THE KINEMATIC OF RELATIVISTIC MOTIONS IN ASTROPHYSICAL OBJECTS - KEY TO THE VERIFICATION OF THE TIME - COORDINATE TRANSFORMATIONS

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ABSTRACT. On the basis of the independent interpretation of Mickelson-Morley experiment the not Lorenz transformations were suggested. Astrophysical data on kinematic for relativistic outflows in galactic sources was investigated. It was shown that the differences between standard relativistic transformations and the suggested ones occur at the v^3/c^3 power. That does not allow to accept or to reject this or that kind of transformations. Peculiarities of the observational data being the result of suggested transformations were enumerated.

Key words: relativity theory

1. Introduction

The of principal assumption of the modern physics is symmetries. They are laid in many of its parts, in the special relativity (SRT) it's postulates, Lorenz transformations and invariants. Although these thesises do not contradict to the visible homogeneousity and isotropicity of the space-time on a very large scale one should keep in mind that symmetries and invariants were not set by nature apriori but they were introduced by researchers in general principles intentions for more convenient in description of physical phenomena.

Evidences of infringement of geometrical, internal, local and global symmetries appeared from the elementary particle physics where quantization processes show themselves especially clearly. Using the postulation of the electromagnetic (EM) radiation propagation without of the any matter environment and because not quantum the SRT lose in her physical essence. By increasing of the experimental accuracy they must inevitably to enter on contradiction with observational data.

On the basis of astrophysical data in previous papers (Larionov 1993,1999) we attempted to base our arguments on facts of the existence of a virtual substance in which the EM radiation could propagate. Qualities of that substance principally differ from the ones of the real matter: quantization on the scale $\Delta l = 0.8 \cdot 10^{-12} cm$, virtual form existence $\Delta t = 2,6 \cdot 10^{-23} sek$, the practical non compression (this to lead to high speed light propagation $c = \frac{\Delta l}{\Delta t}$). That means Δl is the size of the elementary "space-time-matter" (STM) cell at this epoch, Δt is the cell time existence with the energy $E = 1,9 \cdot 10^{-44} erg$ and effective mass $m = 2,1 \cdot 10^{-65} g$.

Connection with the barionic part of the matter is much one of the physical vacuum (PV) qualities probably. This may mean that the terrestrial laboratory experiments will not give any positive results for the PV substance revelation for the reason of the practical absence of the relative movement between the Earth and PV formatted by it. That's the way haw we came to idea of the enclosations of the terrestrial and solar PV one into another etc. In consequence quanta of the EM radiation propagate through the PV of the Metagalaxy on the background of the Universe expansion.

At the same time processes of the desintegrations and birth of about 10^{121} having new parameters PV cells take place unremittingly. For the reason of the PV stretching quanta themselves are suffering the redshift (not Doppler origin) at time spreading. If only follow of this ideology there is no exist the absolute system co-ordinate for reason of the absence of the absolute PV.

Having probably an electron-positron (EP) virtual structure the PV is becoming available for observations in cases of electrical charge creations. When a charge is on rest we have a common phenomenon of a PV polarisation. The even motion of the virtual polarised EP pairs, surrounding the charge, give the occurrence of a direct current and a direct magnetic field. The accelerative charges give rise to EM radiation, when the phasation of the PV is carried out harmonically. The EM radiation propagation is the visible display of the excited state of the PV. Consequently, a medium of virtual particles is necessary in order to EM radiation propagate.

Interaction of charges could be a co-ordinated action of accompanied their virtual "fura", where the orientation of virtual EP pairs is formed either by attraction (because of the disappearance of the cells in common parts of EP "fura"), or by repulsing (by appearance of additional STM quanta in the space between of charges). In other words, according to the principle of the minimum action we have the realisation of the energetically more profitable situation. In the one case this leads to the distruction of the part space between charges, in the other one we may "observe" the birth of additional STM cells.

Thus the electrical interaction in that conception could have a virtual-mechanical nature, but charges themselves and matter in general have a nature of the topological space-time peculiarity. And besides the course of time direction is setting by the expansion of the Universe.

The dependence of an inertial body quality from the speed may have a physical explanation in the plan of a PV medium resistance by body motion. The top speed is formed by parameters of the PA matter and equal to speed light $c = \frac{\Delta l}{\Delta t}$. Enumerating qualities of the PV in the case of their existence might show that in the principles of the electrodynamic and relativistic physic constriction effects of the influence of PV matter should be take into consideration, both in the case of time - co-ordinate transformation and in one of motion lows and the EM radiation propagation.

2. Postulates and time - coordinate transformations (TCT)

Implying the existence of PV medium providing EM radiation propagation we can construct the TCT on the known principles keeping in mind the top speed propagation interactions. Both the electrodynamical postulate and the one of the PV matter, invisible under unexcited state, should be set in the basis of TCT. In spite of the unusual parameters PV behave itself as physical environment when EM radiation propagate through it. In that sense if parameters PV not changed the speed of the EM radiation propagation is a constant.

Therefore this is enough to introduce the postulate of the existence of the virtual PV matter that is providing of the translation EM radiation through PV with the top speed c. But the electrodynamical postulate must be based on the high accurency experiments. The Mickelson-Morley type experiments are of that ones. They direct on the absence of a variation of a interferent pattern with a changing of the instrument orientation. The only independent from interpretations conclusion follow from it: in inertial co-ordinate system (IKS) (the terrestrial system, on the short time, for example) falling on a mirror and reflecting from it

wavelengths are equal ($\lambda_1 = \lambda_2$) and do not depend on the device orientation. These two postulates form the foundation of the TCT, connecting coordinates and time intervals in the moving with speed v TCT and the one the immovable relatively PV TCT (Larionov 1993,1999).

$$x_0 = x_1 \pm \frac{c \mp v}{c \pm v} v t_1; \qquad y_0 = y_1; \qquad z_0 = z_1$$

$$t_0 = t_1(1 \mp \frac{v}{c})$$

$$x_0 = c t_0; \qquad x_1 = (\frac{c \mp v}{c \pm v}) c t_1, \qquad (1)$$

where index "1" relates to the moving IKS, "0" relates to the one on rest; the bottom sign correspond to the IKS moving in the direction of the light propagation, the top sign correspond to the IKS moving in the opposite one. The suggested TCT are not symmetrical firstly by time interval, length and angle transformations:

$$\Delta t_0 = \Delta t_1(1 + \frac{v}{c} Cos\theta_1); \quad \Delta l_0 = \Delta l_1(1 - \frac{v}{c} Cos\theta_1);$$

$$tg\theta_0 = \frac{tg\theta_1}{1 - \frac{v}{c} Cos\theta_1}, \qquad (2)$$

where index "1" relates to the moving IKS, "0" relates to the one on rest also, θ is the angle between the direction to the observer and moving emitting object (IKS).

The TCT are not symmetrical relatively to angles between directions to an observer and a moving emitting object. They contain always in the general case sighchanging or trigonometrical functions. In a common case differences between standard relative expression and reduced ones for the Doppler shift (for example) are at the power of v^3/c^3 (for the linear shift). It means that the organisation of the consequence experiment for the examination of the expression validity is a problem.

3. Visible manifestations of the TCT

The sample analysis of formulas (1) directs that with the positive and negative $Cos\theta$ (direction of moving IKS to the observer and a wrong way round) we have different numeral quantity for Δt, Δl and $tg\theta$. It should be taken into account in constructions of kinematic models of relativistic sources in parameters of compact double systems (CDS) calculations.

As the consequence transformations of Δt and Δl visible speeds of moving IKS's transformate of the not symmetrical way also:

$$v_{vis} = v\frac{1 + \frac{v}{c} Cos\theta}{1 - \frac{v}{c} Cos\theta}, \qquad (3)$$

where v is a groupal speed of movement.

Visible overlight speed of movements (VOSM), observed in some extragalactic and galactic sources, have the natural explanation in the sense of giving expressions. The effect of the VOSM in our case is realised in some low than Spacial Reletivity number data ($v/c = 0,43$ and $\theta = 20 deg.$).

The symmetry absence in transformations leads to visible morphological peculiarities in relativistic object:
a) differences in corners of precession cone for jet and contrjet,
b) bend of lines connecting outflow in contrdirections,
c) not equal intervals between blobs in the jet and contrjet,
d) a high flux ratio from the jet and contrjet blobs, that give additional difficulties in contrjet observations.

A visible difference of intervals between blobs in opposite directions from the sources as a visible asymmetry in jet corners is confirmed by VLBI interferometry observations. These confirm also the dependence between corners of jets and sources energetic (Parma et al. 1987, Bridl 1989).

Morphological and energetic peculiarity in relativistic sources TCT predicted let us carry out experimental tests of their validity and in some cases to get a new information applying independent methods of astrophysical objects observations.

4. Experimental tests for validity TCT

1. On the optical data basis (Margon 1984) kinetic model parameters for CDS system SS433 were calculated (Larionov 1993). Doppler shift expression deduced by us were used, that differ from the standard relativistic one in number of power $v3/c3$. The obtained data for the model SS433 agree with the standard relativistic case by making small (about some percent) modifications of the relation v/c or ones for the corner and the inclination of the precession cone of CDS. Solving of this problem required independent methods of finding CDC parameters (Larionov, 1993,1999).

2. TCT morphological peculiarities in relativistic objects were tested also in CDS SS433. Because the source belongs to Galaxy the VLBI system may gives the structure of separate blobs from source. The asymmetry of lineal transformation suppose stretch of blobs moving towards an observer and compression of ones in the opposite direction. The isophotes analysis confirmed completely these peculiarities and gave the possibility to determine some model parameters with using of independent methods (the inclination and value the precession cone, the v/c ratio from the blobs fluxes relation). It is important especially in the cases when optical objects are invisible and radio methods only give possibility to determine kinematic model CDC (Larionov, 1999).

3. At the first sight, it seems quite conveniently to use pulsar observations for testing TCT. We have a case of moving receptor and one measure a difference or ratio of impulses periods in various points of the earth orbit. Doppler shift expression differed also from relativistic one at the level $v3/c3$ (Larionov 1999). But periods ratio coincide exactly with the relativistic one. Because of insufficient precision in the determination of the light speed and especially the speed of Earth in her orbit it is impossible to choose between the offered and standard relativistic expressions in spite of the high stability of pulsar period and earth generators.

5. Conclusions

1. We have examined the type of the symmetry violations introduced by existence of PV as virtual matter.

2. It is offered TCT based on the principle of the virtual environment existence necessary for EM radiation propagation. The top speed of the interactions spreading is implied.

3. Visible manifestations of TCT suppose the presence of morphological peculiarity in relativistic objects connected with the not symmetrical TCT with the corner between directions to the observer and the IKS (emitting object).

4. Experimental tests for TCT show that modern possibilities of astrophysical objects observations do not allow us to reject the offered TCT and therefore they have right for the existence.

5. Terrestrial experiments of the Mickelson-Morley type do not reject the existence of the virtual matter necessering for the EM radiation propagation. The invariable interferent pattern in this case is evidence of invariable wavelengths in interferometers arms ($\lambda_1 = \lambda_2$) both as in the case of reflection from the mirror so in the case of the orientation changing in the space. The direct conclusion of this experiment is basis for the second (electrodynamical) postulate of TCT.

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