Resonances in the ether and their application

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The main aim: give briefly theory of the ether resonances, demonstrate its application to LENR and show prospects of practical use. Intended for the ether and LENR researchers, and practical physicists.

Contents

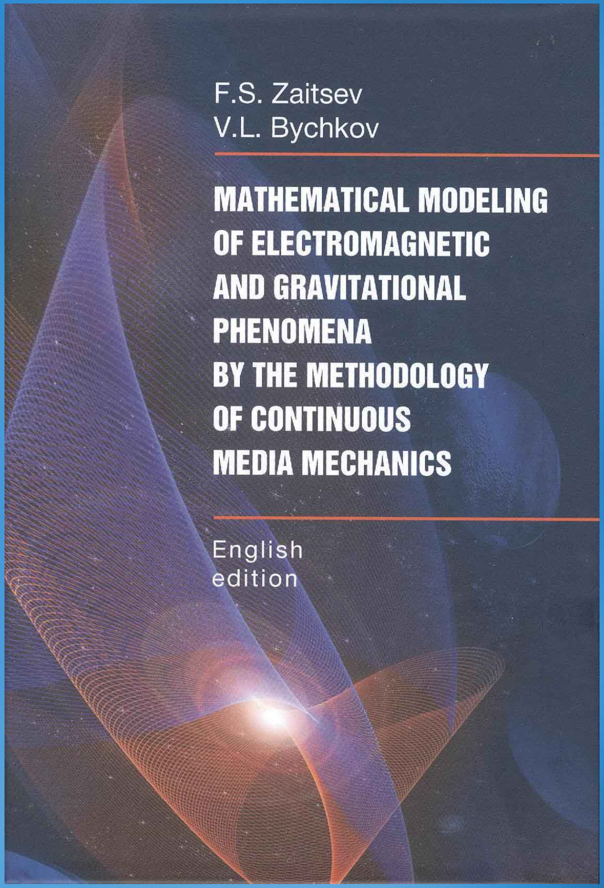
1. Introduction

A new approach to the study of fundamental natural phenomena is proposed in the book. The approach is based on the methodology of math. modelling (MM) and uses the hypothesis of the presence of a physical vacuum or the ether in which all processes occur.

The main objective of MM is to obtain important for practice results, create concepts of devices, calculate their design and conditions of use. MM is the base for science intensive business and not only.

Instead of relativity theory and quantum mechanics, a more fundamental and general math. model of space and nature is proposed in the book.

For the first time, 150 years after the works of Faraday and Maxwell, Maxwell's eqs. and <u>all</u> experimental laws of electricity, magnetism, electrodynamics and gravity were mathematically derived from only two premises – the laws of conservation of matter and momentum.



April 2021. Free on site eth21.ru

So, the assumption of many great scientists of the past was confirmed that Maxwell's eqs. are a logical consequence of Newtonian continuum mechanics.

The main experimentally obtained general laws of electrodynamics and gravity are mathematical consequences of two ether equations – the laws of conservation of matter and the amount of ether motion:

- Maxwell's equations (sec. 2.1).
- Lorentz force (sec. 2.1 and 16.1).
- Gauss theorem and Coulomb law (sec. 3).
- Bio – Savard law (sec. 7).
- Electromagnetic induction law (sec. 9).
- Ampere laws (sec. 12.1).
- Ohm's law, Joule – Lenz law (sec. 12.2,12.3).
- Wiedemann – Franz law (sec. 21.11).
- All the main effects and formulas of electrical engineering and electrochemistry (sec. 18).
- Magnetic phenomena (sec. 19).
- Gravitational attraction law (sec. 16.2, 17.2, 22.2).

In physics, these laws are experimental facts. Not logically related to each other.

These laws have been confirmed in numerous experiments and are used in technical devices. Therefore, their math. derivation from the eqs. of the ether motion is a serious argument in favor of recognizing the existence of the ether both in the methodology of MM and in the methodology of experimental physics, generalizing experience.

Thus, the ether theory gives a unified field theory, that theoretical physics has been looking for a hundred years. Relativity theory and quantum mechanics, considered as other math. models of nature, are inferior to the ether model, since the listed laws have not yet been mathematically obtained from Maxwell's eqs. or Schrodinger's eq.

Such a strong foundation allows deeper understanding of nature and developing brand new technologies using this understanding.

Physical parameters of the ether and its carriers – newtonians

The parameters of the ether carriers (particles) are found under the simplest assumption that they behave like a loose medium (granular medium – weak interaction between particles), similar to a monatomic gas.

The unperturbed ether density is determined and verified in the book using data of dozens of experiments, accuracy is of the order $\pm 20\%$:

$$\rho_0 \approx 3 \cdot 10^{-13}\ [\mathrm{s\ g}^{1/2}/\mathrm{cm}^{3/2}]$$
$$\rho_{m,0} \approx 2 \cdot 10^{-9}\ [\mathrm{g/cm}^3]$$

$$k_{m,0} = \rho_{m,0}/\rho_0 \approx 6.7 \cdot 10^3\ [\mathrm{g}^{1/2}/(\mathrm{s\ cm}^{3/2})],$$
$$[\mathrm{statCoulomb/cm}^3]$$

Pressure of unperturbed ether is estimated from $\gamma p_0/\rho_{m,0} = c^2$ with $\gamma = 5/3$ (solid particles). In ~10^6 times > atm (sec. 21).

$$p_0 \approx 1.1 \cdot 10^{11}\ [\mathrm{Pa}]$$

Newtonians molar mass $M_э$ – from Clapeyron – Mendeleev eq $p = M_э \rho_{m,0} \bar{T}/\bar{R}$ at $p = p_0$, $\bar{T} = 2.73$ [K]:

$$M_э \approx 4.1 \cdot 10^{-13} \left[\frac{\mathrm{kg}}{\mathrm{kmol}}\right]$$

The gravitational mass is introduced as a coefficient in the formula of the ether pressure gradient effect on a continuous medium object containing many ether structural elements. Therefore, the mass of one newtonian $m_э = M_э/N_A$ is interpreted as the behavior of a trial newtonian in the gravitational ether flow.

$$m_э \approx 4.1 \cdot 10^{-13} m_p$$

Close to the Mendeleev estimate $\sim 5 \cdot 10^{-11} m_p$.

The newtonian size is derived from the condition of a dense proton core and Compton radius $r_p = \hbar/(m_p c)$:

$$r_э \approx 4.1 \cdot 10^{-13} r_p \approx 8.6 \cdot 10^{-27}\ [\mathrm{cm}]$$

The ether kinetic parameters are estimated by analogy with the molecular kinetic theory

For the unperturbed ether:

Heat conductivity is extremely small compared to air: $2.62 \cdot 10^{3}$ $[\mathrm{erg}/(\mathrm{s} \cdot \mathrm{cm} \cdot \mathrm{K})]$. Well-known.

$$\chi \approx 1.3 \cdot 10^{-3}\ [\mathrm{erg}/(\mathrm{s} \cdot \mathrm{cm} \cdot \mathrm{K})]$$

Heat capacity is extremely high compared to air: $c_p \approx 10^{3}$ $[\mathrm{J}/(\mathrm{kg} \cdot \mathrm{K})]$. This means, the ether temperature is difficult to change and it is actually a thermostat. Use for practical purposes.

$$c_p \approx 8 \cdot 10^{16}\ [\mathrm{J}/(\mathrm{kg} \cdot \mathrm{K})]$$

Viscosity is extremely low compared to air: $2 \cdot 10^{-4}$ $[\mathrm{Poise}]$. The possibility of long-term existence of various flows and structures in the ether.

$$\eta \sim 7.0 \cdot 10^{-25}\ [\mathrm{Poise}]$$

Self-diffusion is 15 orders of magnitude less than in gases. The possibility of long-term retention of the ether pressure in the object.

$$D \sim 3.5 \cdot 10^{-16}\ [\mathrm{cm}^2/\mathrm{s}]$$

Electrical conductivity is extremely low compared to copper: $5.8 \cdot 10^{17}$ $[1/s]$. The well-known high electrical insulation of vacuum.

$$\sigma_{\text{эл,э}} \sim 1.03 \cdot 10^{10}\ [1/\mathrm{s}]$$

Ether in this model is a loose (granular, sand) medium of extremely small particles under high pressure; weak coupling of the ether kinetic parameters with the material (tangible) media kinetic parameters because of very different particle scales; high penetrating ability of the close to const ether flow, e.g., gravity; formation of various long-term living structures; high information capacity.

2. Resonances in the ether. Cyclotron ether resonance

As in usual solid medium, different kind of waves are possible in the ether: including plane, spherical, longitudinal and transverse waves (sec. 4). Small perturbations are described by the well studied oscillation equation. Resonances are known for it.

Nikola Tesla (and many others) stated that the whole nature is based on vibrations and that in many devices he used resonance excitation of the ether longitudinal waves (easier energy accumulation). By the way, modern theoretical physics rejects existence of longitudinal waves in physical vacuum and states that only transverse waves can be present, this hampers development of brand new technologies.

Sec. 11.2 of the book in English or addendum 2 of the book in Russian shows that the ether elementary volume in strong external magnetic and electric fields moves similar to a charged particle. Actually such statement is valid for any inviscid solid media (with long-lived vortices) in the presence of large external pressure gradient and vorticity. This is one of the main results of the book.

$$\frac{d\mathbf{y}}{dt} = k_{m,0}\mathbf{E}_{\text{ext}} + \frac{k_{m,0}}{c}\mathbf{y} \times \frac{\mathbf{B}_{\text{ext}}}{\rho_m}, \qquad \mathbf{y} \equiv \rho_m \mathbf{V}$$

The ether elementary volume is not charged, but the equation is mathematically identical to the equation of positively charged particle motion. This allows to use all known information about the motion of a positively charged particle with appropriate substitution of constants.

In particular, with $\mathbf{E}_{\text{ext}} = 0$ the ether elementary volume rotates in the magnetic field $\mathbf{B}_{\text{ext}}$ with a radius $r_{э,L}$. By analogy with the Larmor radius of a charged particle we call it the Larmor radius of the ether elementary volume.

$$r_{э,L} = \frac{\rho c|\mathbf{V}_{\perp}|}{|\mathbf{B}_{\text{ext}}|}.$$

Speed $|\mathbf{V}_{\perp}|$ cancels in cyclotron frequencies of the ether and charged particle oscillations, so they are constant in seed (ν is angular rotation speed [Sivukhin, v. 3, 2004, sec. 86])

$$\nu_{э,L} = \frac{|\mathbf{V}_{\perp}|}{r_{э,L}} = \frac{|\mathbf{B}_{\text{ext}}|}{\rho c} \quad \text{and} \quad \nu_{p,L} = \frac{|\mathbf{V}_{\perp}|}{r_{p,L}} = \frac{|e||\mathbf{B}_{\text{ext}}|}{mc}$$

This allows the cyclotron ether resonance (CER) with constant (speed independent) frequency for pumping energy in the ether by the analogy with electron and ion cyclotron resonances (ECR and ICR). Without knowing the ether density ρ it is impossible to **predict** $\nu_{э,L}$ numerical value. Too many trials to find experimentally.

Experimental verification of the CER theory: enhancement of a gas discharge glow on a photomultiplier in over 2 times.

E.g, with $\rho_m \approx \rho_{m,0}$, $|\mathbf{V}_{\perp}| = 10^5$ [cm/s] – appropriate to $I = 5.6$ [mA] in a wire of cross section 2.5 $[\text{mm}^2]$ (sec. 23.9.3), $B_{\text{ext}} = 0.02 \cdot 10^4$ [Gauss] $= 0.02$ [T] we get $r_{э,L} \approx 4.5$ [cm]. For comparison, the Larmor radii of the electron and proton moving at the same speed and magnetic field are $r_{\text{elctr},L} \approx 2.8 \cdot 10^{-5}$ [cm] and $r_{\text{prot},L} \approx 5.2 \cdot 10^{-2}$[cm].

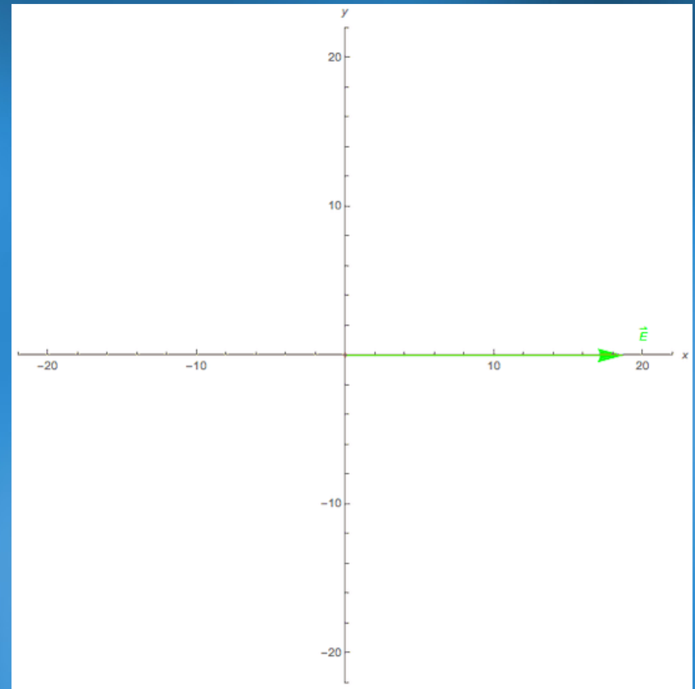
Values of $r_{э,L}$ explains existence of the Hall effect and absence of the magnetoresistance – the ether elementary volume does not have time to turn much before interacting with the surface of the metal conductor, whereas electrons should be locked by B_{ext} (magnetic confinement), especially since in metals the velocity of the directional motion of electrons does not exceed several cm/s [Sivukhin, v. 3, 2004, p. 214].

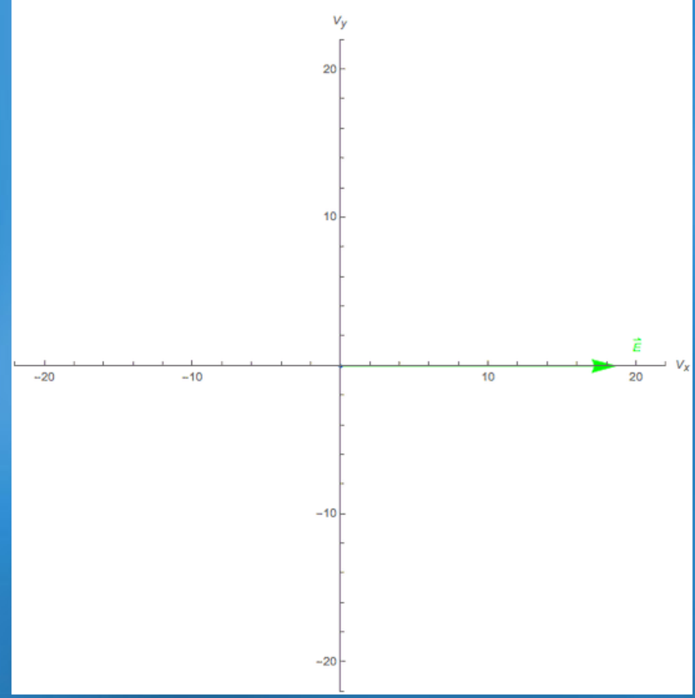
The same values give:

$$\nu_{э,L} \approx 2.2 \cdot 10^4\ [1/s]$$
$$\nu_{elctr,L} \approx 3.5 \cdot 10^9$$
$$\nu_{prot,L} \approx 1.9 \cdot 10^6$$

CER for typical magnetic fields occurs at sound frequencies. Easier to create.

Example of cyclotron resonance between a charged particle and linearly polarized electric field (green). The position vs. time (top) is shown as a red trace and the velocity vs. time (bottom) is shown as a blue trace. The background magnetic field is directed out towards the observer.
https://en.wikipedia.org/wiki/Electron_cyclotron_resonance



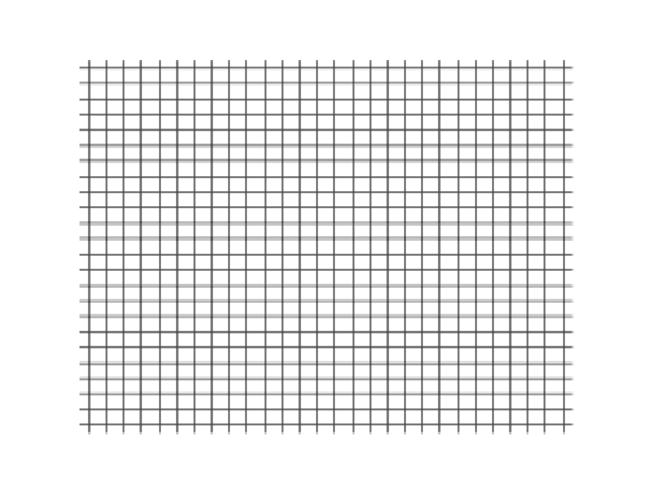


The detailed quantitative analyses (not in the book) of Corum's replication of Tesla's experiments on producing ball lightnings (sec. 24) shows that Tesla used resonant pumping of kinetic energy into the ether longitudinal waves, namely CER, at sound frequencies.

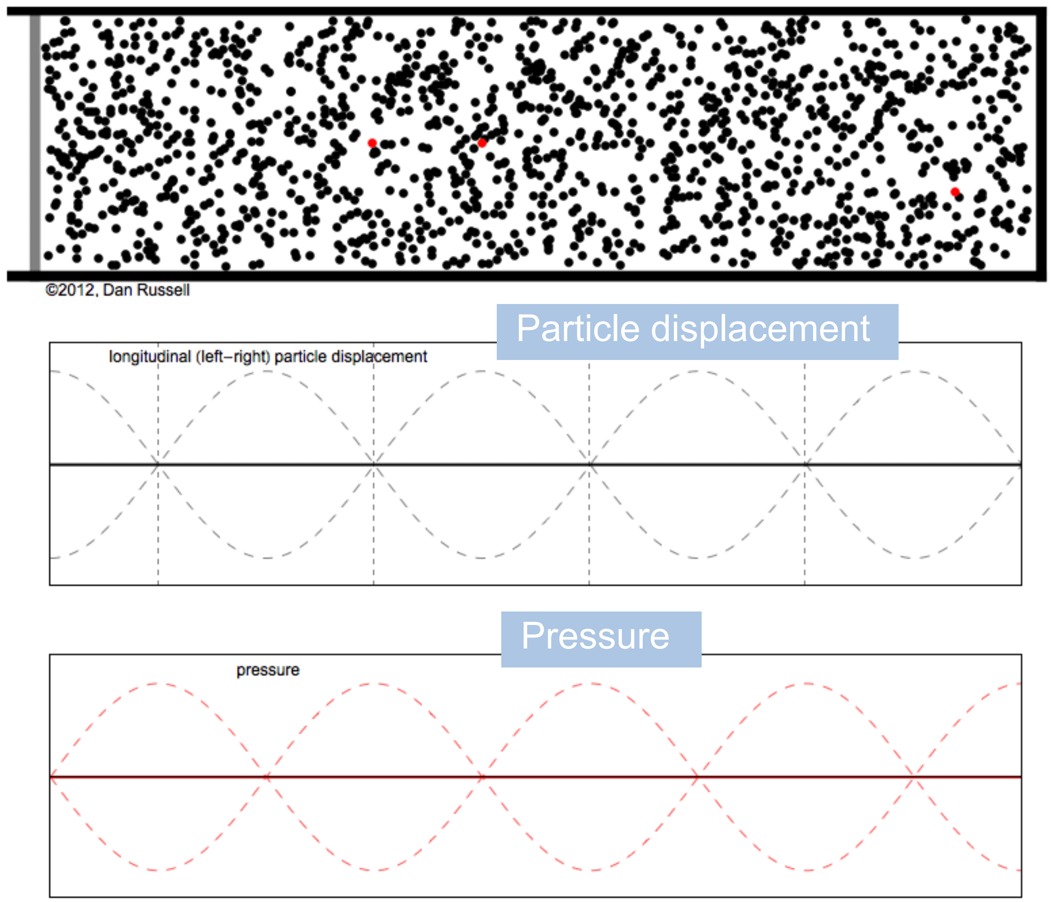
Discreet pushes of the ether elementary volume at the right moments of time are possible.

We used the CER effect for developing LENR-R (Low Energy Nuclear Reactions on Resonances) technology and device TNLT (Transformation of Nuclides at Low Temperature) demonstrating it.

Right. Propagation of longitudinal perturbation in the plane. Does not go above or below the plane.
https://en.wikipedia.org/wiki/Longitudinal_wave



Below. Longitudinal standing wave in the plane. Does not go above or below the plane. Solution of the oscillation eqn. is the sum of standing waves.
https://en.wikipedia.org/wiki/Standing_wave



Modern theoretical physics rejects existence of longitudinal waves in physical vacuum and states that only transverse waves can be present. This hampers development and application of brand new environmentally friendly technologies meeting the needs of humanity: energy production and storage, motion in space, gravity control, operating with information.

3. Results of application to LENR generation

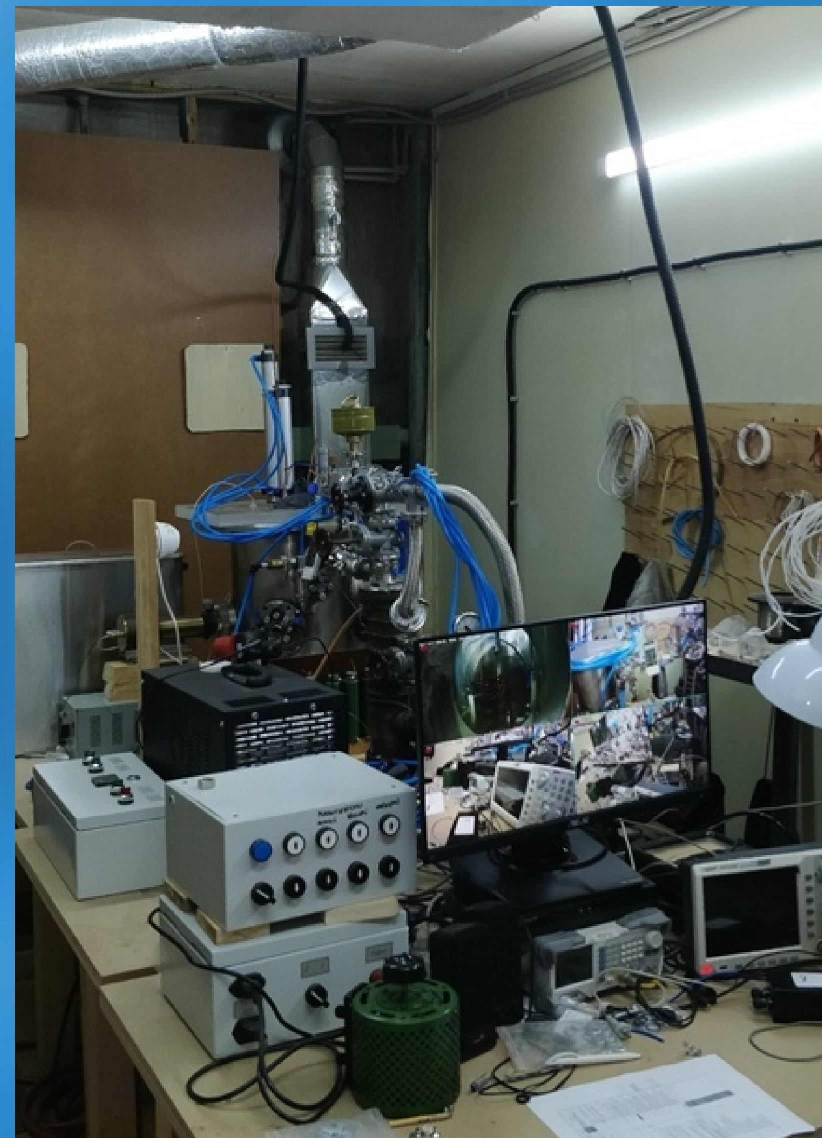
CER in a gas discharge. Several people keep the LENR-R technology know-how.

Right: the original installation occupies 3 laboratory tables and weights ~ 150 [kg].

The mobile version of the installation fits in a suitcase with a size of $50 \times 50 \times 40$ [cm^3]. Total weight is ~ 35 [kg].

The most functionally advanced mobile compact version of TNLT was created by S.M. Godin. The Telefunken lamp LS-50 (ГУ-50) of year 1934 gave fine performance in the generator.

The idea of CER is released. One can either make his own way with CER, or order ready to use mobile TNLT from S.M. Godin and F.S. Zaitsev.



Extended description of experiments on TNLT and their analyses are in the booklet, intended for LENR researchers and practical physicists:

F.S. Zaitsev. Low-energy nuclear reactions LENR and related processes in the TNLT device». 2022, 99 p., 26 figs., 69 refs.

Russian and English versions for personal viewing can be downloaded free from
http://eth21.ru/LENR.html, http://eth21.ru/LENR_en.html

Для личного ознакомления

Низкоэнергетические ядерные реакции LENR и сопутствующие процессы в установке TNLT

Обзор данных, предоставленных командой TNLT

Составил специалист по физике плазмы и LENR

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Обновления – на сайте http://eth21.ru/LENR

Москва – 2022

For personal viewing

Low-energy nuclear reactions LENR and related processes in the TNLT device

Overview of data provided by the TNLT team

Compiled by specialist in plasma physics and LENR

Fedor S. Zaitsev

DSC in Physics and Mathematics, Professor, Academician of RANS

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Version of 14.06.2022
Updates are on the website http://eth21.ru/LENR

Moscow – 2022

All the main processes accompanying LENR have been detected in TNLT. These are described and analyzed the booklet:

1. X-ray and γ-radiation.
2. The appearance of thermal and cold neutrons.
3. Changes in the composition of isotopes.
4. The formation of new chemical elements.
5. The appearance of fast electrons.
6. Excess heat generation.
7. Strong voltage spikes on the thermocouple.
8. Strange radiation.
9. The aftereffect.

The use of resonances determines the fundamental advantages of LENR-R technology over LENR generation in traditional nickel-hydrogen reactors:

1. Generation of LENR at room temperature $\sim 20\ [\mathrm{C^o}]$, which is ~ 50 times less than usually used.
2. The power input into the reactor zone is $\sim 10\ [\mathrm{W}]$, which is ~ 2 orders of magnitude less than in traditional installations.
3. Generation of LENR in a few minutes after the TNLT device is turned on.
4. The emission of cold and thermal neutrons or neutron-like objects of energies less than $\sim 0.03\ [\mathrm{eV}]$ with intensity of $\gtrsim 10^6\ [\mathrm{neutron}/s]$ into the solid angle $4\pi\ [\mathrm{sr}]$ is observed, which is comparable to the intensity of industrial fast neutron sources. Booklet, sec. 1.6, 2.2–2.4.
5. The regularity of LENR reproduction in experiments (over 200 experiments).
6. Excess heat generation in ~ 2 times (measuring technique: booklet, sec. 4) is comparable or higher than in typical LENR units.

The primary objective of research on TNLT was to convincingly demonstrate LENR generation. Maximizing neutron and excess heat generation was not studied.

The main proofs of LENR in TNLT are:

- The activation of long term radioactivity of a non-radioactive copper plate and other materials (booklet, sec. 1.2, 1.4). Isotopes decay according to channels known in nuclear physics with appropriate half-lives. Therefore, we call generated neutral objects «neutrons» and not «neutron-like».
- The registration of cold and thermal neutron emission (booklet, sec. 1.6).
- X-ray and γ-radiation (booklet, sec. 1.1, 1.3, 1.4, 1.6.1, 2.1). X-ray ($1.24 - 124$ [keV]) is characteristic to atomic processes and quick deceleration of fast electrons. Radiation in the γ-range (> 124 [keV]) occurs in nuclear and cosmic processes, and radioactive decay. X-ray and γ-radiation do not appear in significant amounts in chemical reactions. Giving electrons the speed necessary for the appearance of X-rays during abrupt braking requires a voltage of at least ~ 30 [kV], such or even comparable voltage is not used in TNLT.

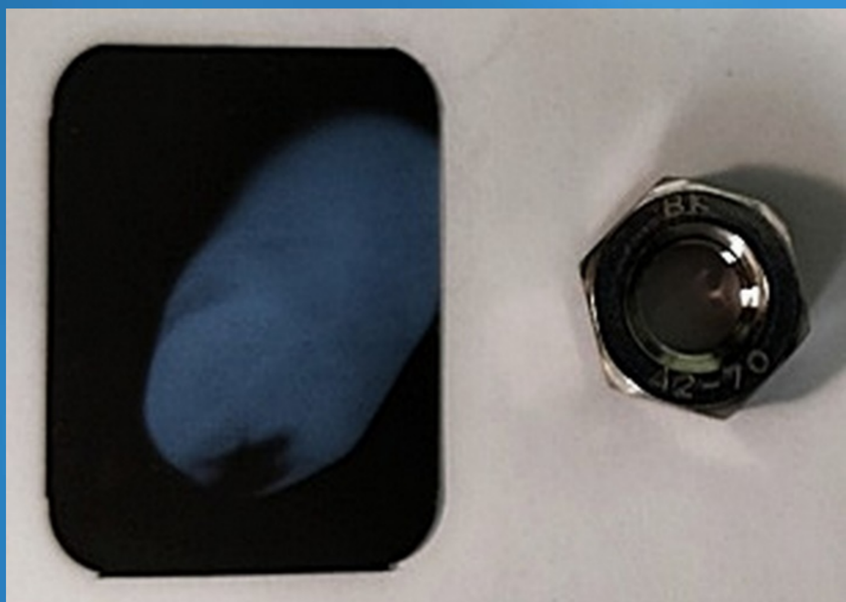
Measurements with different reaction (working) mixtures were done, see booklet, p. 8. Amount ~ 0.5 [g]. One of them is traditional powder mixture of Ni, 10 [μm], and $NaBH_4$, 99.9 and 97% purity, usually $2/3$ and $1/3$ by volume, respectively. Works also without Ni! Effects were not observed without a working mixture.

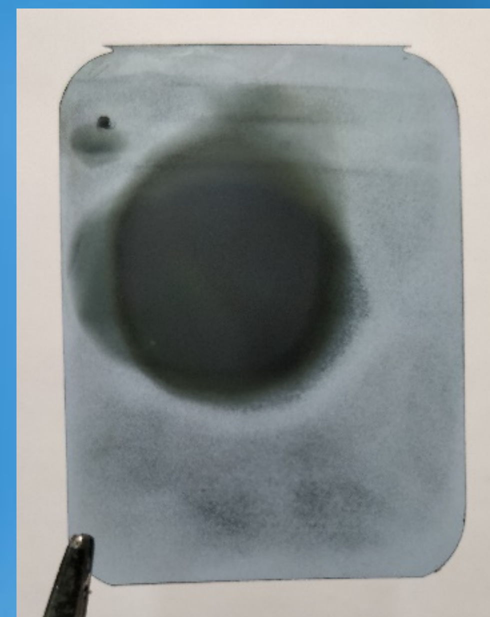
Explanation: accumulation of large kinetic energy in the cyclotron ether resonance (like pushing a swing) with subsequent impact on the working mixture.

Physics has no clear explanation of why e and p give stable H and non-stable n. Apparently, the CER accumulated high energy commit violence against e and p when combining them in n. An appropriate places are twin boundaries. See «F.S. Zaitsev, V.A. Chizhov, V.L. Bychkov. Study of the physical mechanisms of low-temperature transformation of nuclides. Presentation at RUDN University 27.12.2018», http://eth21.ru/LENR.html.

Examples of measurements

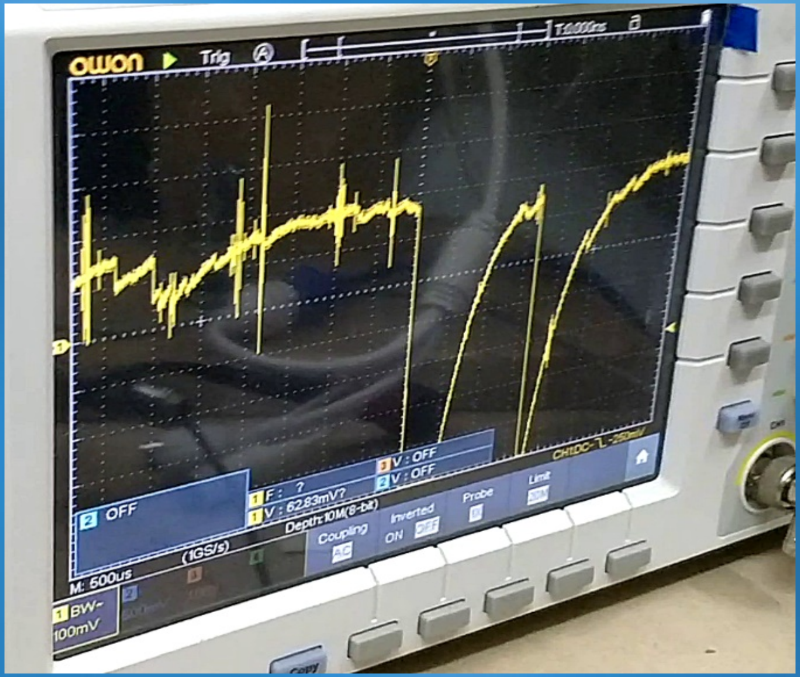
1. Exposure of dental X-ray films ERGONOM-X on the reactor (booklet, sec. 1.1, 2.2, 2.3). ERGONOM-X films are oriented on the X-ray quanta with energies of tens of keV (booklet, sec. 1.5) and are not sensitive to ultra-violet radiation in its entire range (booklet, annex 1).



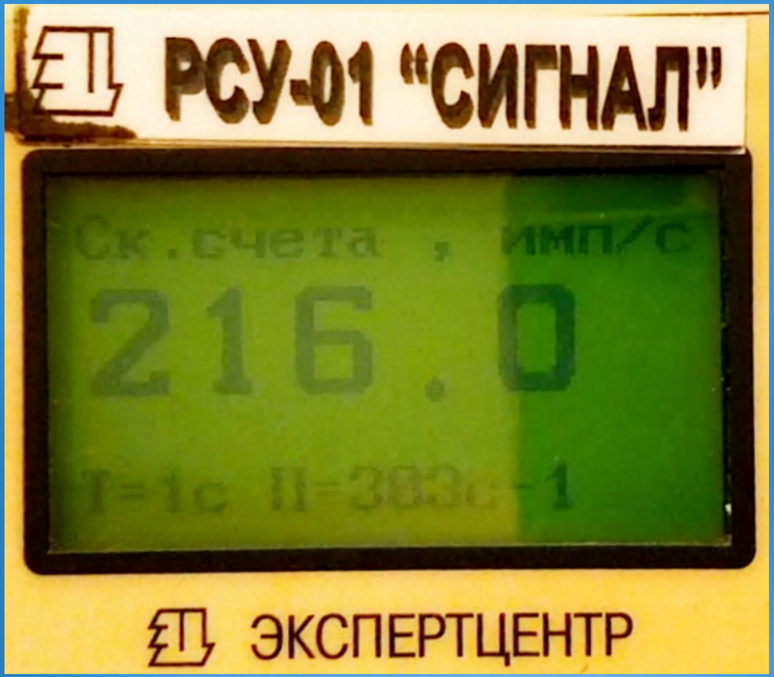


Left – typical X-ray image of a nut. Right – inverse exposure of the nut in TNLT reactor zone during $30\ [\mathrm{min}]$: born neutrons activate iron, unstable isotopes β-decay, fast electrons and positrons appeared with intensity maximum at $100\ [\mathrm{keV}]$ decelerate quickly in the nut, giving X-rays, which darken the film.

2. Measurement of X/γ-radiation by БДЭГ2-38-СП1 and РСУ-01 «Сигнал» scintillation meters (booklet, sec. 1.3, 1.6.1).



Oscilloscope OWON XDS3104AE with БДЭГ2-38-СП1 detector. One cell vertically is appropriate to energy 2.5 [keV].



Display of РСУ-01 «Сигнал». Automatic X/γ-quanta counting with energies > 10 [keV].

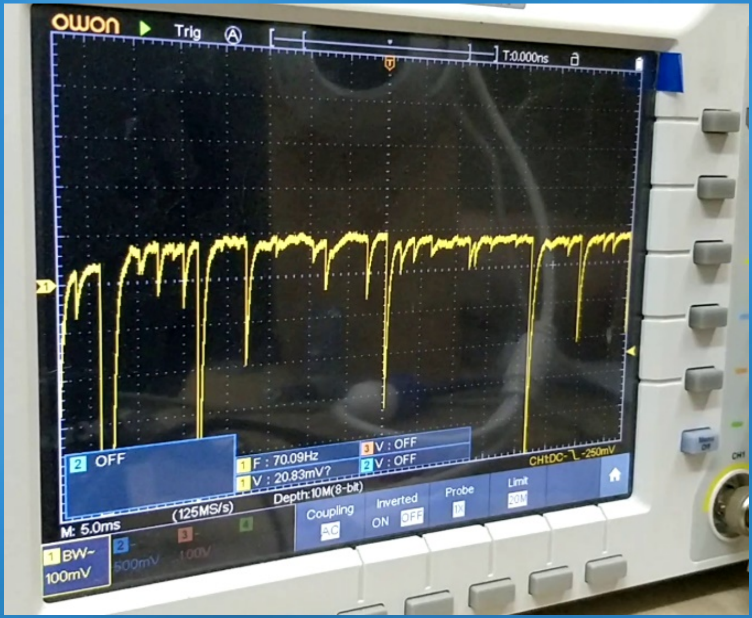
Recalculation in the whole solid angle 4π [sr] gives $6 \cdot 10^5 - 3 \cdot 10^7$ X/γ [quanta/s] of energies $1 - 20$ [keV] . Background X/γ radiation $\sim 10^2$ [imp/s].

3. (A) Exposure of X-ray films by a copper plate activated in the reactor (booklet, sec. 1.2, 2.2, 2.3). (B) Measurement of radiation from a copper plate with БДЭГ2-38-СП1 scintillation X- and γ-ray meter with a well-stabilized high-voltage БНВ2-95 power supply (booklet, sec. 1.4 , 2.2, 2.3).

A

Exposure 40 $[\mathrm{min}]$ away from TNLT.

B



One cell vertically is appropriate to energy of 2.5 $[\mathrm{keV}]$.The intensity of X/γ-quanta radiation with energies from ~ 0.3 $[\mathrm{keV}]$ is 10^5 $[\mathrm{imp/s}]$. Background radiation $\sim 10^2$ $[\mathrm{imp}/s]$. Natural copper ${}^{63}\mathrm{Cu}$ 69.1%, ${}^{65}\mathrm{Cu}$ 30.9% activated by thermal neutrons gives radionuclides ${}^{62}\mathrm{Cu}$, ${}^{64}\mathrm{Cu}$ and ${}^{66}\mathrm{Cu}$ with half-lives of 9.9 $[\mathrm{min}]$, 12.8 $[\mathrm{h}]$, 5.1 $[\mathrm{min}]$. ${}^{62}\mathrm{Cu}$ – β^+-decay, ${}^{66}\mathrm{Cu}$ β^--decay. Produce stable Ni, Zn. Refs. – in booklet, sec. 2.3. Fast deceleration of β-decay electrons and positrons gives X-quanta of 10s keV.

4. Measurements of thermal and cold neutrons with three different diagnostics types: РСУ-01 «Сигнал», detector with СНМ-18 tube filled with $^3\mathrm{He}$ and analyses of X-ray registration from the Cu plate, activated in the reactor (booklet, sec. 1.6, 2.4). Gave $\sim 10^6 - 10^7$ [neutron/s] into the solid angle 4π [sr] (booklet, sec. 1.6, 2.4, 10.2). . This falls in the middle of the industrial fast neutron sources intensities $10^3 - 10^{13}$.

Neutrons, X/γ-quanta, inverse film darkening confirm LENR generation in TNLT.

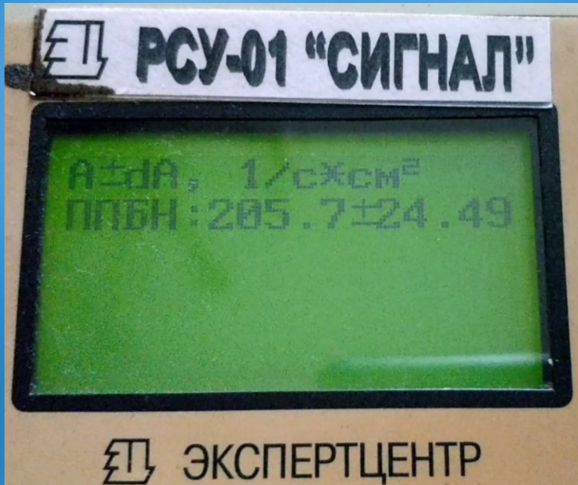
Group of neutrons	Energy range [eV]	Temperature order [K°]	Speed order [m/s]
Ultracold	$< 10^{-7}$	$1.1 \cdot 10^{-3}$	0.44
Cold	$10^{-7} - 10^{-2}$	11.6	$4.37 \cdot 10^2$
Thermal, ~ 0.0253 [эВ]	$0.01 - 0.1$	293	2200
Resonant	$0.1 - 50$	$1.16 \cdot 10^4$	$1.38 \cdot 10^4$
Slow	$50 - 500$	$1.16 \cdot 10^6$	$1.38 \cdot 10^5$
Intermediate	$500 - 10^{-5}$	$1.16 \cdot 10^8$	$1.38 \cdot 10^6$
Fast	$10^5 - 10^7$	$1.16 \cdot 10^{10}$	$1.38 \cdot 10^7$
High energies	$10^7 - 10^9$	$1.16 \cdot 10^{12}$	$1.28 \cdot 10^8$
Relativistic	$> 10^9$	$1.16 \cdot 10^{14}$	$2.99 \cdot 10^8$

Neutron classification by energy. Detection of n is a very complicated task. No universal methods. A reliable equipment ~10000$.

Reasons: (1) Strong variation of their mean free path, which depends on both neutron energy and isotopes absorption property.

(2) Signal recognition neutrons vs. X/γ-quanta. (3) Automatic counting of poorly studied phenomena can give distorted data.

Various diagnostics showed that many cold neutrons with energy less than thermal are born in TNLT. The neutron capture cross section, as a rule, increases sharply with the transition to the cold energies. However, typical neutron meters, including those used here, are focused on detecting thermal neutrons. (4) As a result, a significant part of the cold neutrons settles on the walls of such meters, their number is difficult to count. Required: thin window 0.07 [mm], cooling for calibration. (5) In addition, the material of the detector walls is activated. Usually the β-decay of unstable isotopes begins with the appearance of ~ 100 [keV] electrons and positrons, which can influence the meter readings. Initial measurements after a brake are more reliable.



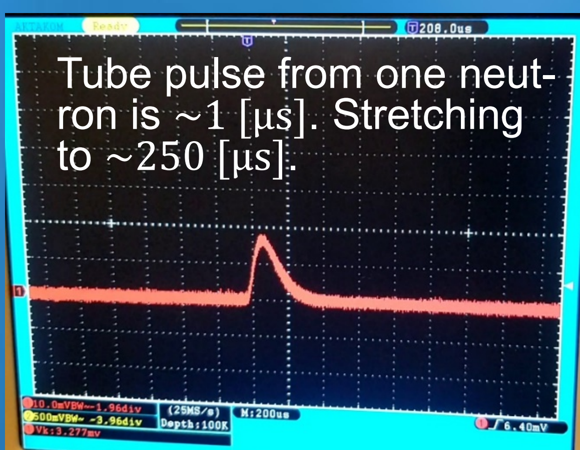
A) Neutron flux intensity by РСУ-01 «Сигнал» automatic neutron radiation counting with energies above thermal at a distance of 16 [cm] from the center of the reaction mixture (booklet, sec. 1.6.1)

B) ^{3}He tube provided by V.N. Zatelepin and D.S. Baranov together with the amplifier-recognizer and neutron moderator. Not sensitive to X/γ-quanta.

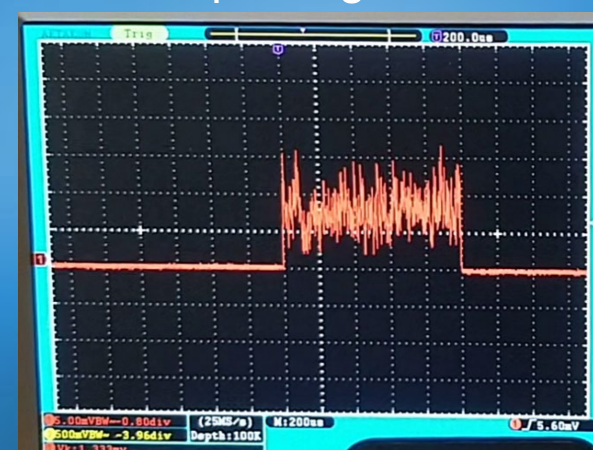
Great thanks!

The computer counter program was not used. The signal of the amplifier was send directly to the oscilloscope AKTAKOM ADS-2121MV.

Signal from a single neutron. Amplifier is a «black box»: neutron packages or noise?

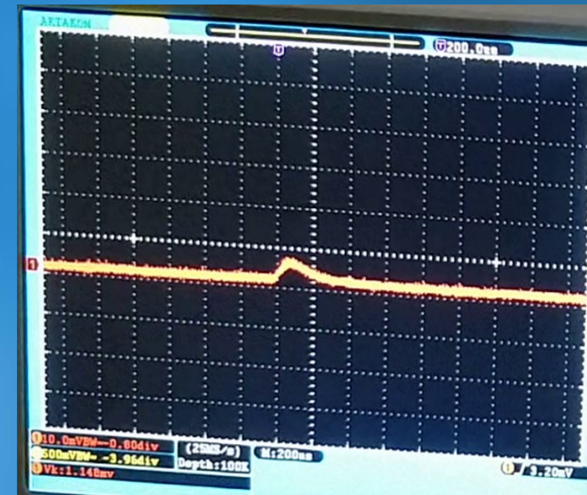


Tube pulse from one neutron is ~1 [μs]. Stretching to ~250 [μs].



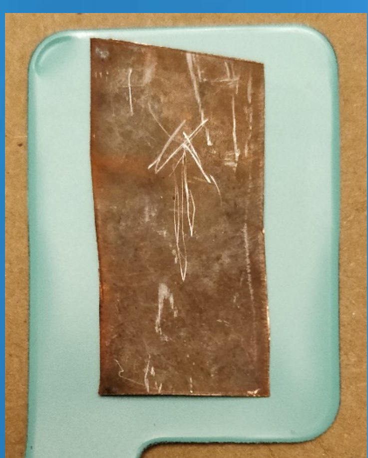
Confirmations of cold neutrons birth (booklet, sec. 1.6.2, 2.2, 2.4)

(A) The $^{3}\mathrm{He}$ tube captures many signals of small amplitude. Such signals are almost not observed without a working mixture. In a proportional CHM-18 tube, low-amplitude signals can be given by cold neutrons, as well as electrons and positrons formed during the β-decay of the elements of the activated casing. However, β-decay occurs with a delay. Therefore, pulses of small amplitude at the beginning of the reactor operation characterize mainly the appearance of cold neutrons.

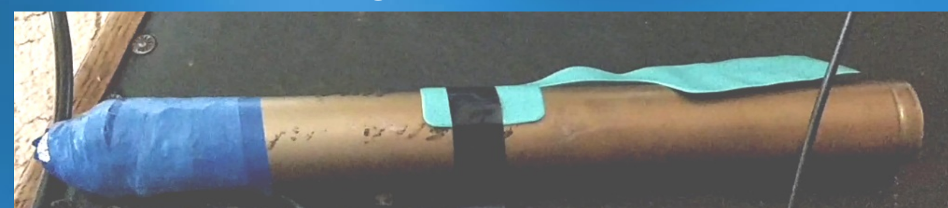


(B) X-ray films after ~ 35 [min] exposure away from the TNLT reactor.

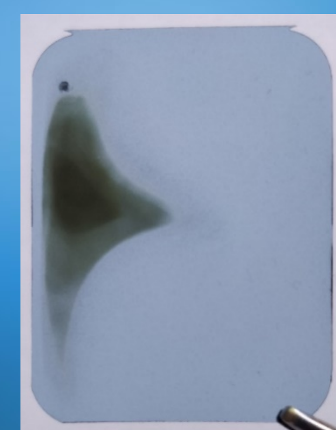
On a copper plate with a thickness of ~ 0.5 [mm].



On the casing of the CHM-18 tube.



Thermal and faster neutrons shouldn't have been absorbed much by the relatively thin plate and casing.



5. Appearance of fast electrons and positrons (booklet, sec. 3).

The radiometer RadiaScan 701A measurement of the β-radiation intensity with energies greater $50\ [\mathrm{keV}]$ from the activated in the reactor copper plate showed an excess of background by $\sim 30 - 50\%$.

Up. Background β-radiation $> 50\ [\mathrm{keV}]$

Left. β-radiation $> 50\ [\mathrm{keV}]$ of the cooper plate activated in the reactor.

Data on $> 50\ [\mathrm{keV}]$ is appropriate to electron and positron birth in β-decay, many have energies $> 10\ [\mathrm{keV}]$ with maximum intensity at $\sim 100\ [\mathrm{keV}]$.

6. Strange radiation traces near TNLT (booklet, sec. 6).

On DVD.

Up. A trace in the form of a «girl in a dress» on an X-ray sensitive glass plate 9×12 [cm^2], 1.4 [mm] thick.

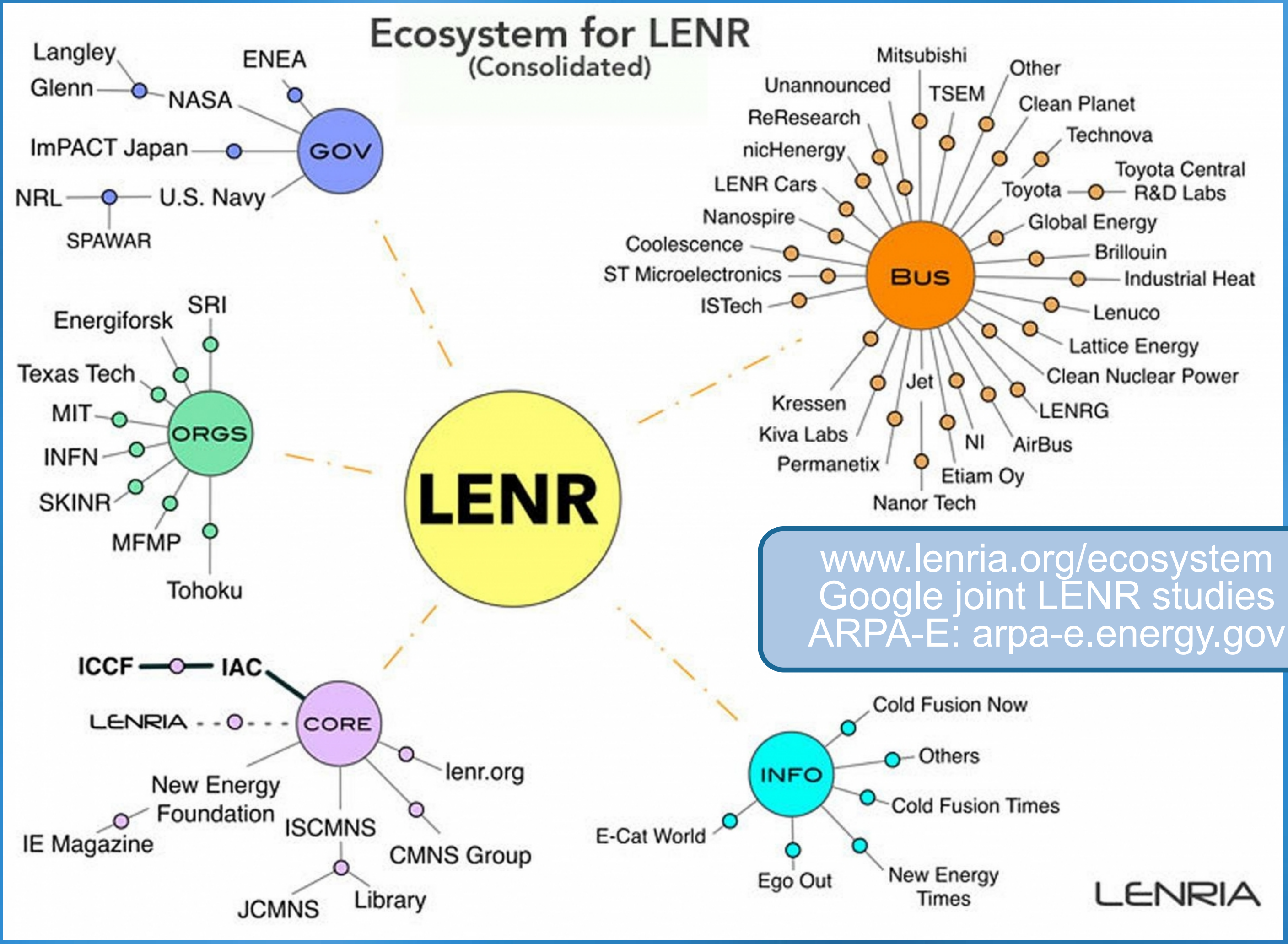
Left. Inside plexiglass 33 [mm] thick.

The quantitative etheric interpretation is in the books: pdf in Russian of 04.07.2021 and later, addendum 5; English edition, sec. 23.13. Formation of the ether vortex by LENR in twin boundaries like in a shot from a cannon. The energy density close to the one in a ball lightning $1.8 \cdot 10^{11}$ [J/m^3].

4. Prospects of the ether resonances practical use

Possible applications of resonances excitation in the ether are listed in the booklet on p. 10, 11. Here are details on some of them. Important for attracting investments.

LENR-R technology and TNLT device can be of interest to laboratories which do LENR study, Including fundamental research. <u>Ready to use equipment</u>. The efficiency of the new approach is discussed in sec. 10 of the booklet.



www.lenria.org/ecosystem
Google joint LENR studies
ARPA-E: arpa-e.energy.gov

1. Source of cold and thermal neutrons neutrons.

Generation of $10^5 - 10^8$ [neutron/s] of thermal neutrons with energies of ~ 0.025 [eV] and lower in a solid angle of 4π [sr]. Falls into the middle range of standard industrial fast neutron sources intensities: $10^3 - 10^{13}$ [neutron/s]. To our knowledge, there are no industrial sources of thermal neutrons, that are not obtained by deceleration of fast ones. Fast neutrons are very radiotoxic.

A safer and more environmentally friendly neutron source that allows long-term storage in a non-radioactive state and emits neutrons only after activation of the working mixture. Due to material used (aluminum, iron, plastic) radioactivity of TNLT vanishes in several days. It can be used, for example: in neutron activation analysis, in medicine (blood and tissue analysis, drug production), geology (well logging), oil and gas industry, criminalistics, agriculture, and etc.; in non-destructive analysis of the solids composition, liquids, suspensions, solutions and gases in the absence of preparation or minimal preparation, including in the field conditions.

The efficiency of neutron generation (ratio of neutron flux densities, at distances where they can be used, to the powers put in the devices) in TNLT turns out to be comparable with ITER – the international thermonuclear tokamak reactor, the operation of which is scheduled for 2025-2030, sec. 10.2. Thermal and slow neutrons are born in TNLT (sec. 2.2) and the energy they carry is much less than the energy carried by fast neutrons in ITER. However, fast neutrons are usually slowed down before use. This makes source of slow neutrons more attractive for practical applications.

TNLT device can be adopted to specific needs jointly with specialists from appropriate areas and give health and environment friendly solutions.

1.1 Neutron activation analysis (NAA).

NAA uses nuclear process for determining the concentrations of elements in a vast amount of materials. It allows discrete sampling of elements as it disregards the chemical form of a sample, and focuses solely on its nucleus.

The method is based on neutron activation and therefore requires a source of neutrons. The sample is bombarded with neutrons, causing the elements to form radioactive isotopes. The radioactive emissions and radioactive decay paths for each element of the periodic table are well known. Using this information, it is possible to determine the concentrations of the elements within a sample.

A particular advantage NAA technique is that it does not destroy the sample, and thus can be used, e.g., for analysis of works of art and historical artifacts. NAA can also be used to determine the activity of a radioactive sample.

Relative precision of NAA is very high, often much better than 0.1%.

TNLT device can be adopted jointly with NAA specialists for commercial use.

1.2 Nuclear medicine (NM) is a medical specialty involving the application of radioactive substances in the diagnosis and treatment of disease.

The most advanced NM diagnosis is based mainly on using technetium $^{99m}\mathrm{Tc}$. It is produced by decay of $^{99}\mathrm{Mo}$ obtained with neutron irradiation of $^{98}\mathrm{Mo}$.

The production of $^{99}\mathrm{Mo}$ is a "super-dirty radiochemical production". It began in the USA in the 1980s, but under pressure from «Greens», was banned in all states in the late1980s and was carried out outside the USA to Canada. At present there are several main providers of $^{99}\mathrm{Mo}$: NRU (Canada), HFR (Holland), BR-2 (Belgium), OSIRIS (France), Rosatom (Russia).

Preliminary successful experiments on obtaining $^{99m}\mathrm{Tc}$ by irradiation of $^{98}\mathrm{Mo}$ with neutrons have been done on TNLT. Also, sodium molybdate $\mathrm{Na_2MoO_4} \bullet \mathrm{n\ H_2O}$ ($n = 2$ and 10) was activated – the final product supplied to clinics for further chemical separation of $^{99m}\mathrm{Tc}$. One can study jointly with NM specialists perspectives of TNLT commercial use in NM.

This can help stopping severe environmental pollution worldwide.

2. Heat generation.

   The primary objective of research on TNLT was to convincingly demonstrate LENR generation and measure their characteristics.

   The problem of maximizing excess heat generation has not been studied.

   However, from the very first measurements, the heat release COP (coefficient of performance) was about two (booklet, sec. 4), which is comparable or higher than in typical LENR reactors.

   Given the two orders of magnitude greater efficiency of LENR generation in TNLT compared to other LENR devices (as fraction of energies input to the reactor), sec. 10.1 of the booklet, it is extremely promising to create a thermal energy source based on LENR-R technology. This work should be done jointly with specialists on powerplants.

3. Using the ether resonances for chemical compounds and fertilizers production.

There is high concentration of energy in TNLT due to excitation of resonances and pumping energy in them, which leads to the appearance of nuclear reactions.

The energy of one nuclear reaction ranges from tens to millions of electronVolts and more. The energy of one chemical reaction is much lower and does not exceed a few electronVolts.

Therefore, it is natural to expect a catalytic effect of the conditions in the TNLT on chemical reactions that do not occur or are hindered under normal conditions.

A perspective direction is studying the possibility of nitrogen fertilizers production directly in the field using nitrogen from the air, ~70% of which consists of nitrogen.

This research should be done jointly with specialists on chemistry and agriculture.

Stopping strong environmental pollution by fertilizers, which are only partially absorbed by plants and large amount of which spoil rivers and lakes ecosystems.

4. The use of the ether resonances for pumping energy into various solid materials (sec. 18.10, 21.12, 23.8 – increase the ether pressure), including granite, in order to soften, form and cut them, and also create conditions for the interpenetration of materials. We haven’t tried this yet, but such technologies existed in the past.

Jordan. Al Khazneh. Scale structure carved in the rock more than 2000 years ago.

A hole of complex geometry in a granite rock.

Peru. Sacsayhuaman Fortress. One of the numerous examples of polygonal masonry of well-fitted monolithic stones of solid rock. Many stones exceed the human height. This is worldwide.

5. Resonances in the ether can help weakening gravity.

In the ether, gravity and mass are explained as a phenomena arising in the particular case of the ether flow – gravitational flow (sec. 16.2, 17.2). The attraction is caused by the ether pressure gradient, like objects are forced to the center of a tornado. Control of gravity is reduced to the creation, screening or destruction of the ether gravitational flow or gravitational boundary layer of an object.

In sec. 23.10 several experiments are analyzed in which a decrease in the measured weight of objects was observed.

A cosmic scale experiment – abnormally high orbits of the first six Von Braun's satellites. Not explained by physics or engineering. Quantitative etheric interpretation is in sec. 23.12. Anomalies are caused by interaction of the rocket rotating parts with the Earth's gravitational ether flow. Accounting this flow will allow putting the same mass into a given orbit with less energy consumption, may be $\sim 20\%$ less.

Relatively simple test experiments affordable for implementation:
1. Weight measurement of an object placed in a vertical rotating cylinder made of a high-temperature superconductor in the SP mode or with a wall filled with mercury (Vimana).
2. A stand reproducing the behavior of the ether density $\sim r$ and velocity $\sim 1/r$ in the gravitational flow (see sec. 23.10.4, 23.6.6, 23.6.4).

Study the stability of the planetary and stellar systems motion, taking into account the etheric mechanisms. Explanation of the planets and stars concentration near a certain plane and regularities of planets distribution along the radius due to their masses.

6. Conclusion

In 2016-2019, there was a transition from the natural philosophical study of the ether to quantitative, to the beginning of mastering new ether technologies on this basis.

The advantage of resonances: pumping large energy in a volume by small portions.

We successfully tried out on TNLT the CER technique of resonant kinetic energy pumping in longitudinal ether waves. There is a noticeable reserve for increasing the pumping. New LENR-R technology: LENR at $\sim 20\ [C^o]$ with $\sim 10\ [W]$ input to reactor.

The conditions in many traditional approaches do not facilitate, but obstruct LENR to occur, in particular due too high temperatures, which ruin many twin boundaries.

Directions of possible scientific and commercial applications:

1. CER technology can be mastered using the ideas presented here. This needs guessing up some solutions that were not in Tesla's devices. Alternatively, re-ady to use LENR-R & TNLT can be obtained from S.M. Godin and F.S. Zaitsev.
2. Maximize neutron, heat and X/γ-quanta generation by working mixture, etc.
3. Source of cold and thermal neutrons. Applications in NAA and NM.
4. Study the efficiency of compounds and fertilizers production.
5. Research on softening for forming and cutting hard materials by resonant pumping the ether energy into them.
6. Efficient creation of ball lightnings by advancing/replacing Tesla's equipment.

Items 3, 4 require involving appropriate specialist from industry.