Physics of hydrogen isotopes generation at friction in vacuum

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Abstract. The authors considered the physical basis of X-rays and hydrogen isotopes generation processes at dry friction. The main results of experiments shows tritium appearing in a ruby-steel friction pair.

1. Introduction
The physics of hydrogen isotopes appearing at “dry friction” process being considered in this paper is based on complex of fundamental researches in area of vacuum mechanics [1–3], that were realized in BMSTU after Bauman, Moscow. The mentioned researches present mainly designing mechanical engineering decisions, but nevertheless the obtained results show, that they are in the field of fundamental problem of gases behavior in contacting zones of vacuum mechanisms [4]. The authors [5] received the knowledge about the reasons of hydrogen isotopes appearing and generation in friction pairs, that is described below

2. Physical base of friction phenomena set
Hydrogen isotopes generation phenomenon was founded in 1997 in BMSTU and published on 2018 [6], where this phenomenon was presented as a component of the set of another ones, that were founded and investigated in BMSTU. Nowadays the number of IUVSTA scientists isn’t familiar with these phenomena, which are: 1 - gases exchange in friction pairs, 2 - hydrogen illness of friction pair materials, 3 - X-rays generation in friction pairs, 4 - plasmas generation at friction, 5 - hydrogen isotopes generation at friction process.

Physics of many mentioned phenomena is simple and was published in monographs and articles. So, gases exchange in friction pairs (1) was rendered in two monographs [6, 7]. Hydrogen illness of friction pair (2) was also discussed there, and published in high range scientific journals [8, 9]. Principle of X-rays generation phenomenon in friction pairs (3) is very simple and was experimentally realized and reported by the students [10] also as by schoolboys going to science in BMSTU. Plasmas generation phenomenon at friction (4) was searched by prof. Nevshoupa in BMSTU also as in Japan. Hydrogen isotopes generation physics in friction process (5) is close to X-rays phenomenon, but is based on notions of “Physical Vacuum” instead of “technical vacuum” concept [11].

Coming to explanation of hydrogen isotopes generation phenomenon (5) it is comfortably to explain X-rays phenomenon, as both phenomena have common basis.

As we know the real contact o two solids is being realize on the tops of two micro roughness. Physical nature of friction X-rays generation is based on well known result of initial electron strike into atoms electron frame of sample № 2. In our case we consider hyper electron 4, figure 1 [12] of sample № 1 in role of an initial electron for X-rays photon h appearing. Students BMSTU report [10]
show, that calculated intensity of X-rays generation (0.1 mkZv/h) corresponds to the measured figures (0.1–0.8 mkZv/h) for polished Si-Si plates friction.

![Diagram](image)

**Figure 1.** Scheme of X-rays generation as a result of contacting pair atom’s electrons interaction: 1 - sliding surfaces contacting atoms, 2 - surfes atoms, 3 - atom as hyper electron’s source, 4 - hyoer electrone, 5 - friction sample № 2, 6 - inter crystal electrons links, sample № 1, Indexes №№: hі - photone; e1, e2, et(r) - orbital electrons symbols. Vck - sliding velocity

3. Physics of tritium atoms generation in friction process

Now, coming to explanation phenomena tritium generation (5) we need to use notions of “Physical Vacuum” (PV) [13] instead of “technical vacuum” concept [11]. The theory of PV is based on self-organization (generation) of atoms nucleus as a result of variable magnetic, electric, gravitational fields influence on “torsion fields” of “ether”, in space between atoms in traditional understanding [11]. The scheme on figure 1 is useful for explanation, because the electron frames contacting with high frequency one to another one at friction process creates variable electric, magnetic, gravitate influence on “torsion field” of PV, that generates aether (amers ) appearing being consist of proton and neutron also as of unitized atoms of Deuterium and Tritium. The table 1 used from monograph [14] (p. 206) shows the magnetic moment $\mu/\mu_n$ correlation (column 4) and nucleus energy $E$ interaction (5 column) that were used for nucleus “structure” forming of hydrogen isotopes.

| Components: particle nucleus | Structure | $\mu/\mu_n$ | ±$E$, MeV |
|-----------------------------|-----------|-------------|-----------|
| p                           | p         | 1/2         | 2.792743±0 | –         |
| n                           | n         | 1/2         | –1.913139±45 | –         |
| 2D                          | p + n     | 1           | 0.8574073±2 | 2.27463   |
| 3T                          | p+2n      | 1/2         | 2.97884±1  | 8.48212   |

In monograph [14] the energy $E$ interaction (see table 1) is presented as an aether toroidal flow, that is more for proton than for neutron, taking into account, that the resulting part of this aether flow goes into surrounding space and is visible as an electrical field of proton, deuton (deuterium nucleus), triton (tritium nucleus).
The authors of PV consider that gravity fields take an equal part in nucleus “structure” forming of hydrogen isotopes, also as in variation of torsion fields of aether and even in variation of amer density. So, theory of PV contends that neutron’s mass $1.67482 \times 10^{-27}$ kg is more, then proton mass $1.67252 \times 10^{-27}$ rg. The difference is $0.0023 \times 10^{-27}$ kg, and this mass difference influences on aether flow being move around neutron, and that it is visible as electro-magnetic field of proton and that it isn’t taken into account in proton mass detection. The creator of Russian hydrogen bomb in his publication [15] mentioned the electron-positron interaction as a factor of nucleus “structure” of hydrogen isotopes forming. Consider the citation of the article [15]: “Interaction of electron-positron influences cordially on probability of nucleus appearing only in conditions of small velocity of components”.

4. Results
The last nowadays experiments searching tritium generation were realized in BMSTU with hermetically sealed glass volume and with beta, gamma, X-rays radiation Russia-made sensor “RadiaScan 701” and with ruby-steel friction cone pair 0.1 mm diameter. The resulting being generated tritium atoms were accumulated in the top part of the glass volume at period of 300 days. The beta radiation of generated tritium atoms was measured many times and the results are shown on figure 2.

![Figure 2](image)

Figure 2. The accumulated on period 300 days of beta radiation results from tritium atoms being accumulated in top part of glass volume (top distribution) and from ground radiation (bottom distribution).

The results show that the radiation intensity out of generated tritium atoms (top distribution) is about two times more than the ground radiation. This results lead to understanding, that the increased measured beta radiation is a result of small friction pair work in hermetically sealed glass volume at period about one year.

5. Conclusion
The set of physical phenomena that was searched in BMSTU may be estimated as an indicator of high scientific level of Russian scientific school, and the phenomenon of hydrogen isotopes generation, mainly tritium atoms shows the wide possibilities of Russian yang scientists.

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