About alternative approach to realization of nuclear fusion [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2020.47.1.096

1Egorov V.K., 1,2,3Egorov E.V.

1IMT RAS, Chernogolovka, Moscow district, Russia 142432
2Financial university under the government of the Russian Federation, Moscow, Russia
3IRE RAS, Fryazino, Moscow district, Russia

The main intricate and energy outlaying problem for realization of nuclear fusion reactions is the Coulomb barrier overcoming, which hinders to the direct nuclear interaction. In thermonuclear apparatus of civilian or military designation the barrier overcoming is effected by increasing of ions kinetic energy is ionized ensemble. Owing to the moving ions chaotic directivity the probability increase of ions direct collision in high temperature plasma is realized by pressure magnification in the experimental chamber. This approach competence to the nuclear fusion reactions realization is beyond questions [1,2]. A.D. Sakharov and Ya.B. Zheldovich pointed on the principle possibility of alternative approach to the nuclear fusion reaction realization without high temperature application [3]. The idea of cold nuclear fusion was implemented by I.S. Filimonenko [4]. Some his experimental materials are not published, today. But the cold nuclear fusion or nuclear transmutation phenomenon is beyond questions, today [5]. At the same time, the magnitude of cold nuclear fusion effect registered in experiments is smaller as the expects one on some hundreds thousands times. Low efficiency of the reactions yield is connected with its process mechanisms understanding absence. The work proposes a new direction for the cold nuclear fusion mechanism search on base of the radiation fluxes waveguide-resonance propagation phenomenon consequence and the wave-corpuscle dualism principle. The phenomenon was discovered in process of X-ray characteristic radiation fluxes propagation peculiarities investigation through planar extended slit clearances [6]. Our experimental studies showed that the planar extended slit clearance transports X-ray characteristic radiation fluxes without attenuation when its width is smaller as the radiation coherence length half (L/2=λ02/2Δλ). This fact was interpreted as the new phenomenon discovery: the waveguide-resonance propagation of radiation fluxes or the radiation superfluidity. The phenomenon is characterized by appearing of the uniform interference field of radiation standing waves. Devices functioned in frame of the phenomenon were called as planar X-ray waveguide-resonators (PXWR). Study of there devices properties showed that independent radiation fluxes can interact in some conditions in result of mutual influence of uniform interference fields of radiation standing waves excited by these fluxes. Owing to the wave corpuscle dualism principle the radiation standing wave uniform interference field can be excited by particles beams with zero rest mass, too. This hypothesis found own experimental confirmation in investigations of low energy neutrons fluxes propagation peculiarities [7]. Analogical interference fields of radiation standing waves can be formed for atomic and molecular fluxes of hydrogen deuterium, tritium and helium-3 [8]. After the uniform interference fields preparations it will be need to find conditions for there fields interaction and formation atomic and molecular fluxes with different nuclear binding energy. The suggesting approach allows to evade the Coulomb barrier but its realization is not simple arrangement. It is expected that the interference field interaction will demonstrate the resonance disposition.

References

1. L.A. Arcimovich. Controlled thermonuclear reaction. Moscow: PhysMatLit. 1961. 467 p. (In Russian).
2. K. Miyamoto. Fundaments of plasma physics and controlled fusion. Tokyo: Tokyo University. 2001. 415 p.
3. Ya.B. Zheldovich, S.S. Fershtein // UFN. V3 (1961) P. 593-623.
4. I.C. Filimonenko. Priority certificate #717239/38 from 27.07.1962.
5. E.Storm. The science of low energy nuclear reactors. New Jersey: World Scientific. 2007. 312
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/It/ru/DC-Egorov.docx) [↑](#footnote-ref-1)