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Nano energy

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Abstract: Lives in a world that although saves energy by developing software however still consume an increasing amount of energy annually. Major energy crises world have caused the repeated political crises, economic, industrial, social, religious, and even military. While fossil energy issue is threatened with exhaustion and the nuclear fission is totally unfriendly, we are at the time when humanity must find new energies, alternative, renewable, sustainable, cost-effective, non-hazardous. Besides solar, wind, hydro, geothermal, tidal, present work comes to propose and other new alternative energy type nano. In turn it proposes the nuclear fusion energy, energy produced from matter and antimatter, and energy produced using high power lasers. After 1950, began to appear nuclear fission plants. The fission energy was a necessary evil. In this mode it stretched the oil life, avoiding an energy crisis. Even so, the energy obtained from oil represents about 66% of all energy used. At this rate of use of oil, it will be consumed in about 40 years. Today, the production of energy obtained by nuclear fusion is not yet perfect prepared. But time passes quickly. We must rush to implement of the additional sources of energy already known, but and find new energy sources. In these circumstances this paper comes to proposing possible new energy sources. The movement of an electron around the atomic nucleus has today a great importance in many engineering fields. Electronics, aeronautics, micro and nanotechnology, electrical engineering, optics, lasers, nuclear power, computing, equipment and automation, telecommunications, genetic engineering, bioengineering, special processing, modern welding, robotics, energy and electromagnetic wave field is today only a few of the many applications of electronic engineering. This paper presents shortly in the last chap. a new and original relation which calculates the radius with that the electron is running around the atomic nucleus. For a Bohr energetically level (n=a constant value), one determines now two energetically below levels, which form an electronic layer. The author realizes by this a new atomic model, or a new quantum theory, which explains

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the existence of electron-clouds without spin, and promises, that application, construction of some high-energy laser.

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1. Introduction

Energy development is the effort to provide sufficient primary energy sources and secondary energy forms for supply, cost, impact on air pollution and water pollution, mitigation of climate change with renewable energy.

Technologically advanced societies have become increasingly dependent on external energy sources for transportation, the production of many manufactured goods, and the delivery of energy services.

This energy allows people who can afford the cost to live under otherwise unfavorable climatic conditions through the use of heating, ventilation, and/or air conditioning. Level of use of external energy sources differs across societies, as do the climate, convenience, levels of traffic congestion, pollution and availability of domestic energy sources.

All terrestrial energy sources except nuclear, geothermal and tidal are from current solar insolation or from fossil remains of plant and animal life that relied directly and indirectly upon sunlight, respectively (Aversa et al., 2016 a-m; Petrescu et al., 2016 a-c; Petrescu, 2014, 2012 a-b, 2010; Petrescu and Calautit, 2016 a-b; Petrescu and Petrescu, 2014, 2011).

Ultimately, solar energy itself is the result of the Sun's nuclear fusion.

Geothermal power from hot, hardened rock above the magma of the Earth's core is the result of the decay of radioactive materials present beneath the Earth's crust, and nuclear fission relies on man-made fission of heavy radioactive elements in the Earth's crust; in both cases these elements were produced in supernova explosions before the formation of the solar system.

Renewable energy is energy which comes from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are renewable (naturally replenished).

In 2008, about 19% of global final energy consumption came from renewable, with 13% coming from traditional biomass, which is mainly used for heating, and 3.2% from hydroelectricity.

New renewable (small hydro, modern biomass, wind, solar, geothermal, and biofuel) accounted for another 2.7% and are growing very rapidly.

The share of renewable in electricity generation is around 18%, with 15% of global electricity coming from hydroelectricity and 3% from new renewable. Wind power is growing

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at the rate of 30% annually, with a worldwide installed capacity of 158 (GW) in 2009, and is widely used in Europe, Asia, and the United States.

At the end of 2009, cumulative global photovoltaic (PV) installations surpassed 21 GW and PV power stations are popular in Germany and Spain.

Solar thermal power stations operate in the USA and Spain, and the largest of these is the 354 megawatt (MW) SEGS power plant in the Mojave Desert.

The world's largest geothermal power installation is The Geysers in California, with a rated capacity of 750 MW. Brazil has one of the largest renewable energy programs in the world, involving production of ethanol fuel from sugar cane, and ethanol now provides 18% of the country's automotive fuel.

Ethanol fuel is also widely available in the USA, the world's largest producer in absolute terms, although not as a percentage of its total motor fuel use.

While many renewable energy projects are large-scale, renewable technologies are also suited to rural and remote areas, where energy is often crucial in human development.

Globally, an estimated 3 million households get power from small solar PV systems. Micro-hydro systems configured into village-scale or county-scale mini-grids serve many areas.

More than 30 million rural households get lighting and cooking from biogas made in household-scale digesters. Biomass cook stoves are used by 160 million households.

Climate change concerns, coupled with high oil prices, peak oil, and increasing government support, are driving increasing renewable energy legislation, incentives and commercialization.

New government spending, regulation and policies helped the industry weather the 2009 economic crisis better than many other sectors.

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2. Materials and Methods

2.1. Wind Power

Airflows can be used to run wind turbines. Modern wind turbines range from around 600 kW to 5 MW of rated power, although turbines with rated output of 1.5–3 MW have become the most common for commercial use; the power output of a turbine is a function of the cube of the wind speed, so as wind speed increases, power output increases dramatically. Typical capacity factors are 20-40%, with values at the upper end of the range in particularly favorable sites. Wind energy is the cleanest and sufficient, the safest, cheapest and most sustainable. Where land space is not enough, wind farms can be built and in the water. One must put the wind to work.

2.2. Hydropower

Among sources of renewable energy, hydroelectric plants have the advantages of being long-lived (many existing plants have operated for more than 100 years). Also, hydroelectric plants are clean and have few emissions.

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2.3. Solar Energy

Solar panels generate electricity by converting photons (packets of light energy) into an electric current. Solar energy is the energy derived from the sun through the form of solar radiation. Solar powered electrical generation relies on photo voltaic and heat engines. A partial list of other solar applications includes space heating and cooling through solar architecture, day lighting, solar hot water, solar cooking, and high temperature process heat for industrial purposes.

Strano's nanotube antenna boosts the number of photons that can be captured and transforms the light into energy that can be funneled into a solar cell.

2.4. Biomass

Biomass (plant material) is a renewable energy source because the energy it contains comes from the sun. Through the process of photosynthesis, plants capture the sun's energy. When the plants are burned, they release the sun's energy they contain. In this way, biomass functions as a sort of natural battery for storing solar energy.

As long as biomass is produced sustainably, with only as much used as is grown, the battery will last indefinitely.

In general there are two main approaches to using plants for energy production: growing plants specifically for energy use, and using the residues from plants that are used for other things. The best approaches vary from region to region according to climate, soils and geography

2.5. Biofuel

Liquid biofuel is usually either bio alcohol such as bioethanol or oil such as biodiesel.

Bioethanol is an alcohol made by fermenting the sugar components of plant material and it is made mostly from sugar and starch crops. With advanced technology being developed, cellulosic biomass, such as trees and grasses, are also used as feed stocks for ethanol production.

Ethanol can be used as a fuel for vehicles in its pure form, but it is usually used as a gasoline additive to increase octane and improve vehicle emissions. Bioethanol is widely used in the USA and in Brazil.

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2.6. Geothermal Energy

The geothermal energy from the core of the Earth is closer to the surface in some areas than in others. Where hot underground steam or water can be tapped and brought to the surface it may be used to generate electricity.

Such geothermal power sources exist in certain geologically unstable parts of the world such as Chile, Iceland, New Zealand, United States, the Philippines and Italy.

The two most prominent areas for this in the United States are in the Yellowstone basin and in northern California.

2.7. Tidal Energy

Tidal power can be extracted from Moon-gravity-powered tides by locating a water turbine in a tidal current, or by building impoundment pond dams that admit-or-release water through a turbine.

The turbine can turn an electrical generator, or a gas compressor, that can then store energy until needed. Coastal tides are a source of clean, free, renewable, and sustainable energy.

2.8. Hydrogen Obtained by Artificial Photosynthesis

Artificial photosynthesis is a research field that attempts to replicate the natural process of photosynthesis, converting sunlight, water, and carbon dioxide into carbohydrates and oxygen.

Sometimes, splitting water into hydrogen and oxygen by using sunlight energy is also referred to as artificial photosynthesis. The actual process that allows half of the overall photosynthetic reaction to take place is photo-oxidation. This half-reaction is essential in separating water molecules because it releases hydrogen and oxygen ions. These ions are needed to reduce carbon dioxide into a fuel. However, the only known way this is possible is through an external catalyst, one that can react quickly as well as constantly absorb the sun's photons. The general basis behind this theory is the creation of an "artificial plant" type fuel source.

Artificial photosynthesis is a renewable, carbon-neutral source of fuel, producing either hydrogen, or carbohydrates. This sets it apart from the other popular renewable energy sources — hydroelectric, solar photovoltaic, geothermal, and wind — which produce electricity directly, with no fuel intermediate.

As such, artificial photosynthesis may become a very important source of fuel for transportation. Unlike biomass energy, it does not require arable land, and so it need not compete with the food supply.

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Since the light-independent phase of photosynthesis fixes carbon dioxide from the atmosphere, artificial photosynthesis may provide an economical mechanism for carbon sequestration, reducing the pool of CO_2 in the atmosphere, and thus mitigating its effect on global warming. Specifically, net reduction of CO_2 will occur when artificial photosynthesis is used to produce carbon-based fuel which is stored indefinitely.

2.9. Blacklight Power

Beginning in 1986, Dr. Randell L. Mills developed the theory on which the BlackLight Process is based. In 1989, the original patent applications were filed and the conclusions of the theoretical work were published. Dr. Mills believes that he has succeeded with the unification of gravity with atomic physics.

2.10. Waves Power

Wave power is the transport of energy by ocean surface waves, and the capture of that energy to do useful work — for example for electricity generation, water desalination, or the pumping of water (into reservoirs).

Wave power is distinct from the diurnal flux of tidal power and the steady gyre of ocean currents.

Wave power generation is not currently a widely employed commercial technology although there have been attempts at using it since at least 1890.

In 2008, the first experimental wave farm was opened in Portugal, at the Aguçadoura Wave Park.

3. The nano energy from mater and antimatter

Getting energy, renewable, clean, friendly (not dangerous), cheaper, by the annihilation process; for example, the annihilation of an electron with an antielectron (a positron), (Petrescu and Petrescu, 2014, 2011).

Electron and positron are obtained by extracting them from atoms; the extraction, consume a negligible amount of energy. Then, the two particles are brought near one another (collision); now it occur the phenomenon of annihilation, when the rest mass is converted totally into energy (gamma photons).

Occur gamma photons, as many as needed to retrieve the total energy of the electron and positron (rest energy and kinetic energy); usually one can get two or three gamma particles (when we have a lower annihilation, ie two antiparticles with lower energy, each with a little beyond rest mass, ie the particles are accelerated at a low-speed motion), but we can get more

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particles when we have a high annihilation (ie when the particle energy is high and the particles were strongly accelerated before the collision).

Rest energy of an electron-positron pairs exceeds slightly 1 MeV (what is an extremely large energy from some as small particles, comparable energy with that achieved by the merger of two much larger particles, having rest mass of about 2000 times higher).

Hence the first great advantage of the new method proposed, namely that if the most complex physical phenomenon so far tried to get inside the material energy (hot or cold fusion), draw only about a thousandth part of the rest mass of the particle, resulting in the fusion of two particles practically only the energy gap between energy particles being free and their energy when they are united, the proposed method to extract virtually all the internal energy of the particles annihilated.

It started with the electron positron pair because these small particles are more easily extracted from the atoms (the atoms are then immediately regenerated naturally, which determines the nature of renewable energy from the annihilation of particles).

Next step is to test the annihilation between a proton and an antiproton, because their mass is about 1800 times higher than that of the electron and positron, resulting in their annihilation as an energy by about 1000 times higher, ie instead of 1 MeV, 1 GeV (is considered as the only real obtained energy, the energy donated by the proton of the hydrogen ion; but the energy of an antiproton is considered to be donated by us almost entirely, for now, because to obtain today an antiproton we must accelerate some particles at very high-energy and then collide them).

So the real comparison must to be made between the deuterons fusion and annihilation process of a hydrogen ion (proton) with an antiproton. It will be a difference of energy of about 1000 times higher per pair of particles used, in favor of the annihilation process.

Practically it realizes the dream of extracting energy from all the matter.

Another great advantage of this method is that no radioactive substances and is not radioactive wastes from the process. From this process we obtain only gamma photons (ie energy) and possibly other energetic mini particles. The process does not pose any threat to humans and the environment.

The energy produced is clean. The technology required is much simpler than nuclear (fission or fusion), cheaper and easier to maintain. Enough energy is given by the annihilation process (virtually unlimited), cheap, clean, safe, renewable immediately (sustainable), with technology made simple.

It can extract the energy of the rest mass of an electron. For a pair of an electron and a positron this energy is circa 1 MeV.

The "synchrotron radiation (synchrotron light source)" produces deliberated a radiation source.

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Electrons are accelerated to high speeds in several stages to achieve a final energy (that is typically in the GeV range).

One needs two synchrotrons, a synchrotron for electrons and another who accelerates positrons.

The particles must to be collided, after they are being accelerated to an optimal energy level.

All the energies are collected at the exit of the Synchrotrons, after the collision of the opposite particles.

It will recover the accelerating energy, and in addition we also collect the rest energy of the electrons and positrons.

At a rate of 10^19 electrons/s we obtain an energy of about 7 GWh / year, if even are produced only half of the possible collisions.

This high rate can be obtained with 60 pulses per minute and 10^19 electrons per pulse, or with 600 pulses per minute and 10^18 electrons per pulse.

If one increases the flow rate of 1,000 times, it can have a power of about 7 TWh / year. This type of energy can be a complement of the fusion energy, and together they must replace the energy obtained by burning hydrocarbons. Advantages of the annihilation of an electron with a positron, compared with the nuclear fission reactors, are disposal of radioactive waste, of the risk of explosion and of the chain reaction.

Energy from the rest mass of the electron is more easily controlled compared with the fusion reaction, cold or hot.

Now, it doesn't need of enriched radioactive fuel (as in nuclear fission case), by deuterium, lithium and of accelerated neutrons (like in the cold fusion), of huge temperatures and pressures (as in the hot fusion), etc.

Discussion

How much energy, can get from inside of the matter? Einstein has showed that from one kg of matter we could get the energy needs for entire Earth for a year (EQ. 3.1):

$$E=m\cdot c^2=1[kg]\cdot(3\cdot 10^8)^2[(m/s)^2]=9\cdot 10^{16}[j]=2,5\cdot 10^{10}[KWh]=2,5\cdot 10^7[MWh]=2,5\cdot 10^4[GWh]=25[TWh] \quad (3.1)$$

It could do this, but only if one could extract all the energy from inside the matter.

Through nuclear fusion reaction can be extracted only a part of the rest energy of the particles used. This drop of energy (1 / 1000 of the mass energy of a proton-neutron pairs) is called, discrepancy.

For a kg of particles proton-neutron pairs, fusion energy is about a thousand times smaller than the total energy of a kilogram of matter (only 29 [GWh] from the total internal

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energy, 25 [TWh]); and considering that a return of 100% fusion reaction, which can't be done anyway.

Theoretically speaking, we can't draw from within the matter (through nuclear fusion reaction) than at most the thousandth part of its energy. Having in view the yield of the nuclear fusion reaction, this obtained energy is and less.

Through reaction of nuclear fission, the energies obtained will be even smaller.

The solution proposed in this work, obtaining energy by the mutual annihilation of two opposite particles, makes possible the requirement of extracting whole energy contained in matter.

A pair formed by a particle and its antiparticle, are brought side by side, at a distance which allow the process of reciprocal annihilation.

To increase the yield of the annihilation reaction (the number of annihilated particles from all particles that exist), we can accelerate the particles and antiparticles separately, and then we may send them into a room where they encounter annihilation at speeds and energies high, or at velocities and energies very high.

If one uses electrons and positrons for the reaction of annihilation, it results photons of the gamma type.

In this case, to prevent the possible decay of the obtained photons, again into electrons and positrons (for beginning of this annihilation process with success), the antiparticles and particles used in the process of annihilation, should be collided at low speeds and with low energy.

One can test then the optimum energy particle which permits the reaction with the maxim yield. It is necessary that most particles and antiparticles used, to meet and annihilate each other, and it should be stable as many of the obtained gamma particles.

It must rush to implement of the additional sources of energy already known, but and find new energy sources. In these conditions the proposed method to obtaining energy by annihilation of matter and antimatter, can be a real alternative sources of renewable energy.

4. Nuclear fusion nano energy

Research into controlled fusion, with the aim of producing fusion power for the production of electricity, has been conducted for over 60 years. It has been accompanied by extreme scientific and technological difficulties, but has resulted in progress.

At present, controlled fusion reactions have been unable to produce break-even (self-sustaining) controlled fusion reactions.

Workable designs for a reactor that theoretically will deliver ten times more fusion energy than the amount needed to heat up plasma to required temperatures (see ITER) were

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originally scheduled to be operational in 2018, however this has been delayed and a new date has not been stated.

It takes considerable energy to force nuclei to fuse, even those of the lightest element, hydrogen.

This is because all nuclei have a positive charge (due to their protons), and as like charges repel, nuclei strongly resist being put too close together.

Accelerated to high speeds (that is, heated to thermonuclear temperatures), they can overcome this electrostatic repulsion and get close enough for the attractive nuclear force to be sufficiently strong to achieve fusion.

The fusion of lighter nuclei, which creates a heavier nucleus and often a free neutron or proton, generally releases more energy than it takes to force the nuclei together; this is an exothermic process that can produce self-sustaining reactions.

The US National Ignition Facility, which uses laser-driven inertial confinement fusion, is thought to be capable of break-even fusion.

Energy released in most nuclear reactions is much larger than in chemical reactions, because the binding energy that holds a nucleus together is far greater than the energy that holds electrons to a nucleus.

For example, the ionization energy gained by adding an electron to a hydrogen nucleus is 13.6 eV—less than one-millionth of the 17 MeV released in the deuterium–tritium (D–T) reaction shown in the diagram to the right.

Fusion reactions have an energy density many times greater than nuclear fission; the reactions produce far greater energies per unit of mass even though individual fission reactions are generally much more energetic than individual fusion ones, which are themselves millions of times more energetic than chemical reactions.

Only direct conversion of mass into energy, such as that caused by the annihilation collision of matter and antimatter, is more energetic per unit of mass than nuclear fusion.

A substantial energy barrier of electrostatic forces must be overcome before fusion can occur. At large distances two naked nuclei repel one another because of the repulsive electrostatic force between their positively charged protons.

If two nuclei can be brought close enough together, however, the electrostatic repulsion can be overcome by the attractive nuclear force, which is stronger at close distances.

When a nucleon such as a proton or neutron is added to a nucleus, the nuclear force attracts it to other nucleons, but primarily to its immediate neighbours due to the short range of the force.

The nucleons in the interior of a nucleus have more neighboring nucleons than those on the surface.

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Since smaller nuclei have a larger surface area-to-volume ratio, the binding energy per nucleon due to the nuclear force generally increases with the size of the nucleus but approaches a limiting value corresponding to that of a nucleus with a diameter of about four nucleons.

It is important to keep in mind that the above picture is a toy model because nucleons are quantum objects, and so, for example, since two neutrons in a nucleus are identical to each other, distinguishing one from the other, such as which one is in the interior and which is on the surface, is in fact meaningless, and the inclusion of quantum mechanics is necessary for proper calculations.

The electrostatic force, on the other hand, is an inverse-square force, so a proton added to a nucleus will feel an electrostatic repulsion from all the other protons in the nucleus.

The electrostatic energy per nucleon due to the electrostatic force thus increases without limit as nuclei get larger.

H-hour

With the help of powerful lasers one can create dense and highly ionized plasma. We need highly ionized dense plasma to achieve nuclear fusion (cold or hot).

Since 1989, it talks about achieving nuclear fusion hot and cold. Another two decades have passed and humanity still does not benefit from nuclear fusion energy.

What actually happens? Is it an unattainable myth? It was also circulated by the media that has been achieved nuclear fusion heat. Since 1989 there are all sorts of scientists with all kinds of crafted devices, which declare that they can produce nuclear power obtained by cold fusion (using cold plasma).

May be that these devices works, but their yield is probably too small, or at an enlarged scale these give not the expected results. This is the real reason why we can't use yet the survival fuel (the deuterium).

Unfortunately today the dominant processes that produce energy are combustion (reaction) chemical combination of carbon with oxygen. Thermal energy released from such reactions is conventionally valued at about 7000 calories per gram.

Only the early 20th century physicists have succeeded in producing, other energy than by traditional methods. Energy release per unit mass was enormous compared with that obtained by conventional procedures.

The Kilowatt based on nuclear fission of uranium nuclei has today a significant share in global energy balance.

Unfortunately, the nuclear power plants burn the fuel uranium, already considered conventional and on extinct.

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The current nuclear power is considered a transition way, to the energy thermonuclear, based on fusion of light nuclei.

The main particularity of synthesis reaction (fusion) is the high prevalence of the used fuel (primary), deuterium. It can be obtained relatively simply from ordinary water.

Deuterium was extracted from water for the first time by Harold Urey in 1931. Even at that time, small linear electrostatic accelerators have indicated that D-D reaction (fusion of two deuterium nuclei) is exothermic.

Today we know that not only the first isotope of hydrogen (deuterium) produces fusion energy, but and the second (heavy) isotope of hydrogen (tritium) can produce energy by nuclear fusion.

The first reaction is possible between two nuclei of deuterium, from which can be obtained either a tritium nucleus plus a proton and energy, or an isotope of helium with a neutron and energy (4.1-4.2).

$$ {}_1^3T+1MeV+{}_1^1H+3MeV={}_1^3T+{}_1^1H+4MeV \quad (4.1)$$
$$ {}_1^2D+{}_1^2D\text{->}{}_2^3He+0.8MeV+{}^1n+2.5MeV={}_2^3He+{}^1n+3.3MeV \quad (4.2)$$

Observations: a deuterium nucleus has a proton and a neutron; a tritium nucleus has a proton and two neutrons.

Fusion can occur between a nucleus of deuterium and one of tritium (4.3).

$$ {}_1^2D+{}_1^3T\text{->}{}_2^4He+3.5MeV+{}^1n+14MeV={}_2^4He+{}^1n+17.5MeV \quad (4.3)$$

Another fusion reaction can be produced between a nucleus of deuterium and an isotope of helium (4.4).

$$ {}_1^2D+{}_2^3He>{}_2^4He+3.7MeV+{}_1^1H+14.7MeV={}_2^4He+{}_1^1H+18.4MeV \quad (4.4)$$

For these reactions to occur, should that the deuterium nuclei have enough kinetic energy to overcome the electrostatic forces of rejection due to the positive tasks of protons in the nuclei.

For deuterium, for average kinetic energy are required tens of keV.

For 1 keV are needed about 10 million degrees temperature. For this reason hot fusion requires a temperature of hundreds of millions of degrees.

The huge temperature is done with high power lasers acting hot plasma.

Electromagnetic fields are arranged so that it can maintain hot plasma.

The best results were obtained with the Tokamak-type installations.

ITER: the world's largest Tokamak

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ITER is based on the 'tokamak' concept of magnetic confinement, in which the plasma is contained in a doughnut-shaped vacuum vessel. The fuel—a mixture of deuterium and tritium, two isotopes of hydrogen—is heated to temperatures in excess of 150 million°C, forming a hot plasma. Strong magnetic fields are used to keep the plasma away from the walls; these are produced by superconducting coils surrounding the vessel, and by an electrical current driven through the plasma.

Deuterium fuel is delivered in heavy water, D_2O.

Tritium is obtained in the laboratory by the following reaction (4.5).

$${}_3^6Li+{}^1n\text{-->}{}_1^3T+{}_2^4He+4.6MeV \quad (4.5)$$

Lithium, the third element in Mendeleev's table, is found in nature in sufficient quantities.

The accelerated neutrons which produce the last presented reaction with lithium, appear from the second and the third presented reaction.

Raw materials for fusion are deuterium and lithium. All fusion reactions shown produce finally energy and He. He is a (gas) inert element. Because of this, fusion reaction is clean, and far superior to nuclear fission.

Hot fusion works with very high temperatures.

In cold fusion, it must accelerate the deuterium nucleus, in linear or circular accelerators.

Final energy of accelerated deuterium nuclei should be well calibrated for a positive final yield of fusion reactions (more mergers, than fission).

Electromagnetic fields which maintain the plasma (cold and especially the warm), should be and constrictors (especially at cold fusion), for to press, and more close together the nuclei.

The potential energy with that two particles reject each other, can be approximately calculated with the following relationship (4.6).

$$U=E_p=q_1q_2/(4\pi\varepsilon_0d_{12})=(1.602E^{-19})^2/(4\pi 8.8541853E^{-12}4E^{-15})=5.7664E^{-14}[J]=5.7664E^{14}x6.242E^{18}[eV]=3.599E^5[eV]=360[keV] \quad (4.6)$$

At a keV is necessary a temperature of 10 million ^{0}C. At 360 keV is necessary a temperature of 3600 million ^{0}C. In hot fusion it needs a temperature of 3600 million degrees (see the relation 3.9).

Without a minimum of 3000-4000 million degrees we can't make the hot fusion reaction, to obtain the nuclear power. Today we have just 150 million degrees made.

To replace the lack of necessary temperature, it uses various tricks. In cold fusion one must accelerate the deuterium nuclei at an energy of 360 [keV], and then collide them with the cold fusion fuel (heavy water and lithium).

Dynamic everything changes! See Petrescu and Calautit, 2016a.

5. Cold Nuclear Fusion

Because obtaining the necessary huge temperature for hot fusion is still difficult, it is time to focus us on cold nuclear fusion.

It needs to bomb the fuel with accelerated deuterium nuclei. The fuel will be made from heavy water and lithium. The optimal proportion of lithium will be tested. It would be preferable to keep fuel in the plasma state.

Between deuterium and tritium the smallest radius is the radius of deuterium nucleus (5.1).

$$\text{Deuterium } A=2 \quad A^{1/3}=1.259921 \;\text{-->}\; R_D=1.8268855223476E^{-15}\,[m] \qquad (5.1)$$
$$\text{Tritium } \quad A=3 \quad A^{1/3}=1.44224957 \;\text{-->}\; R_T=2.0912618769457E^{-15}\,[m]$$

One calculated the minimum distance between two particles which meet together. This is just the diameter of a deuterium nucleus, d_{12D} (5.2).

$$d_{12D}=2R_D=2x1.8268855223476E^{-15}[m]=3.6537710446952E^{-15}[m]=3.653771E^{-15}[m] \qquad (5.2)$$

The deuterium nuclei which will bomb the nuclear fuel, will be accelerated with the (least) energy which reject the two neighboring deuterium nuclei (see the below relationship, 5.3).

$$U=E_p=q_1q_2/(4\pi\varepsilon_0 d_{12})=(1.602E^{-19})^2/(4\pi 8.8541853E^{-12}x$$
$$x3.653771E^{-15})=6.3128464855E^{-14}[J]=6.3128464855E^{-14}$$
$$x6.242E^{18}[eV]=3.94E^{5}[eV]=3.94E^{2}[keV]=394[keV] \qquad (5.3)$$

Important! All these calculations have been made static. Dynamic everything changes! See Petrescu and Calautit, 2016a.

$U_{Dynamic}$=Ep=6.01333E-10 [J]= 3753521838 [eV]= 3753521.838 [KeV]=
=3753.521838 [MeV]=3.753521838 [GeV] (5.4)

R_D=1.91788E-19 [m] (5.5)

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Dynamic the radius of a particle (in movement) has been determined with the original expression 5.6 (Petrescu and Calautit, 2016a).

$$R=\sqrt{\frac{10}{8}\cdot\frac{h\cdot\sqrt{c^2-v^2}\cdot\sqrt{c^2-\frac{v^2}{2}-c\cdot\sqrt{c^2-v^2}}}{\pi\cdot m_0\cdot c^2\cdot v}} \tag{5.6}$$

6. Atomic and laser nano energy

Determining the ray with that the electron orbit around an atom

The main relationships 6.1 and 6.2 are written:

$$\left.\begin{array}{r}\left.\begin{array}{l}Kinetic\quad energy\quad E_c=\frac{1}{2}\cdot m\cdot v^2\\ Coulomb\quad form\quad E_C=\frac{1}{8}\cdot\frac{Z\cdot e^2}{\pi\cdot\varepsilon_0\cdot r}\end{array}\right\}\Rightarrow m=\frac{Z\cdot e^2}{4\cdot\pi\cdot\varepsilon_0\cdot r\cdot v^2}\\ Lorentz\quad relation\quad m=\frac{m_0\cdot c}{\sqrt{c^2-v^2}}\end{array}\right\}\Rightarrow \tag{6.1}$$

$$\Rightarrow\frac{m_0\cdot c}{\sqrt{c^2-v^2}}=\frac{Z\cdot e^2}{4\cdot\pi\cdot\varepsilon_0\cdot r\cdot v^2}\Rightarrow\begin{cases}l\cdot r\cdot c\cdot v^2=\sqrt{c^2-v^2}\\ with\quad l=\frac{4\cdot\pi\cdot m_0\cdot\varepsilon_0}{Z\cdot e^2}\end{cases}$$

$$\left.\begin{array}{r}Niels\quad Bohr\quad relation\quad m=\frac{\varepsilon_0\cdot h^2\cdot n^2}{\pi\cdot e^2\cdot Z\cdot r}\\ Lorentz\quad relation\quad m=\frac{m_0\cdot c}{\sqrt{c^2-v^2}}\end{array}\right\}$$

$$\Rightarrow\frac{m_0\cdot c}{\sqrt{c^2-v^2}}=\frac{\varepsilon_0\cdot h^2\cdot n^2}{\pi\cdot e^2\cdot Z\cdot r}\Rightarrow \tag{6.2}$$

$$\Rightarrow\frac{\pi\cdot m_0\cdot e^2\cdot Z}{\varepsilon_0\cdot h^2\cdot n^2}\cdot r\cdot c=\sqrt{c^2-v^2}$$

$$\Rightarrow\begin{cases}k\cdot r\cdot c=\sqrt{c^2-v^2}\\ with\quad k=\frac{\pi\cdot m_0\cdot e^2\cdot Z}{\varepsilon_0\cdot h^2\cdot n^2}\end{cases}$$

It put the relationship 4.2 at the square and we obtain the formula 6.3.

$$v^2=c^2-k^2\cdot r^2\cdot c^2 \tag{6.3}$$

6.3 is inserted in the relationship 6.1 and it obtains the relations 6.4.

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$$\begin{cases} l\cdot r\cdot c\cdot\left(c^2-k^2\cdot r^2\cdot c^2\right)=\sqrt{c^2-c^2+k^2\cdot r^2\cdot c^2}\Rightarrow \\ \Rightarrow l\cdot r\cdot c\cdot c^2\cdot\left(1-k^2\cdot r^2\right)=\sqrt{k^2\cdot r^2\cdot c^2} \\ l\cdot r\cdot c\cdot c^2\cdot\left(1-k^2\cdot r^2\right)=\pm r\cdot c\cdot k\Rightarrow \\ \Rightarrow l\cdot c^2\cdot\left(1-k^2\cdot r^2\right)=\pm k\Rightarrow 1-k^2\cdot r^2=\pm\dfrac{k}{l\cdot c^2}\Rightarrow \\ r^2=\dfrac{1}{k^2}\cdot\left(1\mp\dfrac{k}{l\cdot c^2}\right)\Rightarrow r=\pm\dfrac{1}{k}\cdot\sqrt{1\mp\dfrac{k}{l\cdot c^2}}\Rightarrow \\ \Rightarrow r=\dfrac{1}{k}\cdot\sqrt{1\mp\dfrac{k}{l\cdot c^2}}\Rightarrow \\ r=\dfrac{\varepsilon_0\cdot h^2\cdot n^2}{\pi\cdot m_0\cdot e^2\cdot Z}\cdot\sqrt{1\mp\dfrac{\pi\cdot m_0\cdot e^2\cdot Z\cdot e^2\cdot Z}{n^2\cdot\varepsilon_0\cdot h^2\cdot 4\cdot\pi\cdot m_0\cdot\varepsilon_0\cdot c^2}}\Rightarrow \\ r=\dfrac{\varepsilon_0\cdot h^2\cdot n^2}{\pi\cdot m_0\cdot e^2\cdot Z}\cdot\sqrt{1\mp\dfrac{e^4\cdot Z^2}{4\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}} \end{cases} \tag{6.4}$$

The final form (in 6.4) determines the ray of an electron running on an orbit around an atom. One has two r values at a single principal quantum number, n. It obtains a new and doubled relationship.

Determining the velocities of an electron which is running around an atom

From relationship 6.1 it obtains the speed of an electron to the square. One determines relationships numbered with 6.5.

$$\begin{cases} v^2=\dfrac{2\cdot c^2}{1+\sqrt{1+4\cdot c^4\cdot r^2\cdot l^2}}\Rightarrow v^2=\dfrac{2\cdot c^2}{1+R}\quad with\quad R=\sqrt{1+4\cdot c^4\cdot r^2\cdot l^2} \\ R=\sqrt{1+4\cdot c^4\cdot r^2\cdot l^2}=\sqrt{1+\dfrac{4\cdot c^4\cdot l^2}{k^2}\mp 2\cdot\dfrac{2\cdot c^2\cdot l}{k}}= \\ =\sqrt{\left(1\mp 2\cdot\dfrac{c^2\cdot l}{k}\right)^2}=\left|1\mp 2\cdot\dfrac{c^2\cdot l}{k}\right|=\begin{cases}\dfrac{2\cdot c^2\cdot l}{k}-1=\dfrac{8\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}-1 \\ \dfrac{2\cdot c^2\cdot l}{k}+1=\dfrac{8\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}+1\end{cases} \\ \quad with\quad E=\dfrac{2\cdot c^2\cdot l}{k}>1 \\ v_-^2=\dfrac{2\cdot c^2}{1+\dfrac{8\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}-1}=\dfrac{2\cdot c^2}{\dfrac{8\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}}=\dfrac{c^2}{\dfrac{4\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}}=\dfrac{k}{l} \\ v_+^2=\dfrac{2\cdot c^2}{1+\dfrac{8\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}+1}=\dfrac{2\cdot c^2}{\dfrac{8\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}+2}=\dfrac{c^2}{\dfrac{4\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}+1}=\dfrac{kc^2}{lc^2+k} \end{cases} \tag{6.5}$$

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Determining the mass of the electron in movement

When the speeds are known is simple to find quickly the masses values (forms 6.6).

$$m_- = \frac{m_0}{\sqrt{1 - \cfrac{1}{\cfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2}}}}$$

(6.6)

$$m_+ = \frac{m_0}{\sqrt{1 - \cfrac{1}{\cfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2} + 1}}}$$

Determining the energy of the electron in movement

To determine the energy of an electron in movement, it multiplies the mass of an electron with the squared speed of light (using the Einstein relation), (forms 6.7).

$$W_- = \frac{m_0 \cdot c^2}{\sqrt{1 - \cfrac{1}{\cfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2}}}}$$

(6.7)

$$W_+ = \frac{m_0 \cdot c^2}{\sqrt{1 - \cfrac{1}{\cfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2} + 1}}}$$

Determining the frequencies of pumping

Finally, we can write the frequency of pumping between the two energetic sub levels, adjacent (see the form 6.8 and the table 1).

$$\nu = \frac{W_1 - W_2}{h} = \frac{m_0 \cdot c^2}{h} \cdot \left(\frac{1}{\sqrt{1 - \cfrac{1}{\cfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot c^2 \cdot n^2}{e^4 \cdot Z^2}}}} - \frac{1}{\sqrt{1 - \cfrac{1}{\cfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot c^2 \cdot n^2}{e^4 \cdot Z^2} + 1}}} \right) \quad (6.8)$$

Notes utilized (used notations) (forms 6.9)

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$$\begin{cases} \text{The permissive constant (the permittivity): } \varepsilon_0 = 8.85418 \cdot 10^{-12} \quad [\frac{C^2}{N \cdot m^2}] \\ \text{The Planck constant: } h = 6.626 \cdot 10^{-34} \quad [J \cdot s] \\ \text{The rest mass of electron: } m_0 = 9.1091 \cdot 10^{-31} \quad [kg] \\ \text{The Pythagora's number: } \pi = 3.141592654 \\ \text{The electrical elementary load: } e = -1.6021 \cdot 10^{-19} \quad [C] \\ \text{The light speed in vacuum: } c = 2.997925 \cdot 10^{8} [\frac{m}{s}] \\ \text{n = the principal quantum number (the Bohr quantum number)} \\ \text{Z = the number of protons from the atomic nucleus (the atomic number)} \end{cases} \quad (6.9)$$

Table 1: The LASER frequencies of pumping (n=2-5)

Z	ע[Hz]	Element
15	=5.54942E14	P
22	=5.072E14	Ti
23	=6.0598E14	V
29	=4.8452E+14	Cu
30	=5.54942E+14	Zn
31	=6.32782E+14	Ga
37	=5.25911E+14	Rb
38	=5.8516E+14	Sr
39	=6.49284E+14	Y

All frequencies, calculated in the table 1, are outside of the visible domain ($4.34*10^{14}\div6.97*10^{14}$ [Hz]).

Only the atmospheric elements, N and O, are located near the visible frequencies when n=1.

The bold value can be used to make a Rubin (Crystal) LASER.

For n=2-5 there are nine values indicated to make a LASER in the visible domain (see the table 2).

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The pumping frequencies, between two nearer level								Table 2
Z	ν	El n_1-n_2	Z	ν	Element	Z	ν	Element
1		H	2		He	3	2.22122E+16	Li 1-2
4	3.95022E+16	Be 1-2	5	6.17499E+16	B 1-2	6	8.89688E+16	C 1-2
7	1.21175E+17	N 1-2	8	1.58388E+17	O 1-2	9	2.00631E+17	F 1-2
10	2.47929E+17	Ne 1-2	11	5.53738E+16	Na 2-3	12	6.59213E+16	Mg 2-3
13	7.73939E+16	Al 2-3	14	8.97936E+16	Si 2-3	15	1.03123E+17	P 2-3
16	1.17383E+17	S 2-3	17	1.32578E+17	Cl 2-3	18	1.48709E+17	Ar 2-3
19	5.7866E+16	K 3-4	20	6.41348E+16	Ca 3-4	21	7.07288E+16	Sc 3-4
22	7.76485E+16	Ti 3-4	23	8.48944E+16	V 3-4	24	**9,24672E+16**	Cr 3-4
25	1.00368E+17	Mn 3-4	26	1.08596E+17	Fe 3-4	27	1.17153E+17	Co 3-4
28	1.2604E+17	Ni 3-4	29	1.35258E+17	Cu 3-4	30	1.44806E+17	Zn 3-4
31	1.54686E+17	Ga 3-4	32	1.64899E+17	Ge 3-4	33	1.75446E+17	As 3-4
34	1.86327E+17	Se 3-4	35	1.97544E+17	Br 3-4	36	2.09097E+17	Kr 3-4
37	1.01887E+17	Rb 4-5	38	1.07502E+17	Sr 4-5	39	1.1327E+17	Y 4-5
40	1.19192E+17	Zr 4-5	41	1.25268E+17	Nb 4-5	42	1.31498E+17	Mo 4-5
43	1.37882E+17	Tc 4-5	44	1.44421E+17	Ru 4-5	45	1.51116E+17	Rh 4-5
46	1.57966E+17	Pd 4-5	47	1.64972E+17	Ag 4-5	48	1.72134E+17	Cd 4-5
49	1.79453E+17	In 4-5	50	1.86928E+17	Sn 4-5	51	1.94561E+17	Sb 4-5
52	2.02352E+17	Te 4-5	53	2.10301E+17	I 4-5	54	2.18408E+17	Xe 4-5
55	1.22612E+17	Cs 5-6	56	1.2715E+17	Ba 5-6	57	1.31772E+17	La 5-6
58	1.36479E+17	Ce 5-6	59	1.41271E+17	Pr 5-6	60	1.46147E+17	Nd 5-6
61	1.51109E+17	Pm 5-6	62	1.56157E+17	Sm 5-6	63	1.6129E+17	Eu 5-6
64	1.66508E+17	Gd 5-6	65	1.71813E+17	Tb 5-6	66	1.77203E+17	Dy 5-6
67	1.8268E+17	Ho 5-6	68	1.88243E+17	Er 5-6	69	1.93893E+17	Tm 5-6
70	1.9963E+17	Yb 5-6	71	2.05453E+17	Lu 5-6	72	2.11364E+17	Hf 5-6
73	2.17362E+17	Ta 5-6	74	2.23448E+17	W 5-6	75	2.29621E+17	Re 5-6
76	2.35883E+17	Os 5-6	77	2.42232E+17	Ir 5-6	78	2.4867E+17	Pt 5-6
79	2.55197E+17	Au 5-6	80	2.61813E+17	Hg 5-6	81	2.68517E+17	Tl 5-6
82	2.75311E+17	Pb 5-6	83	2.82195E+17	Bi 5-6	84	2.89168E+17	Po 5-6
85	2.96231E+17	At 5-6	86	3.03385E+17	Rn 5-6	87	1.8618E+17	Fr 6-7
88	1.90549E+17	Ra 6-7	89	1.94972E+17	Ac 6-7	90	1.99447E+17	Th 6-7
91	2.03976E+17	Pa 6-7	92	2.08557E+17	U 6-7	93	2.13193E+17	Np 6-7
94	2.17881E+17	Pu 6-7	95	2.22624E+17	Am 6-7	96	2.2742E+17	Cm 6-7
97	2.3227E+17	Bk 6-7	98	2.37174E+17	Cf 6-7	99	2.42131E+17	Es 6-7
100	2.47144E+17	Fm 6-7	101	2.5221E+17	Md 6-7	102	2.57331E+17	No 6-7
103	2.62506E+17	Lr 6-7	104	2.67736E+17	Rf 6-7	105	2.73021E+17	Db 6-7

The substance is structured in this mode, that, we can obtain more energy, if one can penetrate it deeply. In this mode, we can check and extract, small portions of energy, but the total obtained energy will be bigger.

The atomic electrons are coupled. The transition between the two coupled electrons can give us more energy, in small portions.

First, one can make a stronger "Electromagnetic Amplification by the Stimulated Emission of Radiation" LASER (MASER), by pumping the energy between two sub levels, adjacent.

This last chap. briefly describes how to determine the relationships by which it calculates the ray of an electron moving on an orbit around an atom.

Now, it's the time to correct the length of the r radius (see the eq. (6.12)).

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Correcting the length of the r radius

The main expression (6.2) can be written in the form (6.10).

$$r = \frac{1}{k} \cdot \sqrt{1 - \frac{v^2}{c^2}} \tag{6.10}$$

The velocities have the forms (6.11), known.

$$\begin{cases} v_-^2 = \dfrac{k \cdot c^2}{l \cdot c^2} = \dfrac{k}{l} \\ v_+^2 = \dfrac{k \cdot c^2}{l \cdot c^2 + k} \end{cases} \tag{6.11}$$

With the relations (6.11) the expression (6.10) takes the forms (6.12).

$$\begin{cases} r_- = \dfrac{1}{k} \cdot \sqrt{1 - \dfrac{k}{l \cdot c^2}} = \dfrac{\varepsilon_0 \cdot h^2 \cdot n^2}{\pi \cdot m_0 \cdot e^2 \cdot Z} \cdot \sqrt{1 - \dfrac{e^4 \cdot Z^2}{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}} \\ r_+ = \dfrac{1}{k} \cdot \sqrt{1 - \dfrac{k}{l \cdot c^2 + k}} = \dfrac{\varepsilon_0 \cdot h^2 \cdot n^2}{\pi \cdot m_0 \cdot e^2 \cdot Z} \cdot \sqrt{1 - \dfrac{e^4 \cdot Z^2}{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2 + e^4 \cdot Z^2}} \end{cases} \tag{6.12}$$

The values imposed by relations 6.12 are probably the real physical values, because the main relations 6.1 and 6.2 are verified in the same time by the relationships 6.12.

The velocities, masses, energies and frequency of pumping have not changed (see a recap in cap. 6, relations 6.13-6.16).

Recap

$$\begin{cases} r_- = \dfrac{1}{k} \cdot \sqrt{1 - \dfrac{k}{l \cdot c^2}} = \dfrac{\varepsilon_0 \cdot h^2 \cdot n^2}{\pi \cdot m_0 \cdot e^2 \cdot Z} \cdot \sqrt{1 - \dfrac{e^4 \cdot Z^2}{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}} \\ r_+ = \dfrac{1}{k} \cdot \sqrt{1 - \dfrac{k}{l \cdot c^2 + k}} = \dfrac{\varepsilon_0 \cdot h^2 \cdot n^2}{\pi \cdot m_0 \cdot e^2 \cdot Z} \cdot \sqrt{1 - \dfrac{e^4 \cdot Z^2}{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2 + e^4 \cdot Z^2}} \end{cases} \tag{6.13}$$

$$\begin{cases} v_-^2 = \dfrac{2 \cdot c^2}{1 + \dfrac{8 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2} - 1} = \dfrac{2 \cdot c^2}{\dfrac{8 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2}} = \dfrac{c^2}{\dfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2}} = \dfrac{k}{l} \\ v_+^2 = \dfrac{2 \cdot c^2}{1 + \dfrac{8 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2} + 1} = \dfrac{2 \cdot c^2}{\dfrac{8 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2} + 2} = \dfrac{c^2}{\dfrac{4 \cdot \varepsilon_0^2 \cdot h^2 \cdot n^2 \cdot c^2}{e^4 \cdot Z^2} + 1} = \dfrac{k \cdot c^2}{l \cdot c^2 + k} \end{cases} \tag{6.14}$$

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$$\begin{cases} m_{-} = \dfrac{m_0}{\sqrt{1-\dfrac{1}{\dfrac{4\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}}}} \\ m_{+} = \dfrac{m_0}{\sqrt{1-\dfrac{1}{\dfrac{4\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}+1}}} \end{cases} \quad (6.15)$$

$$\begin{cases} W_{-} = \dfrac{m_0\cdot c^2}{\sqrt{1-\dfrac{1}{\dfrac{4\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}}}} \\ W_{+} = \dfrac{m_0\cdot c^2}{\sqrt{1-\dfrac{1}{\dfrac{4\cdot\varepsilon_0^2\cdot h^2\cdot n^2\cdot c^2}{e^4\cdot Z^2}+1}}} \end{cases} \quad (6.16)$$

7. Results

Major energy crises world have caused the repeated political crises, economic, industrial, social, religious, and even military.

While fossil energy issue is threatened with exhaustion and the nuclear fission is totally unfriendly, we are at the time when humanity must find new energies, alternative, renewable, sustainable, cost-effective, non-hazardous.

Besides solar, wind, hydro, geothermal, tidal, present work comes to propose and other new alternative energy type nano.

In turn this work proposes the nuclear fusion energy, energy produced from matter and antimatter, and energy produced using high power lasers.

After 1950, began to appear nuclear fission plants. The fission energy was a necessary evil. In this mode it stretched the oil life, avoiding an energy crisis. Even so, the energy obtained from oil represents about 66% of all energy used. At this rate of use of oil, it will be consumed in about 40 years.

Today, the production of energy obtained by nuclear fusion is not yet perfect prepared. But time passes quickly. We must rush to implement of the additional sources of energy already known, but and find new energy sources.

In these circumstances this paper comes to proposing possible new energy sources.

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In hot fusion energy the problem is that at least 10 million degrees are necessary for 1 keV. At 400 keV we need a temperature of 4000 million degrees to occur the hot fusion reaction. Over time it has advanced the idea that the achievement of a hot nuclear reaction can require tens or hundreds of millions of degrees. Precise calculations (given by the relationship 3.6) clearly indicate a much higher temperature. Hot fusion needs a temperature of about 4000 million degrees, or 4 billion degrees. Without a minimum of 3600 million degrees=3.6 billion degrees we can't make a hot fusion reaction to obtain nuclear power. Unfortunately, this clarification does not bring us closer to the realization of hot fusion reaction, but on the contrary, us away from the day when we will be able to achieve it. Today we have only made 150 million degrees. A huge problem is even the achievement of such temperatures. For these reasons we are entitled to think up next following, namely achieving cold fusion. We need to bomb the fuel with accelerated deuterium nuclei. The fuel will be made from heavy water and lithium. The optimal proportion of lithium will be tested. It would be preferable to keep fuel in the plasma state. Between deuterium and tritium the smallest radius is the radius of the deuterium nucleus. We must accelerate deuterium nuclei, which will bomb then the nuclear fuel, and the deuterium nuclei must be accelerated with the (least) energy which rejects the two neighboring deuterium nuclei. Acceleration energy can be decreased or increased by one until it achieves the optimal reaction yield enough. Used as raw material isotopes of hydrogen nuclei, which are found in abundance and can easily be get in industrial quantities. Heavy water is not polluted and presents no risk of contamination, explosion, or uncontrolled reaction. One may use and Lithium, the third element in Mendeleev's table, which is found in nature in sufficient quantities and it is a friend element. By the cold fusion is obtained energy and helium. Helium is an inert gas that does not present any danger. This is the great advantage of the cold fusion reaction than the classical fission reaction. Hot fusion that occurs in stars, for the time being it is difficult to reproduce on earth. Getting cold fusion seems to be easier than ever.

Last chap. presents the movement of an electron around the atomic nucleus has today a great importance in many engineering fields. Electronics, aeronautics, micro and nanotechnology, electrical engineering, optics, lasers, nuclear power, computing, equipment and automation, telecommunications, genetic engineering, bioengineering, special processing, modern welding, robotics, energy and electromagnetic wave field is today only a few of the many applications of electronic engineering. This paper presents shortly in the last chap. a new and original relation which calculates the radius with that the electron is running around the atomic nucleus. For a Bohr energetically level (n=a constant value), one determines now two energetically below levels, which form an electronic layer. The author realizes by this a new atomic model, or a new quantum theory, which explains the existence of electron-clouds without spin, and promises, that application, construction of some high-energy laser.

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8. Conclusions

The nano energies proposed by this article are much closer than expected.

Hot fusion needs a temperature of about 4000 million degrees, or 4 billion degrees.

The proposed method for energy cold fusion is simple but effective.

One needs to bomb the fuel with accelerated deuterium nuclei. The fuel will be made from heavy water and lithium.

The optimal proportion of lithium will be tested. It would be preferable to keep fuel in the plasma state.

Between deuterium and tritium the smallest radius is the radius of the deuterium nucleus.

It must accelerate deuterium nuclei, which will bomb then the nuclear fuel, and the deuterium nuclei must be accelerated with the (least) energy which rejects the two neighboring deuterium nuclei (see the relationship 3.10).

Acceleration energy can be decreased or increased by one until it achieves the optimal reaction yield enough.

Used as raw material isotopes of hydrogen nuclei, which are found in abundance and can easily be get in industrial quantities.

Heavy water is not polluted and presents no risk of contamination, explosion, or uncontrolled reaction.

One may use and Lithium, the third element in Mendeleev's table, which is found in nature in sufficient quantities and it is a friend element.

By the cold fusion is obtained energy and helium. Helium is an inert gas that does not present any danger. This is the great advantage of the cold fusion reaction than the classical fission reaction.

Hot fusion that occurs in stars, for the time being it is difficult to reproduce on earth. Getting cold fusion seems to be easier than ever.

In chapter 6 presents a new atomic model and its possible application to build a high-power laser. And this original method is quite easily achieved with existing technologies.

In this paper one proposes and a simple method to obtain infinite energy in huge quantities. But the necessary technologies are today somewhere behind.

On the other hand getting power by annihilating the matter with antimatter can be dangerous if the process is not well controlled.

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