ERZION MODEL FEATURES IN COLD NUCLEAR TRANSMUTATION EXPERIMENTS

Yu.N. Bazhutov

Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation (RAS),
142092, Troitsk, Moscow region, Russia, bazhutov@izmiran.ru ;

It is described the history of Erzion Model appearance from Cosmic Rays in 1982 & it's development to explain the main features of Cold Fusion Experiments.

Erzion Model can give principle explanation for many problems in Astrophysics and Geophysics, such as: 1) Dark matter in Universe; 2) Solar neutrino problem; 3) Jupiter energetic disbalance; 4) Tritium & He^3 abundance in volcano products; 5) Ball-lightning & forest fire nature and some else.

Some applied problems can be decided in framework of Erzion Model, such as: 1) to create the new energy-capacious, ecology-pure with rather simple technology nuclear energetics; 2) principle & radical utilization of radioactive wastes; 3) cheap production of some chemical elements & isotopes (gold for example).

Erzion Model can explain many experiments in Cold Fusion & can predict many new experiments for it's testing.

Erzion Model History in Cosmic Rays & Cold Fusion

The hypothesis of the new stable massive hadrons existence in Cosmic Rays has been appeared in 1981 to explain abnormal energy spectrum of vertical component of Cosmic Rays Muons [1]. Many characteristics of this hadron (named later as Erzion) such as: mass, charge, lifetime, intensity & spectrum, nuclear interaction modes & paths – were predicted phenomenologically. From this year the direct Erzions search had started [2-4].

Moreover Erzion existence could explain also some other abnormal experimental results in Cosmic Rays such as:

1. Long length hadron cascades;
2. Delayed particles in Air Showers;
3. High energy neutral particles flux from local space sources;
4. Large across momentums in high energy cascades and etc.

But it was great present for author that Erzion existence in nature could explain on principle the new Fleishmann & Pons Phenomena of Cold Fusion [5,6] by Erzion Catalysis Mechanism [7].

For strong theoretical interpretation of such exotic particles existence in nature in 1990 the Mirror model $U(1)xSU_l(2)xSU_r(2)xSU(3)$ had been proposed by Vereshkov G.M. [8-10]. This model without any contradiction with all world totality of experimental results in high energy & cosmic ray physics could explain main part of abnormal experimental results in orthodox physics & main unusual features in Cold Fusion such as:

1. Suppression of the neutron to tritium yield ($10^3 – 10^{11}$ times);
2. Reducing of tritium to energy yield (~ 10^3 times);
3. Unstationary condition of CF reactions running;
4. Great yield fluctuation (up to 10^5 times);
5. New isotopes & element production & etc.

The main features of Erzion model

In framework of this Mirror model the new massive & stable Mirror antiquark (U*) must exist with very small concentration as a relict component relatively to usual quarks ($C_{U*} / C_{u,d} \sim 10^{-15}$). This antiquark can be hadronized together with our usual (u) or (d) quarks into new meson pair: neutral Erzion – Э^0={U*,u}, or negative charged Erzion Э^-={U*,d}. The features of quark numbers of this antiquark U* are going to the unusual feature of repulsion forces of strong interaction of Erzions. Such way this mesons couldn't be captured by all nuclear besides only nucleons forming 5-quark bag, stable singlet state, named as Enion (Э_N={U*,u,u,d,d}). As you can see from fig.1, this particle can dissociate or to charged pair ($\text{Э}_N = \text{Э}^- + p - \Delta E1$), or to neutral pair ($\text{Э}^0 + n - \Delta E2$).

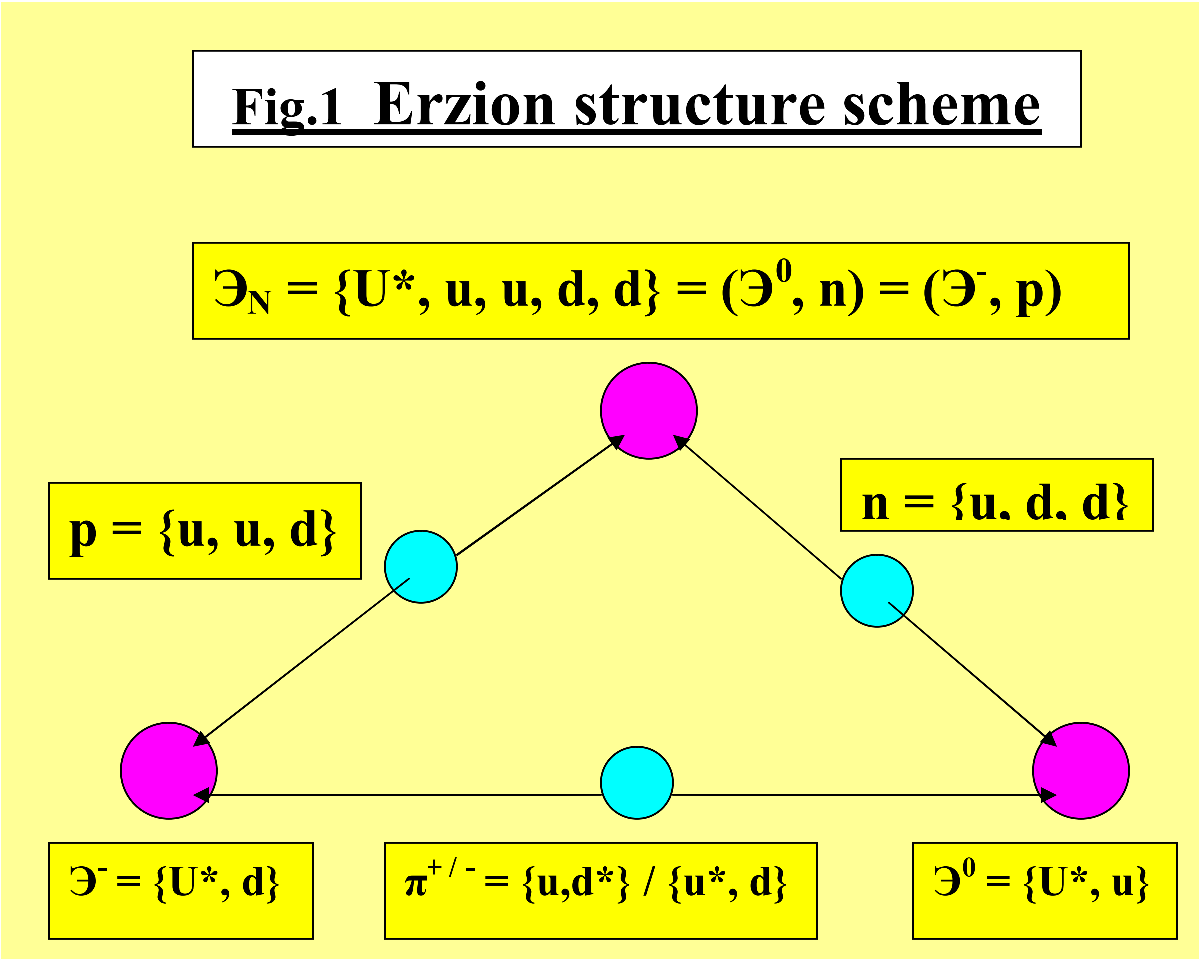

Fig.1 Erzion structure scheme

Such way in nuclear exchange reactions these Erzions & Enions can be changed each to another with changing number of nucleons in nuclear. On the every nuclear only 6 nuclear exchange reactions can run by Erzion catalysis mechanism:

1. $(A,Z) + \text{Э}_N = \text{Э}^0 + (A+1, Z) + \Delta E_1$;
2. $(A,Z) + \text{Э}_N = \text{Э}^- + (A+1, Z+1) + \Delta E_2$;
3. $(A,Z) + \text{Э}^0 = \text{Э}_N + (A-1, Z) + \Delta E_3$;
4. $(A,Z) + \text{Э}^0 = \text{Э}^- + (A, Z+1) + \Delta E_4$;
5. $(A,Z) + \text{Э}^- = \text{Э}_N + (A-1, Z-1) + \Delta E_5$;
6. $(A,Z) + \text{Э}^- = \text{Э}^0 + (A, Z-1) + \Delta E_6$;

In this Erzion Catalysis model we have only 2 free energy parameters ($\Delta E1$ & $\Delta E2$), which we can choose for proper Cold Fusion reactions. So in framework of Erzion Catalysis model we can know all energy reactions for all nuclear Erzion reactions & can predict what reactions (exothermic) can be running.

Enion due to his special peculiarity, caused by his special quantum numbers, has strong repulsive forces. But due to his dipole electric moment thermolized Enion can attract nuclear & create connected state with rather small bounded energy from E_b~1,5eV for proton up to E_b~60eV for Pb^{208}. The main condition for creation of such stable long-lived state is absence of exothermic exchange reactions with such nuclear. Such nuclei were named as Donor nuclei (H^1, He^4,C^{12},O^{16},Ni^{64},…). In nuclear exchange reactions Erzions (Э^-,Э^0) must convert into Enions (Э_N) or Erzions with another charge (Э^0,Э^-) and inversely. Such way there are exist only 6 different Erzion nuclear exchange reactions on any nuclear (see above - 1.,2.,3.,4.,5.,6.) with 6 their special reaction energies (ΔE_1, ΔE_2, ΔE_3, ΔE_4, ΔE_5, ΔE_6 - negative for endothermic reaction & positive for exothermic reaction) on each nuclear. Such way in almost any matter we have very small concentration ($C(\text{Э}_N)\sim 10^{-15}$ per nuclear) of captured Enions. When this Enions became free they can react with nuclei by means of exchange exothermic Erzion nuclear reactions with very large cross sections (σ~Mbn). Such way the frequency of such reactions chain is equal to GHz at best conditions.

At usual temperatures only exothermic reactions can run. There are few such reactions among stable isotopes of all chemical elements. In the usual matter consisted from stable isotopes of light chemical elements only following Erzion nuclear catalytic reactions can run [11]:

$^{1}H\ (\text{Э}^-, \text{Э}^0)\ ^{0}n + 1{,}65$ MeV	(100 %)	(1)
$^{2}H\ (\text{Э}^-, \text{Э}_N)\ ^{0}n + 5{,}6$ MeV	(0,016 %)	(2)
$^{2}H\ (\text{Э}_N, \text{Э}^0)\ ^{3}H + 0{,}1$ MeV	(0,016 %)	(3)
$^{2}H\ (\text{Э}^0, \text{Э}_N)\ ^{1}H + 3{,}9$ MeV	(0,016 %)	(4)
$Li^6\ (\text{Э}_N, \text{Э}^0)\ ^{7}Li + 1{,}1$ MeV	(7,5 %)	(5)
$Li^6\ (\text{Э}^0, \text{Э}_N)\ ^{5}Li + 0{,}5$ MeV	(7,5 %)	(6)
$^{5}Li \to\ ^{4}He +\ ^{1}H + 1{,}7$ MeV		
$Li^6\ (\text{Э}^-, \text{Э}_N)\ ^{5}He + 3{,}2$ MeV	(7,5 %)	(7)
$^{5}He \to\ ^{4}He +\ ^{0}n + 1{,}36$ MeV		
$^{7}Li\ (\text{Э}_N, \text{Э}^-)\ ^{8}Be + 9{,}5$ MeV	(92,5 %)	(8)
$^{8}Be \to 2\cdot{}^{4}He + 4{,}8$ MeV		
$^{13}C\ (\text{Э}_N, \text{Э}^0)\ ^{14}C + 2{,}0$ MeV	(1,1 %)	(9)
$^{13}C\ (\text{Э}^0, \text{Э}_N)\ ^{12}C + 1{,}2$ MeV	(1,1 %)	(10)
$^{14}C\ (\text{Э}_N, \text{Э}^-)\ ^{15}N + 2{,}4$ MeV	(---)	(11)
$^{14}N\ (\text{Э}^-, \text{Э}^0)\ ^{14}C + 2{,}3$ MeV	(99,6 %)	(12)
$^{14}N\ (\text{Э}^-, \text{Э}_N)\ ^{13}C + 0{,}25$ MeV	(99,6 %)	(13)
$^{14}N\ (\text{Э}_N, \text{Э}^0)\ ^{15}N + 4{,}7$ MeV	(99,6 %)	(14)
$^{15}N\ (\text{Э}_N, \text{Э}^-)\ ^{16}O + 4{,}3$ MeV	(0,37 %)	(15)
$^{17}O\ (\text{Э}_N, \text{Э}^0)\ ^{18}O + 1{,}9$ MeV	(0,038 %)	(16)
$^{17}O\ (\text{Э}^0, \text{Э}_N)\ ^{16}O + 2{,}0$ MeV	(0,038 %)	(17)
$^{18}O\ (\text{Э}_N, \text{Э}^-)\ ^{19}F + 0{,}2$ MeV	(0,2 %)	(18)
$^{19}F\ (\text{Э}_N, \text{Э}^0)\ ^{20}F + 0{,}45$ MeV	(100%)	(19)
$^{19}F\ (\text{Э}_N, \text{Э}^-)\ ^{20}Ne + 5{,}05$ MeV	(100 %)	(20)
$^{23}Na\ (\text{Э}_N, \text{Э}^0)\ ^{24}Na + 0{,}8$ MeV	(100 %)	(21)
$^{23}Na\ (\text{Э}_N, \text{Э}^-)\ ^{24}Mg + 3{,}9$ MeV	(100 %)	(22)
$^{27}Al\ (\text{Э}_N, \text{Э}^0)\ ^{28}Al + 1{,}6$ MeV	(100 %)	(23)

^{27}Al ($Э_N$, $Э^-$) ^{28}Si + 3,8 MeV (100 %) (24)

As you can see, the rarest reactions are with neutral Erzion - $Э^0$. There are only 11 stable isotopes reacting with this Erzion, named as Converters. So if you want have the reserved Erzion nuclear reaction chains you must have in your reactor system besides Donor isotopes such Converter isotopes. The best among them is Deuterium [12]. For generating neutrons you must have Hydrogen or Lithium elements in your CF reactor.

All our CF experiments [13-17] (only some last from them) fulfilled in accordance with Erzion model predictions & every time they confirmed it and had success.

Erzion Model in Astrophysics, Geophysics & Practice

Erzion Model can give principle explanation for many problems in Astrophysics and Geophysics [10,18,19], such as:

1) Dark matter in Universe;
2) Solar neutrino problem;
3) Jupiter energetic disbalance;
4) Tritium & He^3 abundance in Volcano products;
5) Ball-lightning & Forest Fire nature and some else.

Some applied problems can be decided in framework of Erzion Model [10,19], such as:

1) Creating the new energy-capacious, ecology-pure with rather simple technology nuclear energetics;
2) Principle & radical utilization of radioactive wastes;
3) Cheap production of some chemical elements & isotopes (gold for example).

Conclusion

I want thank everybody who helped me last 20 years in work on developing of such very interest & fruitful problem of Erzion Catalytic Model & hope that it will reach success.

References

1. Bazhutov Yu.N., Khrenov B.A., [Khristiansen G.B.] “About One Opportunity of Second Shower Spectrum Interpretation Observed at Small Depth Underground”, Izvestiya AN USSR, ser. Phys., 1982, v.46, 9, p.2425-2427.
2. Bazhutov Yu.N., “A Search for the Decay of Hypothetical Penetrating Particles”, Proc. 18-th Int. Cosmic Ray Conference, Bangalore, 1983, He-2, 2-18, p.24-26.
3. Abramov A.V., Bazhutov Yu.N., Khrenov B.A. et al. “Search for Massive Charged Elementary Particles” Proc. All-Union Cosmic Ray Conference, Alma-Ata 1989, v.1, p.101-102.
4. Bazhutov Yu.N., Vereshkov G.M. “Search for New Stable Hadrons in Cosmic Rays”, Preprint No.2, Central Research Institute of Machine Building, 1990.
5. Fleischmann M., Pons S., Hawkins M., Journal Electroanalytic Chemistry, 1989, v261, p.301.
6. Jones S.E., Palmer E.P., Criss J.B. et al., Nature, 1989, v338, p.737.

7. Bazhutov Yu.N., Vereshkov G.M., Kuzmin R.N. & Frolov A.M. “Interpretation of Cold Fusion by Erzion Catalysis”, Proc. “Plasma Physics and some questions of General Physics”, CSRIMash, Kaliningrad, Moscow region, 1990, p.67-79.

8. Bazhutov Yu.N., Vereshkov G.M. «New Stable Hadrons in Cosmic Rays, their Theoretical Interpretation & Possible Role in Catalysis of Cold Nuclear Fusion». Preprint No.1, Central Research Institute of Machine Building, 1990.

9. Bazhutov Yu.N., Vereshkov G.M. “A Model of Cold Nuclear Transmutation by the Erzion Catalysis”, Proceedings of ICCF-4, Hawaii, 1993, v.4, 8-1.

10. Bazhutov Yu.N., Vereshkov G.M., Kuksa V.I. «On a Possibility of Existing New Stable Hadrons-Hypothetical Catalyst of Cold Nuclear Transmutation». Proceeding of 3-d Russian Conf. On Cold Fusion & Nuclear Transmutation, Dagomys-1995, Moscow, 1996, p.157.

11. Bazhutov Yu.N., [Kuznetsov A.B.], Pletnikov E.V. "Spectroscopy of Erzion Catalytic Nuclear Transmutation". Preprint № 1 SRC PhTP «Erzion», CSRIMash, 1993, p.1-172.

12. Bazhutov Yu.N. “Influence of Spin & Parity Preservation Lows on Erzion Model Predictions in Cold Fusion Experiments”, Proceedings of ICCF-7, Vancouver, 1998, p.437-440.

13. Bazhutov Yu.N., Koretsky V.P., [Kuznetsov A.B.] et al. “Tritium, Neutron & Radiocarbon Registration with the Yusmar Hydrofacility Running”, Proceedings of ICCF-6, Japan, 1996, v.1, p.387-391.

14. Bazhutov Yu.N., Koretsky V.P. “Neutron Generation at Ultrasonic Cavitation of some Liquids”, Proceedings of ICCF-7, Vancouver, 1998, p.427-436.

15. Bazhutov Yu.N., Bazhutova S.Yu., Dyad’kin A.P., et al. “Calorimetric & Neutron Diagnostics of Liquids during Laser Irradiation”, Proceedings of ICCF-11, Marseilles, 2004, p.374-378.

16. Bazhutov Yu.N., Grishin V.G., [Nosov V.N.] “Electrolysis with Gas Discharge at Anode”, Proceeding of 10-th Russian Conference on Cold Nuclear Transmutation, Dagomys-2002, Moscow, 2003, p.19-26.

17. Bazhutov Yu.N., Grishin V.G., [Eremeev A.V.], Velikodny V.Yu. et al. “Nuclear Diagnostic of Cold Nuclear Transmutation at Electrolysis with Anode Gas Discharge in Water Solutions”, Proceeding of 13-th Russian Conference on Cold Nuclear Transmutation, Dagomys-2005, Moscow, 2006, p.71-83.

18. Bazhutov Yu.N. “Erzion Construction of Magnetic” Rodionov” Fluxes & Possible Consequences of their Existence in Nature”, Proceeding of 10-th Russian Conference on Cold Nuclear Transmutation, Dagomys-2002, Moscow, 2003, p.12-18.

19. Bazhutov Yu.N. “Erzion Discovery in Cosmic Rays and its Possible Great Role in Nature in Framework of Erzion Model in Cold Nuclear Transmutation”, Proceedings of ICCF-8, Lerici (La Spezia), 2000, p.269-275.