A new interpretation the experiment of Michelson-Morley.

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Abstract

The paper demonstrates one analysis of the Michelson-Morley experiment.

All subsequent theoretical studies led to the search of the theories that could explain why the experience of Michelson there was no measured the difference travel of the two ray of light and later every effort was made to settle the Lorenz equations. In this paper the new special theory of relativity, take into account the indicated shortcomings.

Comparing the result of motion of rays of light in two cuvettes, we will conclude that in the end time, rays of two cuvettes meet in the same point and we not observe the difference of the path. This result led to the conclusion to contradiction of the Lorentz Transformations and the Michelson-Morley experiment.

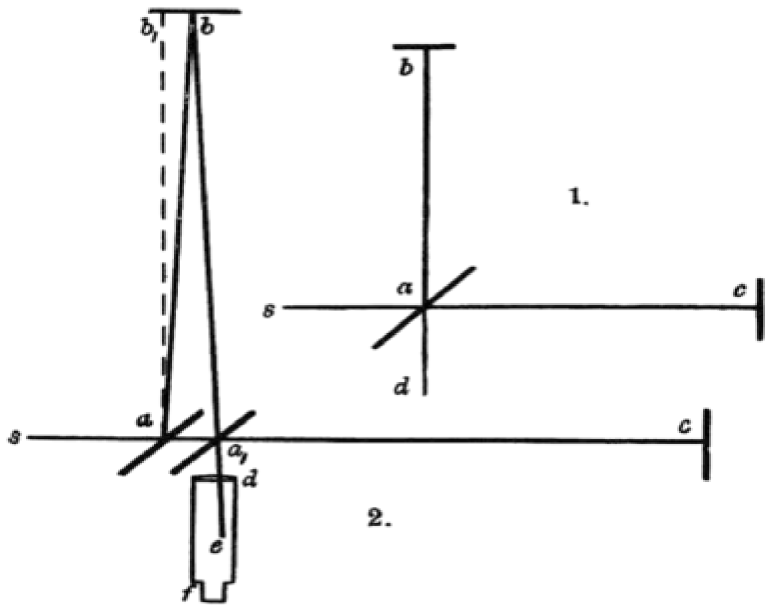
In this paper, it is propose the phenomenon of contradiction of the Michelson-Morley experiment and the Lorentz Transformations .This contradiction is resolved by new special theory of relativity viXra: 1501.0037. A new interpretation of experiment proposed. The paper gives a historical overview of the development of interpretation of this experiment. The contradiction is resolved by this new theory and this may lead to understanding clear its postulates.

Perhaps the most interesting phenomenon that occurred in the history of development of the special theory of relativity consisted that an erroneous physical view about the system of rest and motion was applied.

Let's go back to the origins of appearance of the theory of relativity and Einstein - Lorentz formulas. In 1987 Michelson published the results of famous experiment about registration of motion of earth.

Main theoretical part of this paper, we present below.

Let *sa*, fig. 1, be a ray of light which is partly reflected in *ab*, and partly transmitted in *ac*, being returned by the mirrors *b* and *c*, along *ba* and*ca*. *ba* is partly transmitted along *ad*,



and *ca* is partly reflected along *ad*. If then the paths *ab* and *ac* are equal, the two rays interfere along *ad*. Suppose now, the ether being at rest, that the whole apparatus moves in the direction *sc*, with the velocity of the earth in its orbit, the directions and distances traversed by the rays will be altered thus:— The ray *sa* is reflected along *ab*, fig. 2; the angle *bab*, being equal to the aberration =*a*, is returned along$ba_/$, ($aba_/$ =2*a*), and goes to the focus of the telescope, whose direction is unaltered. The transmitted ray goes along *ac*, is returned along $ca_/$, and is reflected at $a_/$, making $ca_/e$ equal 90—*a*, and therefore still coinciding with the first ray. It may be remarked that the rays $ba_/$ and $ca_/$, do not now meet exactly in the same point $a_/$, though the difference is of the second order; this does not affect the validity of the reasoning. Let it now be required to find the difference in the two paths *aba/*, and *aca/*.

Let V= velocity of light.

v= velocity of the earth in its orbit,

D=distance *ab* or *ac*, fig. 1.

T=time light occupies to pass from *a* to *c*.

T =time light occupies to return from *c* to *a/*, (fig. 2.)

Then $T=\frac{D}{V-v}$, $T_/=\frac{D}{V+v}$. The whole time of going and coming is $T+T_/=2D\frac{V}{V^2-v^2}$, and the distance traveled in this time is $2D\frac{V^2}{V^2-v^2}=2D\left(1+\frac{v^2}{V^2}\right)$, neglecting terms of the fourth order. the difference of ways

is evidently $2D\sqrt{(1+\frac{v^2}{V^2}}$ or to the same degree of accuracy, $2D\left(1+\frac{v^2}{2V^2}\right)$. The difference is therefore $D\frac{v^2}{V^2}$. If now the whole apparatus be turned through 90°, the difference will be in the opposite direction, hence the displacement of the interference fringes should be $2D\frac{v^2}{V^2}$. Considering only the velocity of the earth in its orbit, this would be $2D\times10^{-8}$. If, as was the case in the first experiment, $D=2\times10^6$ waves of yellow light, the displacement to be expected would be 0.04 of the distance between the interference fringes.

Sense of these research consisted in the next reasoning. We present them with Fig. 1 and give conclusions of these reasoning in more certain form [2].

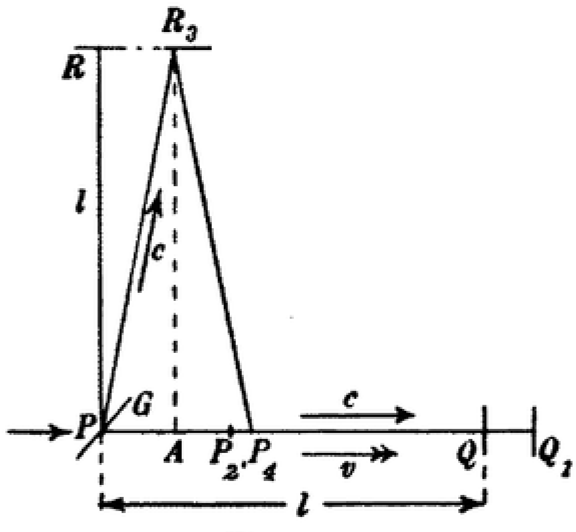


Fig. 1.

Fig. 1 is a graphical representation of the experiment and its interpretation.

The ray of light is simultaneously sends in two cuvettes of interferometer. The ray of light PR_3 reflected on the point R_3 by the mirror$R$. The ray of light PQ reflected on the point Q_1 by the mirror$Q$.

The whole apparatus move in the direction PQ with velocity v of the earth in its orbit. PQ is directed parallel to motion of earth, PR is directed athwart to motion of earth.

From the theoretical conclusion of the experiment expected that the time for passing the distance PQ in the forward and backward direction must be

$$\frac{l}{c-v}+\frac{l}{c+v}=\frac{2lc}{c^2-v^2}=\frac{2l}{c}\cdot\frac{1}{1-\frac{v^2}{c^2}}. \qquad 1)$$

and the distance PR_3P_3 must be

$$PR_3=\frac{lc}{\sqrt{c^2-v^2}} \qquad 2)$$

$$PR_3P_3=2\times\frac{lc}{\sqrt{c^2-v^2}} \qquad 3)$$

where: $\frac{l}{\sqrt{c^2-\upsilon^2}}$ is the time at which the light beam will pass with the velocity $\sqrt{c^2-\upsilon^2}$ the distance$AR_3 = l.$

As a result of these suppositions was obtained the difference of the path. (subtracting equalization 3) from 1)).

$$l\frac{\upsilon^2}{c^2} \qquad 4)$$

This result was the foundation of all subsequent development of the special theory of relativity. The magnitude of $l\frac{\upsilon^2}{c^2}$ was not registered in the experiments of Michelson any subsequent experiments. Applied different hypotheses to explain this phenomenon they stopped on the hypothesis of compression of objects in the system of motion [2, 3, and 4]. After that, all the dimensions of bodies which have the direction of translational motion in moving system shortened.

On the base of these ideas the special theory of relativity was worked out with the Lorentz-Einstein equalizations. The result of theory led to strange conclusions. Time inside of the system of motion changed and depended of the velocity of moving system. Furthermore considering that the time depends of the velocity of the earth in its orbit, this would lead to the change of the velocity of the earth what is impossible. The dimensions of objects intro the system of motion changed and depended of the velocity of moving system. But surprisingly, the sizes of bodies changed only on the axis of x and if a body moved along the coordinate of y or z that the body did not changed the sizes. It is hard to imagine that the body changes its crystal lattice, and all that related to it, the distribution of charges and gravitational forces in the matter, etc., which would lead to the emergence of a new material with new properties.

Let us do an analysis of the above theoretical research.

First, review the formula 1). Why is no one paid attention to the fact that time is determined at different speeds $c-\upsilon$ and $c+\upsilon$. Also in the path that passed the ray of light must be taking into account advancement on distance υt of the system of motion during this time t

$$PQ_1 + \upsilon t \quad и \quad PQ_1 - \upsilon t$$

And we would get the following result

$$\frac{l-\upsilon t}{c-\upsilon}+\frac{l+\upsilon t}{c+\upsilon}=\frac{(l-\upsilon t)(c+\upsilon)+(l+\upsilon t)(c-\upsilon)}{c^2-\upsilon^2}=$$
$$\frac{(lc+l\upsilon-\upsilon tc-\upsilon^2 t)+(lc-l\upsilon+\upsilon tc-\upsilon^2 t)}{c^2-\upsilon^2}=\frac{2lc-2\upsilon^2 t}{c^2-\upsilon^2}=\frac{2ctc-2\upsilon^2 t}{c^2-\upsilon^2}=$$
$$\frac{2c^2 t-2\upsilon^2 t}{c^2-\upsilon^2}=\frac{(c^2-\upsilon^2)2t}{c^2-\upsilon^2}=2t$$

5)

But note that even in these early formulas could was seen that the light in the moving system had the speed $\vec{c}+\vec{v}$, but the physical explaining to this phenomenon not able to find. Clear description of this phenomenon was shown in the new special theory of relativity [11 -25].

A similar error was made in the analysis of the beam motion in the direction PR_3. Then there has not searched the time of light passing the path PR_3P_4 but the length of the path PR_3P_4, formula 3). Then selecting $\frac{l}{\sqrt{c^2-v^2}}$ as the time during which the light beam will pass with the velocity c distance $AR_3 = l$ got difference of the path of two rays in two directions as $l\frac{v^2}{c^2}$. , formula 4).

On the groundwork of this difference of the path $l\frac{v^2}{c^2}$. was grounded all subsequent ideas of special theory of relativity, the concept of two distinct times and compression of objects in the moving system.

As a conclusion can be only said, that from our researches already evidently, that all subsequent investigations in the special theory of relativity were helpless.

Let us pass now to my researchers presented in works [11-25]. Let us reveal more detail Figure 1 and remember that the speed of light as proved in the new theory of relativity [11-25] is equal to $\vec{c}+\vec{v}$. In the beginning we examine the light beam traffic to direction PR Fig.2.

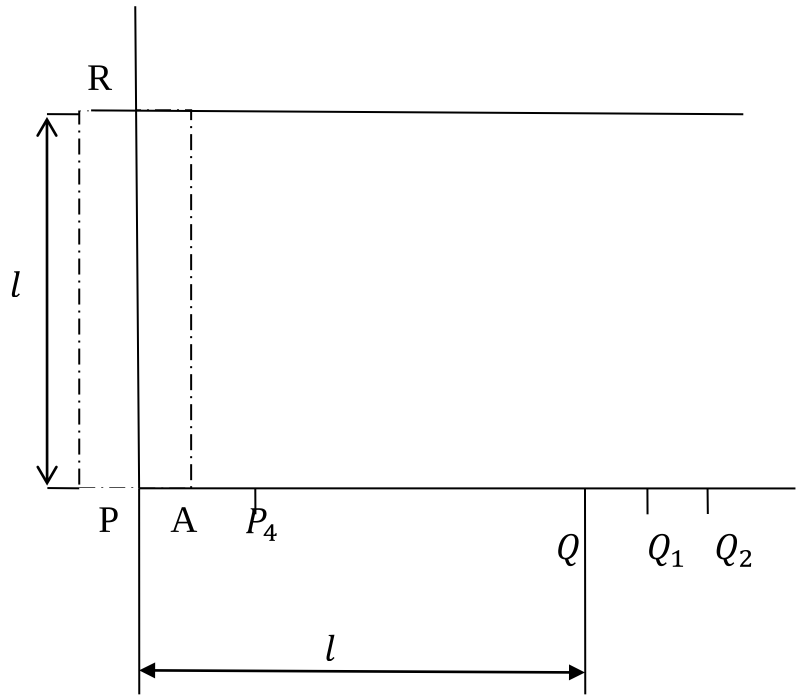


Fig. 2

In initial moment of time the system of motion and system of rest coincide. Denote that the cuvette inside which the ray of light passed is dotted line, as shown in Figure 2.

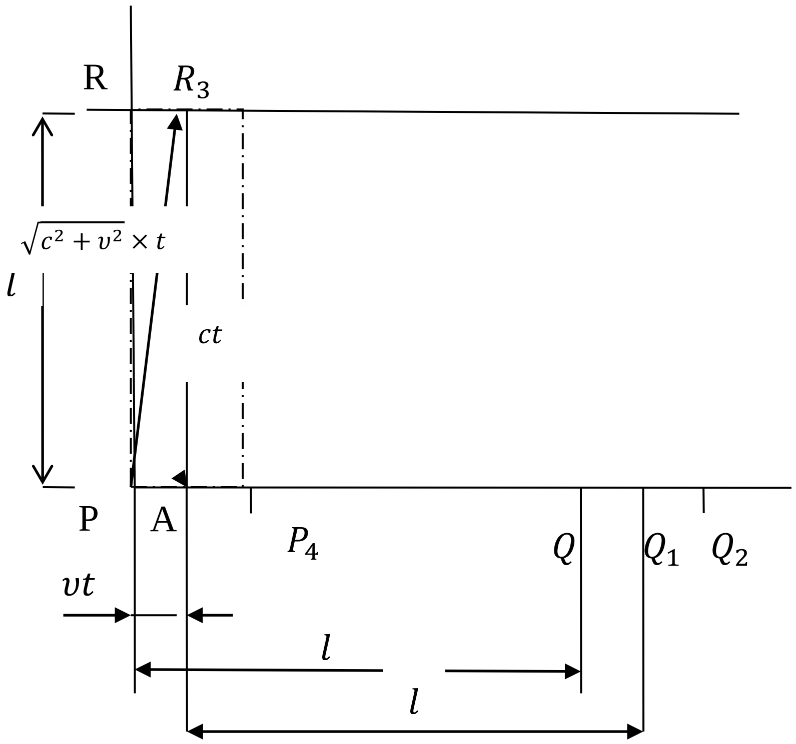


Fig. 3

The ray of light send in the direction of PR in a moving cuvette passed distance PR_3 with velocity $\vec{c}+\vec{v}$ Figure 3. The modul of velocity is $\sqrt{c^2+v^2}$ Fig. 3. During the time t the light beam reaches the point R_3 located on the mirror. The observer will be at a point A.

What can be in actually identified in this process? In the first, the observer that moves similarly with speed v inside of the moving system perceives the ray, as spreading on a straight line AR_3. Moreover if he measures the distance l that a beam of light passed inside of the moving system and time for which the beam passed this distance, then he determines that the speed of light is $c=\frac{l}{t}$. But in reality, the velocity of the light inside of the moving system is $\sqrt{c^2+v^2}$.

Now let us review the reverse movement of the light beam after reflection from the mirror R_3 at the time t, Figure 4.

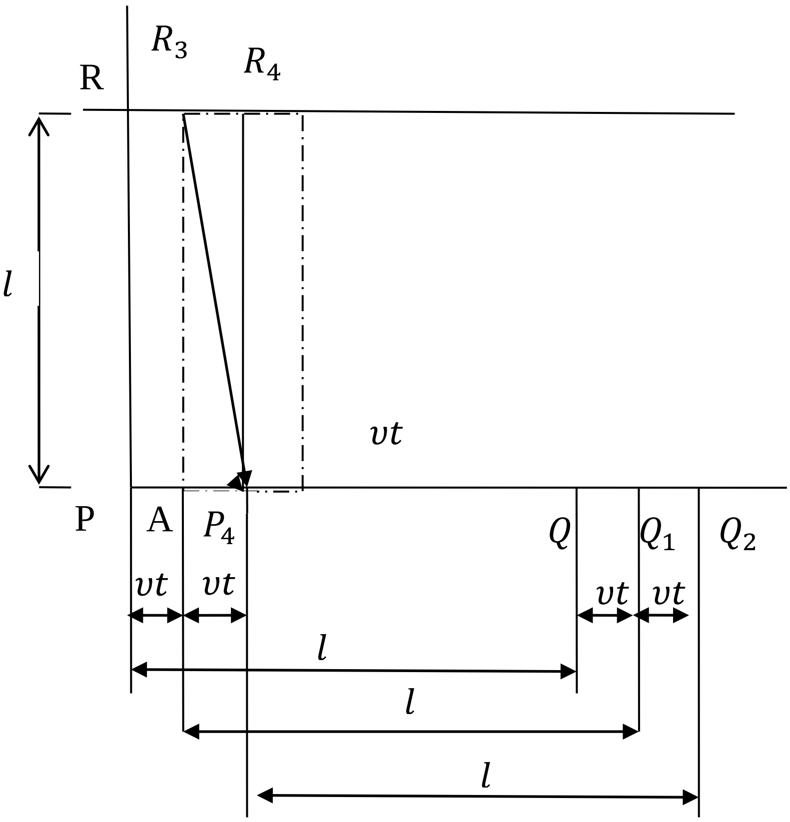


Fig. 4

The ray of light changes the direction, but the module of velocity of ray remains the same $\sqrt{c^2+\upsilon^2}$ inside of the moving system k. During the time $2t$ the ray of light comes at the point P_4, locate on the axis of coordinates x and the cuvette together with the moving system moves on distance $2\upsilon t$. The observer will be at the point P_4. The observer that moves similarly with speed υ in the moving system perceives a ray, as spreading on a straight line R_4P_4. Moreover if he measures the distance l that ray of light passed inside of the moving system and time during which the ray passed the distance l then he determines the speed of light like $c=\frac{l}{t}$. But in reality, the modulo of velocity of the light inside of the moving system is $\sqrt{c^2+\upsilon^2}$.

So we get the result that during the time 2t ray of light inside of cuevette located at the angle of 90^0 in relation to the movement of the earth reaches the point of system at rest P_4 .

Now let us discuss the process of motion of ray of light inside of the cuvette which is located in parallel to direction of motion of earth.

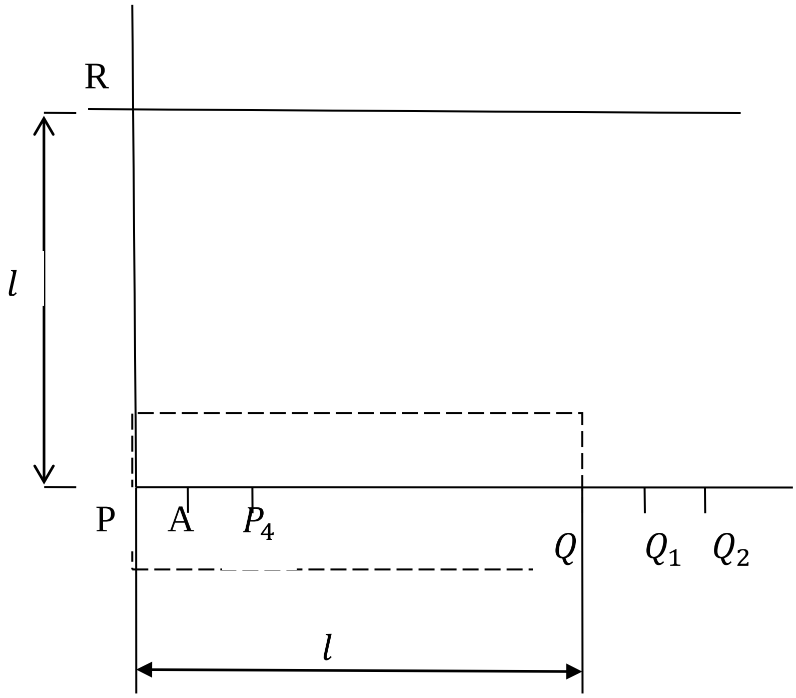


Fig. 5

In initial moment of time the system of motion and system at rest coincided Fig. 5.

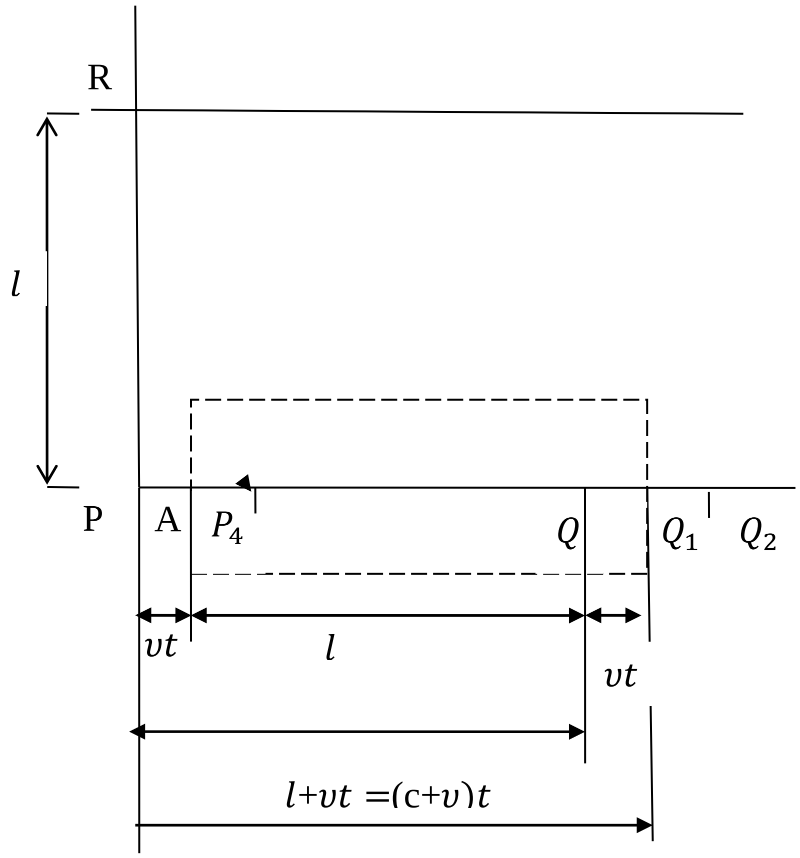


Fig. 6

The ray of light sends in the direction of PQ inside of the moving cuvette passes distance PQ_1 with velocity $\vec{c}+\vec{\upsilon}$, Fig. 6. The modul of velocity is $(c+\upsilon)$ Fig. 6. During the time t the light beam reaches the point Q_1. The observer will be at the point A.

What can be in actually identified in this process? In the first, the observer that moves similarly with speed υ inside of the moving system perceives a ray, as spreading on a straight line PQ_1. Moreover if he measures the distance l that a beam of light passed intro the moving system and time for which the beam passed this distance, then he determines the speed of light is $c=\frac{l}{t}$. But in reality, the velocity of the light inside of the moving system is $(c+\upsilon)$.

Now review the reverse movement of the light beam after reflection from the point Q_1 at the time t, Figure 7.

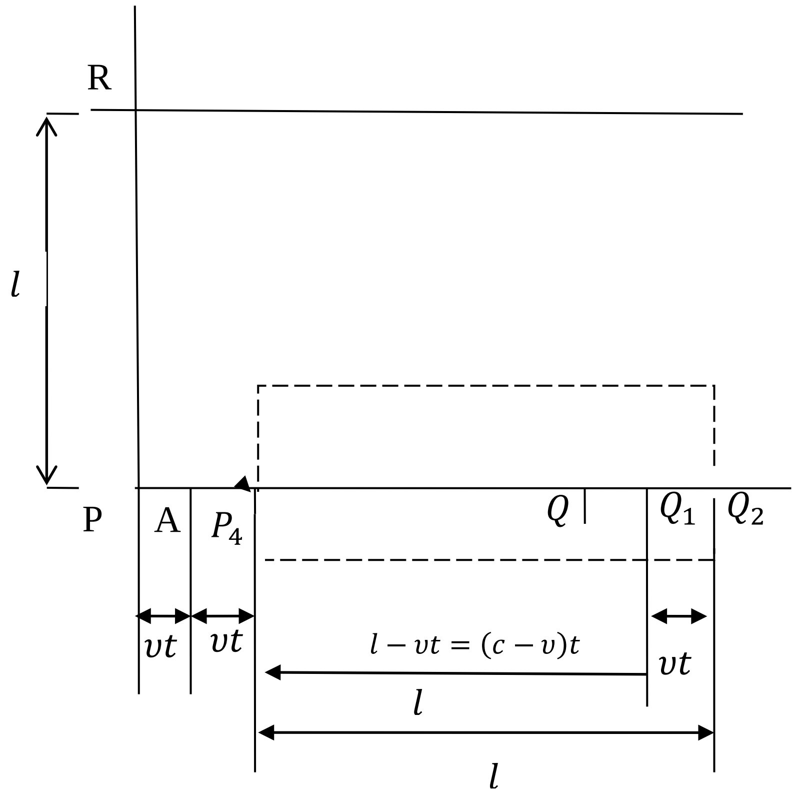


Fig. 7

The ray of light changes the direction, but the velocity of ray remains the same $\vec{c} + \vec{\upsilon}$ inside of the moving system k. During the time $2t$ the ray of light comes at the point P_4, located on the axis of coordinates x and the cuvette together with the moving system moves on distance $2\upsilon t$. The observer will be at the point P_4. The observer that moves similarly with speed υ in the moving system perceives a ray, as spreading on a straight line $Q_1 P_4$. Moreover if he measures the distance l that ray of light passed intro the moving system and time during which the ray passed the distance l then he determines the speed of light like $c = \frac{l}{t}$. But in reality, the modulo of the velocity of the light inside of the moving system is $(c - \upsilon)$.

So we get the result that during the time $2t$ ray of light inside of cuevette located at the angle of 0^0 in relation to the movement of the earth reaches the point P_4 of system at rest.

Comparing the result of motion of rays of light in two cuvettes we will come to the conclusion, that in the end time $2t$ rays of two cuvettes meet in the same point P_4 and we not observe the difference of the path $l\frac{v^2}{c^2}$.

This demonstrates that Michelson's experiment gave the correct result, but later was interpreted not true, and this led to the development of misconceptions in the special theory of relativity. All subsequent theoretical studies led to the search of the theories that could explain why the experience of Michelson there was no measured the difference travel $l\frac{v^2}{c^2}$ of the two ray of light and later every effort was made to settle the Lorenz equations [6-9]

$$\tau = \beta\left(t - \frac{\upsilon x}{c^2}\right) \qquad 6)$$

$$\xi = \beta(x - \upsilon t) \qquad 7)$$

$$\eta = y \qquad 8)$$

$$\zeta = z \qquad 9)$$

which excluded this difference of the path $l\frac{v^2}{c^2}$ of the two ray of light of moving system [3 - 10]

Conclusion

In the works [11-25] of the new special theory of relativity take into account the indicated shortcomings.

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