Beyond spacetime and quantum fields

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During the 20th century there were a couple of scientists who announced the observation of exceptional heat during the electrolysis of water with the help of Palladium electrodes. In spite of the opinion of the community of nuclear physicists that low energy generated nuclear fusion is a hoax there is a lot of research to understand and create the observed emission of exceptional electromagnetic radiation. This paper explains with the help of the concept of quantized space the simple mechanism that is responsible for the decrease of the Coulomb force of Hydrogen nuclei, established by Martin Fleischmann and Stanley Pons.

Introduction

A brief overview of the history of "cold fusion" can be found at page 3 (Background) of "*A Synopsis of nuclear reactions in condensed matter*"[1] The document contains a comprehensive description of papers, patents and research during the last 3 decades. Including short descriptions and links to the publications of a lot of other researchers.

The term "cold fusion" originates from all the fuss that was caused by the sensational publication of Martin Fleishmann and Stanley Pons in 1989.[2] Nevertheless, the experiments and the conclusions of Martin Fleishmann and Stanley Pons were not flawed. It is proved for example by the extensive description of the Pd/D co-deposition experiments of the DTRA.[3][5] Recently (2020) Elsevier has published the book "Cold Fusion" with contributions of different authors in the field of condensed matter nuclear reactions.[4]

At the moment there is no widely accepted hypothesis about the "mechanism" behind cold fusion. That's problematic because modern problems like climate change and the destruction of natural habitats (e.g. by the construction of hydro-electric dams) are related to the production and use of (fossil) energy.

It is impossible to facilitate a big part of the energy demand with the help of nuclear fusion that is generated by Pd/D based "cold fusion". Palladium is a previous metal and the heat of the fusion process is destroying Palladium atoms too (decay of nuclei). So if we want to establish the benefits of cold fusion – the nearly absence of harmful high-energy radiation – we have to understand the mechanism that is responsible for the observed nuclear fusion of Deuterium atoms (^{2}H). Although our present models in physics have no reliable explanation for the Pd/D generated nuclear fusion.

Palladium and Hydrogen

A lattice of Palladium atoms can adsorb Hydrogen atoms at room temperature. That seems a bit awkward but Paladium and Hydrogen share the same electronegativity (Pauling scale 2.20). Electronegativity alone cannot explain the adsorption of Hydrogen atoms by the Palladium lattice. It is the combination of thermal vibrations and the respective radii of the Palladium atoms within the lattice and the solitary Hydrogen atom that make the process of adsorption possible.

If the temperature of a Palladium lattice with adsorbed Hydrogen atoms is decreased far below 0 degrees Celsius the surface area of the lattice of Palladium atoms starts to show cracks because of the decrease of thermal vibrations.

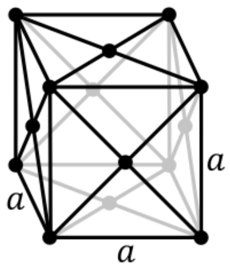

figure 1

The lattice of Palladium atoms is categorized as a face centred cubic (figure 1). Figure 2 shows the same lattice configuration. If I rotate the image at the right side to the right I get the image at the left side. And it shows that all Palladium atoms within the lattice have the same mutual distance between their nuclei (2r). That means that the Palladium lattice has a symmetrical structure.

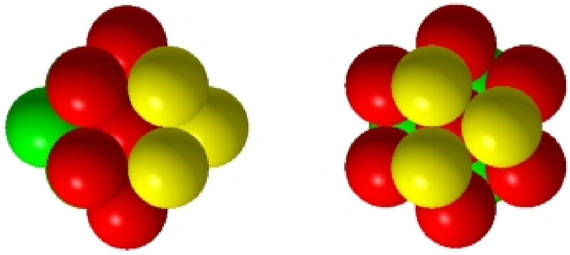

figure 2

“Cold fusion” is the result of the electrolyse of water with the help of a direct current and an electrolyte.[6] The process is simple. The electrons of the direct current move from the anode to the cathode and the surplus of electrons in the fluid influence the bond between the Hydrogen and Oxygen atoms within the water molecules. As a result the involved molecules split up in Hydrogen and Oxygen atoms and the Hydrogen atoms are transferred to the Palladium cathode. The Hydrogen atoms “infiltrate” the empty Palladium lattice and at a certain moment the cathode starts to emit “exceptional heat”, a process of nuclear fusion.

In other words, the process of “cold fusion” is generated by a dense electromagnetic wave packet (electrons) and it influences the nuclei of Hydrogen atoms to decrease the Coulomb force.

Newtonian mechanics

The standard atomic weight of Hydrogen is 1,008 and the standard atomic weight of Palladium is 106,42. That means that the mass of both atoms have a ratio of nearly 1 to 106 (1 to 53 for Deuterium atoms). So if I supply an electromagnetic wave to a solitaire Hydrogen atom it will accelerate 106 times faster than a solitaire Palladium atom. Because in Newtonian mechanics F = m a. The wave packet is the force (F) and the standard atomic weight is the mass (m).

The adsorbed Hydrogen atoms within the Palladium lattice cannot deform the volume of the Palladium atoms in an easy way because the Palladium atom has filled electron shells (2 | 8 | 18 | 18). Moreover, decreasing the temperature of a Hydrogen saturated Palladium lattice will damage the “homogeneous” structure of the Palladium lattice. The result is the damage of the Palladium lattice (cracks).

Suppose I supply a dense electromagnetic wave packet to the Pd/D lattice. The energy of the wave packet influences local Palladium atoms within the lattice and solitary enclosed Hydrogen atoms.

The outcome for the local solitary Hydrogen atom is:

$$\uparrow F = \downarrow m\ a$$

The local Palladium atoms are part of the lattice and the energy of electromagnetic wave packet cannot “break up” the metal bond structure of the lattice, thus F is absorbed by the structure of the lattice (vibrational motion). The solitary Hydrogen atom cannot accelerate because it is enclosed by the Palladium atoms. In other words, if the acceleration of the solitary Hydrogen atoms is obstructed, the mass of the Hydrogen atom is forced to decrease. The result shows to be nuclear fusion so I have to conclude that decreasing the mass of the nucleus is decreasing the Coulomb force of the nucleus.

Quanta transfer

The mass of a nucleus represents an amount of concentrated energy ($E = mc^2$). To transform mass into free energy I have to de-concentrate the energy of the mass. However, everywhere within the structure of quantized space there is a transfer of quanta.[A] Because every unit of quantized space transfers one quantum at exactly the same moment that all the other units of quantized space transfer one quantum too. Moreover, to transfer one quantum every unit has to receive one quantum from around (conservation of energy).

If I de-concentrate energy I have to increase the topological deformation of all the units around the concentration of energy. Because a quantum is a fixed amount of topological deformation of every unit of quantized space. If all the units of quantized space transfer 1 quantum at the same moment individual units cannot stop transferring quanta because all the units transfer 1 quantum synchronously.[B]

The “force” that is responsible for the change of the dynamical shape of one unit of quantized space is the scalar mechanism. That means that every deformed unit “tries” to get the shape of a scalar. The result is a push force between all the surface areas of the units. That’s why at the lowest level quantized space shows a waveform-like structure.

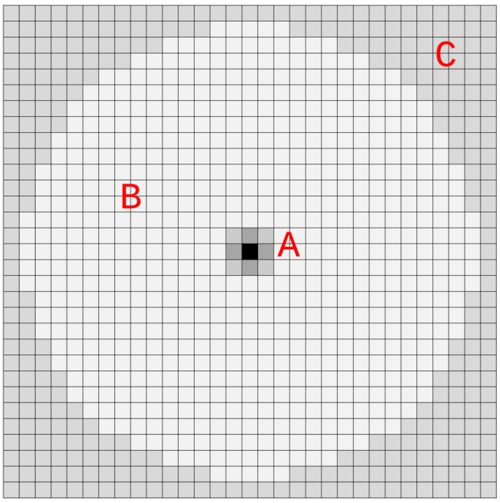

figure 3

The image above (3) shows in a schematic way the concentration of topological deformation within an amount of units of quantized space. The result of the concentration is the division of local space into 3 "types" of space. In the centre a couple of highly deformed units (A), around the centre a large amount of units (B) that have transferred some quanta to the centre and outside B the average deformation of all the other units (C).

The units within region C have an average deformation so I can state that there is no dominant preferred direction to transfer quanta. That means that during a period of time all the faces of every unit have a nearly equal amount of deformation (input deformation = output deformation[B]).

Figure 4 shows what will happen if the average deformation transforms into a loop of deformation (circular deformation within an amount of units).

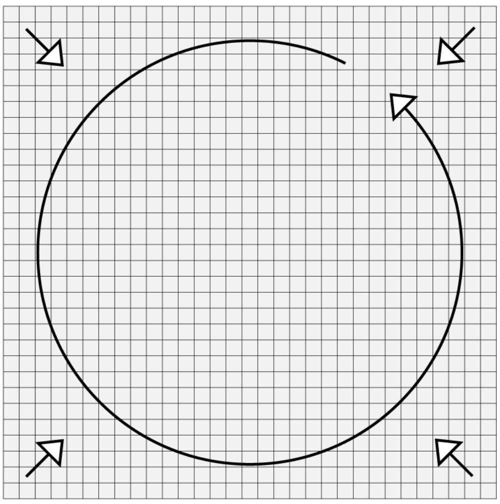

figure 4

The loop of deformation creates a preferred direction of quanta transfer thus every involved unit has 2 faces that are more deformed than the other faces of the unit. The result is that the push force of all the units around can transfer quanta into the loop. The result is an increase of local deformation (the situation in figure 3).

The Coulomb force

The 4 arrows of the push force of the units around in figure 4 don't vanish if the units in region B – figure 3 – have created concentration A (a particle). The deformation of particle A can only be stable if particle A represents a loop of highly deformed units (spin). From the outside of region B particle A seems to be the cause behind the different properties of region B in relation to the average properties of C. Actually, region B can be considered as the spatial influence of particle A.

If particle A is the result of the concentration of energy by region B it is obvious that 2 particles cannot merge. Because region B of particle A will repel the new region B' and particle A'.

However, if I de-concentrate particle A and particle A' the average deformation in both regions B and B' will increase while the average deformation of C will be unaffected. In other words, the de-concentration of particle A decreases the Coulomb force of particle A.

Transfer of topological deformation

If a solitary Hydrogen atom is hit by a dense electromagnetic wave packet (electrons), the Hydrogen atom will start to accelerate. But if it cannot accelerate – because of the enclosure of the Palladium atoms – the concentration of energy – the mass – will accelerate in every direction. Why?

Every unit of quantized space transforms an amount of topological deformation within its boundary synchronously with all the other units of quantized space.[A] That means that 1 highly deformed unit needs more "quanta transfer" to arrive at the state of average deformation than a unit that has a bit more deformation than the average deformation. In other words, the velocity of the transfer of the deformation of particle A within the structure of quantized space depends on the amount of deformation of particle A (inertial mass).

But if the local average deformation of the units around particle A increases, particle A will accelerate. Because now there is less quanta transfer to pass on the amount of deformation to adjacent units of quantized space. In other words, if an amount of deformation is added to the units of region B around particle A (the dense wave packet), particle A will accelerate. The result is the expansion of the boundary of particle A (figure 5).

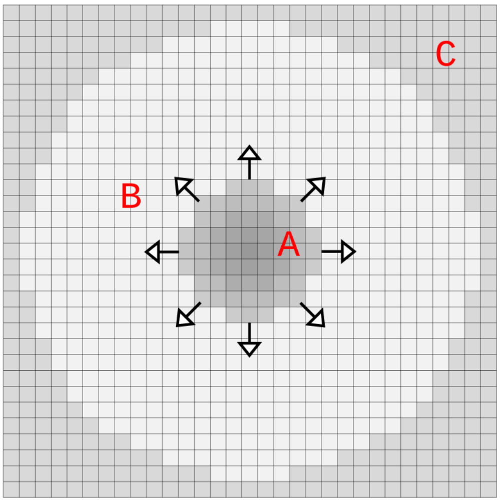

figure 5

The units in C will push the Hydrogen atoms of A and A' together and the result is Deuterium (or Helium if the fusion experiment uses Deuterium atoms).

The wave length of electromagnetic radiation is related to the size of the emitter. Figure 5 shows that the fusion of 2 Hydrogen or Deuterium atoms will result in "low" electromagnetic radiation in relation to the radiation that is created by the process of high energy fusion.

The ground state of the electron in a hydrogen atom is −13.6 eV, which is equivalent to an ultraviolet photon of roughly 91 nm wavelength. But it isn't realistic to expect that the expansion of particle A and A' will equal the volume of the electron shell (ground state) before the fusion of both nuclei will start. Nevertheless, the energy of the emitted electromagnetic radiation is also related to the design and operation of the cold fusion reactor. Because the mechanism behind cold fusion isn't restricted to the use of the Palladium lattice and the electrolysis of ^2H_2O atoms.

"Enclosures"

A. "*Quanta transfer in space is conserved*".
DOI: 10.5281/zenodo.3572846
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B. "*Tessellation and concentration in quantized space*"
DOI: 10.5281/zenodo.3684959
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