Set-ups with which can detect „Aether wind”

Dimiter Stoinov, Dilian Stoynov, Sofia, Bulgaria
E-mail: dgstoinov@yahoo.com
(Open Letter - updated, free to distribution)

It is reported that a set-ups have been created and experiments have been carried through which it was discovered "Aether wind" with the force of a hurricane. Based on the experimental results obtained, it should be assumed that the Special Theory of Relativity is wrong. It is noted that the experimental installations are easy to implement and anyone who is interested can perform such experiments alone and at home.

Introduction

In 1818, in explaining stellar aberration from the point of view of the wave theory of light, Fresnel [1] derived the following formula;

$$u = \frac{c}{n} \pm V\left(1 - \frac{1}{n^2}\right) \tag{1}$$

Obviously according to (1), the speed u of light propagation in a given optical medium, with refractive index n, must depend on the velocity V at which the Earth moves in space, c is the speed of light in vacuum, ie. formula (1) predicts that there must be an "Aether wind" (Aether drag hypothesis). In a broader sense, "Aether wind" should be understood as the influence that the motion of the Earth has on optical phenomena.

The beginning of the epic battle to find the „Aether wind” can be considered 1872, when the Paris Academy of Sciences announced a special competition to determine whether the propagation of light in optical media is influenced by the movement of the source or an observer. And although no ethereal wind was found, the prize was awarded to E. Mascart in 1874.

In 1881, Michelson [2] began a series of so-called Michelson-Morley-type experiments, which were later repeated by himself and other researchers for more than 100 years (Miller 1924, Kennedy and Thorndike 1926, Essen 1955, Towns et al. 1964 and others) [3]. But as is well known, all these experiments related to the problem of searching for an „Aether wind” have been interpreted as unsuccessful.

More information about the enormous efforts made to solve the „Aether wind” problem can be found in [4], where hundreds of such unsuccessful experiments have been described. It is this failure that is the main reason for the emergence of the Special Theory of Relativity (SR).

We were able to unravel some of the secrets of light and the reasons for the long-lasting failures to find an "Aether wind". That is why we can say with a high degree of certainty that the "etheric wind" predicted by Fresnel exists and has already been discovered. The first successful experiment was carried out in mid-June 2020. This success was first (Aug 4, 2020) reported to the editors of Galilean Electrodynamics (USA). A public announcement of this discovery has been made at the sixteenth international scientific conference SPACE ECOLOGY SAFETY, November 4-6, 2020, Sofia, Bulgaria [5]. Here are described experimental set-ups, through which, anyone who is interested can to put experiments, even at home and find the "Aether wind" and alone make sure that the SR is wrong!

What is Michelson's fatal mistake?

In our opinion, the greatest "merit" for the unsuccessful attempts to discover the „Aether wind” and the establishment of the SR as the fundamental theory of modern physics has Michelson. As noted below , he personally set up an experiment and made sure that Fresnel's formula was correct. Therefore, it would be logical for him to use the same when calculating his

interferometer. The question is why he didn't do it. It is also interesting why other researchers who repeat his experiment follow his path and repeat the same mistake. We believe that if a Fresnel formula had been used in the theory of Michelson-Morley experiments, the SR would not have been established. This is just one of Michelson's mistakes. But he made another, in our opinion, fatal mistake. We put this question in [7]. We repeat it here, namely, what is this fatal mistake? It is so obvious that we wonder how it has gone unnoticed for more than a century.

The dilemma Fresnel-Einstein

Fresnel's formula has been experimentally confirmed by Fizo [8], Hook [9] and others, including by Michelson himself [9]. However, after 1905, Einstein and his followers ignored this formula and claimed that it is a consequence of the Lorentz transformation, while the speed of light propagation is constant and does not depend on the motion of the Earth.

In fact, after applying the Lorentz transformation, the following formula results [10]:

$$u = \frac{c}{n} \pm V\left(1 - \frac{1}{n^2}\right) - \frac{V^2}{cn} \qquad (2)$$

As can be seen, formulas (1) and (2) are almost identical. The difference lies in the additional summand in (2), which in some cases can be ignored, for example in explaining Fizo's ience. But there is a significant difference in their interpretation. This is precisely the Fresnel-Einstein dilemma;

- the point of view of Fresnel is that formula (1) reflects a real change in the speed of propagation of light in the optical medium moving in space, i.e. there must be an Aethereal wind
- the point of view of the Einstein and his followers is that formula (2) does not reflect a real change in the speed of light, as in this case it would contradict principle that the speed of light in an optical medium at rest or during constant rectilinear motion must be equal in all directions, i.e. there is no “Aether wind”

Our opinion is that this dilemma would have been solved 100 years ago if Fresnel's formula (1) had been used in the theory of experiments for the search for „Aether wind”. As noted above, Michelson conducted the experiment himself and made sure it was fair. Therefore, the question is relevant; why didn't he use it to calculate his interferometer?

Therefore, Fresnel's formula should be subjected to experimental verification. As early as the end of 2013, we addressed a similar proposal to some members of the Natural Philosophy Alliance (NPA), CNPS. In [11,12] we proposed an experiment on how this dilemma can be solved. Unfortunately, our voice was not heard. That is why we set about solving this difficult task on our own. In the end, after overcoming a number of difficulties, we came to an experimental setup and successful experiments [5,13] and we can now say, with a high degree of certainty, that the „Aether wind” has already been detected and the SR is wrong! We must emphasize that our success is due to the fact that we use the Fresnel formula when sizing our experimental installations.

Experimental set-up based on a hybrid Mach-Zender interferometer for 150 $ at a light source with Fabry-Perot laser diode

The schematic diagram of this experimental set-up is shown in FIG. 1. It is called a hybrid because it is based on the Mach-Zender interferometer of the first order, but there are elements of the second order, such as the nodes 5.

The principle of operation of the hybrid Mach-Zender interferometer is very simple: The signal emitted by the light source 1 is divided by the input splitter 3 into two arms. When there is no phase difference, the two incoming signals in the output splitter 4 are recombined and as they are coherent they are amplified. But when there is a phase difference between the incoming signals, they are now in antiphase and recombine so that some or all of the optical power is lost because the signals interfere destructively, ie. if the phase difference is 180 degrees, the output

signal must be minimal. But if there is no phase difference, the light will pass with very small losses. Therefore, the hybrid Mach-Zedder interferometer converts the phase change into a change in the amplitude of the output signal.

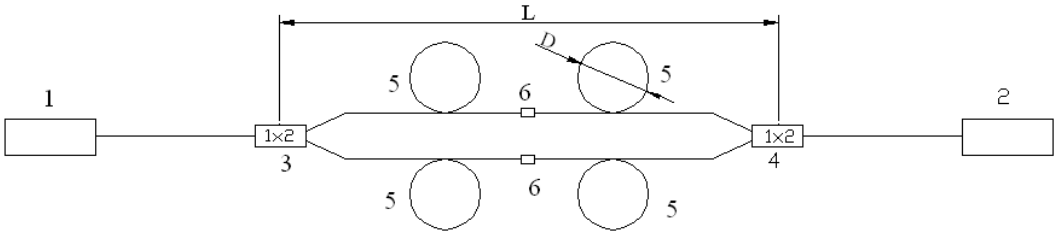

FIG. 1. Schematic diagram of a hybrid Mach-Zender interferometer.
1. Optical Light source with Fabry–Pérot laser diode, 2. Optical power meter
3. Input optical splitter, 4. Output optical splitter, 5 Additional
second order nodes, 6. Connectors

The advantage of this installation is that it is simple, its components are affordable and can be done even at home. The biggest advantage is that a light source with a coherence length of less than a millimeter can be used here, for example an Optical Test Kit Tool with a Fabry–Pérot lasser diode..

In fact the interferometer is composed by two 1x2, 50:50 PSL splitters linked by connectors 6. Here PSL splitters work in both directions as couplers and combiner.

The following components are needed:

- PCL 1x2, 50:50 Splitter with SC/APC connector, 1 m - 2 pcs
- Simplex adapters SC/UPC - 4 pcs
- Simplex Path Cord with FC/APC- SC/APC connecctor - 2 pcs

All these elements here in Bulgaria can be purchased for no more than 25 $. And if we take into account that the Optical Test kit Cool (Optical light source (OLS) and Optical power meter (OPM)) on ebay is to price for $ 75 ÷ $ 100, then the costs for carrying out this experimental installation will be less than 150 $.

In practice, this experimental setup can be realized without a transient Simplex Path Cord between the input and output end of the interferometer and OLS and OPM, if they are connected directly, as shown in the diagram. In fact, it is possible not to use the transient Simplex Path Cord between the interferometer input OLS and output OPM if they are connected directly as shown. However we found on the market only splitters with SC/APC connector and our OLS and OPM have FC/APC connectors so we had to use this transient optical cable. This proved useful as it serves as a buffer to suppress noise. Therefore we recommend using it. We also recommend to use splitters from the same batch. Regarding the Optical Test kit Tool we must note that now on the market are available mostly test kits with Optical power meter units showing the result in dBm, i.e. in logarithmic scale. It is rare to find measuring units with an option for showing the result in mW, but we did use one and strongly recommend them.

In order to establish how the interferometer parameters L and D affect the experimental results we created three experimental set-ups with different components and dimensions:

- Set-up No.1 L=48 cm , D=10 cm
- Set-up No.2 L=40 cm , D=6,5 cm
- Set-up No.3 L=35 cm , D=8,5 cm

Here on FIG. 4 is show set-up No 2.

FIG. 2, Experimental Set-up with a hybrid Mach-Zender interferometer and light source with Fabri-Perot laser diode.

Experimental method

Similar to the Michelson Morley (MM) type experiments where an „Aether wind" is sought with respect to the Earth's orbital motion, here an „Aether wind" is sought with respect to its motion together with the Sun, i. with respect to the total speed (vector sum of the diurnal and annual motion plus the motion together with the Sun). The movement of the Earth together with the Sun is dominant (As suggested by astronomers, this speed is 400 ÷ 600 km / sec). For this purpose, the experimental installation is placed in a horizontal position, with north-south orientation. Thus, during the diurnal rotation of the Earth, the projection of the total speed with respect to the plane, of the experimental plane, changes, respectively the speed of the „Aether wind" must also change.

Which side is the truth?

Einstein and his followers rejected the Aether as the medium in which light propagates and argued that an absolute reference system did not exist. They also claim that the speed of light propagation in all directions is the same and does not depend on the movement of the Earth. Therefore, if there is no ether, if there is no reference system, there can be no "Aether wind".

According to technical data, the OLS we use emits light with a constant power, - 6.5 dBm, which corresponds to 224 μW . The received signal is measured on the OPM.

Therefore:

- If the measured signal does not change, ie if there is no "Aethe wind" the truth is on Einstein's side.
- If the measured signal changes, ie if there is an "Aether wind" it should be assumed that the SR is wrong and the truth is on Fresnel's side.

Experimental results obtained with a hybrid Mach-Zender interferometer

The most important thing to note is that in all experiments with this type of experimental setup it has been established with a high degree of reliability that the measured signal is constantly changing during the day. These experimental results are given in [11, 12], both with respect to the limits within which the measured signal changes, as well as the relationship between the maximum and minimum measured signal, namely:

No 1. (end of June 2020) - min 14 μW - max 70 μW, in a relation 1:5
No 2. (mid July 2020) - min 16 μW - max 53 μW, in a relation 1:3,5
No 3. (October 2020) - min 20 μW - max 50 μW, in a relation 1: 2,5

On the FIG. 3 and FIG. 4 show experimental results reported on June 30, 2020, between 9:26 AM and 10:04 AM (min 14 μW and max 70 μW).

FIG 3, June 30. 2020, 9:26 AM

FIG 4, June 30. 2020, 10:04 AM

Videos are also recorded on different days and at different times of the day. It was also found that during the diurnal rotation of the Earth, the measured signal changes continuously within the above limits.

Experimental set-up, based on Mach-Zender interferometer and light source with DFB laser diode

The schematic diagram of this experimental setup is shown in FIG. 5. It works in the same way as the one with a hybrid interferometer. The signal emitted from the light source 1 is separated by the input splitter 3 in both arms. When there is no phase difference, the incoming signals in the output splitter 4 are amplified, and when there is a phase difference, they are already mutually extinguished so that some or all of the optical power is lost. Second-order nodes are missing here, so it is necessary to use a light source with a longer coherence length, for example one with a DFB laser diode. In this case, we use a light source type S3FC1550 from Thorlabs (working length 1550 nm, maximum radiated power up to 1.5 mW, and price more than $ 3000). According to technical data, the spectral width (Spectral Linewidths) of this light source is $\Delta\lambda \leq 0.06$ nm, which corresponds to a coherence length $\geq$ 0.04 m, sufficient for stable operation of this interferometer. Of course, OLS with a longer coherence length can be used and is preferred (now on the market available they with a coherence length of the order of kilometers), but they are significantly more expensive. We are independent researchers and such a light source is unaffordable for our budget as we fund all experiments with our own funds. It should be noted, however, that an OLS with a longer coherence length is needed for experimental MM interferometer-based installations that are more suitable for another important task, such as determining direction and speed, with which the Earth moves in space.

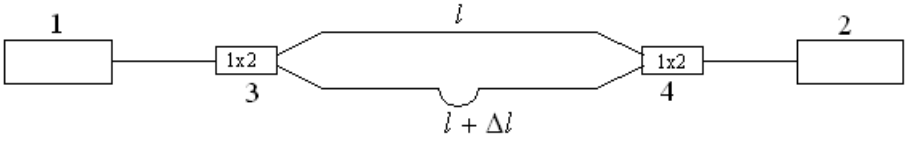

FIG. 5. Schematic diagram of a Mach-Zender interferometer
1 Light source with DFB laser diode, 2 Optical power meter,
3 Input optical splitter, 4 Output optical splitter

Here it is important to note that in order for this type of interferometer to work, the optical path in both arms must be of different lengths, namely:

$$\Delta l = l_2 - l_1 \qquad (3)$$

It was recommended that this difference be within limits $\Delta l \approx 4 \pm 0,5$ mm. Subject to this condition, a maximum change in the strength of the "Aether wind" can be observed more than 30 times, i.e. in a ratio of 1:30 .

The experimental set-up

In order to carry out the experimental set-up on the basis of a standard Mach-Zender interferometer (Fig. 6) are needed:

- PCL Splitter 1x2, 50:50 with SC/APC connector, 1 m - 2
- Simplex Path Cord, FC/APC-SC/APC connector, 1 m - 2
- Simplex SC/APC adapter - 2

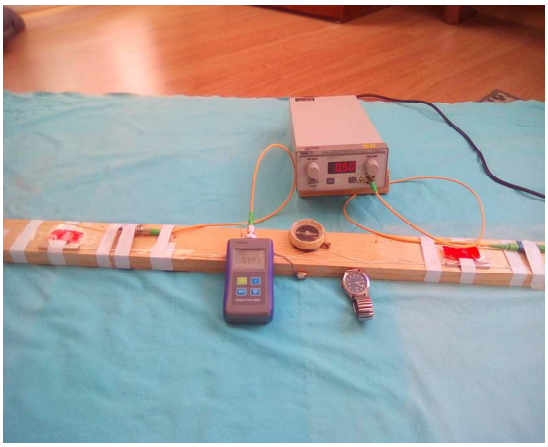

FIG.6. Experimental set-up with a Mach-Zender interferometer

FIG.7. Experimental set-up on a rotating stand

However, as the double outputs of the PCL splitters sold on the market are too long, they shall be shortened and connected by splicing, so that the distance between them may be not more than 40 ÷ 60 cm (distance between the red markers). When splicing, the condition that there shall be a difference in the length of both arms shall be observed $\Delta l \approx 4,4$ mm

If the connectors of the splitters on the one hand and of OLS and OPM on the other hand are the same, they may be connected directly, but if there is a difference, as in this case (splitters sold have connectors of the SC type, and usually OLS and OPM have connectors of the FC type), Simplex FC/APC-SC/APC Path Cords shall be used. All these elements are fixed to a rigid plane.

All these elements are attached to a rigid plane.

Regarding the method of conducting the experiments and how to interpret the results, all the above applies to the experiments with a hybrid Mach-Zender interferometer. It is easiest to place this interferometer in a horizontal plane. But in this case, a more complex experiment was conducted. A special rotating stand has been created (Fig. 7) so that the experimental setup can be placed and rotated in a plane parallel to the equatorial plane of the Earth. In this way the influence of the latitude of the experimental results is eliminated. Sofia is located at $42,7^0$ northern latitude.

Results

Here, too, in experiments with this Mach-Zender interferometer, as well as in the hybrid one, also in the diurnal rotation of the Earth, the measured signal is constantly changing.

The set-up is designed to be convenient for demonstrations. On the one hand, a maximum change in the power of the "aether wind" may be observed, and on the other hand, this is accomplished within the shortest possible time.

In fact, if the rhythm of the Earth's motion is followed, so that both extreme values, maximum/minimum, of the signal measured may be observed in succession, the interferometer shall be rotated at an angle of 900, which takes 6 hours. Thus, it would be possible to observe only two maximums and two minimums per day. In this particular case, given the difference in the optical path between both arms , two successive extreme values may be observed for several minutes. Figure shows the results reported on July 18th, 2021, when a maximum power of 75.7 μW and a minimum power of 4.88 μW were reported within just 4 minutes, i.e. a ratio of 1:15.

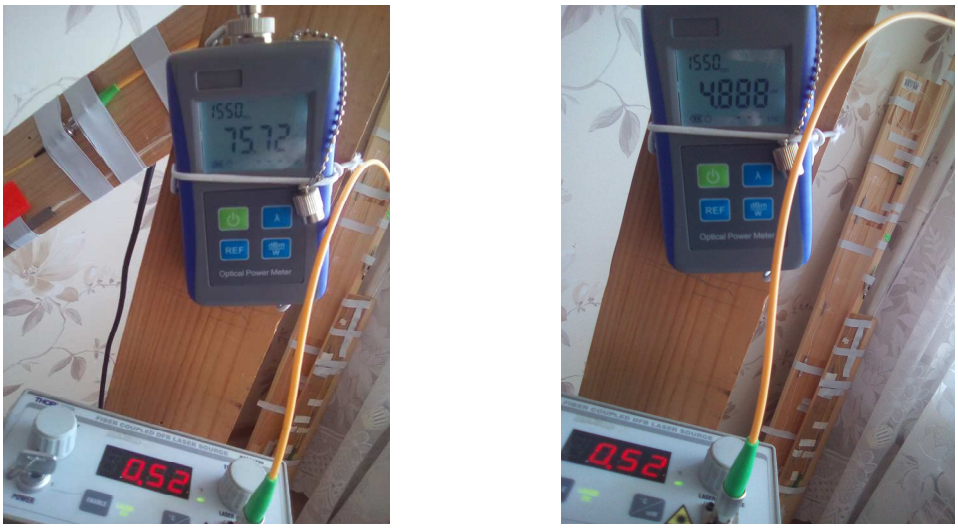

Fig.8. Results measured on July 18, 2021.

In fact, if the rhythm of the Earth's motion is followed, so that both extreme values, maximum/minimum, of the signal measured may be observed in succession, the interferometer shall be rotated at an angle of 900, which takes 6 hours. Thus, it would be possible to observe only two maximums and two minimums per day. In this particular case, given the difference in the optical path between both arms , two successive extreme values may be observed for several minutes. Figure 4 shows the results reported on July 18th, 2021, when a maximum power of 75.7 μW and a minimum power of 4.88 μW were reported within just 4 minutes, i.e. a ratio of 1:15.

The convenience here is that 5 ÷ 6 extreme values of the optical power measured may be observed within a short time. For example, this is the case when an OPM reading of 50 μW is selected at the start and the signal measured increases, reaches a maximum of 75.7 μW, starts to decrease to a minimum of 2.5 μW and again, starts to rise to a maximum of 75.7 μW, etc. Fluctuations in the signal measured are obtained in the ratio of 1:30, which corresponds to a difference between a light breeze and a hurricane. This is how solid our evidence for the existence of "aether wind" is!

It shall be borne in mind that the periods of time convenient for demonstration, when the signal measured fluctuates rapidly between maximum and minimum, have a duration of around 2 hours and are shifted by 1° daily, so that they occur in different hours of the day within the year.For example, for December 1st, 2021, such a period of time was observed from 8 to 10 a.m. There are also periods inconvenient for demonstration. Such a period of time on November 30

was from 4:30 to 6:00 p.m., when the signal measured fluctuated very slowly and within narrow limits.

It is recommended that when the S3FC1550 laser light source is used, it be set to a temperature of 24.5 °C.

Conclusion

From the conducted experiments, it has been established with a high degree of reliability that during the diurnal rotation of the Earth the measured signal is constantly changing. i.e. Fresnel's formula confirms that the speed of light propagation in optical media must depend on the Earth's motion in space.

Therefore, it must be assumed that:

-The truth is on Fresnel's side!"

-There is an „Aether wind"!

-SR is wrong!

The proposed experimental installations are very simple, the components are widely available and can be carried out even at home. Anyone interested, even with modest technical skills, can experiment and find out for themselves which side is the truth!

The authors are ready to answer questions and give advice on how to prepare experimental setups, as well as provide a fully completed and configured interferometer. The correspondent needs to have a light source and an optical power meter.

September 2021
Sofia, Bulgaria

Postscript
May 2022

As noted in [12], in addition to the main goal of the experiment to solve the Fresnel-Einstein dilemma, ie. to detect the "Aether wind", as an additional task was to determine the speed and direction of movement of the Earth in space. To a large extent, this additional task has also been solved. After some improvement of the experimental set-up described above, the following can be reported based on the Mach-Zender interferometer and additional experiments performed:

The speed of the Earth's movement in space together with the Sun is more than 3000 km / s, ie. much more than 400 ÷ 600 km / s, as is now assumed by astronomers.

In this case, we adhere to the classical hypothesis of motion with respect to the Aether, as a fixed reference system.

The results of our experiment are an alternative to COBE (Cosmic Background Explorer) experiment of to NASA, which states that the speed of the Solar system relative to the observable Universe is 368 ± 2 km / s (Nobel Lecture of Physics, G.F. Smoot, Stockholm, December 8, 2006)

As is known, the COBE project had a budget of 160 million dollars and involved nearly 1,000 scientists and specialists. Project leaders have been awarded Nobel Prizes.

It is possible to create experimental setups based on electro-optical modulators [12] and carry out experiments with the help of which it will be possible to obtain even more accurate results, both in terms of speed and direction of motion on Earth, i.e. will determine the equatorial coordinates (right ascension and declination), however, we are independent researchers, and all the costs associated with the experiments carried out so far have been incurred at our expense and time, and our budget cannot afford such an expensive experiment. If this question is really of interest to science, let's provide financial assistance. We are ready to show the experiments that have already been carried out, as well as to conduct new ones based on electro-optical modulators, of course, if they help us.

References

[1] Fresnel O., „Sur l'influence du mouvement terrestre dans quelques phenomenes d'optique"Ann.Chim. et phys., 9, 57 (1818).

[2] Michelson A. The relative motion of the Earth and the luminieterous aether. Amer. J. Phys.,1881, 22, p. 120-129

[3] U.I. Frankfurt , A.M. Frank, Optics of moving bodies, "Nauka", Moscow, p. 77 (1972) (In Rusian)

[4] Roberts T., Siegmar S., http://math.ucr.edu/home/baez/physics/Relativity/SR/experiments.html#Experiments_not_consistent_ith_SR

[5] D.G Stoinov, D.D Stoynov, "Description of Experimental set-up to determine the direction and speed of the Earth movement in Space", p. 84-89, Sixteenth International Scientific Conference, 4 – 6 November, Sofia, Bulgaria (2020) http://www.space.bas.bg/SES/archive/SES%202020_DOKLADI/1_Space%20Physics/11_Stoynov.pdf

[6] Michelson A.A., "Influence of motion of the medium on the velocity of light ". Amer. J. Sci., 1886, 31 (3), p. 337-386

[7] D.G. Stoinov, D.D Stoynov, "On the Fresnel's Aether drag hypothesis", GalileanElectrodynamics, v. **32**, 3 (2021)

[8] H. Fizeau, "Sur les hypotheses relatives a l, ether lumineux et sur un experiment qui parait demontrer que le movement descoros change la vitesse, avec laquelle la lumiere se propage dans leur interieur" C. r., **33**, p. 349-55 (1851)

[9] M. Hoek, "Determination de la vitesse avec laquelle est entrainee une onde lumineuse traversant un milieu en movement" Arch. Neerl., **3**, p. 180-185 (1868)

[10] W.A. Ugarov, Special Theory of relativity, "Nauka", Moscow, p.92 (1977) (In Rusian)

[11] Stoinov D.G., Stoynov D.D., The Fresnel-Einstein dilemma:Whether the speed of light in optical ediums dependent by the Earth's motion in space.(Version 2), The General Science Journal https://www.gsjournal.net/Science-Journals/Research%20Papers-elativity%20Theory/Download/6260

[12] Stoinov D., A NEW EXPERIMENT TO DETERMINE THE GALAXY SPEED OF EARTH IN SPACE..Aerospace Research in Bulgaria, **27** Sofia, (2015) http://www.space.bas.bg/SES/archive/SES%202020_DOKLADI/1_Space%20Physics/11_Stoynov.pdf

[13] D.G. Stoinov, D.D Stoynov, "An Experiment to Address a 100-Year Dispute: Does Aether Wind Exist?, Galilean Electrodynamics, v. **32**, 3 (2021)