---------- S E M I N A R ----------

Collective nucleosynthesis: new class of nuclear fusion

Introductory quotes from http://pages.csam.montclair.edu/~kowalski/cf/217Kyiv.html

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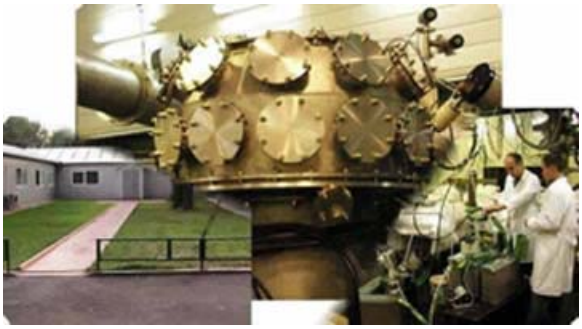
See also http://www.americanantigravity.com/documents/Proton-21-Interview.pdf
and links to the lab below

Research of Adamenko and his associates was presented in unit #168 at the informal workshop organized by the University of Bonn (IZKS Center, February 6-7, 2004). That work was described as follows:

THE KYIV EXPERIMENTS ON LOW ENERGY NUCLEOSYNTHESIS

The physicists of the Kyiv "Proton-21" laboratory of low energy nuclear physics (Dr. S. Adamenko with more than 120 coworkers) claim evidence (through 5000 experiments, carried out since 1999) for an enormous number of "low energy nucleosynthesis" in a little ball of copper invested from all sides by 0.3 MeV electrons. The elemental and isotopic analysis of the reaction products done in Kyiv was confirmed in laboratories of other countries (USA, Russia).

Starting from a 99.99 % pure ball of copper (0.01 % impurities) a large quantity of elements like La, Ce, Pt, Pb was produced. The total number of new nuclei is comparable with the total number of initial copper nuclei. The process has further amazing features: (a) The radioactivity of the resulting material is not different from the background activity and (b) transuranic nuclei are produced, including unknown superheavy ones. The aim of the workshop was to present for the first time the Kyiv results and discuss their significance, meaning and possible applications (e.g. energy production, eliminating of radioactive wastes).



This is from: http://www.proton21.com.ua/articles/BonnAbstracts.pdf
The website of the laboratory headed by Adamenko is:
www.proton21.com.ua/index_en.html
the list of their publications can be seen at
http://www.proton21.com.ua/articles_en.html

Taming a Neutron Star

Ukrainian scientists claim they have tamed thermonuclear fusion.

It appears that Ukrainian scientists have made a discovery, which could be as significant as the production of fire or the invention of the wheel by our ancestors. If their theory is confirmed, humanity will get a source of practically free energy, which could be obtained, in any quantity, out of anything. This energy would be ecologically clean and result in small power plants.

The situation looks like something from a fantasy novel about an inventor of a perpetual motion machine in which a lonely enthusiast who does not care for recognized theories and authorities builds an engine of eternal action or a time machine in a barn, or creates a life-giving potion. In real life we treat such characters skeptically. I have met dozens of them and disappointment has always been the result of such meetings. However, Kyiv scientists from Proton-21 have demonstrated results that leave one speechless.

This is a team of (more than 120) highly experienced experts and the equipment used in their laboratory exceeds the technical capabilities of many scientific research institutes. Bombarding a target with a relatively weak beam of electrons, they get results similar to what goes on inside neutron stars. The target collapses in on itself (shrinks), followed by an explosion and the brightest flash, nuclear transmutation (the occurrence of a great number of elements which the target lacked before) and a stream of various radiation. The energy of the explosion exceeds the initial energy of the election beam by a million times. One need only harness it, and while it appears that is not an easy task, it could be realized technologically.

I have no doubt that readers will cluck: "Thousands of physicists all over the world have been engaged in such experiments for the last 50 years, moreover, they are working with huge synchrotrons like the one at Serpuhov or the one at CERN. Countless billions of dollars have been invested in thermonuclear energy and now amateur "experts" in Kyiv have beat them all? Sorry, but I cannot believe that!" For such educated readers we will repeat that synchrotrons have nothing to do with this discovery. Attempts to produce thermonuclear energy have been underway at Tokamak installations and laser compression systems in Russia at the Kurchatov Institute and in Saratov, as well as in the U.S. at Livermore and Los Alamos, and at a laser center in Kyoto, Japan.

I went to a meeting with project chief Stanislav Adamenko with feeling similar sarcasm. I had taken along a stack of critical reviews of cold nuclear fusion because this project highly resembled that to me from the beginning. I cannot say that what Adamenko and his colleagues told me completely won me over, but his research has reached such a level that despite my skeptical attitude it would be negligent of me not to tell the public about the project. If their results are confirmed, if Proton-21 will achieve at least part of what they claim, the world will obtain a colossal source of cheap and clean energy. If the idea becomes a soap bubble, then we will forget it.

However, the photos of samples exploded from inside look very convincing. And the database with results of analyses based on almost 10,000 of successful experiments forces one to take them seriously.

Nuclear 'Lighter'

Here is what Adamenko says. As the scientist's speech is full of arcane terms and data which are clear only to nuclear experts, I will try to simplify his story.

Adamenko: First we have the goal of developing efficient and safe technology for using nuclear waste. We want to construct a sort of "lighter" able to force radioactive atoms to "burn down" and turn into "ashes." The first successful experiment was made on Feb. 24, 2000, on non-radioactive targets. In a couple of months we found stable, non-disintegrating atoms of super heavy chemical substances among other particles in the screen that captures the target's fission products. Finally, in our installation, which is located in a laboratory at the Institute of Nuclear Research of the National Academy of Science of Ukraine, we conducted successful experiments neutralizing radioactivity in 2002. We managed to exceed the boundaries of the initial topic.

So, why has humanity failed to tame thermonuclear reactions for almost all 60 years? Scientists are not able to find conditions to conduct a stable process. The whole world thinks that the main thing in the process is a race for more powerful ways to impact targets, and such an approach inevitably leads to a dead-end – targets exploded before a large-scale thermonuclear process managed to start. After many searches we succeeded in finding such a tool and we managed to start a reaction. In brief the idea looks like this – we punch the surface of small ball-like target with a powerful, but very short beam of electrons. The surface layer transfers the blow deeper inside, to more deeply located layers, and they in turn transfer the impact deeper. As the target has the form of a ball, the level of compression increases when the shock wave deepens into the substance. It looks like a tsunami – its wave is not too visible at the deep sections of ocean, but it rapidly increases in shallow places, rushing onto the beach with huge waves.

The shock wave in the ball behaves in the same way – starting from some layer its pressure becomes so intense that it presses atoms of substance despite their mutual repulsion. This pressure is a million times higher than anything existing or created on Earth. The nuclear "pot" of a substance with incredible density is formed in the center and all electrons are taken away from their orbits encircling the nucleus, while the very nuclei lose their initial characteristics and mess with each other. The nuclear mix flies away and forms new atoms – many of them were absent in the initial target material. The main idea in this method is to create conditions for such an electronic blow that all surface layers of the target will start continuously shrinking inside. We dubbed it "The method of punching the compression of a substance."

For those who have a deeper knowledge of nuclear physics I will provide data and calculations. Scientists from all over the world are trying to conduct controlled thermonuclear reaction experiments with mixes of deuterium-tritium (D-T). In theory, in order to ignite it and to give way to energy which exceeds the energy spent for "ignition," one should create conditions described long ago known as the "Lawson criterion." According to this criterion, first the temperature T of plasma should not be less than 7-10 keV (70-100 million degrees Kelvin). And second, the density of plasma n (the number of ions in a cubic centimeter) and the time of its detention under specified temperature TAU should satisfy the following ratio:

$$n*TAU>10^{14} .$$

The creation of such density of plasma at a specified temperature, and moreover its detention for a necessary period of time, is a task which has been an unreachable dream for physicists all around the world. According to the results published by

Adamenko and his colleagues, they managed to reach the following conditions inside the core of the target:

$$T >> 40 \text{ keV (upper estimate of 100-200 keV)};$$

$$n >> 10^{27} \text{ nucleus /cm}^3 \text{ (upper estimate exceeds } 10^{30} - 10^{33} \text{ nucleus/cm}^3);$$

$$TAU > 10^{-8} \text{ sec.}$$

So, in some of the 10,000 experiments the Lawson criterion is surely exceeded:

$$n*TAU >> 10^{19}$$

Such density of a substance is characteristic of the nuclei of neutron stars and white dwarves. This extreme state was obtained under Earth conditions for the first time and is the result of the artificially invoked collapse of the target as described above.

It is not difficult to estimate the energy emitted during the collapse and the following explosion. We put 100-200 joules in a beam of electrons to create the initial ionization. For comparison – in order to heat half a glass of water 1 degree we need 400 joules. We take a quarter of this energy – this is an insignificant value. But the emission of the target lasts for 10 -8 sec. So what do we obtain after the collapse? First we obtain isotopes of elements of the entire Mendeleev's periodic table from hydrogen to super heavy elements. It is possible to calculate for each nuclei how much energy such a transformation took. And it happens that to channel nuclear transformations only 10-30 megajoules are necessary! That means that the ratio of input and output energy differs by 5-6 times!

There are other ways of getting energy. If we take only the energy of a light flash, it will be almost equal to the energy necessary to launch the process. The ion component gives 1,000% and this is a low estimate.

First There Was Copper, Then Entire Periodic Table

Aleksander Kochno, the director general of the Proton-21 laboratory, and another employee, Vladimir Vysotsky, a professor of physics and mathematics at the Kyiv Shevchenko University, join our conversation.

Vladimir Vysotsky (V.V.): They demonstrated amazing photos of exploded targets, and it could be clearly seen that the explosions happened in their center, in the depth of the substance. I was particularly interested in a photo of a strange hemisphere imprinted on the screen with a ball clearly cut out from the center. The scientists explained that inside this ball the reaction of the nuclear collapse had happened and the explosion had taken this hemisphere out of the target and smashed it into the screen. Other tables show the results of spectrographic analyses – how many various elements were registered during explosions, for example from a copper target with 99.99% purity.

Alexander Kochno (A.K.): At first we had tested methods of inertial thermonuclear synthesis which are close to classical methods. But we tested in our own way. When we received results which did not fit forecasts, we started analyzing them. And we realized that we faced entirely different physical mechanisms. We started creating theoretical models, optimizing installation and came to what we see now through iterations.

We opened door to that process and a stream of absolutely new information flew out. We simply failed to analyze everything and had to rethink these things.

– So are there any preliminary conclusions available?

V.V.: The first is that these experiments were followed by short-term, but unbelievably powerful emissions – X-rays, gamma rays, light rays, etc. The second is the formation of new elements – both the entire spectrum of Mendeleev's periodic table and such super heavy elements that nobody had ever suspected their existence. These are transuranium and rare isotopes. There is an example – the most distributed isotope of iron is Fe-56. Its proportion of the total weight of iron amounts to approximately 92%. And there is a rare isotope called Fe-57. There is a small amount of it – almost 2.2%. This is the so-called "Mossbauer isotope" which is used in nuclear physics and metrology, and its market value is $10,000 dollars per gram because it is very difficult to split it from ordinary iron. So, during our experiments we got Fe-57 in higher quantities than Fe-56. Even in this single case one could start commercially feasible production.

As for the super heavy nuclei, it is known that until now the only elements with nucleic charges up to 116 were synthesized in the best laboratories of the world. Moreover, there were reports at recent physics conferences – one famous laboratory registered the formation of 4 nuclei with a charge of 116 and rough atomic weight of almost 280. A second famous laboratory synthesized 5 nuclei during a half-year period. We can synthesize transuranium elements in trillions of nuclei and the maximum rough atomic weight we have registered is almost 4,000 units. We suspect that nuclei with a rough atomic weight up to 100,000 were formed during our experiments. It is curious, but the possibility of the existence of such nuclei was forecast 30 years ago by academician Migdal.

Adamenko: The most amazing thing is that these super heavy nuclei are either stable or very long-lasting ones. By the way, you can note that the greatest dream for all thermonuclear laboratories in the world is to provide synthesis on the basis of nuclei lightest in weight – tritium and deuterium. The system of synthesis we have developed goes on with almost similar efficiency with any nucleus (including those classified as the iron group, which is impossible in principle in classical thermonuclear synthesis).

V.V.: Third are the streams of charged particles. These are ions with great energy, electrons, protons, deuterons, fast-moving plasma. There is an abnormally high number of protons. During each explosion, so to say, a small galaxy, a new world, is born. We get interesting confirmation of this fact. The distribution of chemical elements in the universe is known – what percentage of its weight belongs to hydrogen, helium, lithium and so on. There is a curve, which was built with corresponding data. And the distribution of elements, which happens as a result of our experiments nicely correlates with it, no matter what we put into the "oven" – on average the "ash" has the same content. This has been checked by many experiments. As for the energy of the particles, they have from 100 keV to 5-10 MeV for protons and deuterons. Besides that, we register great numbers of particles with energy levels of up to 1 GeV.

The fourth moment is applied deactivation. As a result of mini explosions the substance under radiation gets rid of such phenomenon as radioactivity. After collapse has occurred due to the impact on the sample, the substance loses its initial content. At a certain moment a "nuclear mix" forms, where atoms (in their general meaning) are located in the center of the core, while there are no electrons around them. And the same thing refers not only to light but also to any heavy nucleus. An almost uniform electron-proton-neutron mix is formed. This concoction serves as

material for the immediate formation of a new nucleus in another "package" and this new rebirth must be maximally stable. Unstable nuclei are simply not viable and they split immediately. And in case the substance was radioactive initially, then after the explosion the newly formed substance has no radioactivity at all!

So, this method may be used to utilize various wastes, and not only radioactive ones – any toxins, even the worst ones, could be transformed into safe substances and energy may be obtained as well if scientists will succeed in making them targets for nuclear collapse.

The fifth thing is external manifestations and testing effects. In our experiments we register huge quantities of various abnormalities. For instance, the material of the reactor walls absolutely changes its structure and pores are formed. Experts in nuclear reactor testing say that when comparing our substance with material which had worked in a reactor for 20 years, our substance showed more changes in structure.

Here one can develop theories and technologies for each paragraph. The field for further research and applications is boundless.

Soccer Ball Sized Reactor

– Here is a pragmatic question – how could the effects you have discovered be used in practice?

V.V.: The easiest way is to use them to deactivate radioactive waste. Chernobyl has shown that this is a critical question. In November I was in Las Vegas attending a conference dedicated to the prospects for nuclear industrial waste. The conference was held by IAEA. Each country reported what it could do in the sphere of processed nuclear fuel elimination. Nothing new was offered – waste is still buried. Americans and Japanese are trying to develop huge proton accelerators for getting neutrons, which they will use to emit at waste in hopes that as a result they will get a less radioactive substance. The first experimental installation will be built in the middle of the century. Now hundreds of million dollars are already being spent annually. Russia, China and other countries chose the same way. Even if they are successful they will not have the ultimate utilization of fuel. Neutrons processing some types of radioactive waste will stimulate the formation of other types of waste. That means the market for our installation is wide open. However, we have many problems and we need corresponding solutions.

– Is it realistic to get electricity with the help of your installation? How can your explosion be harnessed to generate electricity?

V.V.: We may choose different paths. Each observed process – emissions, streams of particles and external effects may be potentially used for this. One should calculate which option will be the optimal one. The primitive way is to transform energy from the collapse into heat, then create vapor with heat and use it to rotate the turbines of a generator. Maybe it would be more useful to employ magnetic-hydrodynamic generators. They look like ordinary generators, which produce, current at the moment when conductors cross a magnetic field. Everything works in principle and can be calculated. But we have not yet come to a solution for providing our own laboratory with its own light. Now we are conducting experiments in order to understand the essence of the processes. And the main thing is to install different targets each time, to reach a vacuum, to measure all parameters, to shoot, measure everything again, to disassemble the installation, to replace the target and so on.

For efficient production of electricity the system must be automatic – it should make not one shot an hour, but, say, one or ten per second. The automatic supply of a target rod, the receipt of energy – all these are serious technological problems which should be solved first.

An approximate calculation shows that when using targets with different dimensions at 10 shots per second with a performance factor of 10%, one may hope to get 100 megajoules per second. The capacity of such an installation will practically replace a 100 MW power unit! But we have no limits, say, for increasing its capacity by 10 times and that would equal the standard capacity of a reactor at Chernobyl . Anything could be used as fuel – copper, silica and even water. And there will be no radioactivity either before, or after!

– And what do you think the approximate dimensions of such a reactor would be?

A.K.: The machine itself may be relatively small. The reactor will not be larger than table. So, in the future there will be no need to construct huge power stations. They would be compact and be easily delivered to any necessary place. However, I would like to say again – there are many technical problems and their solution will take several years.

– And what about the safety of your small bomb? Could it be used by terrorists, for instance?

V.V.: These processes are small and they could not be used to produce a great explosion. Moreover, the explosion is always directed inward.

– But as a result you obtain an outside explosion! And could this mini nuclear explosion trigger a reaction, which may result in the collapse of the surrounding world?

V.V.: No! The explosion is always limited by the target, which the beam is aimed at, and the entire process is going on only inside the target. Only nuclear fission products come outside and they could not trigger repetitive explosions.

A.K.: And in order to conduct a relatively serious explosion one should launch the process at a target which has dimensions of at least 1 centimeter. According to our estimates, that is not possible. One could not create a pocket-sized atomic bomb based on this effect.

The Black Hole as an Experimental Artifact

A.K.: Now we are talking about things, which make ordinary physicists speechless and the existence of super heavy elements an axiom for us.

And we had a lot of such cases – after our experiments we gave our samples to other organizations and asked them to check them with their equipment. And we did not tell them what these samples were. They brought us reports and in a couple of months they admitted that they had no idea how such results might be registered, for instance during spectrographic examinations with lines which are impossible for these elements. "This is not according to textbooks!" they said. They overhauled equipment, tuned it, looked for malfunctions and obtained the same results. We told them how we got these samples and they replied: "So, why didn't you tell us!" We explained that we did it to keep the experiments pure.

But we have some things which could not be explained, for instance, "black holes."

A.K.: They do not "light up" under any light.

Adamenko: There are various methods of to analyze substances. One is radiation by a beam of ions and registering reflected signals. We tore secondary ions away from bombarded substances and analyzed them. And after an explosion we saw how local sections (20-50 microns) appeared on a screen. They reflected nothing no matter how hard you bombarded them with ions. Not only did these smashed out particles of screen refuse to fly, but even primary ions did not return. These are regions which absorb absolutely everything, in any range of weight! Just imagine, you shoot a handgun and the bullets simply disappear. They are not reflected and they do not pass through. And moreover, the process of absorption has no visible manifestations. This could not happen according to the laws of classical physics. We gave this effect a temporary name – "black holes." We suppose these places contain the nucleus of some super heavy element which has "not grown yet" till its reaches its limits. A so -called "dump pit ."We spent more time bombarding these sections (up to half an hour), and only then did these "black holes" start to return some part of the ions. Probably, saturation had occurred. These are interesting subjects of study.

There is another assumption connected with these sections and it refers to cosmology. It is known that there is a great quantity of "dark" matter in the universe, and it cannot be detected by ordinary tools. It is possible that the "black holes" we observed are part of this matter. It may be made of the nuclei of super heavy elements.

Ukraine Patents 'Eternal Engine'

– Is your method registered? Have you received any patents for it? What are the results of experiments published in scientific magazines?

A.K.: The patent has already been issued in Ukraine, and our claim is at different stages of registration in Europe, the U.S. and Asia. The international application PCT/UA2003/000015 for the patent was accepted on May 19, 2003, with priority dated of 14.08.02. We have reported our findings at approximately 15 international conferences and published several articles in serious scientific magazines. Did they shout "hurray" or not? They did not shout, but they did not condemn our findings either. Now they are keeping silent, trying to overthrow our data. But the very fact that two theoretical articles totaling 60 pages were published in leading physics journals Foundation of Physics Letters and Foundation of Physics speaks for itself.

– Several years ago scientific circles widely discussed the theory of so-called "cold fusion." And coverage ranged well beyond scientific circles. However, supporters of the theory have failed to provide confirmation yet. I should note that your work has many similarities with this theory.

V.V.: What is general to both cases is that here one can observe processes which are going on under relatively low energy when in general they should not exist, as well as the formation of new elements. There is a difference in approaches and theories, which describe these processes. We managed to create an installation, which gives real results, which can be reproduced with 100% certainty, while the theory of cold fusion cannot do that. The increase in energy emitted during the reaction is at the level of statistical mistakes in experiments. Yet we have increases of many thousands of percent.

– How well are your results documented?

A.K.: We have conducted almost 10,000 experiments and they were carefully documented. All targets were weighed and measured before and after bombardment. All conditions were registered – target content and screen material with an accuracy up to 4-5 digits after the decimal point. We conducted chemical characteristics of electron beams, and spectral and other analyses. We have made more than 20,000 analyses already. All targets are stored safely in their own numbered slots. They may be taken out, measured once more and we may find parameters which we had not thoroughly examined during the first analysis. Each day we receive up to 10 new samples and we simply have no time for proper analysis, leaving them for the time being. All data are entered into a database, which is adjusted to conduct various correlations and calculations. We may take a necessary sample, cut a piece away from it and pass it to somebody for a control check. We do not have situations in which we conducted an experiment, measured and obtained results, and the sample disappeared and we could not confirm what we had found. That could not happen. We welcome scientists from all over the world – let them come, analyze and discuss. We are ready.

Valeriy Novikov

physicist from the Proton-21 laboratory **invited by the Department of Nuclear, Plasma and Radiological Engineering,** is giving a seminar on the latest results, not included in their book **"Controlled Nucleosynthesis"** recently published by Springer in the series Fundamental Theories of Physics.

Room 103, Talbot Laboratory
4 PM February 26

Please join the seminar and discussions

Abstract:

In the Electrodynamics Laboratory "Proton-21", Kyiv, Ukraine, based on original developments, we carry out experimental and theoretical research on collective synthesis of various, including super-heavy, non-radioactive elements, some placed far beyond the known periodic table (up to more than 430 a.m.u.). These elements are present in macro quantities (nanograms), in thousands of samples, analyzed and confirmed by independent laboratories worldwide. Brief description of the experiments can be found at http://www.proton21.com.ua. A recently published book "Controlled Nucleosynthesis" (Springer) provides details on the experiments and theory. We attempt to develop a general approach to the control over nuclear processes based on analysis of the properties of nuclear clusters in the framework of the theory of nonlinear dynamical systems composed of strongly interacting nucleons. Analyzing dynamical properties of the nuclear systems, we describe new classes of action on collective connections and nonlinear resonances in these systems. Utilizing Iterated Function Systems (IFS), we exploit a new model of the nuclear system dynamics to better describe and control these nuclear processes (including the control over their directionality) by using low-energy actions (on the nuclear scale), which initiate processes of self-organization of matter at the nuclear level. The dynamical processes and correlations occurring as a result of the

evolution of the self-organizing nuclear systems involving simultaneous interactions among a great number of particles (nuclei, nucleons, electrons) provide the possibility for both the appearance of the essentially new nuclear structures and the conditions for their stability. The concept of the self-organizing nucleosynthesis and the “informational” action on the nuclear systems that we propose, for the first time allows optimization and control of the processes of both collective nucleosynthesis and Low Energy Nuclear Reactions (LENR). The proposed approach, besides its further contribution to understanding the basic physics of these processes, should help develop new, efficient nuclear technologies and, in a broad sense, methods to control the states and phase transitions in complex, nonlinear oscillation systems, ranging in applications from electronics to biology.

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1972-1978 Research Associate, and 1978-1994, Research Professor at the Ukrainian Institute of Physics and Technology. Studies on nonstationary plasma, particularly, on electron radiation at transitional stages, and acceleration of chemical reactions. 1980-1985, Joint projects with the Space Research Institute (Russia) on laser nucleosynthesis. 1986-1994 Laboratory of SHF generator engineering, Head.

1994-1999, Institute of Electromagnetic Research (Ukraine), Head of Theoretical Physics Dept. Joint projects on development of SHF and EMI generators with U.S. and British companies and organizations, incl. Maxwell, Phillips Laboratory, Kirtland AFB, NM, Sandia National Laboratories, Albuquerque, NM, British Aerospace, Bristol, and Scientific Utilization, Inc, Huntsville, Al.

1999-currently, Proton-21, Research Professor, and 2001 – currently, Institute for Electrophysics and Radiation Technology of NAS, Ukraine, Division Head.

More than 200 papers and book chapters.

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