Search for Not-High Energy Neutrino (NNN) Manifestation in Nature: III. Interaction of NNN with Matter

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The skeptic: The above interaction does not exist!
The author: You're wrong. It is just known that NNN do not interact directly with atomic nuclei.
S.: Do you claim that they interact either with electronic shells of atoms or with atomic nuclei indirectly?
A.: Surely. I insist on both these cases.

The mechanism of the not-high energy neutrino (NNN) interaction with matter is suggested by the way of an electron-neutrino couple *(eν)* formation that causes a series of secondary effects at nuclear, atomic and molecular levels of structure of matter as follows: a) reduction of the size of electron cloud that facilitates nuclear fusion; b) an ersatz substitution of intermediate bosons W^0 and $Z^{\pm}$ or π-meson while noted *eν* couple occurrence within nucleus, that accelerates β- and α-decay (fission), correspondingly; c) formation of a superconducting couple *(ee)* analog with a conductance electron of metal that makes the latter a superconductor; d) at major concentrations of NNN - filling up of conduction band of metal that makes the latter a dielectric; e) variation of conductance and capacitance of *pn*-transitions in semiconductors; f) formation of an uncoupled electron under NNN interaction with an electron couple *ee* in a dielectric, that provides the latter some magnetic properties; g) asymmetry of a torsion of a chain under NNN (having spin value ±½) interaction with electron couple *ee* in a molecular or associated fluid that causes ordering (disordering) of structure of the latter, correspondingly; h) enanthiomorphous transformation of biomolecules after distributed interaction of (±) sign NNN with a set of the same type electrons of optically active carbon atom. The suggested effects to be implemented under NNN flow intensity that exceeds essentially a natural background.

1. Introduction

Earlier we suggest the concept of neutrino as a quantum of radiation (being a fermion contrary to the photon being a boson), the energy of which one is determined by its characteristic frequency (within numerical factor of ½):

$$\varepsilon_\nu = \tfrac{1}{2}\hbar\omega \qquad (1)$$

the probability of which one capture by matter depends on its energy by resonant mode but not threshold one [1].

This consideration allows to reveal various cases of interactions of Not-High Energy Neutrino (further NNN) with matter. Indeed, the representation about inertness of neutrino is based on the fact that ν, contrary to other particles, is a one having not any electric charge, mass etc., except for a spin. The correlation of ν with a photon γ that is even more "featureless" particle, but not so inert one, allows us to doubt of a universality of conventional representation of a neutrino. The consideration of the suggested concept

corollaries carried out in the paper, proves a fruitfulness of the former. Certainly, all effects circumscribed below, can be observable and measurable under intensity of NNN flow that exceeds essentially a natural background.

The energy rate of NNN is defined as follows: from the first tens of electron-volts, that is the ionization energy of valence electrons of atoms, up to zero point. The consideration of hypothetical effects of NNN interaction with matter is carried out in this paper, mainly, in this order – along with a diminution of energy. Hereinafter the sign of a NNN spin (±½) is not regarded, despite it is not noticed specially.

2. The basic mechanism of NNN interaction with matter: formation of an electron-neutrino couple in an atom

The key point of the NNN interactions with matter is the representation about formation of an electron - neutrino *(e ν)* couple in an atom. According to Pauli's exclusion principle, the existence of two particles having identical quantum numbers (except for spin one) is possible in atom. They suggest electrons, certainly, however identity of considered particles to an electron is optional, which is proved by the opportunity of an electron in hydrogen atom substitution by a muon (that is a negatively charged fermion having a mass $m_\mu = 206\ m_e$). We figure, that the negative charge of the particle nor is the factor defining quantum mechanical interaction, and the formation of a couple with an electron (or substitution of the latter) by neutral fermion is also possible. Here is a scheme relevant to the suggested process:

$$\begin{cases} \uparrow + \Downarrow = \uparrow\Downarrow \\ e^- + \nu = e\,\nu^- \end{cases} \qquad (2, a)$$

$$\begin{cases} \uparrow\downarrow + \Uparrow = \Uparrow\downarrow + \uparrow \\ ee^{2-} + \nu = e\,\nu^- + e^- \end{cases} \qquad (2, b)$$

where the upper pair of equations shows a formation of a couple from uncoupled electron and neutrino, and lower one – a substitution of an electron in *ee* couple by a neutrino.

As to atoms having charge of nuclei equal to (+1), that is hydrogen isotopes, the suggested interactions should result in the most significant effects. However, the effects of formation of *e ν* couple may be noticeable in multielectronic atoms, too.

Worth noting that the energy of NNN, absorbed along with excitation of electron, is not equal to a difference of energies of the latter in initial and eventual states, so the energy level which is occupied by a new-formed $e\nu$ couple, may differ from an initial level of an electronic couple. At fig.1 the interaction of atom (molecule) of hydrogen with NNN according to schemes (2, a) and (2, b), accordingly, is shown. It is easy to see, that:

$$\varepsilon_{\nu} = \left|\Delta\varepsilon\right| - \left|\Delta\varepsilon^{*}\right| \qquad (3)$$

and this difference value can be both positive, and negative [1].

3. Corollaries of NNN interaction with matter at a nuclear level: neutrino-driven nuclear reactions

Possibility of neutrino participation in nuclear reactions may, in our opinion, enhance essentially many types of the latter, including fusion, direct and revertive β-decay (including an electron capture), α-decay and fission. The numerous examples of abnormally fast nuclear reactions (AFR) are listed in the paper [2], but it is impossible to perform complete review of the former within a journal paper. AFR with hydrogen isotopes participation proceed, in our opinion, via formation of hydrogen atom having a radius of an electronic orbit drastically reduced due to formation of $e\nu$ couple. Such an atom behave itself as a quasi-neutron (a quasi-bineutron etc.) and is able to fuse an adjacent atom nucleus quite easy because of eliminating Coulomb barrier of repulsion. The existence of exited states of hydrogen atom having a gap between a nucleus and an electron orbit squeezed up to 0,01 of equilibrium radius of the latter was already suggested for AFR explication earlier (so-called Barut-Vigier's atom [3], Mills's hydrino [4]), but was not linked with ν participation. The wide variety of AFR of fusion - from D-D fusion (see, for example, [5]) and fusion of light nuclei [6] up to addition of a proton to heavier nuclei with a set of secondary reactions of β-decay [7].

The latter also proceed with abnormally high rates in the same conditions that those of fusion AFR implementation. Except for reactions of an electron capture, which one can be ascribed by the above-stated mechanism with the subsequent absorption of a

"reduced" electron by a nucleus, these reactions require some more guesses for their explication.

We do not dispute here conventional theory of β-decay that ascribes "normal" reactions of this type and, mainly, doesn't deal with participation of ν on an inlet of reactions. However, as we noted earlier [2], the equation of a radioactive decay rate dependence on time will not change within the suggestion that the decay is "externally" driven and occurs under action of the exterior factor having a stationary value or feebly varying intensity:

$$\lambda_i = I_\nu \sigma_i p_i \qquad (4)$$

where λ_i is a constant of decay, I_ν is an intensity of the exterior factor (a space neutrino flow), σ_i is a neutrino capture by a nucleus cross-section, p_i is a probability of β-decay of a nucleus resulted from the former.

As to AFR, we figure that the eν couple has (according to quantum-mechanical representations) deflection probability of its occurrence within a nucleus. Thus, being a boson, the former represents itself an ersatz substitute of conventional weak interactions carriers, namely of intermediate bosons W^0 and $Z^{\pm}$. By virtue of a minute mass of an eν couple the time of its occurrence within a nucleus is much less than the life time of W^0 and $Z^{\pm}$ bosons. It means, in particular, that the single-pass of an eν couple does not causes inevitable a nucleus decay and that the probability of the latter deduces during many passes. The value of this probability P_β depends essentially on the fact, whether the constituents of a couple oscillate a) synchronously (the same if in opposite phases) or b) independently from each other:

$$P_\beta = \frac{\sigma_\beta}{\sigma} P_e^n \qquad (5,a)$$

where σ_β is a section of a β-decay reaction, σ is a cross-section of a nucleus, P_e is a probability of an electron occurrence within a nucleus and power factor n = 1,2 for situations (a) and (b), correspondingly.

We suggest similar explication for observed AFR of fission [8] and α-decay [6]. In this case the $e\nu$ couple occurring within a nucleus fulfills a role of an ersatz substitute

for the boson responsible for transmission of strong interactions, namely of the π-meson. The resulting equation for probability of fission or α-decay $P_{f,\alpha}$ is similar to the latter one:

$$P_{f,\alpha} = \frac{\sigma_{f,\alpha}}{\sigma} P_e^n \qquad (5,б)$$

We have to consider briefly a problem on, why AFR observed with both radioactive and stable (within conventional consideration, i.e. while disregarding the below nuclides interactions with NNN) nuclides participation proceed without any ionizing radiation yielding [5]. (The latter fact is one of obstacles preventing the AFR incorporation in conventional nuclear physics). Let's note the equations guessed of two above considered types (β-decay, both direct and reverse one, on the one hand, α-decay and fission, on the other one) as follows:

$$A(\nu, \nu\tilde{\nu}e^-)B \qquad A(\tilde{\nu}, \nu\tilde{\nu}e^+)B \qquad (6,a)$$

$$A(\tilde{\nu}, \tilde{\nu}\alpha)B \qquad A(\tilde{\nu}, \tilde{\nu}C)B \qquad (6,б)$$

We guessed earlier [9] that the energy ε of antineutrino $\tilde{\nu}$ yielding from the above reactions, is unanimously determined by the duration of the elementary act of reaction:

$$\varepsilon = \tfrac{1}{2} h \frac{\sum_{\chi=0}^{1} \delta\chi}{\tau_\chi} \qquad (7)$$

where h is a Plank's constant, χ stands for the dimensionless value, so-called coordinate of reaction, and τ_χ is a duration of the act of reaction. AFR are certainly more fast processes than conventional reactions of β-decay, α-decay and fission, because of the fact that the $e\nu$ couple is not the rigorous substitute for W^0 and $Z^\pm$ of bosons and π-mesons, correspondingly. As a sequel, practically all energy effect of reaction is blowed by a vigorous antineutrino, and these reactions result in the stable nuclei having non-excited energy state.

4. Sequels of NNN interaction with matter at an atomic level: numerous electrical and magnetic effects

The numerous sequels of guessed NNN interactions with electrons forming covalent and metallic bonds in solids are listed in our report [10]. It is possible to suspect a realization of following effects under NNN interaction with metals:

1. The formation of $e\nu$ couples by mobile electrons of metal should promote embodying of phase transition (PT) of metal – high-temperature superconductor (HTSC). In this case the $e\nu$ couple occupies one of the conduction band energy levels that has not been localized near certain atom, but is shared by all atoms of metal, and is a single-charged analog of a Cooper electron couple that causes a superconductivity of HTSC.

The formation of $e\nu$ couples by electrons of metal along with its further NNN loading would provide gradual filling all conduction band energy levels, that results in drop of electrons mobility and in metal – dielectric FT implementation. We state that the circumscribed phenomena were observed earlier but misinterpreted [11].

Similarly, the NNN interaction with semiconductors (SC) results in SC – metal, SC – dielectric FTs implementation and in variation of p-n-transitions conductance and capacity. We state that the above effect was already applied in detectors of NNN radiation, though the latter were interpreted erroneously [12,13]. It is also possible that noted effect was already manifested by temporary failures of an electronics under action of nuclear explosion radiation – so-called electromagnetic impulse.

Similarly, the NNN interaction with dielectrics can proceed, taking into account the minute conductance electrons concentration. In this case the formation of $e\nu$ couples can result in enhancing their mobility, and NNN pairing with valence band electron - in occurrence of extra current carriers. Other probable effect is concerned with a change of magnetic properties of a dielectric under splitting electron (*ee*) couples by NNN: so there should be uncoupled electrons, that provides magnetic properties to dielectric material. The latter effect was already observed [11] but misinterpreted.

5. Sequels of NNN interaction with matter at a molecular level: physicochemical and structural effects

We intend to explain a series of observed and supposedly observed physicochemical and structural effects assigned by us to NNN interaction with various matters, by the same mechanism, this time at the NNN action on *ee* couple forming chemical or hydrogen bond. In this case the sign of NNN spin plays an essential role. To continue this consideration we must involve some additional hypotheses – both our ones and ones proposed by other authors – thus, we are forced to enter the field of extrapolations, which makes our deductions less reliable.

These hypotheses concern inequality of left-hand and right-hand items, in this case of left-hand and right torsion, in the nature. So, Zhvirblis [14] guesses, that the space is founded on chiral physical microscopic objects having a property of mass point and toroidal geometry. Thereof, right-hand and left-hand torsion of chemical bonds are not equivalent, that causes a minute contortion of corners between adjacent bonds and in one case (right-hand torsion) provides an opportunity of quasi-crystalline molecular structures formation, and in the other one (left-hand torsion) does not. Similarly, Leonov's hypothesis [15] about «quantum of space» - electromagnetic quadrupole - with our allowance [9] about nonplanar, tetrahedron-like constitution of the latter results in a similar corollary.

Let us assume that all above-stated is valid. It is essential for further consideration whether the atoms connected with above noted bond have a spatial (non-planar) symmetry. This means that noted atoms must be bonded with three or more another atoms each (fig. 2). It is necessary for existence of local energy minimums at rotational displacement of molecular fragments around of considered chemical (hydrogen) bond on a corner diverse, than 2π, that is a requirement of a distinction between the right-hand and left-hand torsion. Note that such requirement is satisfied for all biologically active polymeric compounds – sucg as proteins, polysaccharides, nucleic acids, and also for water, so it does not matter whether there is a non-polar covalent, donor-acceptor or hydrogen bond.

Further, let us consider interaction of both signs NNN with *ee* couple of a chemical bond in a molecule of chemical compound that is in a liquid phase. It is shown at the fig. (2, a). A just formed ensemble consisting of two electrons (one of which occupies an excited energy level) and a ν has a uncompensated spin of 1/2. In our opinion, it should result in small energy nonequivalence of the right-hand and left-hand torsion of a molecule as related to an axis of a chemical bond under consideration. If NNN having a spin of +1/2 (antineutrino within the conventional notation) participates in above interaction, the right-hand torsion is preferential, if the one having a spin of –1/2 – the left-hand one (see fig. 3). If one combines this suggestion with noted hypothesis on contortion of corners between chemical bonds in a molecule at its left-hand torsion it yields a deduction that at "right-hand" NNN ($\tilde{\nu}$) stream interaction with a liquid the latter to be structured, and at "left-hand" one (ν) – to be disordered. Naturally, this deduction is valid to the greatest degree at low temperatures.

Our hypothesis of direct NNN influencing on structure of molecules is as follows. NNN coupled with by an electron of atom or forming an $e\nu e$ ensemble with an electronic couple in a molecule, is not fixed firmly but is capable to exchange amid the same type electrons (*s, p, d, f*) within noted atom (molecule). This exchange redistributes NNN between corresponding chemical bonds that causes, in a case of availability of asymmetric atoms of carbon C* in a molecule, some energy nonequivalence of mirror isomers (enanthiomers). Then "the right-hand" or "the left-hand" C* configuration and relevant optical activity of a molecule wouldl be determined, under condition of stability of $e\nu$ couple, whether the noted molecule was formed under a dominance of NNN having positive or negative sign of a spin.

If above mentioned is real, it results in opportunity of a melting - solidification of liquids FT management at the temperatures distinct from natural FT temperature, using the NNN irradiation. Also, there is an opportunity to modify structure of liquids (water, in particular) and, therefore, to vary their reactivity and dissolving ability. This allows explain existence of abnormal varieties of water [16] (it is possible, that the part of these opportunities is already implemented [17]). Most impressive, due to a biological value of optically active molecules, is the probable opportunity of their enanthiomorphous

transformation under action of high intensity NNN flows of the relevant spin sign and energy.

6. Conclusion

We suggest that the above hypothesis on the NNN interaction with matter by means of an $e\nu$ couple formation will be proved by further experiments and, thereof, will be accepted by a scientific community. Here we note once again, that the resonant mode (instead of the threshold one) of NNN capture by matter determines high selectivity of the interaction. It provides a new insight on different low energy (low frequency, long-wave) processes and phenomena of the non-electromagnetic nature. The manifestations of ones are observed in various fields, but they are not accepted by the majority of scientific community due to lack of their conventional theoretical explication. They are: phenomena of logical thinking and psyche, which ones implementation is essentially improbable on the basis of biochemical molecular structure of a brain [18], and bio-resonant (quantum) medicine [19], on the one hand, and also universal space interactions that cause informational unity and physical integrity of the Universe [20], on the other.

References

1. Filimonov V.A., FMR (Physical Idea in Russia) No 3 (2000), p.89-92.
2. Filimonov V.A., in: Transactions of International Congress - 2000 “Fundamental problems of natural sciences and technique”, St.-Petersburg, Russia, July 4-8, 2000 Vol.1, No1, p. 242-247.
3. Vigier J.-P., In.: “Cold Fusion Source Book”. International Symposium on Cold Fusion and Advanced Energy Sources. Minsk, Belarus, May 24-26, 1994. (Hal Fox, ed.), Salt Lake City, USA, 1994, p.95-104.
4. Mills R.L. and Kneizys S.P. Fusion Technology, Vol.20 (1991), p.65-70. Mills R.L., Good W.R. and Shaubach R.M. Fusion Technology, Vol.25 (1994), p.103-107.
5. Kozima H. “Discovery of the Cold Fusion Phenomenon”. Ohotake Shuppan Inc., Tokyo, 1998, 370 p..
6. Bolotov B.V., Bolotova N.A., Bolotov M.B. Fundamentals of a structure of matter. Zaporozhye: ZGIA Publ., 1996, 110 p. Bolotov B.V., Bolotov M.B., Bolotova N.A. Installation for nuclear transmutations of light elements of ferromagnetic matters. Patent application of Russia No 94024136/25 of 28.06.1994/10.04.1998.

7. Bush R. and Eagleton R. Proceedings of the 4th International Conference on Cold Fusion, Lahaina, Maui, Hawaii, December 6-9, 1993. Transactions of Fusion Technology, Vol. 26, No 4T, Part 2 (1994), p.344-351.
8. Liversage R.R. Infinite Energy, Vol.3 (1997), No 13-14, p.20-24.
9. Filimonov V.A., FMR No 1 (2001) p.86-89.
10. Filimonov V.A., In : Transactions of an International seminar on the investments in Republic Belarus. Minsk, MNITSO Publ., December 6, 2000, p.33-34 (in Russian).
11. Shakhparonov I.M. In: Ball Lightning in Laboratory. (Avramenko R.F. et al., eds.) Khimiya Publ., Moscow, 1994, p.184-198.
12. Veinik A.I. Thermodynamics of Real Processes. Minsk, Navuka i Tekhnika Publ., 1991, 576 p.
13. Veinik A.I., Komlik S.F. Complex Investigation of Chronophysical Properties of Materials. Minsk, Navuka i Tekhnika Publ.,1992, 96 p.
14. Zhvirblis V.E. R.Kh.Zh. (Russian Chemical Journal), Vol.38 (1994), No 6, p.104-117.
15. Leonov V.S. The Theory of Resilient Quantized Medium. Pt.2. New Energy Sources. Minsk, PoliBig Publ., 1997, 122 p.
16. Onatskaya A.A., Muzalevskaya N.I. In: Chemistry - Conventional and Paradoxical. (Bogdanov R.V., ed.). LGU Publ., 1985, p.88-113.
17. Istomin Yu. NGN (Na Grani Nevozmozhnogo, newspaper, in Russian), No 1 (254), 2001, p.13.
18. Kobozev N.I. Research in the field of thermodynamics of processes of information and thinking. In: Item., Selected transactions, Vol.2. MGU Publ., p.3-240.
19. Grabovshchiner A.Ya. Nauka v Rossii 1998, No 6, p.30-34.
20. Lozovskii M.V. In: Transactions of International Congress - 2000 “Fundamental problems of natural sciences and technique”, St.-Petersburg, Russia, July 4-8, 2000 Vol.1, No1, p.175-177.

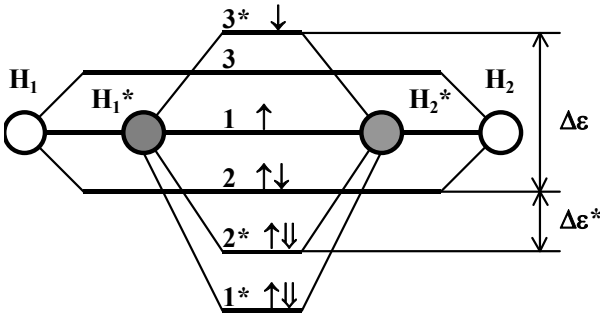
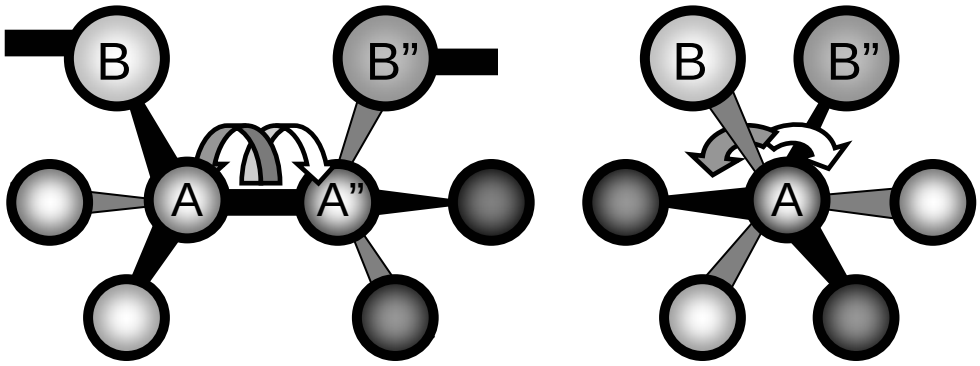

3*
3
H1
H1*
H2*
H2
1
2
Δε
Δε*
2*
1*

Fig.1. The scheme of atomic and molecular orbits of hydrogen under $e\nu$ couple formation

1, 1* - atomic orbit (for an electron and of an $e\nu$ couple, correspondingly)

2, 2* - bonding molecular orbit (for *ee* and $e\nu$ couple, correspondingly)

3, 3* - loosening molecular orbit (in presence and absence of a neutrino, correspondingly)



a) b)

Fig.2. Spatial rotation of molecule around chemical bond

a) a side view; b) a front view;

A–A” - considered bond disposed in a plane of a figure;

A–B, and A”–B” - bonds rotating as related to a link A–A” bond;

∇ – bonds disposed outside of a plane of a figure (the sharp end – behind a plane, the blunt one – in front of a plane)

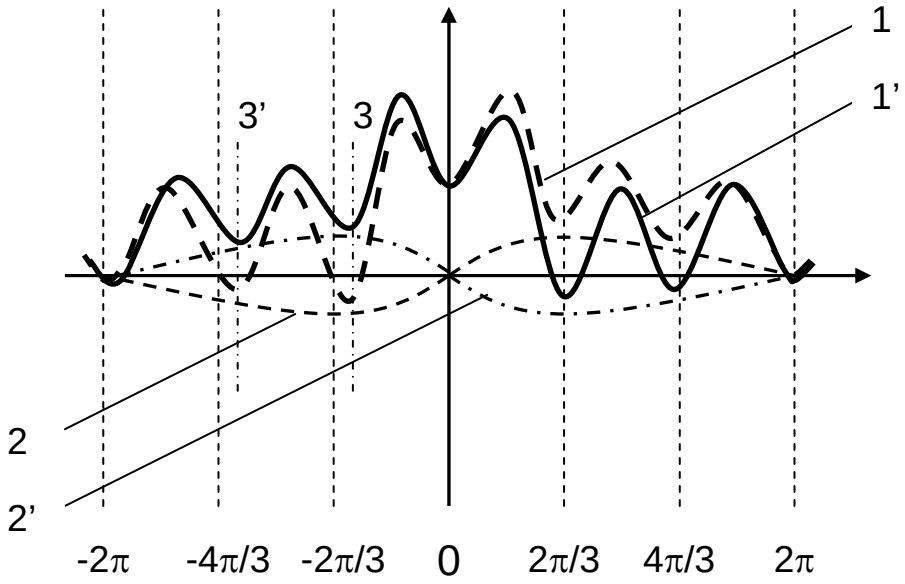

1
1’
3’
3
2
2’
-2π
-4π/3
-2π/3
0
2π/3
4π/3
2π

Fig.3 The energy diagram of a molecule rotation around a chemical bond.

1,1’ – final diagram for $ee\nu$ and $ee\tilde{\nu}$ bonds energy, correspondingly;

2,2’ – contortion of an energy profile under torsion of $ee\nu$ and $ee\tilde{\nu}$ bonds, correspondingly;

3,3’ – contortion of angles of a molecular fragments rotation at left-hand torsion.