Detector of aether operating on transverse Doppler effect

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Rotating the source of light around the point lying on the light's beam we can observe the transverse Doppler effect by a spectrometer located in the center of rotation. The anomalous shift of the electromagnetic wave's frequency was found from this experiment (performed in 1969−1974 years) that appeared to be much higher than anticipated from the standard relativistic expression taking into account solely the linear velocity of rotation of the source in the laboratory. The interpretation of the experimental observations admitting absolute motion of the Earth and respective accounting for reality of the Lorentz contraction and time dilation enabled us to determine the speed of the Earth relative to luminiferous aether. It appeared to be somewhat above 400 km/s that agrees well with the value formerly found by me using three methods of determining the speed of "aether wind" by Michelson-type interferometers thoroughly accounted for refractive indices of optical media.

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1. FOUR EVIDENCES DEMONSTRATING REALITY OF THE ABSOLUTE MOTION

Earlier [1] I produced three experimental evidences revealing the absolute motion of the Earth relative to aether. The speed of "aether wind" was measured by three methods: directly using the Michelson interferometer registering the fringe shift due to second order effects in a single optical medium [2], via the seasonal drift of the peak value of the interference fringe shift found by me [3], and using Michelson-type interferometer with two optical media that measures the fringe shift at first order effects [4]. The horizontal projection of the Earth's speed relative to aether appeared to lie between 140 km/s and 480 km/s as a consequence of its day and night drift during the 24-hour observation at the latitude of Obninsk. The key point in the successful interpretation of the experiments performed was the using instead of the classical velocities addition rule $c' = c+v$, that is forbidden in principle in relativity, of the following quasirelativistic tools: Fresnel formula for the speed of light in mobile media, and real Lorentz contraction of the meter's arm, with the ensuing time dilation, when moving in aether.

Below I show how these tools works in essentially different technique based on the transverse Doppler effect. That will be a fourth approach to experimental detecting the absolute motion of the Earth (performed by me in 1969−1974 years).

2. INTERPRETING TRANSVERSE DOPPLER EFFECT IN SPECIAL RELATIVITY

Let the source of light move linearly with the velocity v directed perpendicular to the straight line connecting the source with the receiver. In such a pair, according to special relativity, in the instant of the ortho-station there should be observed the red shift of the source's frequency in accord with the following relativistic formula of the transverse Doppler effect:

$$\nu = \nu_o \sqrt{1 - v^2/c^2} \tag{1}$$

where ν_o is the frequency of the light's source wave at rest in the sense of special relativity. Even if the receiver and source move in aether translatorily with the absolute velocity $v \neq 0$, in the bounds of special relativity negating aether (let it be called the first model of the description), the receiver and source are considered to be stationary on the ground that the experimental measurement by the moving receiver R_v of the frequency emitted by S will read the value ν_o.

We will make deeper the content of the analysis in the given experiment, placing in points of measurement of the moving ortho-staying S and R_v additionally the stationary in aether receivers $R_o(\nu)$ in other respects identical to

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moving R_v (Fig.1). With such equipment the "observer" register in points 1, 2,... of ortho-staying of S and R_v the presence of radiation from S by the pairs of identical receivers. However, the receiver $R_v(\nu)$ that moves translatorily together with S will register the radiation with the frequency ν_o, but the absolutely immobile receiver $R_o(\nu)$ will read in aether the radiation at the frequency ν shifted to the red zone according to (1). Thus, the translational mobility of S and R_v is correspondent not only by their relative immobility stated by the equality of the registered by the receiver frequency ν_o and the frequency of the emitter ν_o, but also by the occurrence in all aether space of waves those frequency ν has the red shift due to the absolute motion of S with the velocity v. Naturally, the "reddened" frequency is measured by the stationary in aether receiver $R_o(\nu)$.

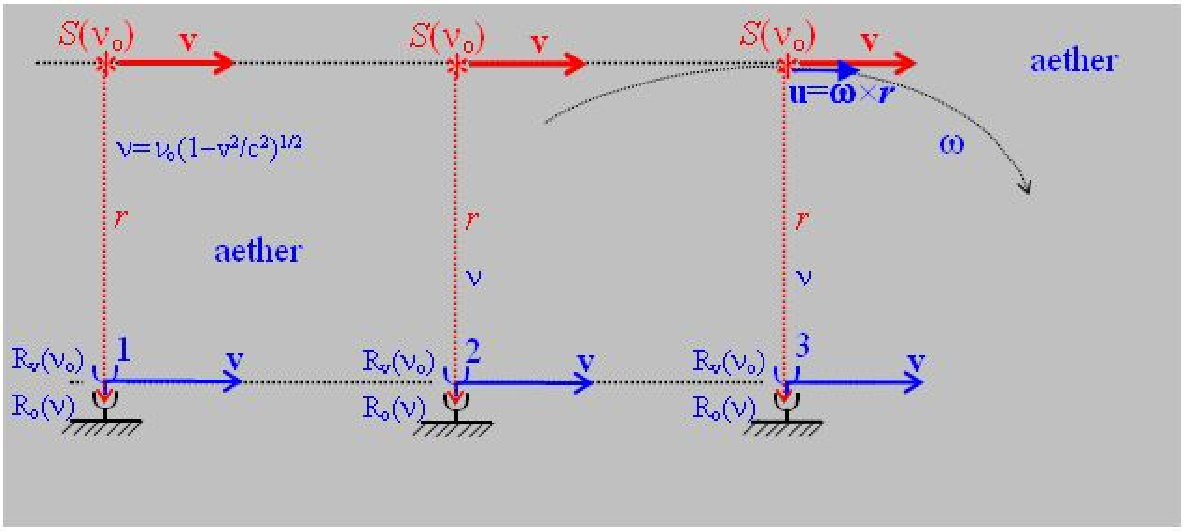

FIG. 1: The scheme of observing the transverse Doppler effect and two principal approaches to explaining the red shift of the frequency ν of the trasnversely-movable Doppler source: 1) by special relativity negating aether and absolute motions − by formula (2); 2) by the Lorentz type theory admitting aether, absolute motion, and reality of the Lorentz contraction and time dilation − by formula (5).

In order to understand this result it is sufficiently to take into account that the "reddening" of the frequency of the absolutely mobile source S is registered according to the law (1) by the stationary in aether receiver $R_o(\nu)$. At the very the same moment the "reddened" in the stationary aether radiation with frequency ν_o is registered by the translatorily mobile receiver $R_v(\nu')$ as $\nu' = \nu/(1 - v^2/c^2)^{1/2}$ since the time is dilated $(1 - v^2/c^2)^{-1/2}$ times at the moving receiver $R_v(\nu')$.

In the model considered of the observation of the transverse Doppler effect special relativity recommends to experimenters of the Earth's laboratories to be satisfied by the consideration of the pair of relatively stationary objects S_v and R_v, as motionless in the empty space, ignoring either aether and any mentioning about the absolute translatory motion of this pair. The registering by the receiver in such pair of the source's frequency "without reddening" in special relativity is regarded to be sufficient in order to describe "correctly" the reality. Still the reality is more complex than special relativity simplifications. As it can be seen from Fig.1 and follows from the experiments described below, in reality in place of any pair S_v and R_v there always (always!) act three objects: S_v, R_v and aether in the form of the actual receiver $R_o(\nu)$ specially set at rest in aether. The latter reveals the presence of aether and absolute motion of the pair in it by detecting the "reddened" frequency ν.

In the series of rotary experiments testing special relativity by the transverse Doppler effect [6–9] there was considered only pair model of special relativity (i.e. only the source and receiver in the Earth's laboratory frame of reference) wholly ignoring the possibility of the existence of aether and absolute motions in it. Such an intentionally truncated model of experiments [6–9] can not be considered rightful verification of special relativity. In rotary experiments [6–9] initially there was assumed that no absolute motion of the Earth is possible, and hence all initiated in laboratory red shifts of the frequency of rotated sources or receivers allegedly can be described by the law (1) in which the velocity $\mathbf{v}$ is taken to be the linear velocity $\mathbf{u} = \boldsymbol{\omega} \times \mathbf{r}$ of the source (or receiver) on the circular orbit of the rotational desk. Rotating the light's source around the point of observation the transverse Doppler effect can be constantly observed that for small angle velocities ω of mechanical rotators, by the formula $u = \omega r$ where r is the radius of rotation, gives rather limited values of linear velocities u. The red shift of the frequency in the Doppler effect is determined from (1) in the following way

$$\Delta\nu = \nu_o - \nu_o\sqrt{1 - u^2/c^2} \approx {}^1/_2\nu_o u^2/c^2. \tag{2}$$

The evaluation by (2) of the red shift ($\Delta\nu$) of the light's source (in my experiments that was lasers with frequency

$\nu_o = 10^{14} Hz$) at two speeds of rotation ($\omega_1/2\pi$=300 and $\omega_2/2\pi$=1200 rpm with r=1 m) gives for $\Delta\nu$ 2 and 8 Hz, respectively. The red shift of the frequency found in my experiment ($\sim 10^5$ Hz, see below) proved to be 10^4 times higher than the estimation above made from (2). Such a huge discrepancy between the experiment and predictions of special relativity there demanded to turn to the second above mentioned model of the interpretation the measurements of the transverse Doppler effect.

3. PROBABLE DYNAMIC INFLUENCE OF THE EARTH'S MOTION RELATIVE TO AETHER ON THE RED-SHIFT IN THE TRANSVERSE DOPPLER EFFECT

We need an alternative interpretation of the experiment. A viewpoint admitting the absolute motion of the Earth's laboratory proved to work well. Let the experimental setup move together with the Earth in luminiferous aether with the velocity $\mathbf{v}$. Then, instead of (1), in the framework of the absolute motion of the source S and receiver R_v we have their translatory motion with the velocity $\mathbf{v}$ weakly perturbed by the harmonic motion of the source's with the angular velocity $\boldsymbol{\omega}$. Moving (in aether) source creates in the luminiferous medium optical waves that are perceived by the stationary (in aether) receiver R_o with the frequency

$$\nu = \nu_o \sqrt{1 - |\mathbf{v} \oplus \mathbf{u}|^2/c^2}, \tag{3}$$

where $|\mathbf{v} \oplus \mathbf{u}|$ is the module of relativistic composition of velocities. Passing to the reference frame of the Earth gives the expression for the perturbed frequency ν' of the moving radiation source as measured in the center of rotation by the moving receiver R_v (which moves only with the velocity $\mathbf{v}$, without rotation)

$$\nu' = \nu_o \frac{\sqrt{1 - |\mathbf{v} \oplus \mathbf{u}|^2/c^2}}{\sqrt{1 - v^2/c^2}}, \tag{4}$$

where frequency ν is registered as ν' because of dilation of time at a moving receiver R_v in $1/\sqrt{1 - v^2/c^2}$ times. Then the red shift in the reference frame of the Earth's laboratory can be found from the expression

$$\Delta\nu' = \nu_o - \nu' = \nu_o - \nu_o \frac{\sqrt{1 - |\mathbf{v} \oplus \mathbf{u}|^2/c^2}}{\sqrt{1 - v^2/c^2}} \approx \nu_o \left(\frac{\mathbf{v} \cdot \mathbf{u}}{c^2} + \frac{u^2}{2c^2} \right). \tag{5}$$

We are interested in the estimations the maximal shift $\Delta\nu'_m$ of the frequency corresponding to vertical position of the light's source on Fig.2. The instantaneous value $\Delta\nu'_m$ of the maximal red shift (for the instant shown in the left of Fig.2) corresponds to the positive value of the scalar product in (5) when $\mathbf{v} \cdot \mathbf{u} = vu$. From (5) the speed v of "aether wind" can be determined that give a realistic value agreeing with that earlier found by me from a Michelson-type experiment where the participation of optical light's carriers (gases, liquids or solids) has been accounted for correctly [5].

4. ARRANGEMENT AND IMPLEMENTATION OF THE EXPERIMENT WITH ROTATED SOURCES OF LIGHT

In practice we used a laser source of light with frequency $\nu_o \approx 10^{14}$ Hz and nonlinear microwave transistor device that can detect frequencies up to 700 MHz. These facilities enable us to measure a frequency combination spectrum formed by frequency-difference superposition of waves emitted from two sources of light. In order to avoid optical asymmetry and eccentricity, two identical opposite sources of light were arranged symmetrically around a common center of rotation where the frequency-difference detector of oscillations from the lights L_1 and L_2 (Fig.2) was placed.

The sources have had identical frequencies of non-coherent radiation, that gave the spectrum of noise-like beatings in the output of the asynchronous detector AD (when $\omega = 0$) having the form of hyperbola with the extremum in the region of near null difference frequencies (curve 1 on Fig.3). Beams L_1 and L_2 are brought together on the crystal of the transistor AD (Fig.2). When sources S_1 and S_2 began to rotate, the spectrum acquired higher frequency-difference combinations $\Delta\nu'_m$, upper boundary frequencies of which are proportional to the frequency ω of rotation (curves 2 and 4 in Fig.3). These frequencies appeared to be 10^4 times higher than those predicted by the formula of special relativity (1).

Results of this rotary experiment appeared to be sensitive to orientation of the rotation plane Σ of the experimental setup on the horizontal plane of the Earth. Variation of the orientation of the rotation axis relative to the absolute velocity $\mathbf{v}$ of the Earth changes the projection of $\mathbf{u}$ on $\mathbf{v}$. This leads to the degradation of the spectrum, that can be explained by the decrease of the influence of the absolute velocity $\mathbf{v}$ on the transverse Doppler effect for rotating sources. Indeed, in accord with (5), if $\mathbf{v} \cdot \mathbf{u} \to 0$ then $\Delta\nu'_m \to \nu_o u^2/2c^2$.

5. INTERPRETATION OF THE EXPERIMENT

Substituting in (2) the frequency $\nu_o \approx 10^{14}$ Hz of the source, angular velocity $\omega = 1200 \cdot 2\pi/60 \approx 120$ rad/s, the radius $r = 1$ m of rotation and the speed $c = 3 \cdot 10^8$ m/s of light we obtain $\Delta\nu'_m \approx 8$ Hz. Comparing the latter with the peak at $\Delta\nu' \approx 10^5$ Hz of the curve 4 on Fig.3 we see that the standard relativistic model is utterly non-suitable

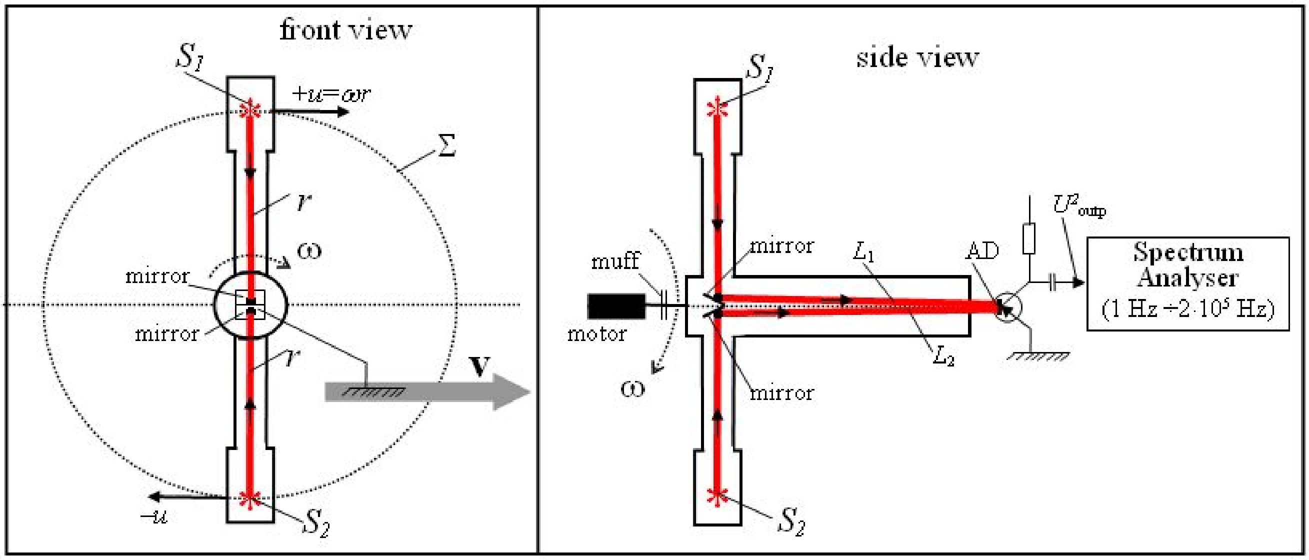

FIG. 2: Measuring transverse Doppler effect in a system rotating in the plane Σ containing vector $\mathbf{v}$ of the velocity that the Earth moves in aether. Two symmetrical laser sources of light S_1 and S_2 located at a distance $r = 1$ m from the center of rotation where the asynchronous detector AD (working on the transistor with the boundary frequency $\nu_\alpha = 700$ MHz, i.e. $\nu_\alpha \gg \Delta\nu'_m$) is disposed. Left: viewing along the axis of rotation, right: side view.

in order to explain results of this experiment since it underestimates $\sim 10^4$ times the observed by us red shift of the source's frequency in the transverse Doppler effect.

Interpreting the system in terms of absolute motion we apply (3) to both sources:

$$\nu_1 = \nu_o\sqrt{1 - |\mathbf{v} \oplus \mathbf{u}|^2/c^2}, \qquad \nu_2 = \nu_o\sqrt{1 - |\mathbf{v} \oplus (-\mathbf{u})|^2/c^2}. \tag{6}$$

Keeping in (6) only terms of the first order in v/c we get the approximate expression for frequency differences spectrum $\Delta\nu = \nu_2 - \nu_1$ (where we take into account that $u \ll v$, $v \ll c$)

$$\Delta\nu' = \nu'_2 - \nu'_1 = \nu_o\sqrt{1 - |\mathbf{v} \oplus (-\mathbf{u})|^2/c^2} - \nu_o\sqrt{1 - |\mathbf{v} \oplus \mathbf{u}|^2/c^2} \approx 2\nu_o \mathbf{v} \cdot \mathbf{u}/c^2. \tag{7}$$

(Here we discarded denominator radicals of (4) since in my symmetrical experimental setup respective terms annihilate each other.)

From (7) we obtain the expression for determining the velocity of motion of the Earth with respect to aether through maximal value $\Delta\nu'_m$ of frequency differences in the observed spectrum (see Fig.2 left), i.e. when $\mathbf{v} \cdot \mathbf{u} = vu$:

$$v = \frac{c^2 \Delta\nu'_m}{2\nu_o u}. \tag{8}$$

Substituting into (8) the measured maximal boundary frequencies $\Delta\nu'_m$ of spectra 2 and 4 on Fig.3, we obtain the evaluation of the "aether wind" velocity projection: ~ 405 km/s. This value agrees well with those obtained earlier by three above mentioned methods. Besides, comparing curves 2 and 4 on Fig.3 we see that the growth of the rotation velocity in 4 times, from 300 to 1200 rpm, leads to respective growth of $\Delta\nu'_m$, from ~ 25 to ~ 100 KHz. This provides yet another support to linear dependence (7) on $\mathbf{u} = \boldsymbol{\omega} \times \mathbf{r}$.

The degradation of the spectrum from curve 2 to 3 on Fig.3 can be explained by the influence on the transverse Doppler shift of the changing the orientation of the sources rotation axis in the horizontal plane of the Earth. Indeed, according to formulas (6) and (7) $\Delta\nu'_m \to 0$ when when we arrange $\mathbf{v} \perp \mathbf{u}$, i.e. $\mathbf{v} \cdot \mathbf{u} \to 0$.

Take notice on another one peculiarity of the shown on Fig.3 spectrum of the red shift of light's frequencies of rotating sources. In the region of infra-low frequencies (see Fig.3, curves 2 and 4) we see peaks with central frequencies 10 Hz and 40 Hz, preserving multiplicity (300/1200) of angular velocities ω. These peaks, in my opinion, are connected not with relativistic phenomena of the time dilation in moving sources but with their classical accelerated motion in rotation (with a cyclotron effect).

The second region of spectra 2 and 4 (Fig.3) with upper boundaries of the red shift at 25 and 100 kHz of optical frequencies of rotated sources, preserving the same multiplicity of the variation of rotation frequencies ω of sources, are caused by relativistic effects of time dilation in the moving reference frame of light's sources. The occurrence of

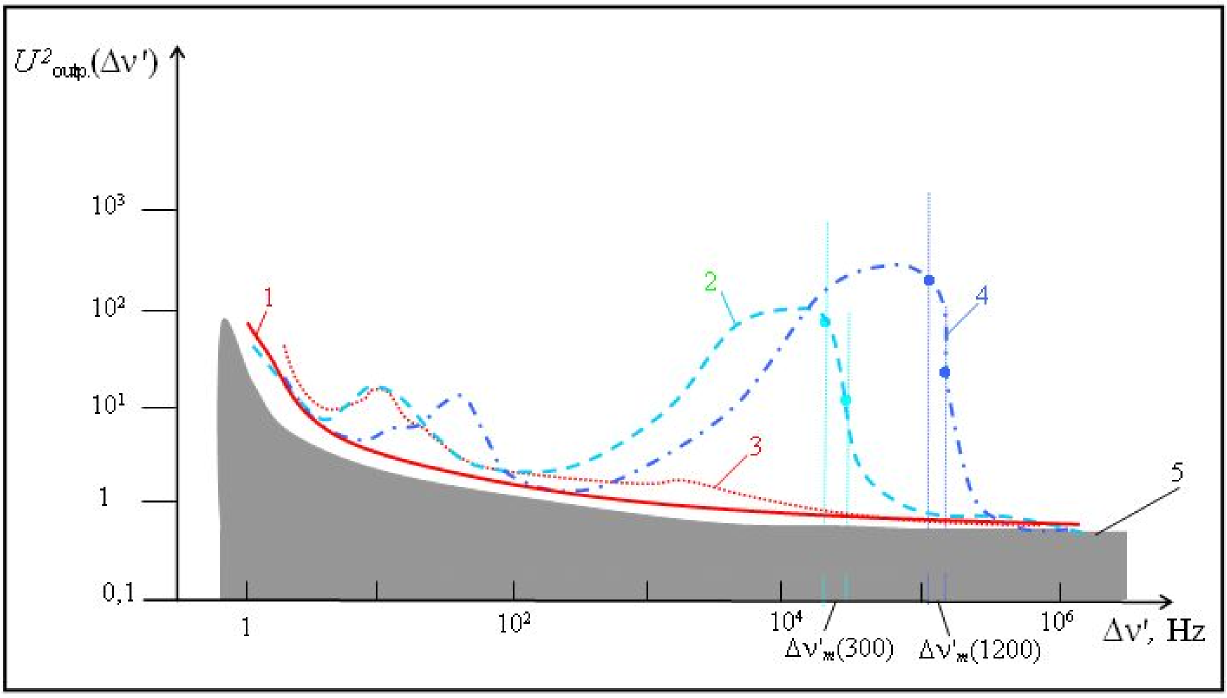

FIG. 3: The combination spectrum of the asynchronous detection of optical oscillations of two non-coherent sources (S_1 and S_2 on Fig.2) of identical frequency $\nu_o \approx 10^{14}$ Hz. Spectral curves: 1 $-$ no rotation of the sources, 2 $-$ rotation with angular velocity $\omega/2\pi = 300$ rpm and orientation of the rotation plane along the Earth's horizontal line $15 - 195°$ (when $\mathbf{v}\cdot\mathbf{u} = vu$), 3 $-$ the same ω though orientation is along the line $105 - 285°$ (when $\mathbf{v}\cdot\mathbf{u} \approx 0$), 4 $-$ $\omega/2\pi = 1200$ rpm with orientation as on curve 2. The measurement error by U^2 is: for frequencies $10^3 - 10^6$ Hz not more than $\sim 7\%$, for frequencies ~ 100 Hz $\sim 15\%$, for frequencies $1 - 20$ Hz $\sim 30\%$ of the nominal value on the curve; values of frequency on the $\Delta\nu'$ axis are determined with the error $\sim 5\%$

low-frequency bands in the experimental spectra 2 and 4 (Fig.3) in the output of the asynchronous detector of the radiation of two non-coherent sources with identical frequencies can be explained by the "cyclotron modulation" of the amplitude of the radiation. If we admit the amplitude modulation $A_i(t) = A_{mi}\cos(\omega t)\cos(2\pi\nu_{oi}t + \varphi_{ns})$ of the radiation intensity of these two initially stationary sources of light with frequencies (6), by the low frequency harmonic oscillation with the cyclotron frequency ω of the experimental setup we will obtain the following form of line splitting for each light's source:

$$A_{mi}\cos(\omega t)\cos(2\pi\nu_{oi}t + \varphi_{ns}) = 1/2A_{mi}\{\cos[(2\pi\nu_{oi} + \omega)t + \varphi_{ns}] + \cos[(2\pi\nu_{oi} - \omega)t + \varphi_{ns}]\}. \quad (9)$$

Near every stationary spectral i-th line of the frequency ν_{oi} the spectrum (9) excites a symmetrical doublet owing to the amplitude modulation by the frequency of the non-inertial (accelerated) motion (rotation) of the radiation source. Electrical charges of the active generating medium of these sources in the accelerated motions will modulate the optical frequency of laser by the harmonic acceleration $g \sim \omega^2 r$ with the "cyclotron" frequency ω of the rotation of the sources, exciting near each mono-frequency ν_i of the stationary source the triplet-spectrum $(\nu_{oi} - \omega/2\pi)$, ν_{oi}, $(\nu_{oi} + \omega/2\pi)$. The quadratic detecting of symmetrical pairs $[(\nu_{oi} - \omega/2\pi)$ and $(\nu_{oi} + \omega/2\pi)]$ as in my experiment, or non-symmetrical pairs $[(\nu_{oi} - \omega/2\pi)$ and $\nu_{oi}]$ as in experiments [6–8], gives two presented on Fig.3 bands of spectral difference combinations. The occurrence of the low frequency peak at the difference frequency $\omega/2\pi = (\nu_o + \omega/2\pi) - \nu_o$ in the non-symmetrical detecting of the triplet pairs probably may explain the part of the causes of those deviations in the observed Mossbauer spectrum by the law (2) of special relativity that was noticed by the authors [6–8]. The other much more important cause of the deviations from (2) of methodological character I will consider below in the next section.

Take notice that I firstly suppose that the origin of the low frequency peaks is in parasitic mechanical vibrations of the experimental setup with the frequency ω. However, when I tried to cancel these vibrations (by a balancing the rotor), the intensity of the low frequency peaks at the doubled frequency of rotations only increased (vibrations acted as if smeared this peak). This correlates with the analogous results of [8] (see their Fig.1) and points out to the non-vibrational origin of low-frequency peaks.

6. DISCUSSION

It is pertinent to ask why in experiments by Ives&Stilwell [9] and other authors [6, 8] there was not registered the absolute motion of the Earth with the velocity $\sim$ 600 km/s? After all, in the Ives&Stilwell experiment the linear velocity v_c of canal rays were only three times higher than v_{Earth} measured by me in [2]. Fortunately Ives&Stilwell [9] presented results of measurements in two orthogonal directions of the horizontal plane of their setup (N−S and E−W) and quoted all these results in [9]. These directions of orientation of the flow of canal rays almost coincide with my orientations of vertical plane Σ of rotation of sources above described.

One of stated in [9] "artifact" shifts of frequency in the transverse Doppler effect in the orientation N−S at $\lambda = 0.036$Å (with the expected from special relativity 0.0472) corresponds to the occurrence of the projection of the absolute velocity $v_{Earth} = \sqrt{2c\Delta\lambda/\lambda_0}$ on the horizontal direction N−S equaled to about $v_{Earth} = 170$ km/s. This agrees with my results [2] where in different periods of day and night there was fixed velocities 140< v_{Earth} <480 km/s. There are agreed with the result obtained by me also the values of wavelength shift $0.045 < \Delta\lambda < 0.051$ for direction E−W gained in [9]. Since for such orientation the channel rays velocities are almost perpendicular to $\mathbf{v}_{Earth}$ and thus do not perceive the influence of the absolute motion of the Earth in aether. This effect I have considered above in the comment to formula (5) and confirmed in the experiment plotted on curve 3 in Figure 3 for orientation of the plane of rotation of sources along the direction E−W (this conclusion can be drawn from results of [5]).

In [6] γ-radiation of nuclei Co^{57} of Mossbauer source has $\sim 3\cdot10^4$ times higher frequency ν_o than in my experiment. That is why, by (5), the red shift $\Delta\nu'_{m\gamma}$ of the γ-frequency $\nu_o \approx 3\cdot10^{18}$ Hz in [6, 8], which is analogous to the observed in my experiment (at the frequency $\nu_o \sim 10^{14}$ Hz) shift $\Delta\nu'_m \sim 10^5$ Hz, must have at the output of the Mossbauer detector $3\cdot10^4$ times higher frequency of the red shift. This corresponds to the shift $\Delta\nu'_m \sim 3\cdot10^9$ Hz. The half-width of the absorption line of Fe^{57}-absorber (with $\Gamma = 3\cdot10^{-12}$ KeV) corresponds to the width of the resonance line $\sim 10^6$ Hz. Used in [6, 8] technique of sweeping the frequency of the source Co^{57} by means of vibrational exciting the linear Doppler effect, judging by the description in this works of the original and shifted to the "red" region of the resonance lines, did not exceed $\Delta\nu_{swp} \approx 2-3$ MHz (Fig.4). This means that in [6–8] the technique of spectral analysis was not able to register shifts that would essentially exceed the width of the resonance line of the absorber. The shifts of frequencies that $\sim 10^4$ times larger than the width of sources Co^{57} line would appear to be unobserved in the scale of frequency sweep of the devices described in works [6–8]. Then, what was measured in these works?

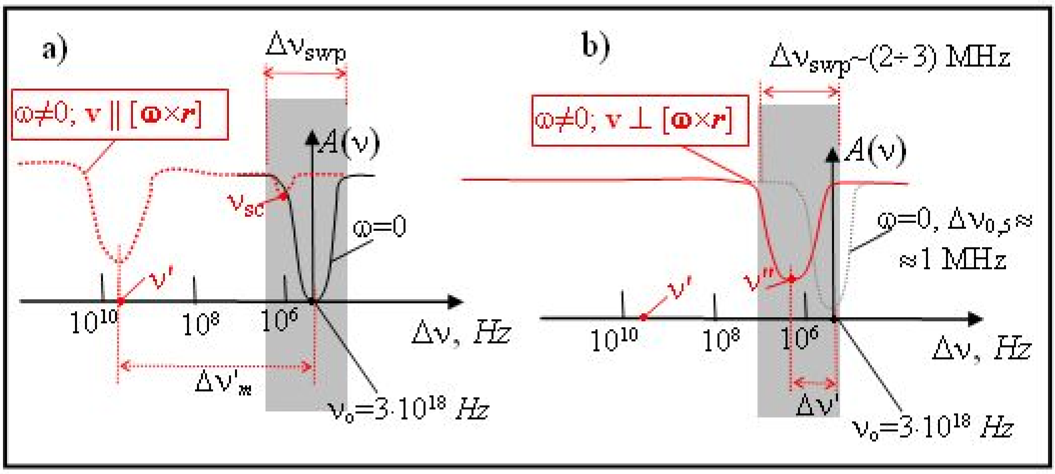

FIG. 4: Explaining the cause of the degeneration of abnormally large red shift of the frequency $\Delta\nu'_m$ of the intake of γ-ray by the rotating in the laboratory absorber (A) in rotary experiments described in [6–8] with my supposition of the absolute motion of the Earth together with the absorber and source (S) in aether: a) the original (when $\omega = 0$) resonance line of the absorbing the γ-ray of Co^{57}-source in works [6–8] and shifted by (5) resonance line in the rotating absorber ($\omega \neq 0$) providing $\mathbf{v} \parallel \boldsymbol{\omega}\times\mathbf{r}$ when the maximal red shift $\Delta\nu'_m$ occurs; b) degeneration of the abnormally large red shift of the frequency $\Delta\nu'_m$ of the intake of the γ-ray by the rotating in laboratory absorber in rotary experiments [6–8] by means of the orthogonalizaiton $\mathbf{v} \perp \boldsymbol{\omega}\times\mathbf{r}$ the vector $\mathbf{v}$ and the direction of the emission of γ-ray of Co^{57}-source to the collimator of the counter of γ-quanta.

I will declare a viewpoint basing on my described above experiment measuring the transverse Doppler effect with rotated optical sources. As we can see from the description of the thorough preparation of the rotary setup to measurements with the rotation ($\omega \neq 0$) of Doppler objects, they are always preceded by their basic tuning for $\omega = 0$ (in the absence of rotation) in order to obtain the initial position of the resonance line. Such observation technique (see. Fig.4a) of the absorption band by the absorber-receiver of the γ-radiation of a Mossbauer source Co^{57} in [6–8] is necessary in order to measure its shift relative to this band in rotation of the absorber (i.e. when $\omega \neq 0$). For instance, in Fig.4 of [6] are shown basis measurements of resonance bands at $\omega = 0$, and the shift of bands in rotation of the absorber $\omega \neq 0$ are presented also in Fig.3 of [6].

As I have shown above with direct estimations by (2) the red shift of the frequency due to the rotation is so small that it is comparable with the width of the source's line (in [6–8] the shifts $\Delta\nu'$ did not exceed $2-3$ MHz as is shown in Fig.4b). Obviously, in such case the shift of the magnitude $\sim 3 \cdot 10^9$ Hz (as shown in Fig.4a) after the switching on of the rotation of the absorber-receiver will not be seen at the frequency sweep of this setup (the range of the sweep in shown $\Delta\nu_{swp}$ by the grey margin). It can be surmised that after switching on the rotation of the absorber the resonance bands were not reproduced in the random orientation of the γ-ray through the collimator on the counter of γ-quanta because of their large shift by (5) that was not covered by the piezoelectric machinery of sweeping the frequency of the γ-source. The picture of the resonance line in $\omega \neq 0$ seemingly was managed to restore close to the adjusted one (with $\omega = 0$) after turning the γ-pupil the setup in the plane of the horizon (basing on [5] I suppose that it was in the direction $E-W$). As I have shown above in (5) this orientation is capable to cancel the contribution of the discovered by me the linear mechanism of red shift ($\Delta\nu' = \nu_o \mathbf{v} \cdot \mathbf{u}/c^2$) in the transverse Doppler effect and even to turn it to negative. According to my measurements [5] the orientation $E-W$ corresponds to the condition $\mathbf{v} \cdot \mathbf{u}/c^2 \leq u^2/2c^2$ in formula (5).

The main point of my explanation of that in works [6–8] was not detected the influence of the absolute velocity of motion of the Earth's laboratory on the value of the measured red shift of the source's frequency in the transverse Doppler effect thus reduces to that facing with the phenomenon of disappearing the the resonance line when switching on the rotation of the absorber-receiver the authors unconsciously carried out methodical adjustments of the direction of outlet of γ-ray $-$ in order to return the heavily shifted to ν' peak to the value ν'' in the region of the observation sweeping $\Delta\nu_{swp}$ (Fig.4b). Orthogonalizing relations of $\mathbf{v}$ and $\mathbf{u}$ in formula (5) they thus unintentionally turned to the level $vu/c^2 \leq u^2/2c^2$ the effect of large red shift of the resonance line $\Delta\nu' \sim \nu_o vu/c^2$ in the transverse Doppler effect (Fig.4a) discovered by me at frequencies ν' as it is well seen from my formula (5). Since the shift $\nu_o \mathbf{v} \cdot \mathbf{u}/c^2$ can be both positive and negative, while the shift $\nu_o u^2/2c^2$ $-$ only positive, the formula (5) explains why there was obtained in [6], table 1 negative initial adjustment readings for $0 < \omega < 3000$ rpm. By this means they unwittingly fitted the interpretation of the transverse Doppler effect to the form (2) under the ideology of special relativity. Inaccuracies of such adjustment there was seemingly noted by the authors [7, 8] in deviations of results [6] from the predictions of special relativity: by 20% [7] and 40% [8].

Thus I have proposed the fourth method (additionally to the three ones based on modernization of the method of Michelson interferometer [1]-[5] for determination of the velocity of "aether wind"). There are revealed the narrow limits of operation of kinematical version of special relativity on a more wide scale of aether electrodynamics of moving media of Fresnel, Maxwell and Lorentz. These are just those limits where there were found all (all!) experimental proofs of special relativity theory in twentieth century (in particular in [6] and [9]. And innovation peeping beyond these "kinematical" limits is regarded until now a bad form.

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