HELIUM and HYDROGEN

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In our previous work "Hydrogen and heavy hydrogen" we have executed precomputation of the geometrical form of atom and molecule of hydrogen. The further work for specification of the form of atom of hydrogen will consist in research of the geometrical form of simple molecules, in which structure atoms of hydrogen are included.

Concerning helium the similar method to apply it is impossible, because helium has no steady compounds with other elements of the table of Mendeleyev. Moreover, at atmospheric pressure, helium has no solid phase even at temperature of absolute zero. The least pressure, at which helium forms a crystal lattice, in 30 times more atmospheric. This fact speaks, that on a surface of atom of helium is not enough nodes, which are capable to combine to the neighboring atoms. Density of helium at temperature of boiling and at atmospheric pressure d = 124.8kg/m^3. Under such conditions for 1 atom of liquid helium fall the volume V_{at}=53.257Å^3.

In conditions of a high pressure solid helium can form three types of crystal lattices with the following parameters:

Alpha-He (T=1.15K, p=6.69MPa) close-packed hexagonal a=353.1pm, c=569.3pm, V_{at}=30.735Å^3.

Beta-He (T=16K, p=127MPa) face-centered cubic a=424.0pm, V_{at}=19.056Å^3.

Gamma-He (T=1.73K, p=2.94MPa) body-centered cubic a=411pm, V_{at}=34.713Å^3.

At density of solid helium d=190 kg/m^3 the volume for 1 atom V_{at} =34.981Å^3.

Natural helium consists of two isotopes ^{4}He – 99.999862% and ^{3}He – 0.000138%.

Formation of atom ^{4}He from four protium atoms is accompanied by emission of two positrons, two electronic neutrino and energy liberation 28.2937MeV.

$$4(^1H) = {}^4He + 2(e^+) + 2(\nu_e) + 28.2937MeV$$

In fig.1 the atom of hydrogen in representation of the polytronic theory is shown. All four polytrons of atom are shown at the frequency order m=4.

Fig.1
Leftspiral hydrogen atom

For formation of one atom of helium from four atoms of hydrogen, it is necessary, that atoms of hydrogen were draw together and are coupled by nodes as a cross, as shown in fig.2.

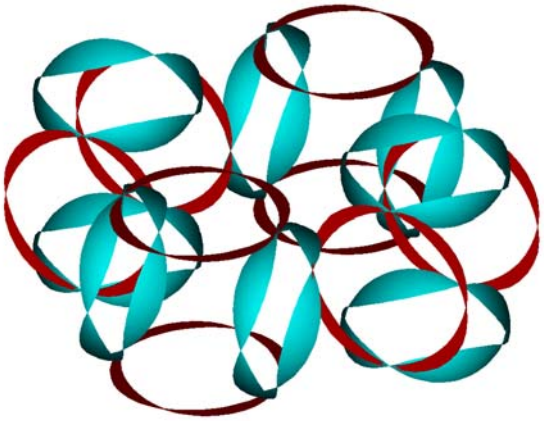

Fig.2
Initial phase of formation of helium atom

After coalescence of nodes, between polytrons the process of redistribution of energy and change of polarization of oscillations begins. In result, from 16 polytrons are formed 12. At that two variants are possible. In the first variant, the atom of helium will consist of 8 axial and 4 radial polytrons (see fig.3). It is ^{4}He. In the second variant, the atom of helium has approximately same form, but will consist of 6 axial and 6 radial polytrons.

Fig.3
The form and structure of atom ^{4}He

In both variants the volume of the cube, circumscribed around of atom, is equal ~54Å^3.
Liquid ^{4}He (bosons) at temperature 2.17K and below possesses anomalous high heat-conductivity and superfluidity.
Liquid ^{3}He (fermions) also has phase transition into a superfluid state, but this transition occurs at considerably lower temperature ~2.6mK.
The form and structure of atom of liquid helium, which is shown in fig.3, is similar a spherical hedgehog. Each combination of four neighboring polytrons makes a megaphone opened outside. Thus, atom of helium, at volume ~54Å^3, has 12 external nodes for connection. Whereas, for example, a molecule of hydrogen, at volume ~17Å^3, has 36 external nodes. We suppose, that physical and chemical properties of helium and other noble gases are caused by similar structure of atoms.
At strong compression, atoms of helium change the form due to turn and displacement of polytrons relative each other. One of intermediate forms of atom of helium is shown in fig.4. The volume of the parallelepiped, circumscribed around of atom of such form, is equal 30.9Å^3.
The single-layered crystal structure from such atoms can transfer lost-free and in various directions two kinds of energy – energy of radial polytrons and energy of axial polytrons .
Hence, solid helium can simulate property of superfluidity though actually it is streams of energy in various directions. The multi-layered crystal lattice from such atoms can show in difractogram as cubic, and hexagonal lattices.

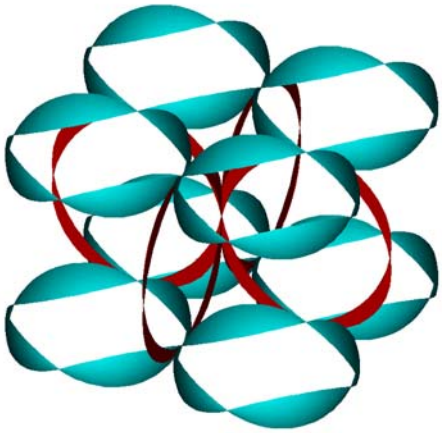

Fig.4
Form of atom ^{4}He under high pressure

Apparently from fig.2, in an initial stage of reaction of formation of one atom ^{4}He from four atoms of hydrogen 8 axial and 8 radial polytrons participate. During nuclear reaction the system loses 4 radial polytrons and also two positrons and two electronic neutrino. These data allow calculating internal nonresonant energy of a cold radial hydrogen polytron:

$$28.2937/4 = 7.073 \text{ MeV}$$

The linear density of nonresonant energy in radial hydrogen polytron is equal 7.111×10^{34} J/m. In the polytronic theory this energy is named as ergoline.
At a photo- or thermo-excitation of radial polytron up to the frequency order m=2, it throws out electron. Internal energy of electron, i.e. the energy, which completely can turn into gamma-radiation, is equal 0.511 MeV. Hence, the radial hydrogen polytron can keep inside itself energy

$$7.073 + 0.511 = 7.584 \text{ MeV}.$$

In the base development of the polytronic theory it has been shown, that in a steady mode of coherent radial and axial oscillations, energy of axial polytron can exceed energy of radial polytron in 707 times. Moreover, it has been established experimentally, that axial polytrons have normal and anomalous modes of resonant oscillations. At anomalous oscillations, the amplitude of oscillations can exceed normal amplitude twice. Since, energy of resonant oscillations is proportional to a square of amplitude, hence, full energy of axial polytron can to

have very wide range of values. Simple calculation shows, that one axial hydrogen polytron can reserve energy:

from $7.073 + 707 \times 0.511 = 368$ MeV up to $7.073 + 4 \times 707 \times 0.511 = 1452$ MeV.

However, the received boundary values of energy demand careful checking.

First, it is necessary to investigate and analyze a spectrum of background radiation of the universe in the field of microwave lengths of waves, which are present in spectra of cold hydrogen and cold helium. These researches are necessary to establish, whether there are free radial hydrogen polytrons in the cosmic space.

Secondly, if the first assumption will be proved, it is necessary to establish amount of free radial polytrons in unit of volume of the space.

In the third, if the first and second assumptions will be proved, then with the help of the gravitational constant the amount of free axial polytrons in unit of volume of the space will be possible to calculate.

In the fourth, if existence of free polytrons will be proved, then by "bombardment of empty space" with gamma-quantums and with easy charged particles in accelerators, it will be possible to receive the new information about the nature of dark mass and dark energy in the universe.

Ability of axial polytrons to reserve a lot of energy theoretically resolves existence of tetra-nucleon isotope of hydrogen – quartium. Then, isotopic set of hydrogen can be submitted by one stable isotope – protium ^{1}H or H, and by three metastable isotopes: deuterium ^{2}H or D, tritium ^{3}H or T and quartium ^{4}H or Q. Deuterium is included into number of metastable isotopes because it is difficult to explain very small percentage of this isotope (0.015%) in the nature.

The nature shows for us infinite amount of phenomena of symmetry and antisymmetry. It is not only phenomena of particle-antiparticle. It is also proceeding of processes in direct and inverse direction. Moreover, the pair x and 1/x concerns to phenomena of symmetry-antisymmetry also.

If in the nature there are metastable structures, hence, there must be conditions at which these structures can be created. Following this logic, we should not exclude an opportunity of formation of quartium from protium due to absorption of energy from surrounding space. For occurrence of this process it is necessary the condition, in which axial polytrons of protium pass into a mode of anomalous resonant oscillations. In this case, simple hydrogen will stop any radiation and will be predisposed only for absorption of energy. From different directions to a place of reaction an electromagnetic wind will arise, which will catch atoms and molecules of gases and a space dust and will carry all this into one little spherical area.

This model is very similar on, a so-called, black hole. Actually, it is vacuum explosion. Similar processes concern to area of non-linear thermodynamics and they proceed at extreme temperatures and pressure.

After in depths of a black hole the critical mass of qartium will be collected and temperature and pressure will rise up to a critical level, reaction of formation of new element similar to reaction of formation of helium will begin. But in this case, atoms of new element will consist of anomalous axial polytrons.

This process is similar to birth of a new star.

The spectrum of a new star carries the information about power and duration of extending explosion.