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Self-Similar Formation of Quantum Coherent Correlated States-the Universal Method for Solving and Optimization of LENR Problems

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In the report the applications of quantum coherent correlated states (CCS) of interacting particles for solving of main problems of nuclear reactions at low energy (LENR) are discussed and short analysis of successful LENR experiments is done. Among well-known LENR problems and paradoxes three are the most important:

a) Absolutely anomalous and mysterious for "standard" nuclear physics the very high (giant) Coulomb barrier transparency for light, intermediate and heavy charged particles at low (e.g. room temperature) energy;
b) Absolute ban on realization of those channels of LENR that lead to the formation of radioactive daughter isotopes;
c) Very sharp suppression of intensity of gamma-ray radiation during LENR (compared to the same reactions carried out at high energy).

It has to be taken into consideration that LENR can be observed in absolutely different systems (solids, crystals, liquid, gas, cold plasma, biological and geological systems, etc). These effects cannot be explained on the basis of the concepts of "standard" nuclear physics. According to our analysis the physical mechanism of all these processes is the same and is connected with the process of self-similar formation of CCS with large correlation coefficient $|r|\to 1$ in physical and biological systems. Formation of CCS leads to giant increase of fluctuations of virtual energy of interacting particles $\delta E_{ccs} = \delta E / \sqrt{1-r^2}$ (from initial very low values $\delta E \approx kT \approx 10^{-2} eV$ up to $\delta E_{ccs} \geq$10-100 keV) that exists for a long time $\delta t_{ccs} = \delta t / \sqrt{1-r^2}$. The report examines the main methods of CCS formation (periodic resonant action on the quantum system, the formation of microcracks in solids, the action of weak pulsed magnetic field or shock wave on ions etc). The report also compared these methods with the conditions of successful LENR experiments that were conducted in USA, Italy, Japan, China, Russia, Ukraine etc.

Recent Publications

1. V.I.Vysotskii, M.V. Vysotskyy., S. Bartalucci. Features of the formation of correlated coherent states and nuclear fusion induced by the interaction of slow particles with crystals and free molecules. Journal of Experimental and Theoretical Physics, 127(3) (2018) 479–490.
2. V.I.Vysotskii, M.V.Vysotskyy. Coherent correlated states and low-energy nuclear reactions in non-stationary systems. European Phys. Journal A49 (2013).
3. V.I.Vysotskii, M.V. Vysotskyy. The formation of correlated states and tunneling at low energy at controlled pulse action on particles. Journal of Experimental and Theoretical Physics, 152(8) (2017) 234.
4. V.I.Vysotskii, M.V. Vysotskyy. Coherent correlated states of interacting particles-the possible key to paradoxes and features of LENR. Current Science, 108(4) (2015) 30.
5. V.I.Vysotskii, M.V. Vysotskyy. The formation of correlated states and optimization of the tunnel effect for low-energy particles under nonmonochromatic and pulsed action on a potential barrier. Journal of Experimental and Theoretical Physics, 121(4) (2015) 559.
6. V.I.Vysotskii, Adamenko, M.V. Vysotskyy. Acceleration of low energy nuclear reactions by formation of correlated states of interacting particles in dynamical systems. Annals of Nuclear energy, v.62 (2013), 618.
7. V.I.Vysotskii, A.A.Kornilova. Transmutation of stable isotopes and deactivation of radioactive waste in growing biological systems. Annals of Nuclear Energy, v.62 (2013) 626.

Biography

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Scientific research: modern problems of quantum theory; astrophysics (collapse of electron-nuclear plasma in Lab and Universe; cosmic rays origin; creation of proton-electron stars): low energy nuclear reactions; gamma-ray lasers; conrolled nuclear decay; modern problems of radiobiology and biophysics etc.

He has published more 300 papers in reputed journals and 10 scientific monographs (USA, Japan, Ukraine, World Scientific Pub., Russia, and India)

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