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ABNORMAL RESULTS OF EXPERIMENTING WITH EXCITED SUBSTANCES AND INTERPRETATION OF THE DISCOVERED EFFECTS WITHIN THE FRAMES OF THE MODEL OF COLLECTIVE INTERACTIONS

Igor.V.Goryachev

Russian Research Center "Kurchatov Institute"

During a number of years there were carried out experiments to investigate interactions of excited substances with radiation, gravity and other kinds of fields. Converting atoms of the substances into excited state was fulfilled by means of bombarding the samples used with intensive beams of electrons with energy of 27 MeV and the accompanying bremsstrahlung generated by the electrons in the substances and intermediate targets.

In the result of those investigations abnormal results were registered in the following directions:

- a) There was discovered a significant increase in the full cross-sections of interactions of gamma-quanta with excited solids;
- b) There was observed an effect of amplification (multiplication) of gamma-quanta with "resonance" energies in the excited substances provided that the energies of the "resonance" gamma-quanta coincide with the characteristic energies of the gamma-quanta emitted by the excited nuclei;
- c) There was searched the effect of enforcing deactivation of radioactive nuclides resulting in decreasing their half-life time;
- d) There was registered the effect of lowering the force of interaction between excited matter and the Earth gravity as well as screening the field of gravity of the Earth by excited substance;
- e) There was registered an effect of generating heavier elements in the process of transmutation of middle-weight elements in the result of excitation of initial substance.

With reference to each of the above noted directions the Presentation will contain description of the configuration and composition of the experimental installation, protocols of experimenting and processing the experimental data obtained. Main experimental results will be presented and analyzed.

The analysis of the experimental data obtained brought the authors to the conclusion that: (1) the interaction of the atoms of excited media with an effecting fields has a distinct synchronized collective character; (2) the life-time of the excited atoms reaches microscopic valued; (3) the excited atoms are probably exist in Ridberg stated; (4) there is a suspicion that the collective character of interactions of excited atoms with outside affection fields represent a universal phenomenon and is actually one of the fundamental feature of matter and that it is directly relates to the so called zero-point oscillation of vacuum.

It was determined that the effects of supererradiation and other abnormal phenomena in excited substances can happen on having reached specific level of activation (specific value of absorbed energy of excitation) of the medium and that this level of specific energy of activation coincides with the specific self-oscillatory energy of the medium at the specific temperature.

Based upon the experimental results obtained and taking into consideration the assumptions taken by the authors a model of collective electron shell of the atoms of the medium has been formulated. Using this model there has been given an explanation for the phenomena observed in the experiments on screening and multiplying gamma-quanta and also proved a principle possibility of synthesizing nuclei in condensed excited mediums with the atoms being in Rydberg states. The latter has been proved experimentally.

Analysis of the experimental data obtained brings one to a supposition about a possibility of changing the notion about origination and structure of atomic electron shells adopted in modern physics. Within the frames of the existing models-Bohr planetary model and quantum mechanics modes-the electrons of atomic shells are considered to be independent microscopic particles though bound with the atom nuclei. The authors of this work proposed to regard the atomic electrons as eruptions or splashes of nuclear matter happening in the result of resonance interaction of the fluctuations of the zero-point energy oscillations with nucleus. It means that atoms consist of nuclei in the outer space of which periodically there appear splashes-protuberances which are actually integral part of the atom matter. Thus it is assumed that the protuberances are transient form of energy (or matter) from the nuclear one to the electronic energy. In the result of resonance interaction of the fluctuations of the field of zero-point oscillations of vacuum with a nucleus the protuberance gets energy sufficient for overcoming the barrier of ionization of the atom, then an electron-[particle] will be formed and irradiated. Without supplying energy from outside at the level exceeding the energy of ionization a protuberance can reveal features of electron as a charged particle only for a very short period of time (at its maximum phase). That's why the protuberances can be regarded as virtual electrons or quasi particles which behave like electrons only for a short period of time and the duration of a protuberance showing the features of electrons can be assumed to be equal to the life-time of atoms relative to spontaneous transitions, that is approximately 10^{-8} s. Since splashing protuberances happens with some frequency the totality of them can appear as a totality of electrons rotating along the orbits around the nuclei. It should be assumed that in an excited nucleus a protuberance can get energy sufficiently higher than the energy of ionization of the atom and then a birth of a beta-particle will happen.

The proposed model allows to interpret the experimental results observed in the following way.

Transition of atoms into Rydberg states result in increasing the life-times of the protuberances-virtual electrons and, hence, in their transformation into real electrons. It, in its turn, results in increasing the effective electron density in the shells of the atoms (in the substance) or, in other words, the effective charge Z of the substance. Since, as is known, the cross sections of all types of interactions of gamma-quanta with substance is proportional to the charge Z to one or another power, it results in significant (several units or even decades fold) increase of the gamma cross-sections for interactions with excited substance as compared to regular cross-sections.

As for the effect of multiplication of resonance gamma-quanta in excited substance this phenomenon is probably analogous to the phenomenon of supererradiation in optics. So, a collective ensemble of atoms in Rydberg states can have the levels coinciding with the energy levels of the excited nuclei. Interaction with such medium of a gamma-quantum obtaining energy coinciding with one of the energy levels of the excited nuclei results in avalanche-like eradiating the energy absorbed by the nuclei followed by transition of the collective ensemble down to a lower energy level provided the energy of the transitions coincide with the energy of the resonance gamma-quantum which has interacted with the excited nucleus.

By using the assumed model it is shown that interaction of Rydberg orbits of the atoms of the excited substance results in formation of clots of charges inside of which strong self compression of the charged nuclei happens which fully neutralizes the repulsive influence of the nuclei charges upon each other and leads to their rapprochement to the distance of effect of nuclear force. It may result in fusion of nuclei with generating energy (synthesis of light nuclei) or transmutation of chemical elements (synthesis of heavy nuclei). The fact of synthesis of heavy nuclei in the result of transferring the nuclei of a medium (nickel, in

particular) into excited state at the expense of bombarding the sample with 27MeV electrons has been proved experimentally.