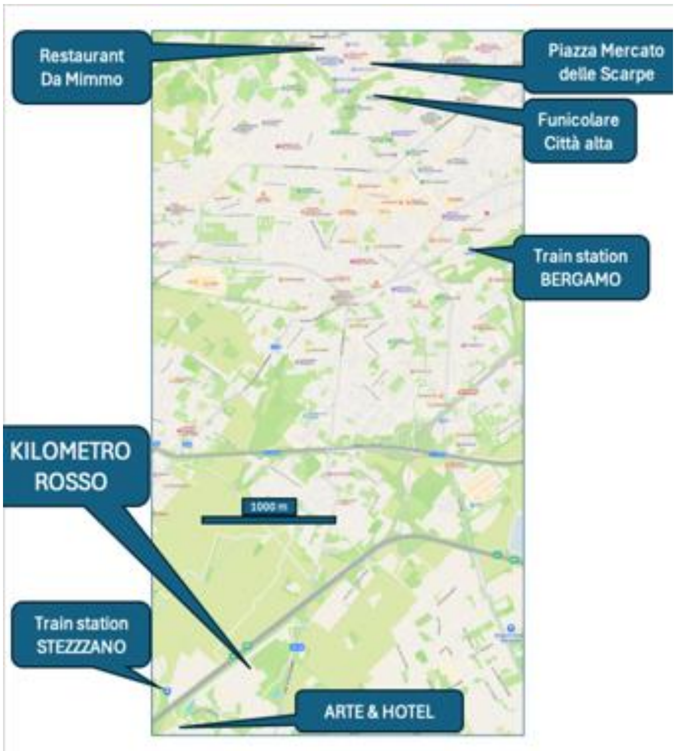
Kilometro Rosso is where Business and Research meet: located in the heart of Lombardy Region, it brings together companies, universities and research centers, in order to foster innovation processes in the manufacturing industry.

Kilometro Rosso innovation district



Conference and exhibition rooms at Kilometro Rosso – Gate 4





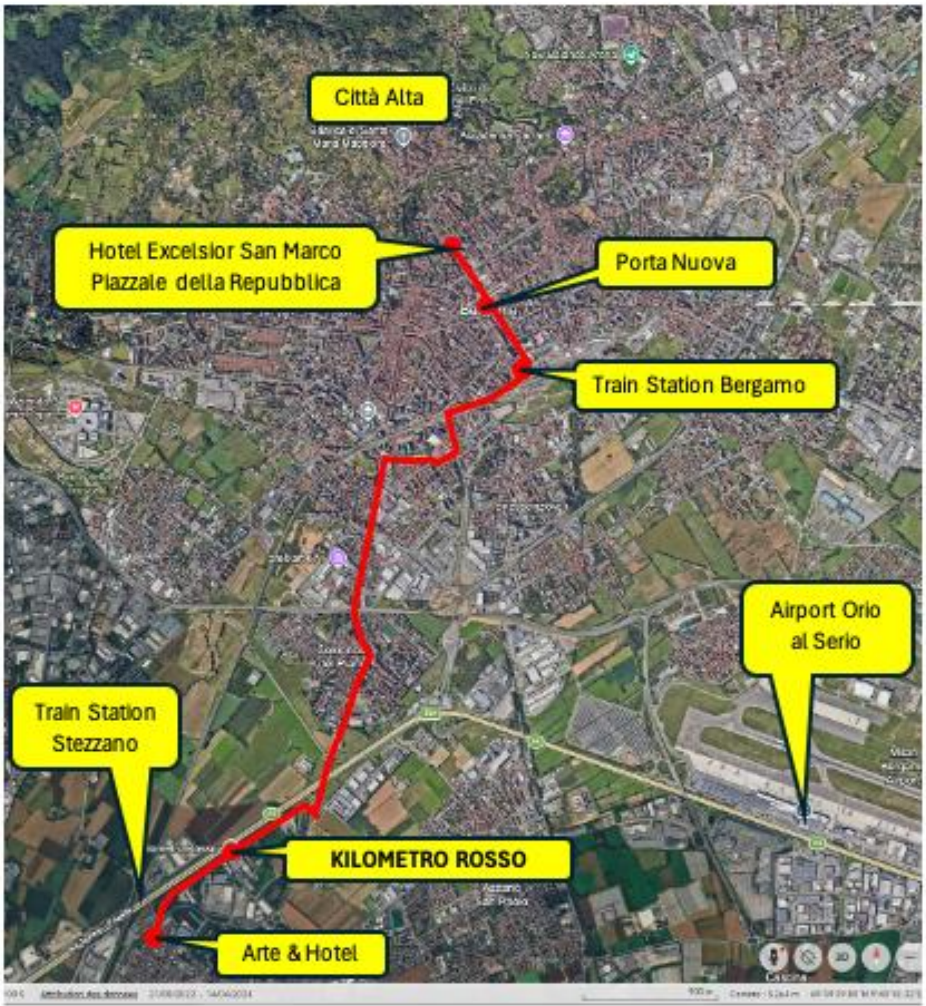
Map showing the main sites

Kilometro Rosso is located south of the city.

A shuttle bus service will operate once in the morning and in the afternoon between the hotel Excelsior San Marco and ARTE & Hotel with intermediate stops at Porta Nuova and Bergamo Train Station.

Most hotels in Città Bassa are within a walking distance to these bus stops.

Conference Shuttle Bus



<u>Monday 23 – Tuesday 24 – Wednesday 25 - Morning service:</u>
Departure Hotel Excelsior San Marco at 8:30
Stops at: Porta Nuova – Train station – Kilometro Rosso – ARTE & HOTEL
On its way back, the bus may transport the accompanying persons staying at ARTE & HOTEL wanting to go to the train station and the city center

<u>Monday 23 – Tuesday 24 – Afternoon service</u>:
Departure at 18:00 from the city center (Hotel Excelsior San Marco, Train station) to transport the accompanying persons staying at ARTE & HOTEL.
Departure from Kilometro Rosso at 18:30 to transport the participants back to the city, same route and stops.

<u>Wednesday 25 afternoon and evening</u>
The bus will leave Kilometro Rosso at 18:30 to Città Alta for the conference dinner at restaurant Da Mimmo located Via Bartolomeo Colleoni, 17. The accompanying persons who will have a walking guided tour in Città Alta will join the group at the Da Mimmo. In the evening, the bus will return the participants to the hotels in Città Bassa and ARTE & HOTEL

Bergamo and Social Events

Bergamo includes two cities: Città Alta, rich of medieval historical sites listed as UNESCO World Heritage monuments and Città Bassa, a modern city where you can admire the paintings of the Accademia ***Carrara*** and the sacred art collection of the Museo ***Adriano Bernareggi***.

https://www.visitbergamo.net/en/

Map of Città Alta

A convenient way to link the two cities is to ride la Funicolare (Cable car) between Viale Vittorio Emanuele II, 62 (Città Bassa) and Piazza Mercato delle Scarpe (Città Alta)

Program for the accompanying persons

The accompanying persons are kindly invited to join the guided tour of the city on Monday March 23rd afternoon as well as another one on Wednesday March 25th afternoon, finishing at the restaurant where the conference dinner will be offered.

Monday 23, tour historic center part 1
15:00 Meeting point Piazza Mercato delle Scarpe
2 h walking tour including access to Basilica of Santa Maria Maggiore

Wednesday 25, tour historic center part 2
17:00 Meeting point Piazza Vecchia (where we finish the first tour)
2 h walking tour including a ride with the Funicolare San Vigilio to the top of the hill for an incredibly beautiful panoramic view
Back to Città Alta, with the same ticket OR on foot with a pleasant walk of 15 minutes.
End of tour at Restaurant Da Mimmo. All accompanying persons are invited to the conference dinner at 19:30.

Your guide: Sara Asperti – mobile: +39 3498081772

Basilica
Santa Maria Maggiore

Restaurant Da **Mimmo is** located at the Casazza, a palace dating back to 1357, the ancient seat of the Venetian postal service. Via Bartomoleo Colleoni, 17

Milano

Bergamo is located 40 kms from Milano, the capital city of Lombardia, the second largest city in Italy, it is not necessary to present. A one-day excursion can be envisaged from Bergamo. There are convenient train services between the two cities:
Bergamo – Milano
In the morning there is a direct train each hour leaving Bergamo at 2 minutes past the hour, arriving in Milano Centrale 48 minutes later.
Milano Centrale – Bergamo
In the afternoon, there is a direct train each hour leaving Milano Centrale at 5 minutes past the hour, arriving in Bergamo 50 minutes later.

Conference The Third Way to Nuclear Monday 23rd, 2026

The first day of the meeting on Monday March 23 is dedicated to the public conference organized by Prometheus. All attendees of the IWAHLM-17 workshop are welcome to attend.

Following the conference after 17:00 the installation of the IWAHLM-17 posters and exhibition will be completed. Note that the posters will have been printed and installed the week before.

MONDAY - 23 MARCH - CONFERENCE THE THIRD WAY TO NUCLEAR	
09:00	**Bus leaves Bergamo to Kilometro Rosso**
9:30 - 10:00	**Registration The Third Way to Nuclear**
10:00 - 17:00	**PUBLIC CONFERENCE LA TERZA VIA AL NUCLEARE**
	Verso un'autonomia energetica possibile
	The Third Way to Nuclear
	Towards possible energy autonomy
	Conference organised by Prometheus Energy
17:00	*For IWAHLM-17 exhibitors: Installation of the exhibition*
19:00	**Bus leaves Kilometro Rosso to Bergamo**

Keynote lecture by Pr. David Nagel during the conference The Third Way to Nuclear on Monday March 23, 2026

The Status, Momentum and Potential of Low Energy Nuclear Reactions

The world needs new sources of clean energy due to the growing population, developing countries, and the several known dire consequences of climate change caused by burning fossil fuels. Besides renewable energies, the world urgently needs new sources of powerful energy that can be controlled at will and characterized by (a) large energy releases per reaction compared to chemical fuels, and associated high energy and power densities, and (b) production of energy without greenhouse gases. Three types of such energy generators are available or under development.

Nuclear fission of heavy elements is a reliable source of clean energy. However, it has significant drawbacks, including huge facilities, large amounts of long-lived radioactive waste, and major problems from rare accidents. There is great interest now in smaller fission systems.

Fusion of light isotopes of hydrogen has attracted tens of billions of dollars of research funding over the past 75 years. It requires temperatures of about 100 million degrees in low-density plasmas, and strong magnetic fields to contain the plasmas. It is expected that hot fusion systems will supply power to the electrical grid in a few countries during the 2030s. Hot fusion reactors are large machines with multi-megawatt powers that still produce significant radioactive waste.

Cold fusion burst on the scene in 1989. It is now called Low Energy Nuclear Reactions (LENR) or Solid-State Fusion (SSF). Over 35 years of research in more than a dozen countries have shown that it is indeed possible to trigger very energetic reactions at modest temperatures in special catalysts loaded with hydrogen. High energy gains have been demonstrated in LENR experiments, so LENR energy might be relatively cheap, when it is commercialized. Because solids catalyze LENR, experiments have shown that energy generators based on LENR should offer high power densities, and hence compact systems. Widely distributed LENR generators with kilowatt outputs appear to be possible for powering homes and businesses. And, it is known from many experiments that LENR do not emit significant dangerous radiation, and produce hardly any radioactive waste.

The scientific study of LENR remains challenging due to highly variable experiments, probably caused by vagaries of the required materials. The fundamental physics of how LENR occur pertains to Quantum Mechanics effects and is still not yet completely understood. Despite these problems, the commercialization of LENR is proceeding. Eleven startup companies are striving to produce commercial LENR generators in Asia, Europe, and America.

The momentum of LENR is due to interest by governments, as well as by investors. A long-term program in Japan, a program in Europe since 2020, and a program in the U.S. from 2023 have legitimized and advanced the study of LENR. Those programs are each about $10M. If LENR captured 1/1000 of the annual market for energy globally, which is $10T, the companies could be worth billions of dollars.

The two major challenges to LENR now are (a) scaling to output energies to the range of kilowatts with significant gains, and (b) the long-term durability of the active materials in LENR generators. LENR is at a stage where collaborations can accelerate understanding and commercialization.

The 17th International Workshop on Hydrogen Loaded Materials will gather the best specialists of the World on both the scientific study and commercialization of LENR. This workshop is not merely a venue for presentations; it is a place to test ideas, validate claims, and define the questions that matter. We welcome those who wish to engage, compare, replicate, and build knowledge of LENR together.

David J. Nagel
Research Professor – George Washington University
Washington DC - USA
27/11/2025

International Workshop on Anomalies in Hydrogen Loaded Metals IWAHLM-17

PROGRAM SCHEDULE OF THE ORAL PRESENTATIONS

TUESDAY - 24 MARCH - MORNING		
08:30	**Bus leaves Bergamo to Kilometro Rosso**	
IWAHLM-17 workshop - Registration and welcome addresses		
09:00 - 9:30	**REGISTRATION IWAHLM-17**	
	Jacques Ruer and Fabrizio Petrucci	**Welcome on behalf of the SFSNMC and Prometheus Energy**
SESSION 1: Introduction Speeches		
9:30 - 10:00	**Wu-Shou Zhang*, J.Rothwell**	**Predictions of cold fusion and related phenomena prior to 1989 and subsequent experimental verifications** ON-LINE
10:00 - 10:30	**N.Targosz-Sleczka**	**Key Scientific Achievements of the CleanHME Project**
10:30 - 10:40	**Lynn Bowen**	**In Remembrance**
Coffee break 10:40 - 11:00 - Exhibition room		
SESSION 2 - Recents results of the CleanHME project		
11:00 - 11:30	**K.Czerski*, R. Dubey, G. Haridas Das, A. Kowalska, N. Targosz-Ślęczka, S. Thulichery, M. Valat**	**Thermal deuteron-deuteron fusion in accelerator experiments at sub-keV energies**
11:30 - 12:00	**M. Valat*, C. Le Roux, JP. Biberian, R. Michel, G. Parchi, U. Abundo, A. Kodek, J. Ruer, S. Bucher, K. Czerski, N.Targosz-Sleczka**	**CleanHME Zoom: Detailed evidence of thermal activity in activated nanocomposite Hydrotalcites at temperature >650°C**
12:00 - 12:30	**F. Celani*, C. Lorenzetti, G. Vassallo, E. Purchi, S. Cupellini, M. Nakamura, P. Cerreoni, U. Mastromatteo**	**Revisiting Anomalous Heat Excess in Nickel Alloys: Three Decades from First Evidence to Robust Reproducibility under Pulsed and Plasma Excitation**
12:30 - 13:00	**M.Valat*, K.Czerski, S.Thulichery, M.Kaczmarski, M.O.Liedke, A.Wagner, N.Targosz-Sleczka, A.Kowalska, R.Dubey, G.Das Haridas**	**Defect formation and evolution on deuterated multilayer nickel-copper nano-structured samples, surface and subsurface analysis with PAS**
Lunch - 13:00 - 14:30		
TUESDAY - 24 MARCH - AFTERNOON		
SESSION 3 - Reactions Measurements and Artificial Intelligence		
14:30 - 15:00	**S.Ólafsson*, N.L. Bowen**	**Neutron ash signature from electrochemical D_2 loaded Palladium wire, a Geant4 MC simulation**
15:00 - 15:30	**M.Lipoglavšek*, A.Cvetinović**	**Spontaneous Nuclear Fusion**
15:30 - 16:00	**A.Bari*, D.Nagel, S.Huang**	**Advancing LENR Frontiers: AI-Upgraded Knowledge Base, Dashboard Evolutions, and Chatbot Assessments** ON-LINE
Coffee break 16:00 - 16:30 - Exhibition room		
SESSION 4 - Plasma reactors		
16:30 - 17:00	**A.Klimov**	**Two Stage LENR Plasmoid Vortex Reactor** ON-LINE
17:00 - 17:30	**H.Back**	**ENG8 Presenting the EnergiCell 100KW Thermal Power Plant**
17:30 - 18:30	**Visit of the exhibition and the laboratory**	
18:30	**Bus leaves Kilometro Rosso to Bergamo**	

WEDNESDAY - 25 MARCH - MORNING		
08:30	**Bus leaves Bergamo to Kilometro Rosso**	
SESSION 5 - Power production		
9:00 - 9:30	**J.Ruer*, J.P.Bibérian, A. Kodeck, C. Le Roux, R.Michel, M.Valat**	**A LENR Based Reactor (LBR)**
9:30 - 10:00	**M.Childs, M.Clarage*, J.Onderco, J.Lickver, P.Anderson**	**Aureon Power Generation**
10:00 - 10:30	**J.Ruer**	**What is the meaning of COP?**
10:30 - 11:00	**V.Vysotskii*, M.Vysotskyy**	**Possible Options for Optimization, Universalization, and Application of gas-filled LENR Systems**
Coffee break 11:00 - 11:30 - Exhibition room		
SESSION 6 - Nuclear Reactions 1		
11:30 - 12:00	**A.Kumar*, T.Verma, P.Jain, R.G. Pala, K.P. Rajeev**	**Measurement of Slow-Neutron–Equivalent Flux During Heavy-Water Electrolysis**
12:00 - 12:30	**M.Fomitchev-Zamilov**	**Nuclear Reactions in Cavitation Jet in Deuterated Benzene**
12:30 - 13:00	**R.W. Greenyer**	**Predictable non-natural isotope synthesis and its relationship to excess heat**
Lunch - 13:00 - 14:30		
WEDNESDAY - 25 MARCH - AFTERNOON		
SESSION 7 - Nuclear Reactions 2		
14:30 -15:00	**H.B.Winzeler**	**Modular LENR Reactor for Ni/Pd -H-Systems - Pressure-Triggered Responses and Nuclear Signatures.**
15:00-15:30	**R.W. Greenyer**	**Developing practical technologies for radionucleide remediation**
15:30 - 16:00	**V.Vysotskii*, M.Vysotskyy**	**Self-controlled nuclear fusion in warm hydrogen gas with random distributed molecular fragments of heat-resistant nanomaterials**
Coffee break 16:00 - 16:30 - Exhibition room		
SESSION 8 - Nuclear Reactions 3		
16:30 - 17:00	**E.Storms**	**Cold Fusion Explained at the Operational Level ON-LINE**
17:00 - 17:30	**Eman Elshaikh*, Lily Noyes**	**Beyond the Lab: Making LENR Visible ON-LINE**
17:30 - 18:30	**Visit of the exhibition and the laboratory**	
18:30	**Bus leaves Kilometro Rosso to Bergamo**	
WEDNESDAY - 25 MARCH - EVENING		
19:30	**Conference dinner - Restaurant Da Mimmo - Bergamo - Città Alta - Via B.Colleoni,17 - Tel: +39 035 218 535**	

THURSDAY - 26 MARCH - MORNING		
08:30	Bus leaves Bergamo to Kilometro Rosso	
THURSDAY - 26 MARCH - MORNING - MAIN CONFERENCE ROOM - SALA ARIA		
SESSION 9 Low Energy Converters		
9:00 - 9:30	F.Gordon*, H.Whitehouse, M.S.Gordon, G.Kerber	LEC/EDEC and LENR
9:30 - 10:00	M. S.Gordon* , H.Whitehouse, F.Gordon, G.Kerber	Advances in LEC/EDEC Material Selection
10:00 - 10:30	F.David	Advances on KEPLER SOLID-STATE FUSION GENERATOR
10:30 - 11:00	J.P.Bibérian	How to build a LEC
Coffee break 11:00 - 11:30 - Exhibition room		
SESSION 10 - From Canada		
11:30 - 12:00	D.Alexandrov*, M.Lazarova, D.Gospodinova, Y.Paunov, T.Malchev	About Possibility for Design of LENR Reactor
12:00 - 12:30	T.Malchev*, Y.Paunov, M.Lazarova D.Gospodinova, D.Alexandrov	Optimization of Control Parameters in Cold Nuclear Fusion Systems via Deep Learning Surrogates
12:30 - 13:00	Y.Paunov*, T.Malchev, D.Alexandrov, D.Gospodinova, Milena Lazarova	Investigation of ratio parameter for optimized LENR
13:00	Conference closing ceremony	
Lunch		
14:30	Bus leaves Kilometro Rosso to Bergamo	

THURSDAY - 26 MARCH - MORNING - SALA ACQUA		
SESSION 11 - Theory 1		
9:00 - 9:30	P.Hagelstein	Modelling excess heat in PdD_x
9:30 - 10:00	L.Boldyreva	Low-Energy Nuclear Transmutations and a Process that Ensures the Conservation of Angular Momentum ON-LINE
10:00 - 10:30	P. Hatt	LENR as a Nucleosynthesis Reaction
10:30 - 11:00	L.Gamberale	Neutron Production via Electron Capture by Coherent Protons
Coffee break 11:00 - 11:30 - Exhibition room		
SESSION 12 - Theory 2		
11:30 - 12:00	A.RPBA.Meijer	Quasifusion: P-P Energy Conversion in Low Energy Capture Reactions (LECR)
12:00 - 12:30	K.A. Fredericks	The Zitter Unit Cell
13:00	Return to Sala Aria for the conference closing ceremony	
Lunch		
14:30	Bus leaves Kilometro Rosso to Bergamo	

IWAHLM-17
ABSTRACTS OF THE ORAL PRESENTATIONS

Predictions of cold fusion and related phenomena prior to 1989 and subsequent experimental verifications (ON-LINE)

#Wu-Shou Zhang [1], Jed Rothwell [2]
[1] Institute of Chemistry, CAS, Beijing, China [2] LENR-CANR.org, USA - Email: wszhang@iccas.ac.cn

Although 37 years have passed since Fleischmann and Pons announced their discovery of cold fusion, the phenomenon remains unrecognized by the scientific community. However, Chinese scholar Hongzhou Zhao (1941–1997) predicted cold fusion and related phenomena as early as 1981 [1]. Subsequently, Hongzhou Zhao and Guohua Jiang (Z-J) deepened their research in 1985 [2], which was translated into English by us for global scholars. Through examining major scientific discoveries from 1500 to 1960, Z-J distilled the following principle:

The process of scientific discovery resembles mineral extraction. In the exploration of the microscopic world, it deepens by progressively reducing the spatial scale of matter and increasing the binding-energy level. At any given historical epoch, one (or some) scales of matter (or forms of motion) in nature become the primary focus of scientific research. These objects constitute the “mineable deposits” of scientific achievements, which Z-J called the “main mining disciplines”. Specifically: 1540–1720 marked the era of classical mechanics; 1680–1740 witnessed the peak of thermodynamics; 1730–1820 saw the height of chemistry; 1810–1920 belonged to electromagnetism; and post-1920 belonged to quantum mechanics. Humanity “mined” research at the macroscopic scale for 210 years (1540–1750), at the molecular scale for 220 years (1640–1860), and at the atomic scale for 250 years (1670–1920). The average cycle spans approximately 230 years. Following this trend, nuclear physics—initiated in 1896—will likely require until at least the first third of the 22nd century to complete its full exploration cycle.

Z-J further observed that the conditions for shift of one discipline to another involve discoveries of energy conversion effects (ECEs) between the current scale and its preceding scales, because these effects provide experimental equipment for scientific research. The discovery of radioactive phenomena marked nuclear physics as a “mining” discipline—one that had come of age and was ripe to produce practical applications. While humanity has identified and harnessed the energy conversion between nuclear and thermal energy in power plants, several fundamental direct ECEs at the nuclear level remain undiscovered. Only after humanity discovers these crucial direct ECEs can we enter a new era of comprehensive nuclear energy utilization. At that point, the nuclear radiation problem will have been resolved, and people will have absolutely no reason to worry about the consequences of nuclear energy. “Nuclear scientists will become the true Prometheus!” [2]

From discoveries in cold fusion, excess heat represents the direct nuclear-to-thermal ECE proposed by Z-J, while temperature-induced excess heat embodies the thermal-to-nuclear ECE. Thus, cold fusion involves direct nuclear-to-thermal conversion, whereas nuclear power plants utilize only indirect nuclear-to-thermal conversion. David’s fusion diode and Gordon-Whitehouse’s LEC represent the nuclear-to-electric ECE. This means their discoveries not only fulfill Z-J’s predictions but also strongly suggest that humanity’s future utilization of nuclear energy will involve direct electrical power generation, bypassing the current “boiling water” approach of nuclear power plants. Meanwhile, the production of hydrogen-oxygen mixtures exceeding Faraday efficiency in certain aqueous electrolytic systems represents the nuclear-to-chemical ECE.

References

[1] H.-Z. Zhao, *Mining model for scientific discoveries*, Science of Science and Management of S. & T., no. 2, pp. 3-5, 1981; no. 3, pp. 34-38, 1981. (*in Chinese*)
[2] H.-Z. Zhao, G.-H. Jiang, *Review of mining model for scientific discoveries (in Chinese, with English translation)*, Studies in Science of Science, vol. 3, no. 1, pp. 38-50, 1985; https://lenr-canr.org/acrobat/ZhaoHZreviewofth.pdf.

Key Scientific Achievements of the CleanHME Project

#Natalia Targosz-Sleczka[1] for the CleanHME Consortium
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The European project CleanHME (Clean Energy from Hydrogen–Metal Systems) has formally ended in January 2025, however its results are expected to support long-term research in low-energy nuclear reactions and development of a novel energy source based on thermal nuclear fusion in metallic environments [1]. The CleanHME consortium comprised 16 academic and scientific institutions as well as industrial partners from Europe, the United States, and Canada. Beyond the identification of new materials capable of generating stable and reproducible excess heat for a future demonstrator, a central objective of the project was to achieve a deeper understanding of the underlying physical phenomena. In the project, hydrogen-loading experiments were complemented by accelerator-based experiments investigating the enhancement of nuclear reaction yields at extremely low energies, as well as by extensive materials characterization [2].
Here we present the main scientific achievements of the CleanHME project. These include the development of hydrotalcite powders incorporating various active metallic nanoparticles and the demonstration of deuteron–deuteron fusion at thermal energies through the detection of nuclear reaction products. Furthermore, the excess heat measured during hydrogen-loading experiments is remarkable, reaching values of approximately 90±5 mW/g of powder, and 25±15 W/g of bulk wire material [3]. In addition, a mechanism for LENR links hydrogen diffusion within the crystal lattice to lattice defects that locally increase the effective electron mass, thereby enhancing electron screening and facilitating tunneling through the Coulomb barrier [4].
Despite our effort, many questions remain open, emphasizing the need for continued investigation across both fundamental principles and practical applications. Resolving these open challenges will be essential for translating recent advances into robust applications.

The CleanHME project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 951974.

References:

[1] https://cordis.europa.eu/project/id/951974/results
[2] CleanHME Deliverable D6.4 "Plan for exploitation and propositions for follow-up studies", 2024
[3] CleanHME Deliverable D3.6 "Report on tests performed at the new reactors", 2024
[4] Huke A. et al., Phys. Rev. C 78, 015803, 2008; Kowalska A. et al., Materials 16, 6255, 2023

Thermal deuteron-deuteron fusion in accelerator experiments at sub-keV energies

*Konrad Czerski[1], R. Dubey[1], G. Haridas Das[1], A. Kowalska[2], N. Targosz-Ślęczka[1], S. Thulichery[1], M. Valat[1]

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[2] *Institute of Mathematics, Physics and Chemistry, Maritime University of Szczecin, 70-500 Szczecin, Poland*

A direct observation of the deuteron-deuteron (DD) fusion at thermal meV energies by emission of its nuclear products, although theoretically possible, was not succeeded using the accelerator technique up to now. The electron screening effect that reduces the repulsive Coulomb barrier between reacting nuclei in metallic environments by several hundreds of eV and is additionally increased by crystal lattice defects in the hosting material, leads to strongly enhanced cross sections which means that this effect might be studied in laboratories. Here, the results of the $^2H(d,p)^3H$ reaction measurements performed on different deuterated metallic targets at sub-keV energies, using an ultra-high vacuum accelerator system at the University of Szczecin, Poland will be presented. The experimentally determined thick target yield, decreasing over many orders of magnitude for lowering beam energies, could be well described by the electron screening effect and the $J^\pi = 0^+$ threshold resonance in ^4He. At the lowest energies of several keV, a constant plateau yield value could be observed for different metallic targets used. As indicated by significantly increased energies of emitted protons, this effect can be associated with the thermal DD fusion. A theoretical model explains the experimental observations by creation of ion tracks, induced in the target by projectiles, and a high phonon density which locally increases temperature above the melting point. The nuclear reaction rates taking into account the enhanced electron screening effect for different target materials and DD threshold resonance agrees very well with the experimental data. This enables to compare them with the results achieved in gas loading and electrolysis experiments.

CleanHME Zoom: Detailed evidence of thermal activity in activated nanocomposite Hydrotalcites at temperature >650ºC

M. Valat [1], C. Le Roux [2], JP. Biberian [3], R. Michel [3], G. Parchi [4], U. Abundo [4], A. Kodek [5], J. Ruer [6], S. Bucher [7], K. Czerski [1] and N. Targosz-Sleczka [1].

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This presentation provides experimental description of excess heat production and level-3 technology readiness level for activated nano-structured hydrotalcite materials at temperature above 650ºC, up to 1000ºC during the CleanHME project [1].
We present expanded datasets on hydrogen and deuterium loading across multiple laboratories and reactor configurations, demonstrating our experience with a broad range of loading levels and thermal responses measured through calorimetric and thermometric techniques. Excess heat generation is analyzed in relation to the number of thermal cycles applied to the nanocomposite system, highlighting the impact of in-situ activation on enhancing the material performance.

For each reactor apparatus, the increased activity is documented with its contextualization. Nuclear measurements are analyzed for time correlation analysis with thermal evolution, details of cross-check verifications and calibrations of these experimental means help the audience grasp the significance of these evidences.

While long-term durability and scalability of the effect require further investigation, preliminary data indicate sustained low-energy nuclear reaction (LENR) activity for over four weeks, accompanied by signatures consistent with electronic flux and charge transfer.

References

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Revisiting Anomalous Heat Excess in Nickel Alloys: Three Decades from First Evidence to Robust Reproducibility under Pulsed and Plasma Excitation

F. Celani[1], C. Lorenzetti[1], G. Vassallo [1,2] , E. Purchi[1], S. Cupellini[1], M. Nakamura[1], P. Cerreoni[1], U. Mastromatteo[(1)].
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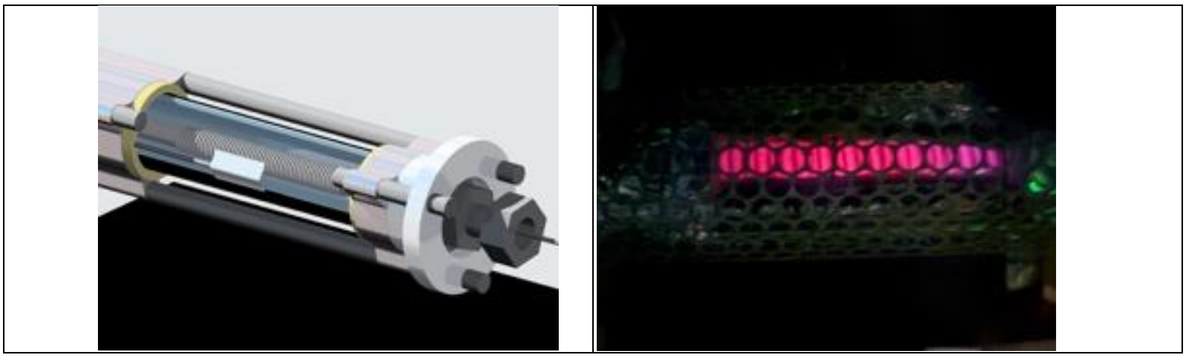
Over the past three decades, a systematic experimental program has been pursued to study electrically induced Anomalous Heat Effects (AHE) in metallic wires exhibiting nanostructured and sub-micrometric surface coatings, with a primary focus on nickel-based alloys such as Constantan. Starting from the earliest observations of excess heat generation under direct current electrical stimulation, successive studies have progressively identified the critical parameters governing the onset, stability, and magnitude of the phenomenon, including surface morphology, gas environment, the role of pulsed stimuli, pulse polarity and shape, temperature regime, and electrode conditioning. Recent experimental activity demonstrates that plasma-based excitation modes, including Paschen discharges and dielectric barrier discharge (DBD) configurations, enable highly reproducible and controllable AHE production. Under optimized conditions, stable excess thermal output of approximately 30% relative to the total electrical input energy—accounting for both Joule heating and plasma excitation—has been consistently achieved. These results represent a significant advancement compared to earlier regimes characterized by poor repeatability and strong sensitivity to uncontrolled variables. At the same time, the experiments reveal that deviation from the optimized operational window can lead to diverging behaviors, including thermal runaway, localized overheating, and eventual wire failure under certain plasma regimes. Such transitions underline the existence of non-linear and self-amplifying processes, strongly dependent on surface activation, charge injection, and gas–metal interactions. The coexistence of stable, reproducible operating modes and **high-gain runaway regimes** highlights both the technological potential and the underlying magnitude of the phenomenon. The present results indicate that AHE is no longer an elusive or sporadic effect, but a robust physical process that can be engineered, controlled, and scaled, bringing it significantly closer to practical applications in advanced energy conversion systems.



Left: schematic of the reactor design. **Right:** photograph of the reactor core viewed through the glass outer wall, showing the characteristic red glow of an argon-deuterium plasma, using a new geometric assembly.

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Defect formation and evolution on deuterated multilayer nickel-copper nano-structured samples, surface and subsurface analysis with PAS

#Mathieu Valat [1], Konrad Czerski [1], Sreelakshmi Thulichery [1], Mateusz Kaczmarski [1], Maciej Oskar Liedke [2], Andreas Wagner [2], Natalia Targosz-Sleczka [1], Agata Kowalska [3], Rakesh Dubey [1], Gokul Das Haridas [1].
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Considering the success of CleanPlanet Inc., we analyzed data produced on a PVD-made multi-layer Ni-Cu nano-structured system* in the aim of understanding the formation of hydrogen induced defect during irradiation, as well as during the heat production phase of the material. Leveraging the features of positron annihilation spectroscopy (PAS) at HZDR, we identify the type and the evolution of such defects when the material is first irradiated with deuterium, then throughout a thermal cycle up to 500ºC.
As seen before [1], low-energy deuterons implantation with currents in the range of 10^{th} of microampere per cm^2, on zirconium at fluences $<10^{17}$ ion/cm^2 produces copious number of defects, up to a physical limit of saturation at depth matching their range of implantation [2]. The type of defects induced are mono-vacancy clusters and mono-vacancies, both filled with multiple deuterons. The participation of defects in the nuclear process described by Czerski is well identified [3], and their evolution is a key parameter in the capability to sustain the *metal-hydrogen quantum energy* production phenomenon.
While the thick target yield evaluation gave minuscule results, due to the un-adapted method of hydride formation and the low electron screening properties of nickel at 10keV, we were able to produce 3 datasets with PAS: after the implantation, after a temperature increase at 500ºC, and after the thermal cycle.
We also use a CleanHME prepared multi-layers Ni-Cu sample, based on scientifically disclosed information of Iwamura*'s Multilayer Metal-Composite* system [4]. We observe the predominance of mono-vacancies by the initial irradiation, in a similar result to the measurement on zirconium or palladium hydrides. During the temperature increase the data shows a large increase of nickel capabilities for diffusion of hydrogen in the sub-surface region. We also report the conversion of mono-vacancies to clusters and voids, a reduction of the mono-vacancy size, and a strong predominance of large void in the bulk.
While these observations confirm the intuition that hot Ni-Cu nano-structured material tends to load large quantity of hydrogen, it also shows that hydrogen helps to trigger a repair mechanism of the sub-surface region and limits the *Kirkendall effect*.

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Neutron ash signature from electrochemical D_2 loaded Palladium wire, a Geant4 MC simulation

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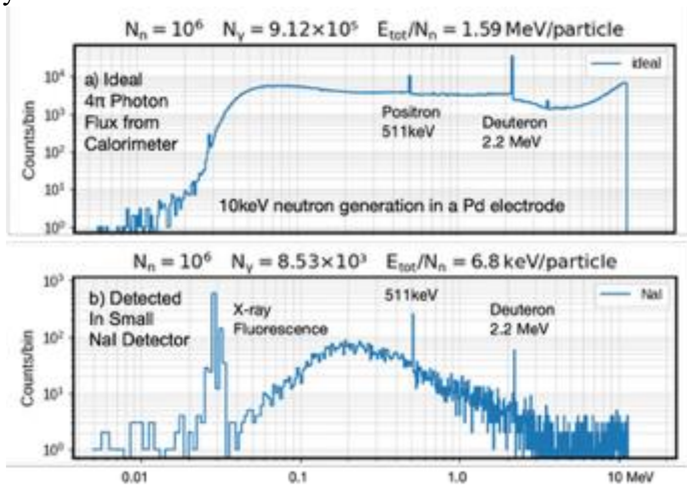
In the LENR literature there has been little work done in studying the ash signature from possible different radioactive sources occurring inside an LENR experimental setup. Such work is reported in this presentation, using Geant4 Monte Carlo computer simulations of an electrochemical cell. A small radiation signature in active cells has sometimes been reported [1], but there is generally no knowledge of how a particular experimental set up might affect the LENR radiation from an active Pd electrode. Also, there is the problem of how the various types of detectors respond to such radiation exposure, as well as how such radiation can be differentiated from the environmental background radiation. Using the Geant4 code the scientist can focus on any part of the experimental cell and study all the scattering, absorption, collision excitation, transmutation and decays events.

In this talk, we report simulations of a 10 cm long by 2 mm diameter Pd rod immersed in a 20 cm by 10 cm Pyrex cylinder, filled with heavy water and 1M LiOH electrolyte. The Pyrex walls are 3mm thick. Around the cell we assume a calorimeter cylinder of 60 cm height and diameter of 70 cm, filled with normal water. The Geant4 code can be initialised such that the Pd wire contains an isotropic and monoenergetic beam source of electrons, neutrons or protons with energy E_{beam}.

As an example, in a simulation when one million 10 keV neutrons are emitted from the Pd wire, they travel through the Pd wire, the heavy water electrolyte, the Pyrex walls, and the water calorimeter. In this case only 19 neutrons out of 1 million make it out of the calorimeter. For 2.54 MeV neutrons, 7360 survive the transport; however, very few would be detected.



During their transit through the experimental setup, the 10 keV neutrons generate gamma radiation. The figures show the spectrum of the x-ray and gamma photons in all these processes. The first graph shows roughly that one photon is emitted out of the calorimeter for every neutron initiated in the Pd wire. The energy range is very large, spanning 3 orders of magnitude. The first drawn conclusion is that when a large water bath surrounds a LENR reactor, the neutrons are absorbed, but gamma photons are created. The second graph shows what a NaI detector spectrum would look like, for this same simulation. The small NaI detector is recording 8530 x-rays and gamma events, with peaks of gamma occurring at 511keV and 2.2 MeV. In the talk more E_{beam} results will be reported. The radiation signature from high energy electron and proton from the Pd electrode will also be presented.

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Spontaneous Nuclear Fusion

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One of the consequences of the electron screening effect is that the cross sections for reactions between charged nuclei have a minimum value. Below certain energy the cross section is almost constant and its value is close to the value at the energy of the electron screening potential. Such behavior has recently been observed [1] in the reaction between two deuterons. Due to such behavior the nuclear reactions become measurable even at thermal energies. We have in a low background environment measured signals of the right height to be interpreted as protons from the nuclear reaction between two deuterons. They were measured in a thin silicon detector facing a specially prepared deuterium loaded palladium foil. Despite our best efforts, we could not observe any electrons or positrons that were predicted to originate from the same nuclear reaction [2]. I will also discuss our new results on the Z dependence of electron screening and on the difference between protons and deuterons as target nuclei, as well as on the palladium foil preparation.

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Advancing LENR Frontiers: AI-Upgraded Knowledge Base, Dashboard Evolutions, and Chatbot Assessments ON-LINE

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This abstract presents updates on the Low Energy Nuclear Reactions (LENR) Knowledge Base, emphasizing expansions in theoretical and experimental papers and reports; advancements in the LENR Dashboard; and evaluations of the developed chatbot. Since the 1989 Fleischmann-Pons announcement, LENR research has yielded over 5,000 papers and reports, embodying rigorous investigations by hundreds of international researchers amid constraints of underfunding and fragmented literature dissemination. To mitigate these challenges, the AI and Predictive Analytics Laboratory at New York University in collaboration with Prof. David Nagel has refined the LENR Knowledge Base, curating a comprehensive repository of reformatted documents segmented into paragraph-level files for optimal AI integration. This enhanced base underpins the updated LENR Dashboard at lenrdashboard.com, which incorporates four principal AI modules: Semantic Search for semantically driven inquiries, Learning Clusters for thematic categorization, Document Similarity algorithms for expedient retrieval of pertinent papers, and a hallucination-resistant ChatBot for literature-grounded interactive queries.
Extending this infrastructure, the novel experimental LENR ExpertFusion AI chatbot embodies a multi-large language model (LLM) ensemble decision-support system, amalgamating techniques such as LLM aggregation, chaining, and unsupervised machine learning to deliver robust, retrieval- augmented generation capabilities for discourse, query resolution, and intricate task assistance in specialized fields like LENR—a prospective avenue for sustainable, low-cost energy.
ExpertFusion surpasses baseline LLMs in empirical assessments via the Retrieval-Augmented Generation Assessment (RAGAS) framework on tailored domain-specific queries, yielding superior performance in answer relevancy (up to 0.91), context precision (up to 0.83), faithfulness, and semantic congruence. Rigorous testing of these tools has underscored the efficacy of the chatbot in corroborating their applicability for bolstering experimental design, research orchestration, and nascent commercialization initiatives, with preliminary publications emerging from these efforts. Freely accessible via lenrdashboard.com, the refined Knowledge Base, LENR Dashboard, and LENR ExpertFusion Chatbot cater to LENR practitioners, prospective entrants, investors, engineers, scholars, educators and students. The architecture is extensible to sectors including finance, healthcare, and governance. This initiative is supported by the Anthropocene Institute, incorporating contributions from more than 14 NYU student researchers mentioned in the ABOUT section in: https://lenrdashboard.com/.
Three reports from this project have been completed so far [1-3]

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Two-Stage LENR Plasmoid Vortex Reactor
(ON-LINE)

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In this work, study of measuring the power balance in the output heterogeneous plasma flow created in a plasmoid vortex reactor (PVR) were continued. In our previous works [1], it was shown that the interaction of hydrogen ions (created from water steam by a pulsed electric discharge) with metallic nano-clusters results in significant release of thermal energy, generation of intensive soft X-rays and neutron-like particles. Metallic nano-clusters in PVR were created as a result of significant erosion of the nickel cathode in this reactor, operating on a testing mixture of argon + water steam. To create a heterogeneous plasma (HP), a pulse-periodic discharge with the following parameters was used: - current amplitude up to 100A, discharge voltage of the order 500-1500V, pulse duration of the order 20 microseconds, pulse repetition rate of the order 20 kHz. On the surface of the exposed cathode, in the optical spectra and X-ray spectra of the HP, the appearance of many transmuted chemical elements was detected, which were absent in the spectra of the initial electrodes and reactor wall materials. Among them, a significant concentration of the following elements *Li, C, Al, Ca, Cu, Zn* was found. Lines of strongly excited and multiply charged ions of these transmuted elements with an excitation energy of **20÷100 eV** were observed in the optical spectra of this HP also. The parameters of the HP were the following: - electronic temperature T_e~ 0.7-1eV, N_e~10^{14} cm^{-3}, gas temperature T_g= 4000-5000C. The maximum of continuous X-ray radiation was located in the quantum energy range E~ 1-1.5 keV. Thus, it is possible to suggest that specific high-energy LENR reactions occurred in this PVR. It is important to note that during these reactions, a significant release of thermal energy and significant production of a cheap hydrogen occurs in this reactor [1]. In the course of this work, it was found that created hydrogen atoms and hydrogen ions in the output HP outflow can effectively interact with an output nickel pipe arranged behind the outlet nozzle of the PVR, Fig.1. The pipe itself was heated to 1000-1500C by this interaction. Such heating of the output nickel pipe caused additional significant heating of the output HP flow. Its temperature increased from 500C without a pipe to 1500C with a pipe. Thus, two-stage heating of the HP outflow was implemented in the PVR at the first time: 1-step - during the interaction of ionized hydrogen with erosive metal nano-clusters inside this reactor, 2 - during the interaction of hydrogen atoms and ions with the walls of an output nickel pipe. The typical COP value obtained in PVR in this two-step regime was about COP_2= 8-10 (comparing COP_1~4 in one-step regime).

Figure 1. General view of the PVR installation. 1 – reactor anode, 2 – nickel cathode, 3 – stainless steel outlet pipe, 4- measuring thermocouple

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ENG8 Presenting the EnergiCell 100KW Thermal Power Plant

Haslen Back - ENG8 International Limited
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www.ENG8.energy, Contact: Valeria Tyutina, CEO, info@eng8.org, +44 7983004275

ENG8 refers to its LENR reactors as EnergiCell®s. The power generating systems have the following main components: an EnergiCell, fluid pump(s), plasma generator, and a control system.

EnergiCells work by creating a plasma field inside the EnergiCell, where the working fluid, in the presence of a catalyst (including condensed plasmoids), is ionised and subjected to high voltage, high frequency, high amplitude, electricity.

The EnergiCell environment creates the conditions for LENR reactions, including fission, fusion and hydrino effects to occur. This is evidenced by transmutation of the elements in the working fluids to other elements or to lower-energy-stage atoms and by production of excess energy in the form of photons (heat) and electrons (electricity). The most common elements used by ENG8 are hydrogen and oxygen from water; the most common elements produced are helium and carbon. The image opposite shows a 100-kilowatt thermal power generator that ENG8 is launching later this year to enable ENG8 to supply energy as a service. EnergiCells currently produce the following energy outputs and specific COPs:

- Steam: up to 100atm/310ºC - Q/COP 7-10
- Gas (including air): 1,000ºC - Q/COP 7-10
- Electricity: Q/COP 5-7 plus COP 3 thermal
- Hydrogen & Oxygen: COP 6

Based on current equipment costs, ENG8 is targeting generation costs of circa €15/MWh.

Technology Readiness Level (TRL) Reached For The Moment - TRL4/5

Following decades of LENR R&D by its team members, the technical development teams are now focusing primarily on application engineering solutions using mainly commercially available off the shelf components (COTS). Current development includes:

100 kW Modular Steam Generator. This system utilises a water cycle EnergiCell with a COP of 7-10 to drive a compound rotary steam expander. The design incorporates a plasma generator capable of providing up to 25kW of input power to produce up to 200kW of thermal power at 100 ATM. This output is sufficient to drive a rotary steam expander with a three-phase alternator to generate the required input electricity. Engineering is scheduled for completion this year, with thermal energy sales commencing in Q4. Hydrogen and oxygen can be produced with a COP of six in a similar system.

100Kw Electricity Generator. The current system utilises a hydrogen cycle EnergiCell that is designed for 10kW of input electrical power to produce 70kW of electricity. This needs its capacity increasing to enable 150kW of electricity output considering system losses including conversion losses of 25% when stepping down from 100kV high frequency DC to 400 volts AC, leaving 100kW-e to sell after the systems electrical power needs. Development is planned for completion in 2027.

100 kW Modular Hot Air /Gas Generator. Portuguese industrial electricity prices are approximately €110/MWh and oil & gas heating costs exceeding €100/MWh. With a system COP 8, €110 of electricity can produce € 790/MWh-thermal (€100 x 8 less €110) less any sales discounts offered.

Electronics Power Supply. In October 2025 ENG8 had a small EnergiCell system independently validated as self-powering. A commercial product suitable for licensing to electronics equipment manufacturers such as Samsung, Apple, Bosch, etc is expected to take a further two to three years to develop. Concurrently a small sub one kilowatt generator will be developed for poverty alleviation

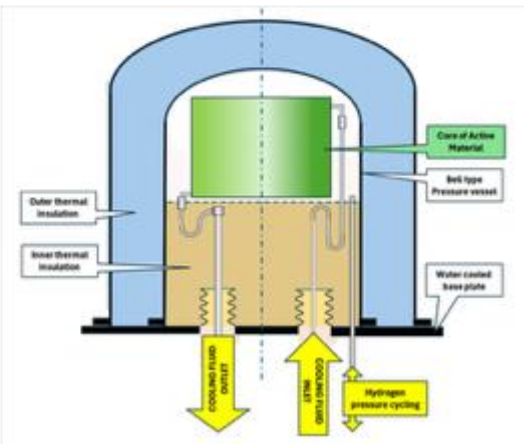
A LENR Based Reactor (LBR)

#Jacques Ruer[1], Jean-Paul Bibérian[2], Arnaud Kodeck[3], Christophe Le Roux[4], Robert Michel[5], Mathieu Valat[6] [1]EEMH, France -[2]Aix-Marseille University, France, [3]LAKOCO, Belgium [4]CNRS, France, [5]VEGATEC, France, [6]University Szczecin, Poland -Email: jsr.ruer@orange.fr

The CleanHME *European project gave the opportunity to perform some experiments on active materials loaded by gaseous hydrogen. These active materials are easily produced from hydrotalcites precursors containing nickel and other metals and processed as metallic nanoparticles embedded in a powdered matrix of alumina. Calorimetry tests at high temperature proved that Anomalous Heat Effect (AHE) is produced in a fully reproducible manner [2]. AHE increases progressively following temperature and pressure/vacuum cycles.
Based on the laboratory results, engineering studies have been pursued to design useful reactors able to deliver heat at high temperature. The basic process data and the basic design of the reactor are presented. The use of hydrogen at high temperature introduces some constraints that are discussed. The control philosophy of the reaction power is introduced. The maintenance of the reactor and the recycling method of the spent powder are explained.
LENR Based Reactors can deliver heat at a temperature level sufficient for conversion into electrical energy. They consume minute quantities of hydrogen and common metals. They are safe because they contain only a small inventory of hydrogen at low pressure and they don't generate dangerous emissions.
The next development step will concern the manufacture of a prototype that will be used to select the most economical operating protocol and find out the ultimate lifetime of the active powder before recycling.

The CleanHME project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 951974. This work reflects only the author's view, and the European Commission is not responsible for any use that may be made of the information it contains.

[1] J.P. Biberian and al. – Excess Heat in Nanoparticles of Nickel Alloys in Hydrogen – JCMNS Vol 38, 186-195, May 2024



Schematic view of a LBR. The active material is arranged in a bell-type enclosure. The inner volume atmosphere is hydrogen. A separate gas loop exports the heat for external use.

Aureon Power Generation

Montgomery Childs[1], #Michael Clarage[1,] Jano Onderco[1], Jason Lickver[1], Paul Anderson [2]
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We present the results of using electromagnetic stimulation to split the Thorium and Uranium nuclei into benign daughter elements in an aqueous solution.
Subsequent quantitative analysis at an accredited laboratory with Inductively Coupled Plasma (ICP) and Gamma Spectroscopy confirmed a decrease of thorium concentration by ~80% and uranium by ~75%.
The reaction was carried out in a tubular metal reactor under electromagnetic stimulation. Two concentrations of the mix of Th232 and U238 were used (a high and low) and the subsequent element distributions were similar between both, indicating a common mechanism of accelerated decomposition to a high concentration of benign magic number daughter elements.
A large exotherm was also noted, so much so that the power was decreased by ~3/4 to maintain safe working pressures. Steady state pressure, temperature, and super-heated steam were maintained for ~2 hours.
Blank runs using the identical carrier solution without thorium addition resulted in no exotherm and required full power to maintain the same temperature and did not obtain a steady state temperature or pressure.
Future work is planned to study reaction pathways to develop a mechanistic route for control of the exotherm, as well as quantify the net heat output using advanced modeling and simulation, calorimetry, neutron and gamma detection, and statistical design of experiments.

We present current plans for the commercialization of micro reactors.

What is the meaning of COP?

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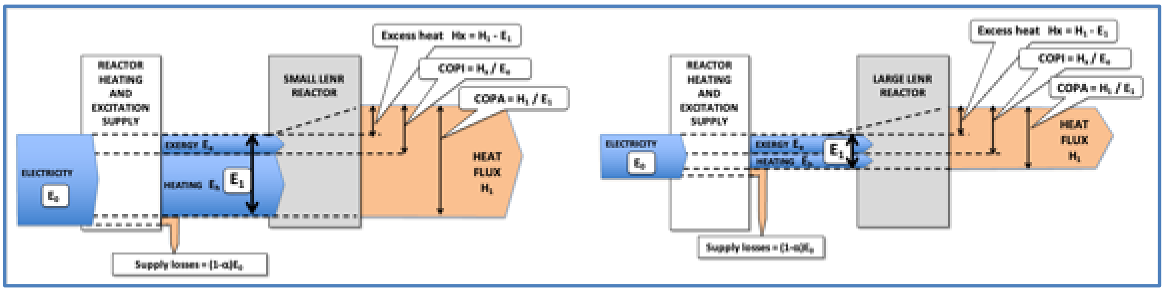
In many papers concerning LENR experiments the excess heat observed is reported as a COP value. The COP (Coefficient of Performance) is the ratio of the energy output to the energy input in the system. Unfortunately, this ratio does not represent the intrinsic quality of the LENR reactor [1]. The evaluation of the COP depends on the input energy considered. If the energy balance is not clearly detailed, a low COP value may lead to the conclusion that this particular LENR reactor is not very efficient, when a closer evaluation could show the contrary.
Let us consider reactions that are triggered by an activation method that consumes some electricity. The figures below illustrate that we can make a distinction between the Apparent COP (COPA) and the Intrinsic COP (COPI). When the reactor must work at high temperature the relative heat losses are much larger for small devices than for large ones. The COPA integrates the heating as energy input and strongly depends on the reactor size. A low COPA measured with a small experimental setup does not mean that this technology would not be of interest when applied in large reactors. Increasing the size simplifies the thermal insulation and improves the COPA. The COPI considers only the exergy of the activation method. The ratio between the quantity of active material and the exergy required for its activation remains more or less constant and is more representative of the potential value of the LENR technology.
The COP also depends on the boundary limit of the system considered. If the heat converter is included in the evaluation, the converter may be able to deliver both the energy required for the activation and energy exported. In this case it may be thought that the COP is infinite. Indeed, the COPA as defined above can never be infinite. Some activation energy is always required, so that the COPI can also never be infinite.
On the other hand, when the excess heat is zero the COPA cannot by definition be lower than unity provided all losses are dully accounted.
As a conclusion, when LENR results are reported, it is strongly recommended to detail the energy balance instead of a simple COP value that may not be meaningful to assess the potential of the technology.



Comparison of the Intrinsic (COPI) and Apparent (COPA) Coefficients of Performance between small and large reactors characterized by different relative heat losses

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Possible Optimization, Universalization, and Application Options for Gas-filled LENR Systems

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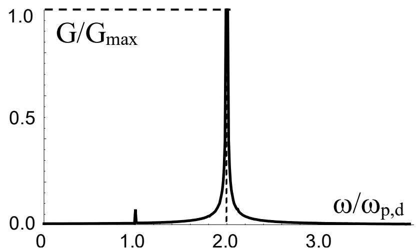
The traditional application of LENR technology using a closed gas-filled chamber with an external heater is based on the model of saturation of the metal hydride walls with hydrogen as a result of thermal diffusion with passive anticipation of subsequent stimulation of LENR in metal lattice. Such processes are typically associated with the influence of dynamic deformation of the metal hydride lattice and the associated change in electron density on tunneling effect and subsequent $({}_{z}X^{A}+p)$ nuclear fusion involving implanted hydrogen atoms. They occur only in the near-surface layer of a deformed metal hydride. This process is typically only possible once for each implanted atom, at the moment of such deformation. These systems are characterized by a typically small COP=1.5-2. The report discusses methods of LENR stimulation in oprtimized gas-filled systems.
The first of these methods involves providing unlimited repeating conditions for (d+d) LENR reactions throughout the entire deuterium-filled volume of the working chamber with arbitrary non-nuclear-active walls by using an alternating magnetic field $H(t)=H_0 \sin \omega t$ with optimal combination of frequency $\omega = 2\omega_d \equiv 2eH_0 / M_d c$ and amplitude H_0 (see Fig.). This condition ensures the periodic formation of coherent correlated states (CCS) of deuterons, which are characterized by long-lasting and giant energy fluctuations $\delta E \geq G^2 kT \approx 50-80\,keV$ at $kT \leq 1-10\,eV$ [1,2]. Their duration δt exceeds the total time required for the tunneling process and the duration of dd-reaction. This condition explains all LENR anomalies [1]. Here $G \gg 1$ is the coefficient of correlation efficiency.



Another perspective type of LENR reaction in the same system can be realized by additionally filling the working chamber with an unoriented bundle or coil of ordinary empty carbon nanotubes (CNTs). The natural mutual random spatial distribution of such nanotubes allows for the formation of similar correlated states and giant energy fluctuations δE of deuterons in the space near these nanotubes, followed by repeated interactions of locally accelerated deuterons with carbon nuclei. With this modification, continuously repeating LENR reactions $C^{12}+d=N^{14}$ with a large COP are possible in this system. It should be noted that during prolonged operation of such systems, some of the carbon nanotubes may evaporate, forming deuterated methane molecules CD_4. These molecules are also effective basis for the same long-term LENR fusion with participation of free deuterons.
An additional method for further optimizing of LENR in similar gas-filled system involves using conventional hydrogen and fluffed, unoriented bundles of boron nitride nanotubes (BNNTs), which are used in electronics, aerospace materials, and biomedical applications. In such a modified alternative system enables time-unlimited $B^{11}+p=3He^{4}$ LENR reaction at using the optimal alternating magnetic field with frequency $\omega = 2\omega_p \equiv 2eH_0 / M_p c$ (see Fig). These BNNTs have very high heat resistance and mechanical strength. It is very important for future self-controlled and time-unlimited gas-filled LENR systems.

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Measurement of Slow-Neutron–Equivalent Flux During Heavy-Water Electrolysis

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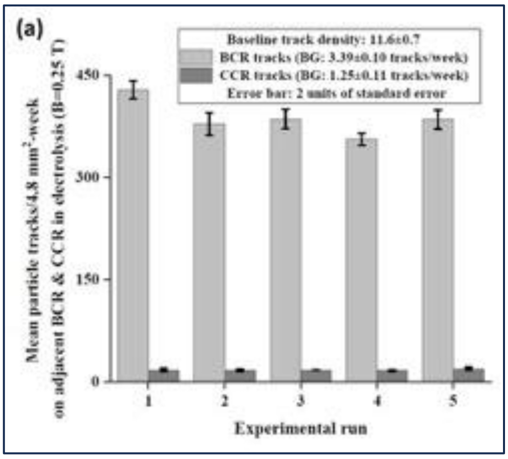
We report reproducible slow neutron track-detector signals during heavy-water (D_2O) electrolysis involving deuterium–palladium (D–Pd) deposited on a platinum cathode [1]. Sensitivity to slow neutrons was achieved using boron-coated CR-39 (BCR), which recorded charged-particle tracks produced via $^{10}B\ (n, \alpha)\ ^{7}Li$ reaction. Identically prepared uncoated CR-39 detectors (CCR), positioned adjacent to the BCRs, were used as controls to quantify background contributions from charged particles and fast neutrons. A reproducible differential detector response (BCR > CCR) therefore serves as an indicator of slow neutron equivalent fluence [2]. Across multiple independent D_2O electrolysis experiments conducted under an applied magnetic field of 0.25 T, the BCR detectors consistently exhibited significantly higher track densities than the corresponding CCRs [see Fig. (a)]. The measured differential response corresponds to an inferred detector-equivalent slow-neutron flux of approximately $(8.0 \pm 0.5)\ cm^{-2}\ s^{-1}$. Removal of the magnetic field resulted in a reduction of the differential signal by a factor of approximately six, indicating a strong empirical dependence on the applied field. In contrast, electrolysis performed in light water (H_2O) under otherwise identical conditions produced no measurable differential detector response, demonstrating the necessity of deuterated electrochemical conditions for the observed effect. An important implication of these results concerns nuclear experiments involving deuteron beam irradiation of electrochemically prepared deuterium-loaded targets, in which neutron yields are measured to infer reaction rates within the target material. Low-level neutron-equivalent activity of the type observed here may contribute to measured neutron signals and should therefore be considered in background characterization.



The present study also establishes a validated passive-detector protocol for measuring low-intensity neutron-equivalent signals, particularly suitable for long-duration experiments in which active neutron detectors are impractical.

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Nuclear Reactions in Cavitation Jet in Deuterated Benzene

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Building on my previous work with deuterated titanium powders in heavy water [1], I report on the neutron and gamma emissions from a cavitation jet emanating from a high-pressure Teflon nozzle in deuterated benzene (C_6D_6), with and without admixture of small amounts of deuterated titanium nanopowder (TiD_x).
The main objective of the study is to achieve a triboelectric glow in benzene, recreating the strong electrostatic effects previously reported by Koldamasov [2] (Fig. 1), and to investigate the possibility of controlled nuclear fusion in the liquid-flow reactor of a new design (Fig. 2).

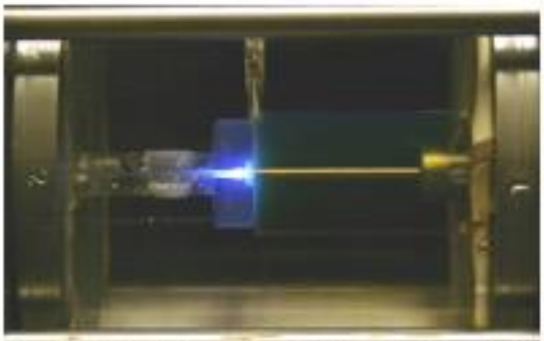

Fig. 1. Oil jet glow due to triboelectric effects.

Fig. 2. Next-generation liquid flow reactor.

The secondary objective of this study is to stress-test the new and improved EM-noise-resistant Neutron-X and Gamma-X neutron and gamma detectors and thus provide the condensed-matter nuclear science community with a new, improved, and easy-to-use set of tools for robust radiation detection [3].

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Predictable non-natural isotope synthesis and its relationship to excess heat

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On the April 23, 1998[1], Professor. George Miley asked Professor Martin Fleischmann:

"What I wanted to ask you about:
since you're talking about the future - you've left the whole field of transmutations out. What is your view of that"

Martin's conclusion in his response was:

"I think if you have a distribution of isotopes which are not natural… then you really have to believe it."

On the 14th June 2021, it was predicted [2] that in the heat producing cavitation reactor of Bin-Juine Huang et.al., the observed carbon would be the result of producing first ^{17}O from ^{1}H and ^{16}O, with two ^{17}O subsequently yielding carbon and neon. It was subsequently found [3] that the most likely reactions according to the hypothesis, yielding ^{17}O and ^{22}Ne, were observed, which is interesting as *these are both the rarest isotopes of their respective elements*.
This understanding allowed a new evaluation of other observations including those of Sundarasen and Bockris [4] in 1994 and more recently, the 2024 observations of Gamberale and Modanese [5]
.
The simple logic of the predictive approach used, will be reviewed and shown to explain the excess heat and rare isotope distributions observed in these experiments as well as potentially why we see particularly abundant isotopes of certain elements in nature.

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Modular LENR Reactor for Ni/Pd -H-Systems - Pressure-Triggered Responses and Nuclear Signatures.

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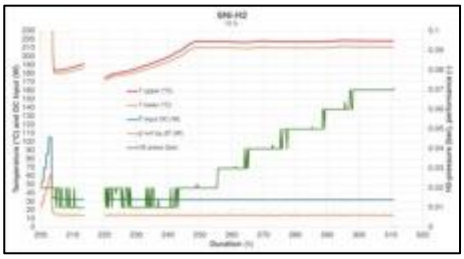
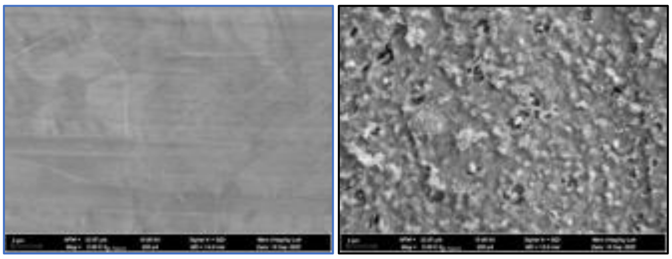
This work summarizes a decade of experimental development in the field of low-energy nuclear reactions (LENRs), inspired by the 2014 'Lugano Report' by scientists from the universities of Bologna and Uppsala [1]. The report's description of anomalous heat generation in nickel-hydrogen systems was the basis of a systematic investigation by our small team of engineers. Initially, we used simple, disposable, double-walled reactors containing nickel powder and lithium aluminium hydride ($LiAlH_4$) as the hydrogen source. Further experiments were conducted because of occasional uncontrolled temperature events and changes in the metal powder. Following Piantelli and Focardi's discovery in 1989 [2], [3], we switched to using sealed nickel foils in a hydrogen atmosphere. These exhibited signs of nuclear activity in the form of carbon deposits on small craters at low pressure.

To improve control and reproducibility, a modular reactor featuring a flange was developed to allow the material to be changed easily. Nickel foils with ring stack geometry were used in this reactor and were excited by inductive heating, which was increased from 33 kHz to 100 kHz, as well as by reference operation with direct current resistance heating. Systematic pressure manoeuvres (pressure reduction, operation under low pressure, and pressure surges) enabled standardized testing. It was found that nickel foam or pure nickel did not produce consistent results. By contrast, Pd/Ni-coated nickel foils (80:20 w%) exhibited consistent temperature and elemental anomalies following pressure reduction. Repeated spontaneous gas developments require clarification. Figures 1 and 2 show the typical temperature progression and morphological changes. Technical nickel foil and H_2 produced a coefficient of performance (COP) 1.87 at 673 °C, but hardly any elemental anomalies.

Fig. 1: Temperature effect Ni- **Fig. 2a, b: SEM Ni foil before and after reaction**





Surface analysis (SEM/EDX) revealed a consistent pattern of small, scattered holes in the coating, as well as melt zones and enrichment of carbon, oxygen, aluminium and silicon. Bulk isotope analyses showed no significant deviations, indicating surface activity. A crucial finding was that thermal and chemical effects do not occur simultaneously: pure palladium coatings exhibit little heat generation, but significant elemental shifts. Hydrogen (H_2) was found to be more effective than deuterium (D_2).

We hypothesize that, under defined pressure and adsorption conditions, a Pd/Ni interfacial mechanism is activated. Artifacts (e.g. heat transfer and impurities) have been ruled out. The next steps proposed are independent COP measurements with an accurate energy balance under standardized pressure conditions, and scaling with multiple stacks.

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Developing practical technologies for radionucleide remediation

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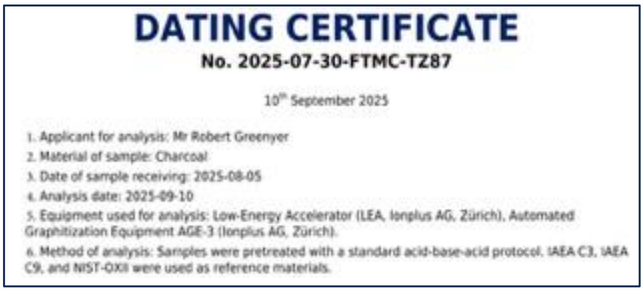
In a world increasingly demanding new carbon-free energy sources, a major stumbling block to commissioning new nuclear power generation is the subject of radioactive waste.
In 1957, Ivan Stepanovich Filimonenko claimed production of excess energy alongside Hydrogen, Helium, and Oxygen Isotopes using a palladium heavy water reactor [1]. Due to its operating temperature of 1150°C, it was called warm fusion. Furthermore, it was reported that the apparatus emitted some form of radiation that reduced the half-lives of radionuclides and/or suppressed radioactivity [2]

Later, Parkhomov showed evidence that matter over 1000°C in the presence of hydrogen or passing through water could produce a kind of radiation that would also trigger reactions at a distance [3] . Brown reported radionuclide de-activation using oxy-hydrogen plasma in 1980s [4]. More recently Klimov has reported reduced detection from a gamma ray source in the locality of hydrogen-oxygen plasma vortex reactors for up to two days [5]



DATING CERTIFICATE
No. 2025-07-30-FTMC-TZ87

10th September 2025

1. Applicant for analysis: Mr Robert Greenyer
2. Material of sample: Charcoal
3. Date of sample receiving: 2025-08-05
4. Analysis date: 2025-09-10
5. Equipment used for analysis: Low-Energy Accelerator (LEA, Ionplus AG, Zürich), Automated Graphitization Equipment AGE-3 (Ionplus AG, Zürich).
6. Method of analysis: Samples were pretreated with a standard acid-base-acid protocol. IAEA C3, IAEA C9, and NIST-OXII were used as reference materials.

Kladov[6] and Ohmasa[7] observed radionuclide de-activation in water cavitation systems, the former having the observation verified posthumously using Soviet Hydro-wave technology.
The conversion of Cs-137 into Ba-138 has even been achieved biologically in a water based medium by Kornilova and Vysotskii [5]

We will present new data from three experiments exploring technology for the rapid deactivation of radionuclides, including a new non-contact method derived from understanding the above observations. These simple-to-repeat observations could form the basis for energy enabling practical technologies.

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Self-controlled Nuclear Fusion in Warm Hydrogen Gas with Random Distributed Molecular Fragments of Heat-resistant Nanomaterials

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The traditional justification for the feasibility of nuclear fusion in a gaseous medium or low-temperature plasma requires a continuous, high-power external stimulus to heat the medium to the very high temperature required to overcome the Coulomb barrier of interacting nuclei. Importantly, even in the case of optimized LENR systems with $LiAlH_4$, continuous control action in the form of constant intensive external heating or an external variable magnetic field is considered essential.
This report examines the prerequisites and conditions for the implementation of self-regulating low-temperature fusion reactions stimulated by the preliminary interaction of a selective (by velocity near v_{opt}) fraction of free hydrogen or helium nuclei (p, d, He^4), in a state of gas thermodynamic equilibrium, with randomly distributed small-sized molecular fragments of heat-resistant (up to 3000°C) optimal nanomaterials (graphene, nitrides Si_3N_4, carbides SiC, B_4C, titanium boride TiB_2). It has been shown that the passage of these selective nuclei through the free part of the internal structure of such fragments leads to the formation of superposition coherent correlated states (CCS) [1,2] and very large fluctuations in their energy (up to $\delta E \approx 30-50 keV$). This process leads to the possibility of subsequent nuclear fusion involving both the nuclei of these fragments and the unaccelerated nuclei of the surrounding warm gas. The formation of such states in a given system is possible when an optimal relationship is achieved between its basic parameters (velocity and mass of the particle, geometric structure and parameters of the interatomic space potential of a specific nanomaterial fragment), which also depends very strongly on the gas temperature.
The fundamental feature of this method of local virtual super-acceleration, leading to subsequent nuclear fusion, is associated with the initial use of a selective, moderately high-speed region of the natural Maxwellian distribution at a relatively low gas temperature of about 1000-2000°C. The subsequent very significant increase in energy is associated with the specificity of self-similar coherent correlated states formed on the basis of these particles by parametric resonance [1,2].
This self-controlled method differs fundamentally from the force-based method of generating similar initially weakly accelerated protons or other nuclei by initiating an "electric corona discharge" near the surface of a nanotube [2] or by using "standard" acceleration of a proton beam in the volume of gas towards distant micro or macro targets [3].
Analysis shows that the following types of nuclear fusion reactions are possible in such systems

$$d + d = H^3 + p,\ B^{12} + p = C^{13},\ C^{12} + d = N^{14},\ N^{14} + d = O^{16},\ C^{12} + He^4 = O^{16}.$$

Another advantage of this combined two-stage self-controlled nuclear fusion is that, due to the relatively high temperature (compared to standard chemistry conditions), there is no "contamination" of the key heat-resistant nano-structural fragments in these systems caused by typical chemical "sticking" of surrounding gas atoms. This significantly increases the long-term stability of such controlled LENR fusion systems.

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Cold Fusion Explained at the Operational Level (ON-LINE)

Edmund Storms
Santa Fe, NM, USA

All phenomena of nature create two separate questions needing an answer. The scientific question asks WHY a process occurs, and the engineering question involves HOW the process works. These two questions are only marginally related. Either question can be correctly answered without knowing the answer to the other question. The cold fusion discovery has been handicapped by an overemphasis on the scientific question. Instead, this paper focuses on HOW cold fusion works and HOW it can be made useful. A successful answer would allow the creation of an infinite COP, which is the only way the successful application can be achieved.

Beyond the Lab: Making LENR Visible (ON-LINE)

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This workshop introduces the Solid State Fusion and Anthropocene Institute initiatives to document the history and evolving trajectory of the field through oral history and public-facing scientific storytelling. In collaboration with independent archivists and historians working in the field, the project contextualizes key experimental and institutional developments for both technical and broader audiences. We will summarize completed work, outline upcoming research and communications projects, and describe plans to expand the oral history archive. The session will invite feedback on priorities and scope. The goal is to strengthen continuity, preserve institutional memory, and support the field by ensuring its scientific and historical record is accurately captured and clearly communicated.

LEC/EDEC and LENR

#Frank Gordon[1], Harper Whitehouse[1], M. Seth Gordon[2], George Kerber[3]
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The ability of an Electrophysical Direct Energy Converter (EDEC) such as the Lattice Energy Converter (LEC) to produce electricity has been independently replicated by multiple individuals. While the authors have provided electrophysical explanations for these results [1], this presentation examines experimental data from multiple experiments that strongly suggest that discrete localized LENR events are the source of energy.

In a 1929 Nobel Laureate address titled "Thermionic phenomena and the laws which govern them" Sir Owen W. Richardson describes an apparatus similar to the LEC where he states: "It consumes nothing and the apparatus has no moving parts." In order to avoid perpetuum, he suggested "… since it works at constant temperature, … the contact potential difference V_{12} is not completely independent of the distance between the two bodies."[2] While the LEC utilizes contact potential difference and the separation distance between the electrodes is important, the power produced by those parameters alone is several orders of magnitude lower than that which the LEC produces. There must be another source of energy.

This presentation includes experimental data from the time of the 1989 announcement by Professors Fleischmann and Pons to recent experimental LEC results. A video will show localized hot spots resulting in significant localized transient temperature increases. Not only does this support the possibility that thermionic phenomena contribute electron emissions, but independent analysis of the hot spots concludes that LENR nuclear events are the source of energy. Exactly how the LENR events are produced is not addressed.

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Advances in LEC/EDEC Material Selection

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Previous work on the Lattice Energy Converter (LEC) and Electrophysical Direct Energy Converter (EDEC) devices focused on the use of palladium (Pd) [1] and iron (Fe) [2] as 'active' hydrogen-occluded hydrogen host material (HHM). The search to identify high performance low-cost alternatives to Pd 'active' HHM continues. Here it is shown that nickel (Ni) can be used as the 'active' HHM at temperatures under 100°C. Prior work with nickel focused on relatively high temperatures in the 500-800°C range [3]. Nickel particulate was electrodeposited on a Ni high work function (HWF) electrode to form a composite electrode. A plane-parallel style LEC cell was constructed with the Ni composite electrode and a magnesium (Mg) low work function (LWF) counter electrode separated by capacitor paper and then placed in a hydrogen environment. Care was taken during the material handling, construction, final assembly, and pressurization to minimize the possibility of chemical reactions. During testing an anomalous temporally-discrete voltage event was observed causing rapidly increasing voltage as a function of time and with decreasing load resistance. This data shows that Ni can be used at significantly lower temperatures than previously reported, and as a low-cost alternative to Pd 'active' HHM. A possible interpretation of this event is that there was an anomalous reaction due to the hydrogen-occluded HHM.

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Advances on KEPLER SOLID-STATE FUSION GENERATORS

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The technology of "Solid-State Fusion Diodes" was proposed to convert the energy of nuclear reactions taking place in condensed matter into electricity.
For some years, positive results have been obtained by several teams and patents filed.
The author summarizes some recent advances on the use of the Entenmann-Gordon Effect in this poster.

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How to build a LEC

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The Lattice Energy Converter has been discovered by Gordon and Whitehouse [1]. Frank Gordon contacted me in July 2020 and under his directions I duplicated their experiment. Later I increased the surface of the electrodes and obtained more current. A LEC is composed of two surfaces, the active one could be made of many different materials, but with a thin layer of palladium at its surface. The counter electrode could be of different materials. The coaxial cylindrical configuration is the easiest to do.

Most people doing electrochemical deposition of palladium use $PdCl_2$ dissolved in water. As electrolyte. However, when I started this work, I had only $PdBr_2$. The problem being that it does not dissolve in water. Any palladium-based compound is very expensive, so I tried to dissolve it in alcohol and acetone, without success. I had some acetonitrile, and happily it dissolved $PdBr_2$. So, all my successful first experiments were made using $PdBr_2$. When I ran out of $PdBr_2$, I decided to do as everybody else does, and I used $PdCl_2$. Unfortunately, I was very unsuccessful, they all failed. Lately, I decided to go back to what worked for me, and I bought $PdBr_2$, and I again became successful.

In my talk, I will give very precise indications about how to do the deposition correctly. If the deposit is shining, there is no LEC effect, it must be black. Other parameters are surface state of the electrode, thickness of the deposit, current density and deposition time.

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About Possibility for Design of LENR Reactor

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New nuclear technology based on successfully performed replicable experiments of cold nuclear fusion reactions [1, 2, 3] is the basis for design of novel LENR energy sources. The experimental scheme consists of a gas chamber where the samples of a preheated constantan wire are placed and where the interaction of these samples with injected deuterium gas takes place. As a result of the interaction, energy and helium gas (^3He and ^4He) are released. The released energy causes an increase of both the temperature and the brightness of the constantan wire and an appearance of a glow in the reactor chamber (Fig.1 and Fig.2). The experiments were carried out at initial temperatures of the constantan wire in the interval T = 660^{0}C – 950^{0}C, as the increase of the temperature of the constantan with an additional ~400^{0}C occurs for the corresponding time interval from 30 seconds to under 1 second, the density of the generated power in the constantan is in the interval 105 W /g – 2280 W/g, and the <output power>/<input power> ratio is in the range ~4 – 16 (and more) for the corresponding experiments. No radiation (gamma rays and neutrons) was recorded in the experiments. The energy release has been shown to be of nuclear origin (non-electrical and non-chemical).

Fig. 1. Before constantan-deuterium interaction

Fig. 2. During constantan-deuterium interaction

These experimental outcomes can be considered as a sufficient basis for further design of novel LENR fossil free, carbon emission free, radioactive free and weather independent energy source without radioactive waste. The source can be used for either off-grid or on-grid electrical power supplies. The source uses deuterium gas as fuel. The anticipated costs pertaining to two source types and the comparisons between the costs of their output powers with the cost of the grid electrical power at present are provided in the table below. Also, it can be shown that the energy of the LENR reactors will be cheaper (in times) than the energy coming from the solar panels and from the wind farms.

LENR Source	Output power	Source cost	Cost (US$/kWh)	Cheaper than el. grid
Single Household	10 kW	US$14,700.00	US$ 0.032	3.64 times
Reactor	1000 kW	US$670,000.00	US$ 0.008	14.18 times

Artificial Intelligence (AI) will be used in development and in the optimization of the operation of the LENR reactors. The AI achievements of the team in this field will be presented in IWAHLM17.

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Optimization of Control Parameters in Cold Nuclear Fusion Systems via Deep Learning Surrogates

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Optimization of operating conditions in Cold Nuclear Fusion (CNF) experiments is frequently challenged by the non-linear dynamics of metal-hydrogen systems and the high resource cost associated with exploring high-dimensional parameter spaces. This paper presents a data-driven methodology for identifying optimal control parameters by leveraging historical experimental time-series data. We introduce a specialized Deep Long Short-Term Memory (LSTM) neural network architecture [1] capable of modelling the complex temporal correlations between system inputs, impulse features, and thermodynamic responses.
To derive optimal operating conditions, we implement an optimization algorithm that utilizes the trained LSTM network as a differentiable surrogate model. By defining target performance metrics—characterized by specific statistical moments such as the mean, standard deviation, and extrema of the system's response—we employ gradient-based optimization techniques [2] to iteratively refine the input parameter space. This process minimizes the loss function between the model's predicted output and the desired target metrics, effectively retrieving the optimal configuration of control variables.
The proposed framework demonstrates that optimal parameter sets can be mathematically derived from existing datasets, providing a systematic and scalable approach to enhance experimental reproducibility and reaction stability. This method reduces reliance on heuristic trial-and-error procedures, enabling more efficient exploration of the CNF reaction environment.

Fig. 2 The reactor used for CNF experiments

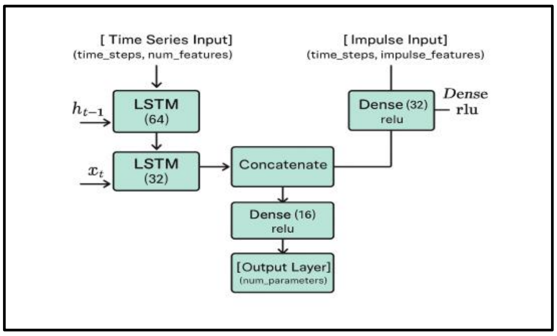

Fig. 1 Block diagram of neural network

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Investigation of ratio parameter for optimized LENR

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This study reports continued investigations of Low Energy Nuclear Reactions (LENR) in solid-state systems conducted in the Semiconductor Research Laboratory at Lakehead University. Previous experiments demonstrated reproducible excess heat generation accompanied by helium production, with a strong correlation between these effects [1, 2]. In the latest reported work [3], we have determined the optimal initial temperature for energy release to be 535 °C.

Ideally increasing in the temperature creates significantly higher energy output, however it creates momentary evaporation of the constantan wire and is not sustainable for constant energy release [1. 2]. Therefore, the present work shifts the focus from temperature to the role of **deuterium injection relative to no-injection conditions** as the primary control parameter governing reaction sustainability and energy output. Experiments were performed at three distinct injection-to-no-injection ratios, as the initial temperature remained the same in all three – 535 °C.

When investigating optimal operating conditions in earlier temperature-focused studies [3], a transient temperature decrease of approximately 8 seconds was consistently observed at the onset of deuterium injection, prior to the establishment of net heating from the reaction. This initial cooling effect is attributed to the introduction of deuterium at room temperature, which temporarily reduces the overall specimen temperature upon entering the reaction chamber. After this interval, the reaction compensates for the thermal loss and produces a sustained increase in temperature.

The primary objective of the present work is to mitigate the cooling effect associated with room-temperature deuterium injection. An initial approach considered preheating the deuterium prior to injection; however, this option was excluded due to laboratory technical constraints and safety considerations. As an alternative strategy, the effect of modifying the deuterium injection–to–no-injection ratio was investigated, based on the hypothesis that adjusting this ratio could reduce or eliminate the transient cooling of the specimen.

The first experiment was conducted using a 1:1 injection-to-no-injection ratio and produced results comparable to those reported in previous temperature-based investigations, including the characteristic initial temperature drop.

In the second experiment, a 11:7 injection-to-no-injection ratio was employed. Under these conditions, the initial 8-second temperature decrease was not entirely eliminated, however it was reduced to 10-degree difference, compared to the 25–30-degree difference in the other two experiments, consistent with the proposed hypothesis. In addition, the temperature peaks became more stable and exhibited a higher average value, indicating an increase in overall energy output.

A third experiment was performed using a 4:5 injection-to-no-injection ratio. In this case, the initial temperature drop was reduced by approximately half but was not completely suppressed, suggesting a non-linear dependence of the cooling effect on the injection ratio. Given the Mass spectrometric analysis of the evolved gases supports a nuclear origin of the observed excess energy.

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Modelling excess heat in PdD_x

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We have long worked toward the development of new models to describe excess heat and other anomalies in PdD_x. Progress up to late 2024 was documented in [1,2]. Since then, we have worked to correct errors in the models, and to develop better versions.

The latest version models excess heat as a coherent process [3], which fixes a problem with the 2024 model. We recently focused on developing estimates for the rate at which energy goes from the fusion transition to the Pd nuclei, and separately the rate at which the excited Pd nuclei transfer energy to the lattice oscillators [3].

The coherent rate at which energy is transferred from the fusion transition, from a naïve estimate based on the transition matrix element divided by hbar, is low by 9 orders of magnitude from what is needed to connect with experiment. We had originally thought that this could be made up through Dicke factors (which gives numbers close to what is needed), but the model that results is not compatible with experiment for other reasons. More recently, we noticed that the missing factor can be made up by the number of pathways that contribute, leading to the model currently under study.

We developed a naïve estimate for the rate at which energy is exchanged from the Pd nuclei to phonons and plasmons, which was higher than what is needed to connect with experiment by an order of magnitude or so. Since then, we have developed a much-improved formulation (based on a dressed nuclear ground state), which fixes a problem with the nuclear ground state in the naïve model and leads to a reduced energy exchange rate. We expect the energy exchange rate will be reduced by about an order of magnitude in this better version of the model, and be close to what is needed.

We have also developed a finite basis formalism for the new model, which will allow (realistic) simulations in terms of coupling parameters that are natural to the model.

It is possible to implement a “quick and dirty” version of the model based on simple rate equations that track the energies in the different components of the coupled system, which provides intuition as to what the model does and how it works.

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Low-Energy Nuclear Transmutations and a Process that Ensures the Conservation of Angular Momentum

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The aim of this work is to prove that Low-Energy Nuclear Transmutations may be performed by a process that emerges due to change in spin orientation of virtual photons created by quantum objects taking part in low-energy nuclear transmutations.

The processes that determine the execution of low-energy nuclear reactions are the following.

1) According to Feynman's theory [1], virtual photons are created by quantum objects which are features in electric and/or magnetic fields. The virtual photon has the properties of spin vortex (precessing spin and electric dipole moment) and is produced in physical vacuum characterized by inner angular momentum. The schematic image of virtual photons is shown in Figure #1.

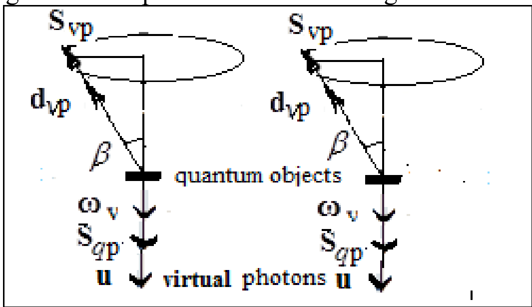

Figure #1. The schematic image of virtual photons created by positively charged quantum objects with parallel spins ($\mathbf{S}_{qp}$) constituting orthohydrogen.

Characteristics of the virtual photons: $\mathbf{S}_{vp}$ are spins; $\mathbf{d}_{vp}$ are electric dipole moments; $\boldsymbol{\omega}_{v}$ are frequencies of precession; β are angles of deflection; **u** are velocities.

2) As a result of electric dipole-dipole interaction of virtual photons (Figure #1), inversion of one of the parallel oriented electric dipole moments ($\mathbf{d}_{vp}$) of virtual photons and simultaneously inversion of spin ($\mathbf{S}_{vp}$) related to the moment takes place. The inversion is accompanied by generation of energy [2].

3) The reorientation of spin of virtual photon means the reorientation of angular momentum in physical vacuum and, in accordance with the law of conservation of angular momentum, the process compensating the changes in angular momentum emerges. The moment related to the inertial properties of the physical vacuum may be a characteristic of this process. That is, this moment is the main characteristic of the process that ensures the conservation of angular momentum. (This is the same process that defines Newton's first law (law of inertia) [3]). This moment while acting on electric dipole moments of virtual photons of quantum objects can cause, firstly, the energy generation, and, secondly, the reorientation of these electric dipole moments in physical vacuum. The changes in orientations of electric dipole moments of virtual photons act on characteristics of quantum objects creating these virtual photons and in such a way on the structure of chemical elements containing these quantum objects. Thus, the transmutations of chemical elements can take place.

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LENR as a Nucleosynthesis Reaction

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The LENR is not a fusion process, but a nucleosynthesis one. This nucleosynthesis is based on the generation of the neutron, then proton mass from the Higgs boson.
This paper shows how the masses of the neutron and the proton are derived from the decay of the Higgs boson into charm and strange quarks. The nucleosynthesis of He-4 is examined on the basis of the mass structure of the neutron and proton as generated by the Higgs boson mass. The mass relationships between He-4 and H-2, H-3, and He-3 are demonstrated. These nuclei are then used to investigate the mass structure of He-5, Li-6, Li-7, Be-8, Be-9, B-10, B-11, C-12, C-13, C-14, N-14, N-15, O-16, and O-17.
The goal of nucleosynthesis theory is to explain the large differences in elemental abundances through natural processes. Hydrogen and helium are by far the most abundant elements. The next three elements—lithium, beryllium, and boron—are comparatively rare. After hydrogen and helium, oxygen is the most abundant element in nature. The purpose of this paper is to explain the discrepancy in abundance among these first elements of the Periodic Table and to describe the nucleosynthesis pathway from helium to oxygen. The binding-energy structures of these elements are analyzed in order to explain this apparent anomaly. The stability of oxygen-16 results from both its α-cluster structure and its binding-energy configuration. According to the author's theory, nucleosynthesis does not stop at helium or the α particle, but proceeds step by step through successive α additions.
The following sections show how the He-5 nucleus is structured, as well as the structures of Li-6, Li-7, Be-8, Be-9, and subsequent nuclei up to O-17. This process operates at the level of the Higgs boson, during the massification/demassification stage that occurs prior to the electronic stage, which itself is a consequence of this massification/demassification process. This framework explains why LENR is possible. While classical hot fusion exists, it occurs only once nuclei have reached the electronic stage, at which point the Coulomb barrier must be overcome.
To determine the binding energy of light nuclei, the following hypothesis is adopted: each nucleus (starting from He-4) possesses a substructure composed of α particles. Neutrons and protons in excess of the α particles can form H-2, H-3, and He-3 substructures or clusters. Thus, once a nucleus contains two neutrons and two protons, its structure corresponds to that of an α particle. When a nucleus consists of x α particles plus two neutrons and two protons, its structure becomes equivalent to (x + 1) α particles. This is consistent with the Ikeda diagram, which describes light α-conjugate nuclei as system composed of α clusters, as follows:

$x\alpha + N,\ x\alpha + P$

$x\alpha + 2N,\ x\alpha + N + P,\ x\alpha + 2P$

$x\alpha + 3N,\ x\alpha + 2N + P,\ x\alpha + 1N + 2P,\ x\alpha + 3P$

$x\alpha + 4N,\ x\alpha + 3N + P,\ x\alpha + N + 3P,\ x\alpha + 4P$

$x\alpha + 2N + 2P = (x + 1)\alpha$

Neutron Production via Electron Capture by Coherent Protons

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We investigate a mechanism for neutron production at low energy and ambient conditions via electron capture (EC) enabled by coherent vibrational states of protons and conduction electrons within metal hydrides [1]. In standard vacuum, EC is suppressed by a ~782 keV threshold due to the proton–electron mass deficit. Previous theoretical approaches to ultra-low-momentum (ULM) neutron production invoke collective or electromagnetic effects, but do not provide a rigorous mechanism capable of justifying the emergence of a localized quantum of energy E > 782 keV required to overcome the neutron production threshold, as discussed in Ref. [2].

In contrast, within highly loaded metal hydrides, collective quantum coherence can supply the required energy through a large number of correlated degrees of freedom. The theoretical framework adopted here is Coherent Quantum Electrodynamics (CQED), developed over the last three decades [3], which has proven to be the appropriate tool for the description of a wide range of condensed-matter phenomena. CQED identifies as a constitutive element of matter the existence of coherent configurations, which in many systems determine the very properties of atomic or molecular aggregation. Within this framework, Coherence Domains (CDs) form, where matter fields oscillate in phase with a self-generated electromagnetic field and acquire an energy gap per particle (~1 eV), enabling macroscopic energy concentration.

We model the multi-particle initial and final quantum states of proton and electron plasmas and derive the EC transition amplitude within a coherent many-body quantum field formalism. The decay rate within a single CD scales quadratically with the number of coherent protons ($N_p \approx 1.2 \times 10^{13}$) and is strongly enhanced with respect to incoherent EC, allowing the weak-interaction threshold to be exceeded without introducing new fundamental interactions.

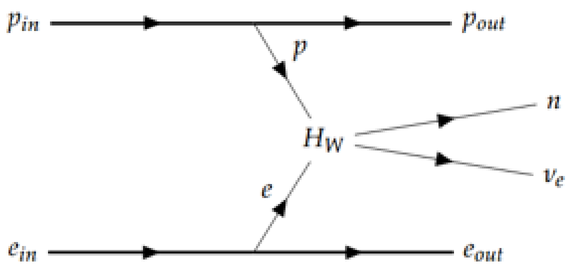

Figure 1. Feynman diagram for the coherent neutron production.

Beyond neutron generation, the theory also provides a self-consistent description of the down-conversion mechanism through which nuclear-scale energy released in coherent processes is redistributed among collective excitations and ultimately degraded into thermal energy, offering a unified framework for neutron production and heat generation in condensed-matter nuclear systems.

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Quasifusion: P-P Energy Conversion in Low Energy Capture Reactions (LECR)

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Protons do not fuse without neutron formation. Bethe's reaction $p + p \rightarrow d + e^+ + \nu_e$ for the first phase of solar fusion, implies the conversion of a proton into a neutron by β^+ decay: a positron is produced which annihilates into double gamma (1,022 MeV). The reaction involves *two distinct steps*: a) The formation of a neutron by weak interaction and b) The formation of a deuteron by strong interaction. It concerns a loop, a mutual reinforcement of lepton/hadron interactions converting (LHCL) mass energy by e- and n-capture nuclear reactions (LECRs). Reaction a) *requires* 0,782 MeV to bind an electron to a proton: Mn-(Mp+Me). Reaction b) however *delivers* 2,224 MeV: Md-(Mp+Mn). This results in a net gain of Qd = 1,442 MeV [1].

There are two problems with this Qd. 1) The annihilation of the positron in CM systems is not accounted in the Q as locally recoverable energy. 2) The reaction with an electron called p-e-p has an experimental cross section of practically zero (exp. ς=0). As for 1) the positron production and conversion into γ for p-p fusion takes place only because of the deuterium reaction directly following. This way the *positron rule* is surpassed (Mdaug.-Mpar. ≥ 1,022 MeV). As for 2) the p-p reaction without a positron in the Sun delivers but 0.42 MeV, with a cross section 400 times higher, but even in the sun rarely happens. This led to the assumption that direct imitation of stellar p–p fusion via LECRs is infeasible: we cannot copy the sun's energy production by LECR, not even with a tokamak [2].

The good news of LENR is that we with lattice confined and plasma energized hydrogen, that by the LHCL appears to make some annihilation energy recoverable, can deliver excess energy by neutron production, resulting in tritium (d + n -> T + 6.257 MeVγ) and further nuclear $(D+e^-)$ quasiparticle induced isotopes and transmutations. But the bad news is that we have difficulty explaining this by the p-p chain because of the formal neglect of positron annihilation and the ς=0 chance of e-capture.

Studying the LENR bookkeeping of the LHCL process in LECRs however, the headache of the positron catch and the e-capture hurdle can be overcome by uniting *three steps* of experimental p–p fusion into one formula. **Step I**: an input of ~1.8 MeV, associated with electron–neutrino balance and spacetime expansion effects, enables free-neutron production and yields **1.022 MeV** gamma via β^+ decay with prompt electron–positron annihilation. **(Bn-1)**.

$$p + e^{-}_{amb} + 1{,}804 \text{ MeV} \rightarrow n + 2\,\gamma + \upsilon_e$$

Step II next implies the engagement by electrochemical conversion (lattice/plasma) of a part of the step I gained gamma into a heavy electron e* [3] with an effective mass of **≈ 0,782 MeV,** capable of producing by its capture a *bound neutron* without a positron **(Bn-2).**

$$p + e^{*} \rightarrow n_b + \upsilon_e$$

Because of the positron rule this can, by the Bethe chain, only happen when *at the same time* in **step III** a deuteron is synthesized with the bound neutron of step II, delivering **2,224 MeV (Bd)**

$$p + n_b \rightarrow d + \gamma$$

Combined into one first phase LECR 3p reaction, these three steps result in a **Qq of 2,464 (Bd+Bn1-Bn2).** The Qq thus found matches the result of Fleischmann and Pons' first CF announcing article [4]. This value was historically controversial, as its physical origin could not be explained within then-available models. Now their result no longer seems to have been an instrumental artefact. We may name this LENR process **Quasifusio**n, for only β^+decay and LECR is involved and no Coulomb barrier or any exotic process but the production of a heavy electron is involved. Quasifusion overall offers a bookkeeping-consistent pathway for proton–proton energy conversion in condensed matter.

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The Zitter Unit Cell

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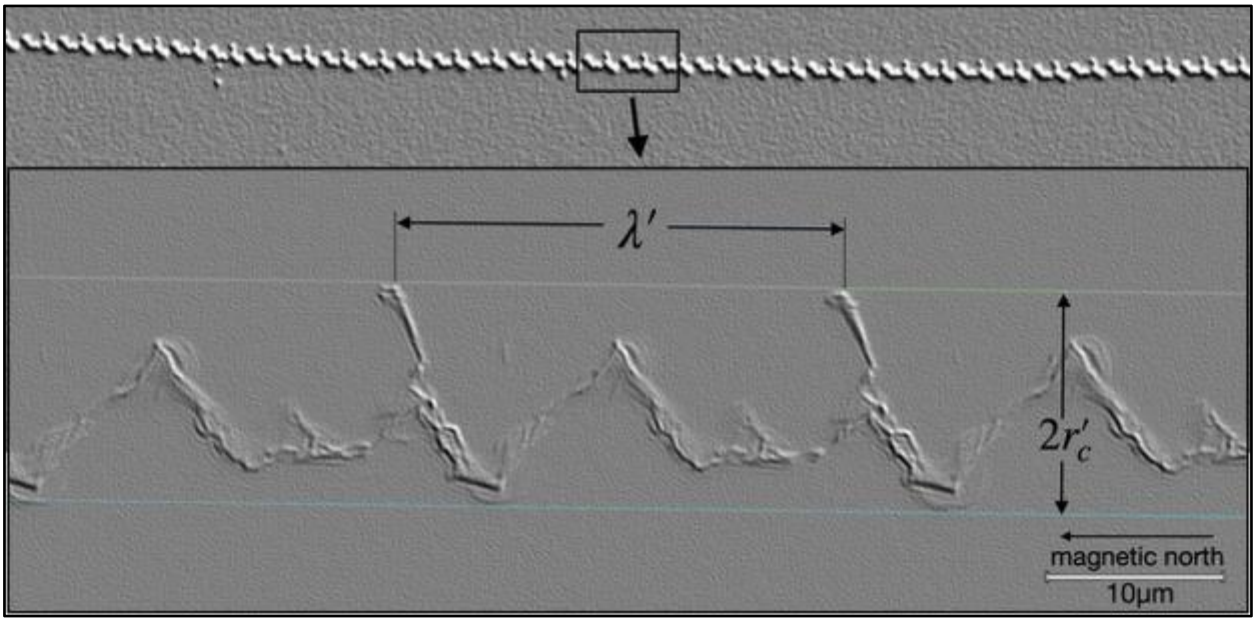
Novel experiments recently performed in our laboratory are reported where signals resembling magnified electrons have been observed in periodic *tracks* of wavelength $\lambda' = \lambda_e\alpha^{-4}$ (where λ_e is the wavelength of the electron and α is the fine structure constant), in layered dielectric detectors inside of a solenoid or the ambient environment. These tracks exhibit the central relation of electron zitterbewegung (or zitter), $\bar{\lambda}_e = \lambda_e/2\pi$, transformed by α^{-4} to $\bar{\lambda}' = \lambda'/2\pi$, as well as radial and axial oscillations manifested in the 2D unit cell as quantized ranges of *spatial* track radii and *temporal* pitch. These tracks correspond mathematically to electron zitterbewegung, but with two anomalies: the α^{-4} size offset and the detection of the de Broglie traveling wave rather than the intrinsic wave. Transformation of the detected angular frequency to the electron's resolves both anomalies and suggests an interpretation of the detection of $v > c$ waves as $v < c$ waves due to a relativistic observation. The electron analog behavior (magnified by α^{-4}) supports the Hestenes zitter model and enables an unprecedented direct study of the electron and a new tool to explore the vacuum.

FIG. 1. Segment of 2663μm track losing energy from right to left. Inset: Unit cell of $\lambda'/r'_c = \phi = 25.59\mu m/6.52\mu m \approx 5\pi/4$.



POSTER PRESENTATIONS

POSTER PRESENTATIONS	
D.S.Szumski	Cold Fusion Theory
D.S.Szumski	Consequences of Cold Fusion Theory
V.F.Chibisov, I.V.Chibisov	Multi-electron model of LENR
M.Menichella, F.Galli, G.Parchi*	Why LENR Transmutations Cluster into Five Mass Ranges: A Geometric Explanation
P. Hatt	LENR as a Nucleosynthesis Reaction
E.F.Marano	Development of multi-purpose data acquisition boards based on the Theremino software system
POSTERS PARALLEL TO ORAL PRESENTATIONS	
S.K.Velide	Low Energy Nuclear Reactions based Clean Energy System: Application of Pons-Fleischmann Electrolysis-based Cold Fusion & Widom-Larsen Model

Cold Fusion Theory

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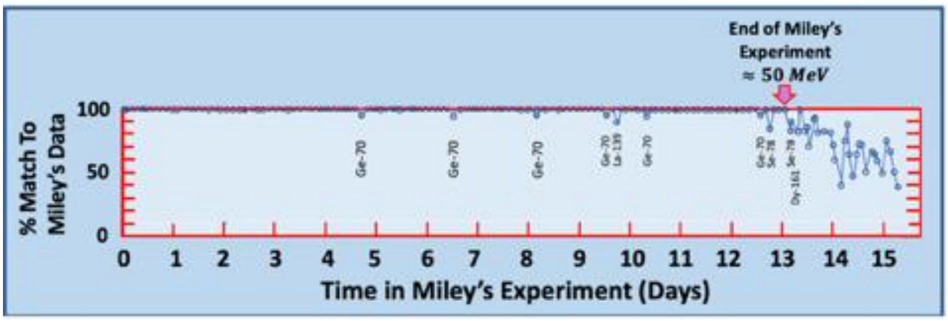
A theory is a collection of ideas and concepts that describe how a physical process works. A model on the other hand translates those concepts into a mathematical framework, and assigns numerical values to the equation's coefficients, such that the theory matches experimental data. In this presentation I explain cold fusion theory, and illustrate how it is translated into a model that calibrates(2) well against George Miley's nuclear transmutation data(3).

Cold fusion's fundamentals are rooted in the thermodynamics of reversible processes(1). These are processes that occur at the very limits of the Second Law where all processes are perpetual, and all events are exactly deterministic. Let's see how theory allows this kind of exotic behavior.

First, how is the energy stored…and, in a way that we can't detect it? It is stored as single gamma photons being emitted, then absorbed by metal hydride nuclei,… then reemitted…then absorbed…reemitted…reabsorbed…in perpetuity. This electromagnetic energy localization is what is called a Mössbauer nuclear bond. It is a true reversible thermodynamic process.

So, where is that energy coming from? It is from a most unexpected place. It begins as the kinetic energy of protons, that are 'quieted' as they adhere to the surface of the metal hydride lattice, And because this is a reversible process environment, and only because it is a reversible process environment, the kinetic energy of motion is allowed to become the electromagnetic energy within those nuclear bonds. I want you to see that the continual influx of protons adds energy to those nuclear bonds until the energy reaches the threshold for the next fusion reaction. I'll be showing you how that next nuclear reaction is 'selected for' in this model.

So, the next fusion reaction occurs, with either of two outcomes. If its product is stable, it becomes another nuclei that is available for subsequent fusion reactions. However, if it is unstable it decays the only way that it can…along the well-known nuclear decay pathways…thereby releasing excess heat. The paper compares nuclear transmutation and excess heat calculations to George Miley's observations(3) (below).



[1] D.S. Szumski, "Nickel Transmutation and Excess Heat Model using Reversible Thermodynamics", J. Condensed Matter Nucl. Sci. 133 (2014) 554-564.
[2] D.S. Szumski, "Initial Calibration of the Least Action Nuclear Process Model Using George Miley's Published Data, submitted to J. Condensed Matter Nucl. Sci. (2023).
[3] Miley G., J. Patterson, "Nuclear Transmutations in Thin-film Nickel Coatings Undergoing Electrolysis", J. New Energy, 1 (1996), 5-38.

Consequences of Cold Fusion Theory

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Cold fusion theory finds that excess heat results from the decay of unstable nuclear fusion products(1).

Experimentalists measure this excess heat, but always in disappointingly small quantities relative to the input power requirements. I want to show you how a calibrated model of the cold fusion process can provide useful insights into the design of a commercial cold fusion device.

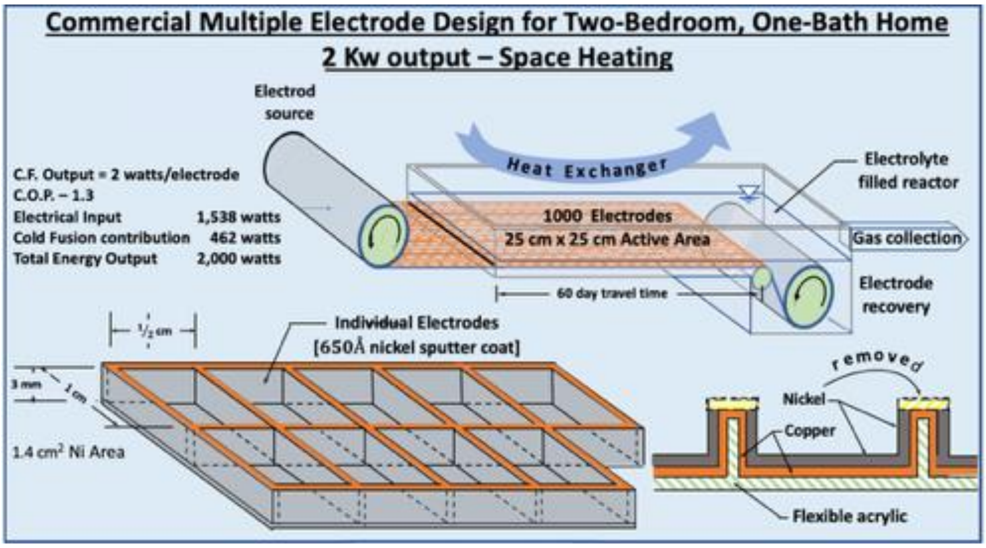
For example, cold fusion theory tells us that the fusion process is strictly sequential. Every fusion event and its contribution to excess heat is completed, before the next fusion event can occur. And because the excess heat from a single nuclear event is in the 1-4 watt range, that should be our expectation from an operating cold fusion electrode. I'll be showing you how cold fusion theory allows us to amplify this output.

Similarly, the commonly observed surface cracking on electrodes has theoretical foundations that inform design. I'll be describing the theoretical reasons underlying cracking, and demonstrate how this theoretical insight informs the design of a commercial device.

Theory suggests opportunities for other design enhancements. These include:

- The role of input current in the overall heat budget;
- Why commercial applications are limited to heating, and not electricity;
- Opportunities to design electrode materials to optimize excess heat;
- Designing electrodes to enhance the production of rare earth's and other metal's;
- He-4 production
- Recycling opportunities

The presentation illustrates a space heating design for a two bedroom, one bath home, and how this device incorporates theory based enhancements.



[1] D. S. Szumski, "Nickel Transmutation and Excess Heat Model using Reversible Thermodynamics", J. Condensed Matter Nucl. Sci. 133 (2014) 554-564.
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[3] Miley G., J. Patterson, "Nuclear Transmutations in Thin-film Nickel Coatings Undergoing Electrolysis", J. New Energy, 1 (1996), 5-38.

Multi-electron model of LENR

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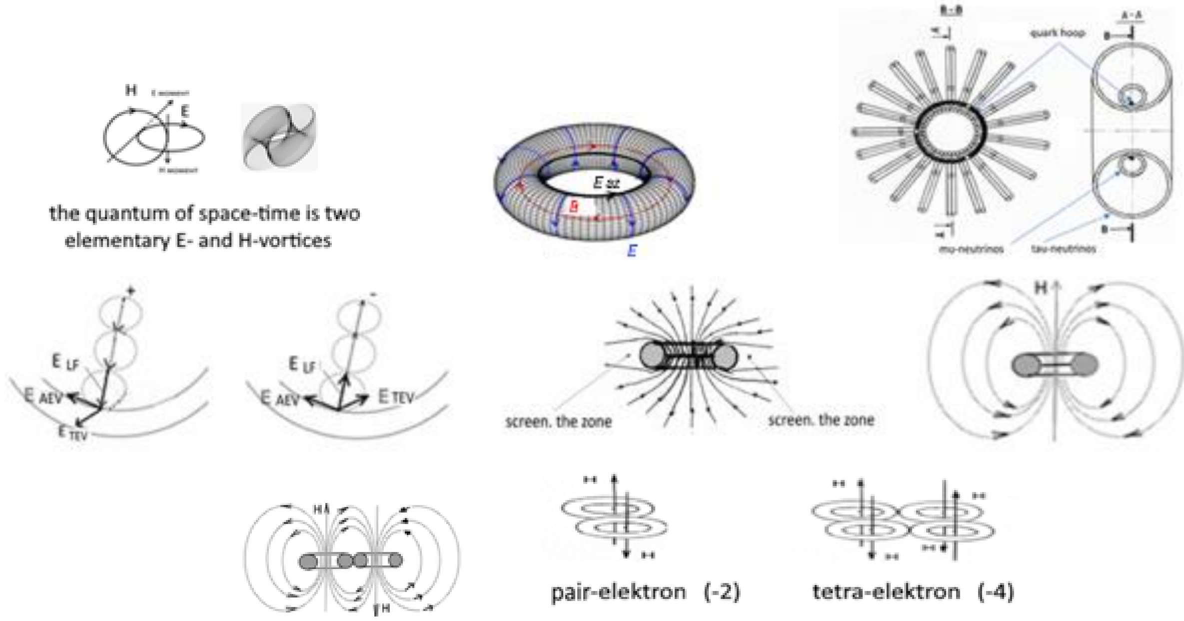
The authors plan to present their paper as a poster presentation.

The paper presents a theoretical topological model of known experimental data on LENR reactions, taking into account the quark Standard Model and the hypothetical preon structure of nucleons and electrons.
The proposed models are based on the quadrupole model of the quantum spacetime, which deterministically predicts the formation of simple preons, such as Zeldovich anapoles with an additional azimuthal electric vortex, which constitute all particles of matter with mass [1, 2].



The discussion of LENR reaction models is structured into four stages (steps).
Step 1: Formation of pairs and multi-electrons.
Step 2: LENR fission reactions by electron pairs.
Step 3: LENR fusion reactions by multi-electrons.
Step 4: Formation of strange radiation particles.

The report proposes four experimental setups for testing the preon structure of matter particles and the proposed LENR reaction models.
A specific practical application of the presented LENR reaction model could be its use in decontaminating radioactive waste by irradiating it with a measured flux of pairs and multi-electrons.

[1] Chibisov V.F., Chibisov I.V. «Corpuscle-Simple Theory of Everything (Physical Models)», International Journal of Quantum Technologies, v 1(1), 01-31, 2025.

[2] V.F. Chibisov «Four steps of LENR reaction (multi-electronic reaction model)», PROCEEDINGS of the 28-th RUSSIAN CONFERENCE on COLD NUCLEAR TRANSMUTATION of CHEMICAL ELEMENTS and BALL LIGHTNING, p. 156-176, ISBN 978-5-4499-5056-7.

Why LENR Transmutations Cluster into Five Mass Ranges: A Geometric Explanation

Mario Menichella[1], Federico Galli [1, 2], Ugo Abundo[1], Guido Parchi[1]

[1]FutureOn Srl, Rome, Italy - [2]Sapienza University of Rome – DIEE.

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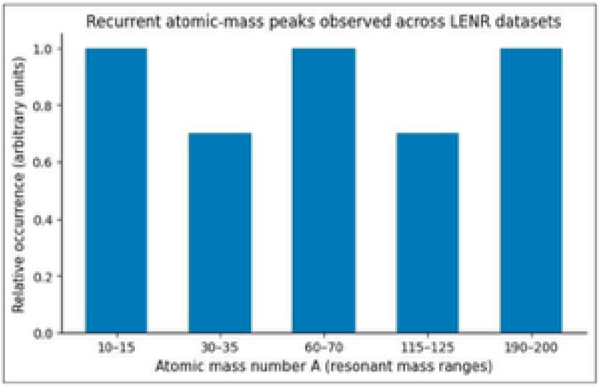
Over more than three decades of Low Energy Nuclear Reactions (LENR) research, a persistent and highly non-trivial experimental pattern has repeatedly emerged: nuclear transmutation products cluster into five narrow and reproducible atomic-mass ranges (see Fig.1), largely independent of materials, experimental setups, or laboratories. Remarkably, the same five mass regions also appear in low-energy accelerator experiments investigating electron screening effects.



While the existence of these five mass peaks has been clearly documented – most notably by Nagel and others – their physical origin remains an open question. In this contribution, we present a geometric interpretation of the five mass peaks observed in LENR experiments, based on resonance conditions between nuclear dimensions and ultra-slow neutron-like interaction wavelengths hypothesized in picometric, coherent electromagnetic structures, within the Zitterbewegung- based framework developed by Vassallo and collaborators.

The proposed approach offers a unified perspective on transmutation data from LENR studies and on anomalies produced by electron-screening effects, and highlights the role of geometry and coherence at the picometric scale in selecting preferred nuclear mass regions.

References:

[1] Nagel, David J., "Potential Correlations between Apparent Peaks in LENR Transmutation Data and Deuteron Fusion Screening Data", J. Condensed Matter Nucl. Sci. 39, pp. 295–321, 2025.

[2] Czerski, Konrad, et al., "Experimental and theoretical screening energies for the 2H(d,p)3H reaction in metallic environments", European Physics Journal, vol. A 27, s01, pp. 83–88, 2006.

[3] Kasagi, Junichi, et al., "Screening Energy for Low Energy Nuclear Reactions in Condensed Matter" in J.-P. Biberian (Editor), "Cold Fusion: Advances in Condensed Matter Nuclear Science", Elsevier, pp. 167–187, 2020.

[4] Widom A. and Larsen L., "Nuclear Abundances in Metallic Hydride Electrodes of Electrolytic Chemical Cells", arXiv:condmat/0602472 v1, 20 Feb 2006.

[5] Celani, Francesco, et al., "Maxwell's Equations and Occam's Razor", J. Condensed Matter Nucl. Sci. 25, pp. 100–128, 2017.

[6] Vassallo, Giorgio, "Charge Clusters, Low Energy Nuclear Reactions and Electron Structure", J. Condensed Matter Nucl. Sci. 39, pp. 220–240, 2025.

[7] Menichella, Mario, "The Pico-Physics Revolution", Independently published, ISBN: 979-8-2435-1914-4, January 2026.

LENR as a Nucleosynthesis Reaction

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The LENR is not a fusion process, but a nucleosynthesis one. This nucleosynthesis is based on the generation of the neutron, then proton mass from the Higgs boson.

This paper shows how the masses of the neutron and the proton are derived from the decay of the Higgs boson into charm and strange quarks. The nucleosynthesis of He-4 is examined on the basis of the mass structure of the neutron and proton as generated by the Higgs boson mass. The mass relationships between He-4 and H-2, H-3, and He-3 are demonstrated. These nuclei are then used to investigate the mass structure of He-5, Li-6, Li-7, Be-8, Be-9, B-10, B-11, C-12, C-13, C-14, N-14, N-15, O-16, and O-17.

The goal of nucleosynthesis theory is to explain the large differences in elemental abundances through natural processes. Hydrogen and helium are by far the most abundant elements. The next three elements—lithium, beryllium, and boron—are comparatively rare. After hydrogen and helium, oxygen is the most abundant element in nature. The purpose of this paper is to explain the discrepancy in abundance among these first elements of the Periodic Table and to describe the nucleosynthesis pathway from helium to oxygen. The binding-energy structures of these elements are analyzed in order to explain this apparent anomaly. The stability of oxygen-16 results from both its α-cluster structure and its binding-energy configuration. According to the author's theory, nucleosynthesis does not stop at helium or the α particle, but proceeds step by step through successive α additions.

The following sections show how the He-5 nucleus is structured, as well as the structures of Li-6, Li-7, Be-8, Be-9, and subsequent nuclei up to O-17. This process operates at the level of the Higgs boson, during the massification/demassification stage that occurs prior to the electronic stage, which itself is a consequence of this massification/demassification process. This framework explains why LENR is possible. While classical hot fusion exists, it occurs only once nuclei have reached the electronic stage, at which point the Coulomb barrier must be overcome.

To determine the binding energy of light nuclei, the following hypothesis is adopted: each nucleus (starting from He-4) possesses a substructure composed of α particles. Neutrons and protons in excess of the α particles can form H-2, H-3, and He-3 substructures or clusters. Thus, once a nucleus contains two neutrons and two protons, its structure corresponds to that of an α particle. When a nucleus consists of x α particles plus two neutrons and two protons, its structure becomes equivalent to $(x + 1)$ α particles. This is consistent with the Ikeda diagram, which describes light α-conjugate nuclei as systems composed of α clusters, as follows:

$x\alpha + N,\ x\alpha + P$

$x\alpha + 2N,\ x\alpha + N + P,\ x\alpha + 2P$

$x\alpha + 3N,\ x\alpha + 2N + P,\ x\alpha + 1N + 2P,\ x\alpha + 3P$

$x\alpha + 4N,\ x\alpha + 3N + P,\ x\alpha + N + 3P,\ x\alpha + 4P$

$x\alpha + 2N + 2P = (x + 1)\alpha$

Development of multi-purpose data acquisition boards based on the Theremino software system

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Many LENR experiments require custom hardware to accomplish their objectives.
In all cases, data acquisition systems are a fundamental part of the setup. They perform multiple functions: gathering data from sensors at an established rate and precision, and eventual processing, displaying and saving it for storage and further analysis.
In recent years, many open-source systems have become available to a broader audience. The ability to design and produce custom-made PCB boards has also never been easier for anyone [1].
The present paper will describe the use of the Theremino system [2], a versatile, powerful, and modular open-source project, to research-grade experiments. We also describe the development of multi-purpose printed circuit boards to measures voltages, currents (see Figure 1 as an example), and other quantities, and to integrate it with other hardware.
In particular, some features of the system are:

- Up to 24-bit of native resolution
- 16 channels, expandable to 256
- Acquisition of positive and negative DC voltages (up to 500V)
- Acquisition of AC voltages in the kHz range
- Acquisition of AC and DC currents via shunt amplifiers
- Acquisition of temperatures via RTD (Pt100 or Pt1000)
- Reading and controlling devices using serial port (e.g. power supplies or RF devices)
- Modularity (different numbers and types of adapters can be selected based on needs)
- Easy intercommunicability between different devices and software
- Low cost

A few applications of the system in real LENR experiments will be shown.

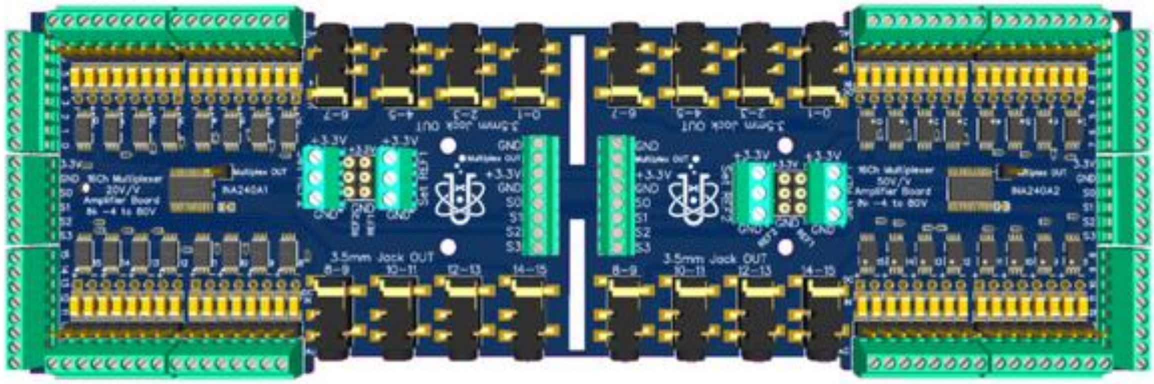

Figure 1: Example of an adapter board meant to measure AC or DC currents from up to 32 channels.

[1] https://jlcpcb.com/
[2] www.theremino.com

Low Energy Nuclear Reactions based Clean Energy System: Application of Pons-Fleischmann Electrolysis-based Cold Fusion & Widom-Larsen Model

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Researchers in condensed matter nuclear science continue to investigate Low Energy Nuclear Reactions (LENR) in palladium–deuterium (Pd–D) systems due to persistent observations of anomalous heat generation and nuclear transmutation signatures under electrochemical conditions. This work presents a unified theoretical and experimental framework describing LENR behavior in Pd–D electrolysis by integrating the Widom–Larsen weak-interaction model with materials-science analysis of palladium loading dynamics, surface evolution, and nuclear-active environments.

The study examines deuterium absorption, α–β phase transitions in the Pd–D system, crack formation, nanoscale surface morphology, and lithium-assisted alloy formation as key parameters governing reaction localization. Theoretical modeling incorporates electron mass renormalization, collective electromagnetic surface modes, and ultra-low-momentum neutron generation mechanisms within hydrogen-loaded metallic systems. These are correlated with experimentally motivated diagnostics including calorimetry, deuterium loading measurements, resistance analysis, and surface characterization techniques.

A conceptual framework based on confinement, coherence, and threshold phenomena is proposed to explain the intermittency and spatial localization of LENR activity. Experimentally testable predictions are presented linking deuterium flux, nanoscale morphology, and electromagnetic stimulation to enhanced reaction probability. The analysis suggests that controlled engineering of surface microstructures and coherent excitation conditions may significantly influence LENR activation behavior.

This work establishes a systematic connection between condensed matter physics, electrochemistry, and weak-interaction nuclear processes, providing a structured pathway toward reproducible LENR experimentation and future energy-oriented investigations.

Keywords: Low Energy Nuclear Reactions, Cold Fusion, Ultra-Low Momentum Neutron Catalyzed Reactions, Phonon Induced Fusion, Condensed Matter Nuclear Fusion.

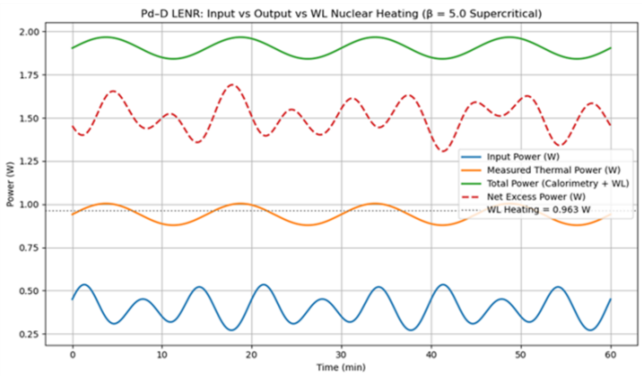


Fig 1: *Input vs Total Thermal Output in Pd–D LENR with Widom–Larsen Nuclear Heating.*

International Workshop on Anomalies in Hydrogen Loaded Metals

IWAHLM-17

EXHIBITION

An exhibition is organized in parallel to the conference

Static devices will be on display in the exhibition room, together with the posters and will be accessible during the coffee breaks as well as the Tuesday and Wednesday afternoons

Life devices will be installed in Prometheus laboratory and will be accessible during the Tuesday and Wednesday afternoons

The exhibition ends on Wednesday March 25 afternoon

EXHIBITION	
Exhibition in Prometheus Laboratory	
ENG8	**ENG8 Presenting the EnergiCell 100KW Thermal Power**
ARGAL	**The LENR Reactor by Argal & Solitonix srl**
Maximus Energy	**Noise resistant Neutrons and Gamma rays detectors**
FutureOn	**The Catalysed Plasma Reactor for combined heat and power production A small prototype**
CleanHME	**The LENR Based Reactor concept**
Fabrice David	**KEPLER ENGINE : A subcritical hybrid reactor based based on the Parkhomov-Belousova Effect**
Exhibition in the exhibition room	
InovL	**Combining Innovation and Novelty to produce Low Cost, Abundant, Sustainable 'Green' Energy Solutions**
Lake Head University	**A novel energy source**
Francesco Celani	**Pulse–Plasma Nickel-Alloy Reactors for Anomalous Heat Generation Toward Scalable Solid-State Energy Modules**
SOLITONIX	**Conduction State Transition Induced by Solitons in a Graphene Junction at Room Temperature**
David Fojt	**Nickel–Hydrogen Pathway: Materials, Architectures and Excitation Modes Exploration**
Brillouin Energy	**Brillouin Energy Corporation**

ENG8 Presenting the EnergiCell 100KW Thermal Power Plant

ENG8, PCI Science Park, Via do Conhecimento, 3830-352 Ílhavo, Portugal

www.ENG8.energy - **Contact:** Valeria Tyutina, CEO, info@eng8.org, +44 7983004275.

ENG8 refers to its LENR reactors as EnergiCell®s. The power generating systems have the following main components: an EnergiCell, fluid pump(s) for working fluid(s), plasma generator, and a control system.

EnergiCells work by creating a plasma field inside the EnergiCell, where the working fluid, in the presence of a catalyst (including condensed plasmoids), is ionised and subjected to high voltage, high frequency, high amplitude, electricity.

The EnergiCell Combined Heat & Power (CHP) plant, configured for production of hydrogen & oxygen as well as heat and electricity for commercial and industrial use

The EnergiCell environment creates the conditions for LENR reactions, including fission, fusion and hydrino effects to occur. This is evidenced by transmutation of the elements in the working fluids to other elements or to lower-energy-stage atoms and by production of excess energy in the form of photons (heat) and electrons (electricity). The most common elements used by ENG8 are hydrogen and oxygen from water; the most common elements produced are helium and carbon. The image above shows a 100-kilowatt thermal power generator that ENG8 is launching later this year to enable ENG8 to supply energy as a service.

- **Origin of the research that led to the innovation, history of the development**

In 2010, Russian theoretical nuclear physicist and academic, Professor Vladimir Leonov, published his *Theory of Superunification* available through Cambridge International Science Publishing. The theory is based on Quantum Energetics and super-strong electromagnetic interaction. He subsequently began working on a precursor of the EnergiCell that uses water as the working fluid. This work was taken up by colleagues at a purpose-built laboratory, funded since 2018 by a team lead by Valeria Tyutina, CEO of ENG8. Dr Anatoliy Klimov, Dr Gyorgy Egely and other invaluable researchers have also contributed to the successful development of the EnergiCell technology.

- **Collaboration with universities, research centres**

ENG8 has established an application engineering centre at the Science Park of the University of Aveiro uses commercial services provided by the University of Aveiro, Institute of Materials (CICECO) and collaboration with university researchers and interns.

- **Experiments performed and results achieved**

ENG8 has been developing the EnergiCell technology since 2017. The technology has been independently validated by several specialist certification agencies and recognised LENR sector experts in Europe and the USA.

EnergiCells currently produce the following energy outputs and specific COPs:

- Steam: up to 100atm/310ºC - Q/COP 7-10
- Gas (including air): 1,000ºC - Q/COP 7-10
- Electricity: Q/COP 5-7 plus COP 3 thermal
- Hydrogen & Oxygen: COP 6

Based on current supply and equipment costs, ENG8 is targeting generation costs of circa €15/MWh.

- **Awards and grants obtained.** ENG8 has received funding from

- **Technology Readiness Level (TRL) Reached For The Moment -** TRL4/5

- **Planned Technological Development**

Following decades of LENR R&D by its team members, the technical development teams are now focusing primarily on application engineering solutions using mainly commercially available off the shelf components (COTS). Current development includes:

100 kW Modular Steam Generator. This system utilises a water cycle EnergiCell with a COP of 7-10 to drive a compound rotary steam expander. The design incorporates a plasma generator capable of providing up to 25kW of input power to produce up to 200kW of thermal power at 100 ATM. This output is sufficient to drive a rotary steam expander with a three-phase alternator to generate the required input electricity. Engineering is scheduled for completion this year, with thermal energy sales commencing in Q4. Hydrogen and oxygen can be produced with a COP of six in a similar system.

100Kw Electricity Generator. The current system utilises a hydrogen cycle EnergiCell that is designed for 10kW of input electrical power to produce 70kW of electricity. This needs its capacity increasing to enable 150kW of electricity output considering system losses including conversion losses of 25% when stepping down from 100kV high frequency DC to 400 volts AC, leaving 100kW-e to sell after the systems electrical power needs. Development is planned for completion in 2027.

100 kW Modular Hot Air /Gas Generator. Portuguese industrial electricity prices are approximately €110/MWh and oil & gas heating costs exceeding €100/MWh. With a system COP 8, €110 of electricity can produce € 790/MWh-thermal (€100 x 8 less €110) less any sales discounts offered.

Electronics Power Supply. In October 2025 ENG8 had a small EnergiCell system independently validated as self-powering. A commercial product suitable for licensing to electronics equipment manufacturers such as Samsung, Apple, Bosch, etc is expected to take a further two to three years to develop. Concurrently a small sub one kilowatt generator will be developed for poverty alleviation.

- **Business**

  Co-founded by Valeria Tyutina and Haslen Back in 2017, the multinational ENG8 team comprises 65 people, including 35 scientists and engineers in four labs.
  The company has raised over €10 million to date from over 100 private investors, with the share price rising from €2 to €20 share as key technical milestones have been achieved.
  - Current financing round - €30m to enable the business to start energy sales and develop its business including acquiring new facilities, equipment, additional personal, IPR protection, etc.
  - Next financing round – To be confirmed.

  - **Business model – Development roadmap**

    Upon reaching TRL 7, ENG8 will begin commercial energy sales to industrial clients in Central Portugal, where it has identified specific clients with a demand exceeding 1GW of thermal capacity. For the next five years the company will focus on direct energy sales whilst expanding its patent portfolio and further securing its IPR. ENG8 then plans to license its technology to manufacturers of power generating equipment, vehicles, industrial machinery, consumer electronics, etc

  - **Expected TRL within 24 to 36 months** At TRL 9

The LENR Reactor by Argal & Solitonix srl

Ubaldo Mastromatteo, ARGAL, via S. Stefano 27-B, Bareggio (MI), Italy
Fabrizio Righes, Solitonix srl, via Bolzano 89, Belluno, Italy

Introduction

The reactor presented by Argal and Solitonix srl is a closed system containing a special glass electrolytic cell with a single electrode made of 99.99% ultra-pure nickel wire, 300 microns in diameter and 1.3 meters long. The electrolyte used is ultrapure water, in which a rectangular polymer support wrapped with the nickel wire is immersed.

During operation, a current of approximately 1.2 A flows through the wire, superimposed by rapid current pulses. An additional trigger input is provided by a 2 mW, 660 nm laser and a very low-power radiofrequency emitter (<1 mW).

The current pulses superimposed with instantaneous high-power direct current produce "dark" solitons, a proprietary technology of Solitonix; This is to exploit the effects described in an article published in the Journal of Physics Communication and present in the NASA astrophysics database at Harvard, the first author of which is Dr. Righes, CEO of Solitonix (https://iopscience.iop.org/article/10.1088/2399-6528/ac809c).

Setup Description

The main part of the experimental apparatus consists of a cube of about 20 cm in width and height now entirely shielded with lead foil, inside which the special electrolytic cell is positioned. A THD X100-7 sensor able to measure bremsstrahlung photons in a low energy range, is positioned directly above the electrolytic cell (EC), providing Counts Per Second (CPS) output. Additionally, a Radiacode 102 sensor acquires real-time energy spectrum of any radiation produced to identify specific radio nuclides (Figure 2, right). External monitors show recorded data.

The laser and two temperature sensors for the electrolyte and the outside of the cell are also located inside the cube. Two power supply and control systems are outside the reactor box; a first one is a low-noise, low-consumption system dedicated to reaction stimulation supplying the laser, the radio frequency, and solitons generator; a second one feeds the nickel wire with continuous current.

Description of Operation in a Typical Experiment and radioactivity evidence

The start of the experiment was preceded by a 30-minute background count acquisition, and the value hovered around 0.6 CPS, with peaks of 1.1 CPS.

The temperature sensors inside and just outside the EC reported the temperature of the electrolyte and the temperature outside the cell. The next step was to power up the reactor by activating the EC power supply, bringing the current in the wire to 1236 mA.

The heating of the nickel wire increased the electrolyte temperature, and in the case we are describing, reaching 30 degrees after about 15 minutes, allowing for manual adjustment of the excitation parameters. An increase in CPS usually occurs over the course of a few minutes, with several oscillations controlled by manual feedback from the excitation system. Thanks to this stimulation, the CPS increased to 6 CPS, with an electrolyte temperature of 34°C and 30°C outside the cell. After approximately 30 minutes of operation, the CPS continued to increase monotonically without further significant oscillations or changes in stimulation.

After 40 minutes of operation, the CPS was at 11 CPS, indicating that the desired reaction had been maintained. Generally, the CPS continues to increase; in the case we are describing, after approximately 50 minutes, it had reached 19 CPS with a temperature of 36°C outside and 39°C in the EC, then increasing to approximately 23 CPS after an additional 30 minutes of operation.

Self-sustaining and heat generation

Reducing the nickel wire current to 669 mA, about half the initial value, the CPS dropped slightly for a short time, then slowly rose to 24 CPS, with temperatures rising further to 43.0°C in the EC and 37.0°C outside. An hour after power-up, applying a further reduction in the input current to 369 mA resulted in behavior similar to the previous reduction in wire current, with the CPS dropping slightly and then returning to approximately 24 CPS.

Finally, the power supply was completely turned off, and the CPS level remained stable at approximately 24 CPS for several minutes, with temperatures of 43.4°C and 38.4°C, respectively.

Under this condition, the CPS began to slowly decrease, but after 25 minutes, it was still at 18.8 CPS. The reactor returned to background CPS after approximately four hours.

An article on these experiments can be found on ResearchGate at the following link. (https://www.researchgate.net/publication/395452383_Evidence_of_reproducible_tritium_production_in_a_pulsed_light-water_electrolytic_cell).

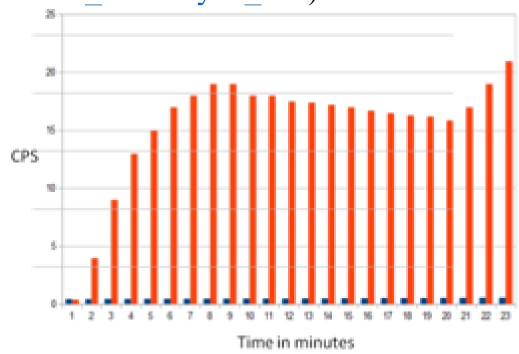


Figure 1. Trend of the counts for a test in the ARGAL laboratory in Bareggio for approximately 20 minutes from reaction activation.

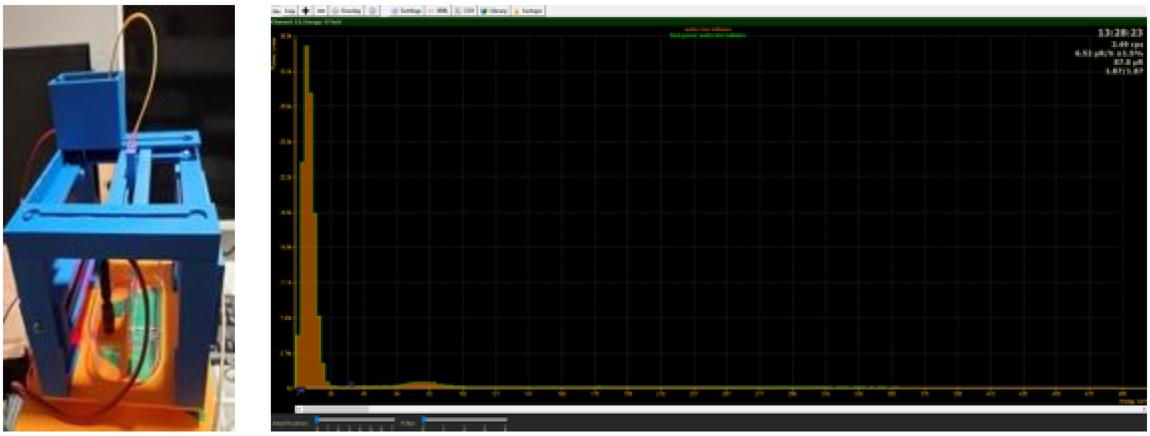


Figure 2. Photo of the reactor (open) in operation and evidence of the bremsstrahlung spectrum of Tritium (the peak at about 11 Kev) acquired by the Radiacode 102 sensor. Acquisition time 13 h 26 m.

ARGAL www.argal-research.it SOLITONIX

Reliable Neutron and Gamma Detection in Noisy Environments

Max Fomitchev-Zamilov
Maximus Energy Corporation
Email: founder@maximus.energy

Radio frequency (RF) interference is the most common cause of false results in neutron and gamma detection. Maximus Energy has addressed this significant problem by introducing the new generation of noise-resistant NEUTRON-X and GAMMA-X detectors (Fig. 1).

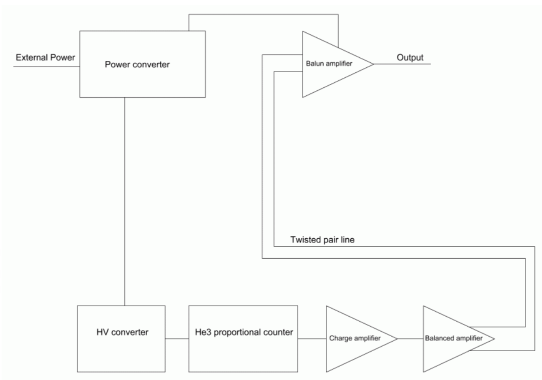
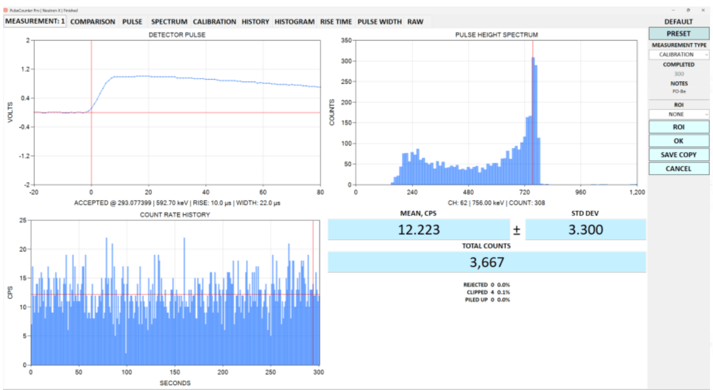


Fig. 1. NEUTRON-X neutron detection system. Fig. 2. NEUTRON-X block diagram.

The principal improvement over NEUTRON-LITE/GAMMA-LITE is the use of balanced signaling to transmit the detector signal to the MCA (Fig. 2). The detector enclosure contains a built-in HV bias supply, a charge-sensitive preamp, and a balanced amplifier. The detector communicates the balanced signal to the MCA via a standard USB Type-C cable of arbitrary length, allowing the detector to be as close to the neutron source as possible while keeping the MCA at a safe distance from the reactor. The MCA contains a balun amplifier that converts the balanced signal to a ground-referenced RF output, which is digitized, processed, and analyzed by the PulseCounter Pro software (Fig. 3).



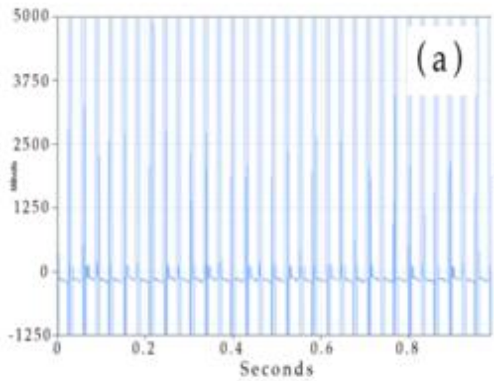


Fig. 3. PulseCounter Pro software thermal neutron spectrum. Fig. 4. Example RF Interference.

Balanced signaling is the main reason NEUTRON-X/GAMMA-X are virtually impervious to electromagnetic disturbance, such as ground-loop noise and RF interference, which commonly pollute the detector signal when measuring neutrons in the presence of plasma discharges, variable-frequency drives, electric motors, and other power equipment (Fig. 4).

NEUTRON-X uses ^{3}He-filled proportional neutron counter. The built-in charge-sensitive preamplifier is designed to emulate Ortec-142PC in terms of performance and to produce positive-polarity step-like pulses with slow exponential decay, facilitating trapezoidal pulse shaping as the main algorithm for digital pulse processing. The typical thermal neutron pulse magnitude range is from 0.2 to 1.5 volts.

NEUTRON-X/GAMMA-X are also available in component form, where the balun amplifier is packaged in a separate 'receiver' enclosure, which takes in a 5V DC power via a USB-C power connector and outputs an amplified RF detector signal that can be sampled using PicoScope or routed to a third-party MCA or digitizer for analysis and processing (Fig. 5-6).

Fig. 5. NEUTRON-X, component form.

Fig. 6. GAMMA-X, component form.

We recommend using an HDPE moderator (available as an option with the NEUTRON-X system) to thermalize fast neutrons (e.g., those from thermonuclear fusion) and thereby maximize the likelihood of detection. ^{3}He proportional counters are ~10,000 times more sensitive to thermal neutrons than to fast ones. As such, proper use of a moderator will enhance detection sensitivity up to 4 orders of magnitude compared to an unmoderated detector.

For high-resolution gamma spectroscopy, in addition to NaI(Tl), we offer GAMMA-X systems with $LaBr_3$(Ce) and SrI_2 scintillators.

Conclusion

NEUTRON-X/GAMMA-X systems make neutron and gamma detection easy and radiation detection results reliable by eliminating the RF interference issues common to all commercially available neutron and gamma detectors.

Availability
NEUTRON-X/GAMMA-X are available for sale online at www.maximus.energy.

FutureOn's LENR-Based Clean Energy Systems

Company Name: FutureOn Srl - Rome, Italy.

TECH TEAM PICTURE:

Mission and organization:

FutureOn is an R&D-driven company focused on transforming validated LENR phenomena into scalable energy systems. It operates as the scientific and IP core of a European alliance integrating research, commercialization, and ethical oversight.

Founders:

Ugo Abundo - Guido Parchi and others

Main shareholders (80%)

- Ugo Abundo
- Guido Parchi
- Unifying Fields Foundation (The Netherlands)

Investors:

Private shareholders + Strategic partner (Restoration Power Corporation B.V.).

Strategic & Scientific collaborations:

- Restoration Power Corp. B.V. (NL)
- Prometeon Srl (IT)
- Energy utilities (Alliander N.V. (NL)).
- EU CleanHME project Consortium

Business model:

Capital-efficient development model:

- In-house R&D and IP generation
- Industrial partnerships
- Technology licensing
- Joint ventures

Focus on modular, combined heat and power generators for residential users, industrial facilities and ESCo.

TECHNOLOGY:

FutureOn develops innovative clean-energy systems based on Low Energy Nuclear Reactions (LENR), also referred to as Low Energy Anomalous Phenomena (LEAP). Our technology uses hydrogen–metal interactions with thermal, electrical, and plasma stimulation to generate excess heat, avoiding combustion, emissions, or radioactive materials.

Core experimental platforms include:

- Catalyzed Plasma Reactor (CPR)
- Stainless Steel Four Electrodes Reactor (SSFER)
- Small Tubular Reactor (STR-HP)
- Synergistic Fusion Plasma Converter (SFPC)

The exhibited device represents a small laboratory prototype of CPR platform only.

The systems integrate active catalytic materials, advanced power electronics, and adaptive control algorithms to ensure stability and repeatability.

Awards/Grants:

- EU Horizon 2020 CleanHME (grant # 951974)
- Two EU Innovation Radar recognitions

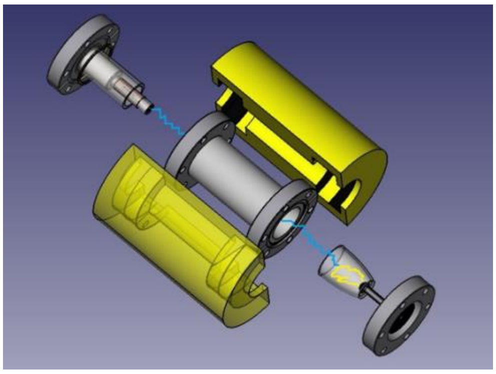
https://innovation-radar.ec.europa.eu/innovation/53261

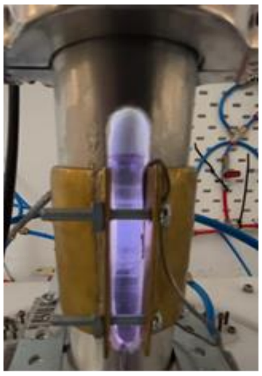
https://www.innoradar.eu/innovation/62446

PATENTS:

- Synergistic Plasma Ionic Reactor and Converter of Fusion energy (SFPC) – Patent Application filed on July 2025.
- Multiple patent families covering reactor geometries, materials, and triggering methods.
- PCT/IT2025/050176 and related filings.

EXHIBITED DEVICE: THE CPR CORE





Current TRL:

TRL 4 (Laboratory validation of multiple LENR based systems)

Research originated within the EU Horizon 2020 CleanHME Project (Grant No. 951974), involving 16 international partners.

More than ten years of experimentation (2012–2025) led to measurable excess heat under controlled laboratory conditions.

24-48 MONTHS TRL:

Target: TRL 6–7 (2028–2029)

Planned milestones:

- Extended independent validation
- Long-duration operation tests
- Safety and certification procedures
- Pilot installations
- Pre-industrial prototypes

Next Financing Rounds:

1. Scale up to TRL 6 (2026–2028): 7,5M€ Focus: full development of controlling electronics, third party validation, performance & safety certifications (CE), long-term testing and pilots manufacturing.

2. Scale up to TRL 7/8 (2029-2030): 12,5M€ Focus: joint development with industrial partners of pre commercial prototypes at different power levels, manufacturing of multiple pre-series co-generators (CHP), broad marketing initiatives.

LEAPGENs ROADMAP:

Development roadmap of FutureOn's heat and combined heat and power (CHP) generators.

Contacts & web site:

Scientific & Business Inquiries:

- Guido Parchi – Managing Director
  Email: g.parchi@futureon.it

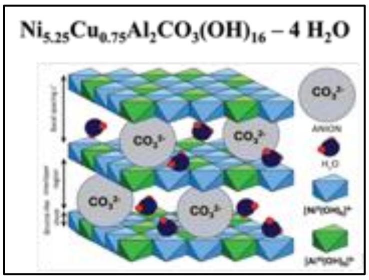
Website:

- https://www.futureon.it/

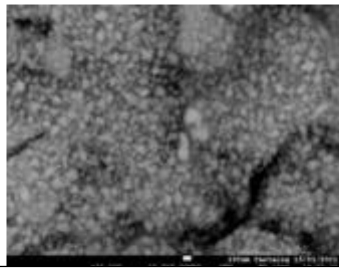
FOR MORE INFORMATION:

The LENR Based Reactor

The technology is developed based on the results of the CleanHME* European project. It gave the opportunity to perform some experiments on active materials loaded by gaseous hydrogen. These active materials are easily produced from hydrotalcites precursors containing nickel and other metals and processed as metallic nanoparticles embedded in a powdered matrix of alumina.

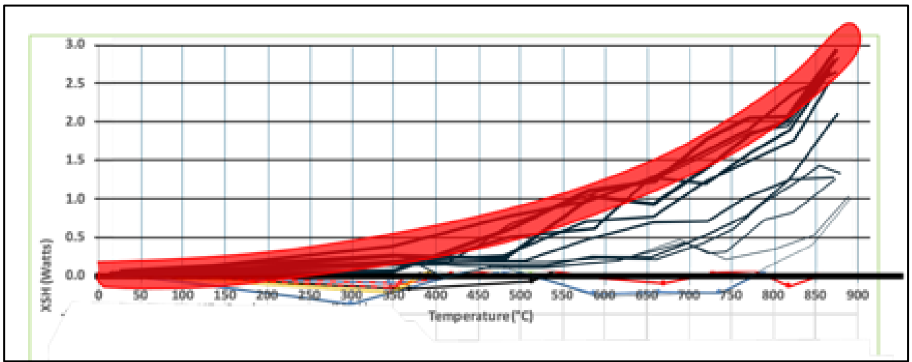


Structure of the hydrotalcite precursor



Micrograph of the active material with nano-sized metal particules

Calorimetry tests at high temperature proved that Anomalous Heat Effect (AHE) is produced in a fully reproducible manner by Metal-Hydrogen-Energy reactions (MHE). AHE increases progressively following temperature and pressure/vacuum cycles.

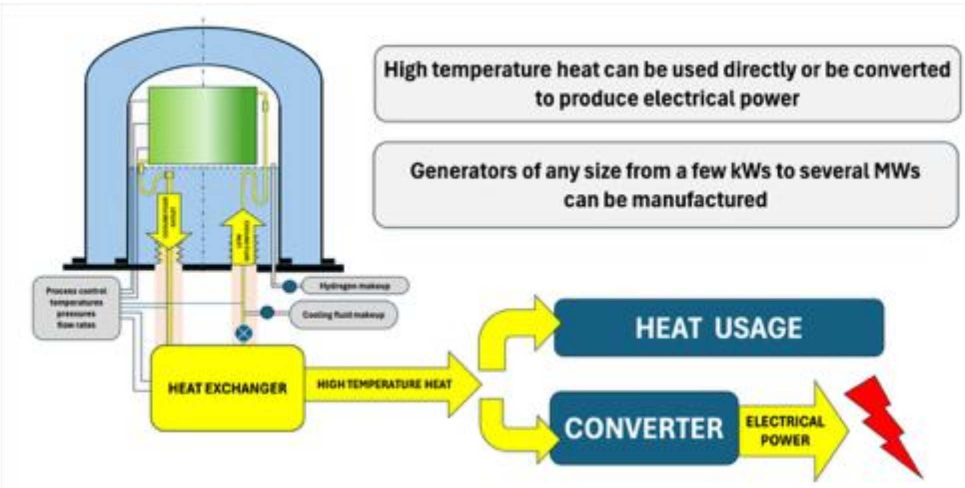


Relationship between the temperature and Anomalous Heat Effect after several temperature and pressure cycles

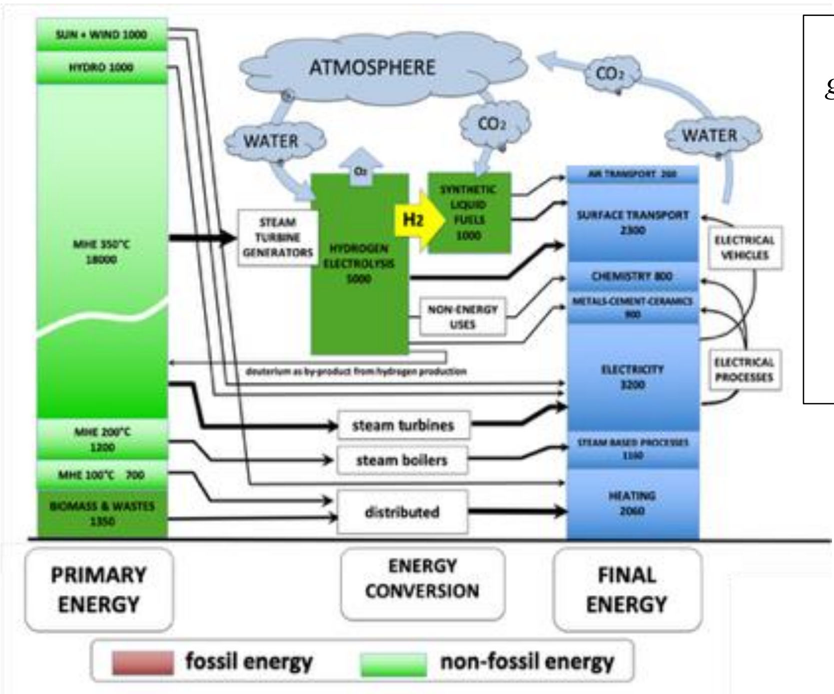
Pursuant to the CleanHME project further experiments are ongoing to refine the results, test the most appropriate stimulation method and optimize the chemical composition of the active material. Based on the known results the basic design of the future reactors was performed. It addresses suitable solutions to the following technical challenges:

- Operation at temperature levels between 800°C and 1000°C
- Sturdy construction for industrial use
- Gas tightness with a hot hydrogen atmosphere
- Uniform temperature throughout the beds of material, efficient heat exchange with the cooling fluid
- Full control of the heat production rate, startup, power changes, shutdown, avoidance of thermal runaways
- Protection of the environment, perfect recovery of the hazardous nanoparticles and recycling of the metals contained in the active material once it is exhausted

LENR Based Reactors can deliver heat at a temperature level sufficient for conversion into electrical energy. They consume minute quantities of hydrogen and common metals. They are safe because they contain only a small inventory of hydrogen at low pressure and they don't generate dangerous emissions.
The present TRL is 3 and will reach 5 after the completion of the ongoing tests. The next development step will be the manufacture of a prototype with a power rating of several kWs.



The development of this new form of energy bears the potentiality to displace the reliance on fossil fuels in the future



Energy in Tons Oil Equivalent (TOE)

Prospective scheme of the global energy sector after full deployment of LENR based low-cost energy generation. Fossil fuels are no longer used
Low-cost energy makes it possible to adopt electrical processes in all branches of the economy

*The CleanHME project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 951974. This work reflects only the author's view, and the European Commission is not responsible for any use that may be made of the information it contains.

KEPLER ENGINE : A subcritical hybrid reactor based on the Parkhomov-Belousova Effect.

Fabrice David
Kepler Aerospace (Midland, TX, USA)
Email: fabrice.david.kepler.aerospace@orange.fr

Model of a Vickers VC10 with Ariel launcher.

One of the best among us, Dr. Ed Storms, spent much of his career developing nuclear space engines. These engines were successfully tested on the ground, but they never had the honor of reaching the deep space for which they were designed. [1]

60 years ago, the first ionic nuclear powered space engine was launched into orbit. SNAPSHOT will remain in orbit even longer than the pyramids dominated Egypt, reminding our posterity of the audacity of its designers: the first satellite had been launched only a few years earlier. [2]

KEPLER ORBITAL STIRLING technology allows for a more efficient conversion of heat from a space-based nuclear reactor than thermoelectric converters, without generating the harmful vibrations of NASA's current Stirling systems. This will undoubtedly be a significant advantage for powering future lunar bases according to the specifications of NASA's "KRUSTY" program. [3]

But in order to build propulsion systems, even lighter ones must be designed, operating aboard a space probe without any moving parts that could compromise long-duration operation or the quality of photographs and astrogation. At the ICCF 24 conference in Mountain View, we explained why it was more efficient to directly use the energy released by fission or fusion reactions, rather than accelerating hydrogen atoms by heating them in a reactor furnace or accelerating them in ionic form. Aren't 3 MeV fast neutrons equivalent to hydrogen nuclei ejected at 23,900 km/s, or 8% of the speed of light?[4-12]

Experiments with uranium glass sphere

But LENR reactors don't produce neutrons. This fact is explained by the Czerski-Valat Effect. (De-excitation of $*He^4$ by electron/positrons pairs) [13],[14] We've all observed this lack of neutrons since the landmark experiments of Fleischmann and Pons and Steven Jones: no neutrons, nor gamma rays. Indeed, the energy of the excited helium nuclei is released in the form of electron/positron pairs. This effect will have very important consequences in astrophysics.

The Parkhomov-Belousova Effect makes it possible to overcome this problem and to create efficient and very lightweight space propulsion systems, and that is the subject of this poster. The P-B Effect is the inverse beta decay induced by pairs of neutrino/antneutrinos of ultra-low energies.[15],[16]

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INOVL, Inc.

Combining Innovation and Novelty to produce Low Cost, Abundant, Sustainable 'Green' Energy Solutions

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2787 Curie Place
San Diego, CA USA 92122
Contact: Frank Gordon, feg@inovl.com, +1 858 349-7869

Technology: InovL discovered and patented a Lattice Energy Conversion (LEC) device that performs Electrophysical Direct Energy Conversion (EDEC) that uses properties of materials with different work functions, including some 'active' materials that are occluded with hydrogen, to produce electricity. A LEC will self-initiate and self-sustain the production of voltage and current. Naturally radioactive materials, electrochemical reactions, and external electrical energy are not required. In addition, unlike electrochemical batteries that can heat up and explode when shorted, the LEC can be shorted without catastrophic results. When the short is removed, the LEC will resume the production of power. Multiple scientists throughout the world have independently replicated these surprising direct energy conversion results.

Explaining these unexpected and surprising results is a story of unrecognized opportunities involving discoveries by multiple scientists, including several Nobel Laureates, over the time span from the 1600's to the 1989 announcement by Fleischmann and Pons. For example, A. Volta was studying contact electrification when he found that if he used cardboard that was soaked in salt water between two electrodes of different work functions, a voltage and current was produced. This discovery led to the development of the electrochemical battery which is the source of energy for many applications today. At the same time, it diverted research away from contact electrification which had motivated Volta's original research. In a 1929 Nobel Laureate address titled "Thermionic phenomena and the laws which govern them" Sir Owen W. Richardson describes an apparatus where he states: "It consumes nothing and the apparatus has no moving parts." In order to avoid perpetuum, he suggested "… since it works at constant temperature, … the contact potential difference V_{12} is not completely independent of the distance between the two bodies." While the apparatus described by Richardson works, the electricity produced at laboratory temperatures is extremely small. However, the LEC has demonstrated that by using 'active' electrode materials such as palladium occluded with hydrogen or deuterium, which Fleischmann and Pons used, the activation energy required to extract electrons from the electrodes is greatly reduced. This results in several orders of magnitude more power produced. Low Energy Nuclear Reactions have been shown to produce significant localized temperature differences, thereby satisfying the Second Law of Thermodynamics.

Figure 1 shows a simplified functional model of an EDEC or LEC. When electrodes with different work functions and active materials occluded with hydrogen are electrically connected through an electrical load impedance, Z_L, electrons will flow from the low work function electrode through the load to the high work function electrode to equilibrate their Fermi levels. If an electrolyte with mobile ions is present between the electrodes, they will try to revert to their original Fermi levels by transferring negative charge from the high work function electrode to the low work function electrode resulting in more electrons being conducted through the electrical load impedance to maintain Fermi level equilibration, thereby producing a continuous voltage and current. Figure 2 shows a typical data plot of electrical power as a

function of resistance. Papers containing more details and experimental data are available on the InovL website.
InovL has established both experimental and theoretical support to explain electrophysical direct energy conversion. The challenge is to scale up the output. Multiple opportunities include the use of different metallurgies to adjust material work functions, different electrolytes, and different LEC cell configurations. One example pictured below involves cutting open and unrolling an electrolytic capacitor, adding active materials to one of the electrodes and then rolling the capacitor back up and sealing it with silicone rubber, resulting in a self-charging LEC capacitor. More experimentation and analysis are needed for optimization, but this configuration offers the potential for low-cost rapid development and production using existing manufacturing systems.

Business: InovL Inc was founded in 2017 and is self-funded and wholly owned by the three founders. InovL holds three patents with two additional patents pending. Members of the InovL team have broad experience in scientific research and development. Dr. Gordon has been involved in LENR research since the 1989 announcement by Fleischmann and Pons when he was the head of a department at a Navy R&D center that included PhD electrochemists Stan Szpak and Pamela Mosier Boss who conducted foundational research and published multiple papers.

The opportunities are enormous. For example, a LEC that only produces two to three watts to charge cell phones and power LEDs to provide light to several hundred million people who don't have access to electricity and currently use kerosene lanterns for light. A 1 kW device would produce 24 kWh per day which when combined with a battery to meet peak demand, is more power than most homes consume. A 5 kW device would produce 120 kWh per day which could meet peak demand to power a home with power left to charge an electric vehicle.

We look forward to collaborative partnerships that take advantage of the combined expertise and facilities to accelerate development and commercialization of this technology. Interested companies should contact Frank Gordon.

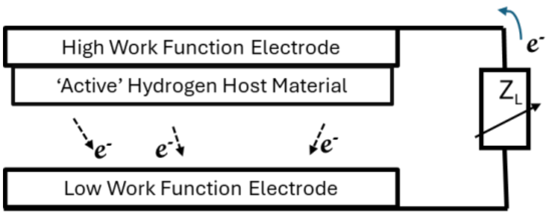

Figure 1.

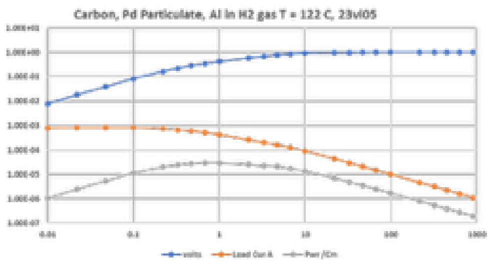


Photo of an electrolytic capacitor with 4 LEC's
Made from disassembling an electrolytic
capacitor and adding some active material

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Research background

A novel energy source based on cold nuclear fusion is described. The new nuclear technology is based on successfully performed replicable experiments of cold nuclear fusion reactions carried out at Lakehead University in Canada [1,2]. The experimental scheme consists of a gas chamber where the samples of a preheated constantan wire are placed and where the interaction of these samples with injected deuterium gas takes place [1,2]. As a result of the interaction, energy and helium gas (the two non-radioactive isotopes ^{3}He and ^{4}He) are released. The released energy causes an increase of both the temperature and the brightness of the constantan wire and an appearance of a glow in the reactor chamber. Fig. 1 shows the view of the constantan wire and of the chamber before the constantan – injected deuterium interaction, and Fig. 2 shows this view after the beginning of the interaction.

Fig.1

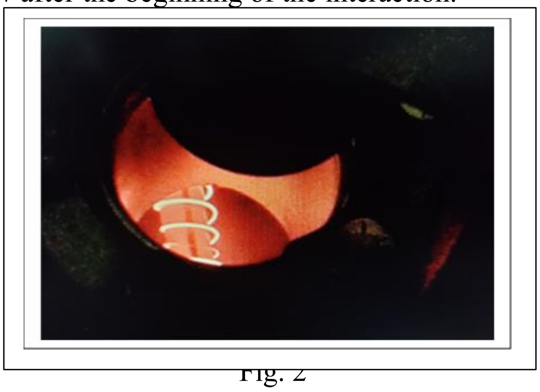

Fig. 2

The replicable experiments were carried out at initial temperatures of the constantan wire in the interval T = 660^{0}C – 950^{0}C, as the increase of the temperature of the constantan with additional ~400^{0}C occurs for the corresponding time interval from 30 seconds to under 1 second, the density of the generated power in the constantan is in the interval 105 W /g – 2280 W/g, and the <output power>/<input power> ratio is in the range ~4 – 16 (and more) for the corresponding experiments. No radiation (gamma rays and neutrons) was recorded in the experiments. The energy release has been shown to be non-electrical and non-chemical. Despite the absence of radiation, it can be proven on the basis of the existing establishment in physics that the energy release is the result of cold nuclear fusion reaction in the constantan wire. The estimated cold nuclear fusion energy generation is based on observed experimental results [1,2], i.e.: i) In terms of the nuclear fusion energy generated per 1 kg of molecular deuterium: $2.65*10^{14}$ J/kg or $7.35*10^7$ kWh/kg; ii) In terms of nuclear fusion energy generated per volume of 1 cubic meter of molecular deuterium at STP: $4.76*10^{13}$ J/m^3 or $1.32*10^7$ kWh/m^3.

Rational and specific features of both 10 kW and 1 MW energy sources

The experimental outcomes achieved can be considered as a sufficient technological basis for further design of novel fossil free, carbon emission free, radioactive free and weather independent energy source without radioactive waste. The source can be used for both on-grid and off-grid electrical power supply. The source uses deuterium gas as fuel. The specific features of two sources are provided in tables below.

Type of Source	Output power	Cost of the source	Cost per 1 kWh	Cheaper than el. grid
Single Household	10 kW	US$14,700.00	US$ 0.032	3.64 times
Reactor-module	1 MW	US$670,000.00	US$ 0.008	14.18 times

Consider the following regarding the above table: *1)* The source for single household can be used for one household only and the reactor can be used for 100 households or for other purposes; *2)* The cost of the single household source includes the price of a lithium-ion battery, which is electrically connected to the nuclear source (this cost can be reduced if other type of battery is used.) *3)* The cost per 1 kWh is determined on 10 years basis and it includes the cost of the source hardware, the cost of fuel (deuterium gas) for 10 years and the cost of the maintenance for 10 years; *4)* The cheaper cost regarding the electricity of the national grid system is determined on the basis of the price of the delivered electrical power in February 2023 in the Province of Ontario, Canada. *5)* Comparisons of the costs of the electricity with the costs of the electricity coming from other sources are provided in the table below.

Type of Source	Output power	Cheaper than the solar energy	Cheaper than the wind energy	Cheaper than the nuclear plants energy
Single Household	10 kW	1.72 times	1.22 – 7.34 times	1.7 times
Reactor-module	1 MW	6.88 times	4.88 – 29.36 times	6.75 times

Round map and required funds for development of energy source (at least 10 kW output electrical power)

The current Technology Readiness Level (TRL) reached at present (the Day D) is TRL-4 (Technology development and demonstration). Current financial round of US$1.4M has provided the opportunity that TRL-4 has been achieved. The planned next goal is development of the prototype of the energy source for 30 months (D + 30 months) for the total additional cost US$5.8M (the required funds for every TRL are shown in brackets at the relevant fields in the table below). These additional funds are expected to come from potential industrial partners as new corporate body can be established.

Current Day D	D + 6 months	D + 18 months	D + 30 months
TRL-4			
	TRL-5 (US$1.8 M)		
		TRL-6 (US$2.0 M)	
			TRL-7 & 8 (US$ 2.0 M)

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Pulse–Plasma Nickel-Alloy Reactors for Anomalous Heat Generation Toward Scalable Solid-State Energy Modules

F. Celani*, C. Lorenzetti*, G. Vassallo, E. Purchi, S. Cupellini, M. Nakamura, P. Cerreoni
ISCMNS_L1 Research Group *(*startup in formation: **AETHERIS**)*

Contact:
Francesco Celani – Scientific Lead
Email: **Franzcelani@libero.it**

Exhibitor Overview
ISCMNS_L1 is an informal, internationally connected research group with more than three decades of experimental activity in electrically induced anomalous heat effects (AHE) in metal–hydrogen systems. The group is currently organizing into a startup structure with the aim of translating a reproducible laboratory phenomenon into a future energy technology.
The exhibit presents a compact, high-temperature reactor module based on nickel-based alloys, demonstrating controlled excess heat generation under pulsed and plasma-assisted excitation.

Technology Description
The system shown is the core of a compact coaxial reactor operating nickel-rich alloy filaments in a controlled low-pressure gas environment (typically H_2/Ar or D_2/Ar). While earlier work focused on commercial Constantan (Cu–Ni–Mn), recent developments extend to **new nickel-based alloy compositions and tailored surface treatments**, which show enhanced performance.
Two orthogonal excitation modes are combined:

1. **Longitudinal excitation** via high-density microsecond electrical pulses, inducing thermionic emission, electromigration, and cyclic lattice stress.
2. **Transversal excitation** via a counter-electrode operating in Paschen or, preferentially, dielectric-barrier-discharge (DBD) and related plasma excitation modalities, selected to activate the surface while suppressing destructive arcing.

The coupled action of pulsed current, plasma micro-discharges, and defect-engineered surfaces sustains a strongly non-equilibrium state in which anomalous heat release is observed beyond classical Joule heating. Internal temperatures reach ~900 °C, while the external jacket remains below ~300 °C, enabling reliable calorimetric evaluation.

Origin and Development History

The research originates from post-1989 investigations of excess heat in metal–hydrogen systems. After extensive work with palladium, the group shifted in 2011 to nickel-based alloys due to higher defect density, lower cost, and compatibility with ordinary hydrogen. Since 2019, reactor geometry, excitation electronics, alloy selection, and surface conditioning have been progressively refined to improve reproducibility and controllability.

Collaborations
The work has involved members of the International Society for Condensed Matter Nuclear Science (ISCMNS), and academic contributors in Italy, Japan, and elsewhere. The project benefited from participation in the EU-funded CleanHME (H2020) program.

Experimental Results
Under optimized pulsed and plasma-assisted operation, the reactor consistently shows:

- **20–25 W** of excess thermal output for ~**80 W** electrical input
- **COP values up to ~1.25–1.30**
- Clear separation between inert-gas calibration runs and hydrogen/deuterium operation
- Improved repeatability compared to DC-only or uncontrolled spark regimes

More recently, enhanced results have been obtained using newly developed nickel-based alloys, advanced surface treatments, and specific plasma excitation modalities, including earlier onset of AHE and improved stability. Further quantitative details are not disclosed, as **patent applications covering these advances are currently in preparation**.

Technology Readiness Level (TRL)
Given the nature of non-equilibrium metal–hydrogen systems, readiness is described along two dimensions:

- **Scientific Reproducibility TRL: 3–4**
  Reproducible AHE has been demonstrated in laboratory-scale reactors with calibrated calorimetry and defined excitation protocols, including with next-generation materials. Robustness remains limited to specific operating windows.
- **Engineering and Industrial Potential TRL: 1–2**
  From an industrial standpoint, the technology is at an early stage. Challenges include electrode lifetime, long-duration stability, thermal extraction, electronics hardening, safety margins, and manufacturability. Current systems are research-grade demonstrators.

Development Roadmap (24–36 Months). Targeted development aims to reach:

- **Scientific Reproducibility TRL: 4–5**, with broader operating windows and improved inter-laboratory repeatability
- **Engineering TRL: 3–4**, aimed at demonstrating industrial viability and scalability via an intermediate reactor targeting COP > 2, using engineered prototypes with optimized electrodes, improved thermal management, and extended-duration testing.

Business Vision and Strategic Framing
The technology targets high-temperature process heat and distributed energy applications where fuel-free, low-emission heat sources may offer strategic advantages, including industrial heat, off-grid systems, and advanced thermal platforms. **The opportunity lies not in proving the existence of anomalous heat generation, but in engineering it into a stable, manufacturable, and viable energy module demonstrator.** Recent gains enabled by proprietary alloys, surface treatments, and plasma excitation strategies strengthen the case for focused engineering development under IP protection.

Invitation to Investors and Partners
Visitors and potential partners are invited to meet the team during the conference to discuss validation pathways, joint development or replication programs, and early-stage investment or spin-out opportunities. The exhibit shows that AHE in nickel-based systems has evolved from a fragile laboratory curiosity into a reproducible physical effect, now awaiting systematic engineering development.

CONDUCTION STATE TRANSITION INDUCED BY SOLITONS IN A GRAPHENE JUNCTION AT ROOM TEMPERATURE

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The aim of this research was the study of the transition between high and low electrical resistivity states of two overlapped graphene layers when subjected to short electromagnetic pulses (soliton waves). These transitions have already been previously observed by the authors in experiments carried out with different conductors, separated by a tiny insulating layer. The choice of a highly ordered material, such as graphene, was justified by the attempt to achieve greater stability and reproducibility of these transitions. What has been observed is an instantaneous reversible transition of the graphene overlapped layers to/from a state of insulator with resistance in the order of Megohms from/to a state of resistance of few ohms or, in some cases, of zero ohms. The transition from a high resistance state to a lower one requires EM pulses of different polarity than the transition from a low resistivity state to a higher one. Some intermediate relatively stable states have also been observed

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ALBAIR

Nickel–Hydrogen Pathway: Materials, Architectures and Excitation Modes Exploration

David Fojt

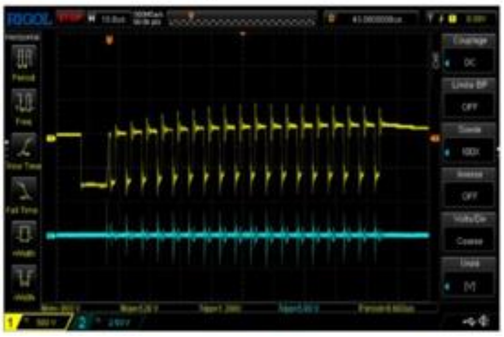
This contribution presents an experimental program dedicated to the exploration of Nickel-Hydrogen (Ni–H) systems within the framework of advanced energy conversion. The approach is based on the structured study of transition metals - primarily nickel, iron, and chromium - combined with catalytic elements such as palladium, carbon, and various metal oxides.

The investigated architectures include thin films, micro- and nano-structured powders, or mesh-based structures, enabling fine control of interfaces, active surface area, and internal material conditions. A particular attention is given to interfacial effects and multilayer configurations that promote localized electronic phenomena.

The excitation modes explored combine controlled thermal activation, transient magnetic pulses, and pulsed electrical stimulation, in order to study the influence of energetic and electromagnetic environments on the Ni–H system behavior. Hydrogen is primarily protium, supplied either by external gas feeding or generated in situ through solid hydrides.

The objective is to characterize physico-chemical conditions capable of producing reproducible energy effects, with coefficients of performance (COP) compatible with industrial deployment. The work includes materials optimization, control of hydrogen absorption parameters, and reactor engineering.

This pathway aims to establish a coherent materials–excitation–architecture framework oriented toward experimental robustness and technological scale-up.



Brillouin Energy Corporation

Francis Tanzella[1], Jin Liu[2], Robert Godes[2], Robert George[2]
[1] Energy Research Center   [2] Brillouin Energy Corporation

- Company:
    - 6550 Vallejo Street, Suite 101, Emeryville CA 94608 USA
    - https://www.brillouinenergy.com
    - Robert Godes, (President and CTO) , Robert George (CEO), David Firshein (CFO) dnf@brillouinenergy.com
- Technology:
    - Hydrogen-loaded nickel on ceramic tube stimulated via high power, fast rise pulses, impedance matched to the metal coated target (Q-Pulse).
    - Input power measured “at the wall”
    - Output power measured using three mass flow calorimeters
    - Origin of the research that led to the innovation, history of the development
        - Palladium H_2O electrolysis
        - Nickel H_2O electrolysis
        - Controlled Electron Capture mechanism
        - Pressed Ni powder/H_2 -> Q-Pulse
        - Sprayed copper/dielectric/nickel triaxial tube/H_2 -> Q-Pulse
- Collaborations
    - Five-year contract with SRI International
    - Research/analysis agreement with Texas Tech University
- Experiments performed and results achieved

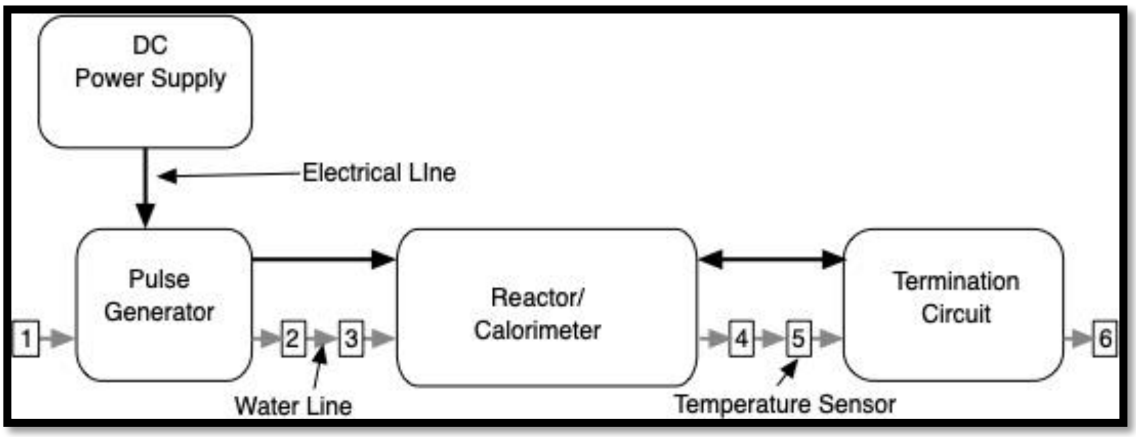


Figure 1. Diagram of mass flow water and pulse stimulation lines.

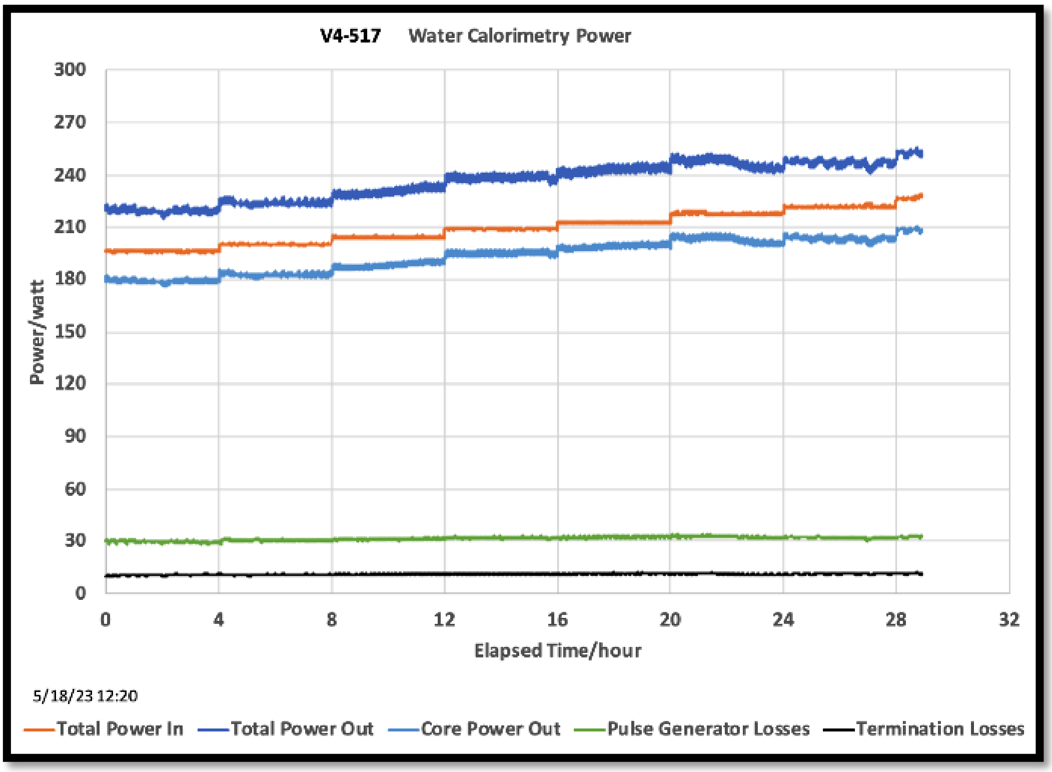


Figure 2. Input and output powers versus time during a Q-Pulse Run

  - Static ~3 atm H_2 gas on high-surface-area Ni coating
  - Reactor tube temperature varied from 200° to 600°C
  - Input electrical power is measured at DC power supply feeding pulse generator
  - Flow rate measured via ultrasonic flowmeter and mass/time using balance
  - RTD temperature sensors at inlet and outlet of three calorimeters
  - Water cooled to room temperature using heat exchanger with fan after termination
- Business
  - Technology Readiness Level (TRL) reached for the moment: 3-4
  - Next technological development planned: Prototype manufacturing
  - Founders: Robert Godes and Robert George
  - Current financing round: D
  - Next financing round: E
  - Business model: Technology Licensing.
  - Expected TRL within 24 to 36 months: 9