Proton and neutron - nuclear bonds

(Translated from Polish into English by Maksymilian Miklasz)

Abstract: In the article are presented the properties of neutrons and protons, and the principles of interaction between them that enable them to create nuclear bonds, which are the basis of structure of atoms of all chemical elements. For an explanation of the processes, the author uses a computer modeling program, in which models of protons and neutrons interact with each other and mutually accelerate in the likeness of what happens to these particles in reality, when they form nuclei of atoms.

The properties of protons and neutrons should result from the experimental facts. For this to happen, the first step is to pay attention to the fact that **in nature all the atoms and their isotopes (except protium) consist of a mixture of protons and neutrons. In nature, there are no atoms or other particles which would consist only of single protons or neutrons.**

These facts indicate that there is a natural barrier that prevents the mutual combine of protons or neutrons themselves. However, it does not prevents the combine together of protons and neutrons. An example of a strong bond between these two types of particles in a single structure are the "alpha" particles consisting of two protons and two neutrons.
From this it follows that there are two basic types of particles that make up the matter, but they can only do this together. It arises the question: What is the mechanism that prevents joining together of protons or neutrons themselves, but allows to connect with one another and thus the creation of atomic nuclei?

This issue can be resolved and can be described above-mentioned natural barrier if we use the idea of potential shells. Subject of potential shells will not be developed here, because this issue can be read in articles: "The essence of fundamental particles of matter and of interactions" on: http://nasa_ktp.republika.pl/Protoelektron_uk.html and "The hydrogen atom - what is most important"
on: http://nasa_ktp.republika.pl/Atom_wodoru.html*1) In a big short, the cause and mechanism of the formation of stable structures in the form of atomic nuclei are as follows.

Potential shells are those areas of every centrally symmetric fundamental field (that is, every one of the fundamental particles: proton, neutron and protoelectron), which are described by a structural component of the mathematical potential function of the fundamental field. Due to the existence of the structural component of field the atomic nuclei are formed. It contributes to this the family of nuclear potential shells of protons and neutrons. The second family of shells – the family of molecular shells of these particles - contributes to the fact that the molecules, crystals and any other material stable structure are formed from the atoms. This is done in such a way that

when it has created the atomic nucleus, the potentials of molecular shells of nucleus components add up, and both contribute to accelerating the motion of nuclei other neighboring atoms. All these processes, resulting in the formation of stable structures of matter, run on a mutual acceleration motion of adjacent structural components of matter in accordance with appropriate mathematical function of acceleration.

Describe the work of such mathematical functions of acceleration (or potential field intensity) requires a lot of words. These descriptions can be found in the above-mentioned articles. The efficacy of accelerating particles ability can be seen in the example of their mutual interaction in a computer modelling program Self-Organization.exe.*2) Because in this program particles accelerate each other in accordance with such mathematical function.

Proton and neutron, in a certain circumstances and with certain distance, accelerate each other in a way that provide them a stable position relative to each other. In this way arise the nucleus of hydrogen isotope - deuterium. In a similar way comes to connection to such structure the another neutron, and form the nucleus of hydrogen isotope - tritium. And if in a similar manner another proton joins to the structure, the helium nucleus will be created.
A stable connection between the two particles means that there is a certain average distance between these particles where the acceleration of motion equals zero. This average distance is approximately equal to the radius of potential shell.
When the distance between particles increases and becomes greater than the size of the shell radius, in those areas of shell the direction of acceleration is that the inhibition of distancing occurs and after a short stop of the movement, the approaching of particles occurs. In contrast, when the distance between particles decreases and becomes smaller than the shell radius, in the areas of the shell the direction of acceleration is such that the inhibition of approaching occurs and after a short stop of the movement, the particles are distancing from each other. As a result, the particles vibrate in the vicinity of each other, thereby forming a stable configuration.*3)

There is no need to call in a special way presented properties of protons and neutrons. Just remember that the protons can not be combined with each other to form a stable structure, and the same happens with neutrons. But together, protons and neutrons, can create a stable structures. Determination of protons and neutrons by signs – and + would be meaningless. Because these characters were already booked for determination of electron and proton (and ions) in electrostatic (electric) interactions. Contradictory properties of protons and neutrons in the areas of their nuclear potential shells are different kind than the properties of protons and electrons. Determination of these particles by signs - and + would be wrong, because in physics these characters are associated with the directions of acceleration, which particles give to each other. Unlike particles are attracted to each other, and the singularity particles repel each other.

In the case of proton and neutron, the situation is quite different.*4) In the area of

potential shell of the particles (from group of protons or neutrons), another particle of the same kind is accelerated in such directions that followed the expulsion from the shell. So, if the distance between the central points of particles is smaller than the radius of shell, then the acceleration acts in such direction that this distance was even smaller.*4a) And vice versa, when the distance between central points of particles is greater than the size of the radius of shell, then the acceleration acts in such direction that this distance was even greater.*4b)
Motion acceleration in the area of potential shell of particle - proton or neutron - which is given to the adjacent particle with opposite type has such a direction that the particle was constantly directed to the side where there is an extreme value of the potential on the shell and where the acceleration is zero.*4c) This behavior of two particles relative to each other can be observed in the modelling program “Self-Organization.exe” after opening the working file “Parts_N-P.ato”.

After opening (using the modelling program) the working file “Parts NP.ato" or file from the group of "Parts_PP-NN" and run the modelled process can be observed the phenomenon of accelerated motion of the particles group. The self-acceleration phenomenon arises due to the fact that the particles P and N are different and in the area of their potential shells, the potentials - depending on the distance from the central point - vary in different ways. This difference is reflected in such a way that the particles accelerate their neighbors (when they are in the areas of shells) by different mathematical functions. For this reason, the system (e.g., two or four) of particles, which exists as a stable entirety and there is no obstacle to its motion, constantly move with acceleration. Thus the particle "alpha" have their own drive.*5)

According to the experimental facts, the own drive, which have the particles "alpha", does not stop when their constituent protons are surrounded by a dense cloud of protoelectrons and particles exist in the form of helium atoms. It only reduces the self-acceleration movement of such particles - atoms of helium. But in spite of this protoelectron ballast (electrons), the self-acceleration ability of helium atoms are still large enough to prevent connecting them with each other or in combining with other atoms and thus the formation of new chemical entities.

The deuterium atoms although they also have a self-accelerating ability, do not have such problems related with connecting to each other in pairs or in combining, for example with oxygen atoms and making the formation of heavy water. It shows that the nuclei of these atoms have a much lower self-acceleration motion than the nuclei of helium atoms. The size of their self-accelerating abilities do not bother them, so that they can combine with other atoms and form chemical molecules.
The self-accelerating ability of the binary particles (ions of protium hydrogen) and quaternary particles ("alpha") can be compared with each other when we compare the distances which these particles have to overcome during the self-accelerating process after approx. 10 000 iterations. This can be done by comparing the parameters of particles from the working files: Parts_N-P_10134.ato, Parts_N-P_a_10124.ato, Parts_PP-NN_1b_10069.ato, Parts_PP-NN_1c_10111.ato.

Annotations

Note: Computer modelling programs that can be copied from " pinopa page" work properly on computers running Windows ME and Windows XP. It is possible that they can work properly with other Windows systems.

*1) To understand the essence of this article it is useful to refer to the indicated articles.

*2) Computer modelling program Self-Organization.exe can be copied from http://pinopapliki1.republika.pl/Self-Organization.zip. In this file are also working files in .ato format whose names begin with the word "Parts_N-N", "Parts_N-P", "Parts_P-P". In these working files are stored initial parameters of the two particles. Opening in the modelling program .ato file and running the program on the screen you can see the behavior of particles with initial conditions that are stored in the program editor and displayed in the table "Listing".
In this zip file there is a code of the modelling program Self-Organization.exe - located on the file Main_Self-Organization.html.

On https://www.youtube.com/watch?feature=player_embedded&v=UhZkbWgRtqk you can watch the experiences that have been carried out on the Earth orbit. In these experiments was studied the behavior of plasma particles in weightlessness. On the film can see how the plasma particles create a stable structures, how the particles vibrate in its stable positions, and how changes the structural system, which is formed from the plasma particles. The particles behave in completely the same manner as in the computer modelling program Self-Organization.exe. In this program, the interaction of particles occurs as a result of mutual acceleration according to a mathematical function. It means that in this program, you can reflect what happens in reality.

* 3) The stable nature of interconnect two particles - the neutron and proton models - you can see by using the working files: Parts_N-P.ato and files with the name "Parts_PP-NN".
To watch the process in "slow motion", activate the "Show Listing". Then you can also watch the changing parameters in the table "Listing". Double-clicking the left mouse button on a white field of “Listing” table cause the display change from the positional parameters - that currently have the particles - to the speed of the particles, or vice versa.

* 4) The program Self-Organization.exe can be operated in two versions - buttons "Taoscope" and "Gravoscope". The difference between the work of program in these versions is that in the taoscope particles are divided into positive and negative, or having a special properties, such as proton and neutron. So using this version, you can imitate the electrostatic interaction (electrical) or nuclear forces. However, in the gravoscope version the program imitates the gravitational interactions (in this program this type of interaction is closed) and interatomic interactions, running in accordance

with the structural component of the fundamental interactions.
In Self-Organization.exe program the particles accelerate each other according to mathematical function that is a structural component of the fundamental impact (and only with this component - because the gravitational component of this program is closed). This means that the program in taoscope version (working on the basis of the structural component of the acceleration function!) works in a specific way that is perfectly suited to follow interactions of fundamental particles - protons and neutrons - and their ability to create (modelling) atomic nuclei.
When working in taoscope version, to record parameters and imaging the interaction between protons and neutrons, are used even and uneven lines of the table "Listing". Here you can take advantage of the similarity of initial letters to mark the protons (even lines of writing parameters) with the letter P, and neutrons (uneven lines of writing parameters) with the letter N. The two particles whose initial parameters are stored in the even and uneven Listing editor line are able to create a stable form a two-component structure. In contrast, the two particles, whose parameters are stored in two even lines or in two uneven lines, behave towards each other like two protons or two neutrons, that is, they can not form together a stable two-component structural system. Causes that prevent a stable connection each of two particles - two neutrons or two protons, can be viewed using the working files whose names begin with the letters: "Parts_N-N" or "Parts_P-P".

* 4a) Described behavior of particles can be viewed using the working files Parts_N-N_a.ato and Parts_P-P_a.ato.

* 4b) Described behavior of particles can be viewed using the working files Parts_N-N_b.ato and Parts_P-P_b.ato.

* 4c) Described behavior of particles can be viewed using the working files whose names begin with the letters: "Parts_N-P" and "Parts_PP-NN".

* 5) In Self-Organization.exe program, to be able to register the different parameters for self-acceleration functions of different particles (e.g., protons and neutrons) in the editor there are division for groups of particles: 1-50, 51-75, 76 -100.

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