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“Halo” of Dark Matter and Gravitational Waves

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I. Introduction

It surprises me that physicists are trying to explain all the new discoveries in astrophysics from the standpoint of Einstein’s general theory of relativity, which is already more than a hundred years old. Based on the latest discoveries of dark energy and dark matter, which make up more than 95% of the energy density of the Universe, I propose in this article a new interpretation of recent astrophysical discoveries the framework of the new cosmological model [1]. The last discovery by astrophysicists of the rotation of space-time around a white dwarf in the PSR J1141-6545 binary star system is interpreted by them as a new proof of the correctness of Einstein's theory [2] (Fig.1) although been established that the halo of dark matter forms spheres around galaxies, stars and planets that rotate with them (Fig.2).

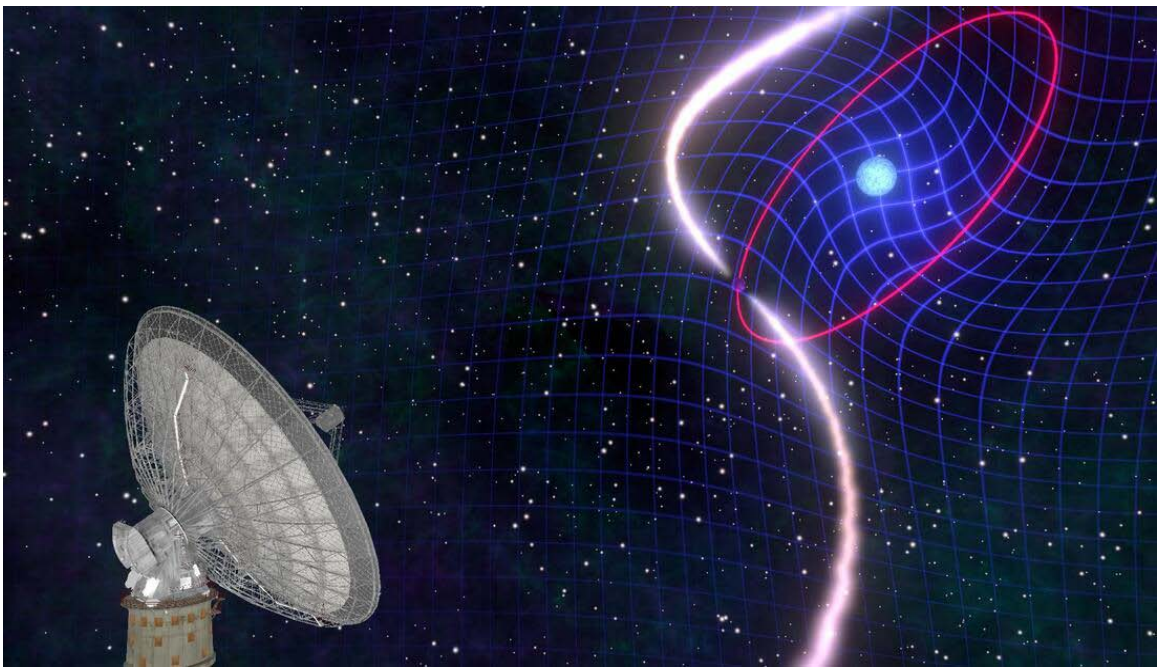

Figure 1: The illustration of Lense-Thirring frame-dragging resulting from a rotating white dwarf in the PSR J1141-6545 binary star system

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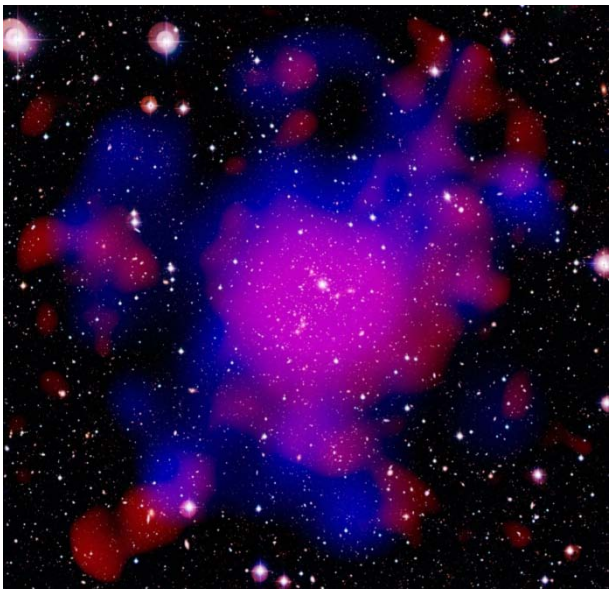

Figure 2: Components of the cluster of galaxies Abell 2744. White color - galaxies, red color - hot gas and blue color - dark matter

The pulsar is located 10,000 to 25,000 light-years from Earth in the constellation Musca (the fly), which is near the famous Southern Cross constellation. PSR J1141-6545 circles a white dwarf with a mass about the same as the sun's. White dwarfs are the superdense Earth-size cores of dead stars that are left behind after average-size stars have exhausted their fuel and shed their outer layers. The rapidly spinning white dwarf pulls dark matter has caused the pulsar's orbit to change its orientation slowly over time. That prediction is a phenomenon known as frame dragging, or the Lense-Thirring effect. It states that space-time will churn around a massive, rotating body, although, of course, it is not space-time that rotates, but a sphere of dark matter together with a star. Satellite experiments have detected frame dragging in the gravitational field of rotating Earth, but the effect is extraordinarily small and, therefore, has been challenging to measure. Objects with more powerful gravitational fields, such as white dwarfs and neutron stars, offer better chances to see this phenomenon. Study lead author Vivek Venkatraman Krishnan, an astrophysicist at the Max Planck Institute for Radio Astronomy in Bonn, Germany, told that the researchers measured when pulses from the pulsar arrived at Earth to an accuracy within 100 microseconds over a period of nearly 20 years, using the Parkes and UTMOST radio telescopes in Australia. This allowed them to detect a long-term drift. The rapidly spinning white dwarf pulls on space-time has caused the pulsar's orbit to change its orientation slowly over time. The scientists detailed their findings in the journal Science [3,4]. However, their conclusions can be interpreted differently, since the Military Space Academy staff named after are considered A.F. Mozhaisky with the help of satellites were able to discover yet in 1997 in the near-Earth environment an additional sphere formed by dark matter rotates together with the planet. A similar but more powerful sphere of dark matter should exist and around a dead star. The rapid rotation of the white dwarf together with the halo of dark matter caused the pulsar orbit to slowly change its orientation (tilt).

II. Experiments with Artificial Earth Satellites make it Possible to Detect in A Near-Earth Environment an Additional Sphere Formed by Dark Matter Rotating with the Planet

The presence of additional gravitating masses of dark matter in near-Earth space was discovered during experiments with artificial earth satellites equipped with magnetometers. With the help of magnetometers, it was possible to detect moving vortex quantum spinors of dark matter in the near-earth medium having the form of tangential cylinders, with axes parallel to the axis of rotation of the Earth [5]. The velocity of the satellite relative to dark matter was determined from the change the intensity of the magnetic field. The experiments were conducted in the A.F. Mozhaysky Military-Space Academy in the 90s of the 20th century, under the leadership of the Deputy Head of the Academy for by Scientific Work, Professor V.Fateev. Head of the Department is Colonel V.L. Groshev published the results of dark matter detection in his book [5]. Academy staff found that in areas of tectonic faults, where there is intense electromagnetic and gravitational energy interaction between the liquid magma of the Earth and the cosmic dark matter, are formed toroidal luminous vortices with sizes ranging from micro particles to tens of meters (rotators, spinors, hadrons) [5]. Such spheres, formed by dark matter, should exist around other planets, stars and galaxies. This discovery allowed researchers to amend the law of universal gravitation of Newton and propose a new formula for calculating time on artificial satellites of the Earth instead of the relativistic Einstein-Lorentz formula. Now when calculating the motion of a spacecraft according to Newton's law of gravitation $F = Gm_1m_2 / r^2$, it is necessary to take into account and the additional variable mass of dark matter that forms a sphere around astrophysical bodies. When the spacecraft leaves the planet, the position of the center of gravity of the masses in the planetary system Earth - the sphere will constantly shift in accordance with the flight of the ship due to dark matter [6]:

$$F = G\frac{(Me+Md)m}{R^2} \quad (1)$$

where Me is Earth's mass,
Md is variable mass of dark matter in near-Earth space,

m is spacecraft mass,
R is distance between the ship and the center of gravity of the system.

Availability of a sphere formed by dark matter near the sun can explain the strange acceleration, marked by American scientists in removing automatic interplanetary station "Pioneer 10" and "Pioneer 11" from the Sun at a distance of more 20a.e. when solar radiation effects has practically disappeared. Pioneer 10 and 11 were launched in the early 1970s and explored the outer solar system. But in 1980, mission scientists noticed that spacecrafts have unexpectedly drifted off course. Both spaceships experienced a slightly stronger force of attraction to the sun than expected, and since their launch, they have drifted off course by hundreds of thousands kilometer. Coherent radio Doppler data generated by the Deep Space Network with the Pioneer 10 and 11 spacecraft show an anomalous, constant, frequency drift that can be interpreted as an acceleration directed towards the Sun of magnitude (8.74 ± 1.33) x 10^{-10} $m{\cdot}s^{-2}$ at distances between 20 and 70 AU (Anderson et al., Phys. ... Rev. D 65, 082004). But this is not the only problem regarding the trajectories of distant spacecraft. "Galileo", NEAR (sent to the asteroid Eros), "Rosetta" (to comet Churyumov – Gerasimenko), "Cassini", "Messenger" (to Mercury) - all of them at different times performed an accelerating maneuver near the Earth, using its gravity, in order to get energy and to accelerate or slow down, and in all experiments the acceleration / deceleration was anomalous, not quite consistent with the indicators of both Newtonian (which is natural) and Einstein's physics. The Voyager 1 and Voyager 2 spacecraft, which in 2012 gone even further from the Sun than the Pioneers, weren't a helpful as might have been expected in contributing to the investigation of the Pioneer anomaly because of the way in which they are stabilized. Unlike the Pioneers, which are spin-stabilized, the Voyagers have what is known as three-axis stabilization. This results in an greater uncertainty in the spacecrafts' theoretical positions. The uncertainty was great enough to mask any deceleration similar in magnitude to that seen in the Pioneer probes.

The course of time on the satellite depends on the density of dark matter, but density of dark matter itself depends on the gravitational field (potential U) in which the system is located and on the speed of the satellite relative to dark matter. Since the sphere formed by dark matter in the near-Earth space rotates around the Earth together with her, the lag of the clock on the satellite compared to the clock on the earth will depend only on the difference gravitational potentials, that is, from the height of the orbit, since relative to the dark matter at a satellite that moves in the equatorial plane of the Earth, there will be no difference in speed. The duration of time intervals between events on satellites in comparison with the same processes on Earth increases with distance from the Earth, since the gravitational potential decreases and the density of dark matter also decreases. This causes a change in mass and, as a result, entails a change in the time it takes for chemical, nuclear and other processes in the satellite's orbit. Time does not slow down or accelerate in different reference systems, but simply the speeds of all processes change equally under the influence of a changing gravitational potential, since mass changes [7]. In medicine, there are cases when a person ages quickly due to flaws in genetics, while the metabolic processes in his body proceed at a tremendous speed, and he dies at the age of 20 like a very old man. However, this does not mean that time accelerated its run, the biochemical reactions in the body simply changed. If the satellite is moving perpendicular to the equator, it will have a velocity relative to the dark matter equal to its orbital velocity. This will change the density of dark matter on the satellite and, as a result, the course of time. Thus, the course of time depends not only on the satellite's height, but also on the angle of inclination of its orbit to the plane of the Earth's equator that is, from the speed of the satellite relative to dark matter. So, if the period of time measured between events by the clock on the Earth's surface is Δte, the same of time measured by the clock on the satellite Δts, of determined by the formula [6]:

$$\Delta ts = \Delta te \frac{\sqrt{1 - \frac{\upsilon^2}{c^2}\,(1 - \cos\alpha)^2}}{1 + (Ue - Us)/c^2} \qquad (2)$$

where: υ it the orbital velocity of the satellite relative to the Earth;
α it angle of inclination of the satellite's orbit to the plane (magnetic) equator of the Earth;
Ue, Us it the gravitational potentials on the surface of the Earth and the satellite orbit.

The validity of the formula (2) was confirmed in experiments with satellites and the latest high-precision measurements at the international space station. It allowed made it possible to detect using an atomic clock the time dilation at the international space station. At space research command centers there are special time services that monitor the change in the course of time on the satellite and introduce the necessary amendments to coordinate the movement of the clock on the satellite with the clock on Earth. When launching communication satellites, a preliminary adjustment for the acceleration of the clock on satellites by 44,000 nanoseconds per day is provided. The time on the satellite should vary depending on the difference in the gravitational potential and the absolute speed of the satellite relative to dark matter and should not depend on the relative speed of the satellite and the ground observer, as required by the Einstein's-Lorentz's formula (3):

$$\Delta ts = te\left(\frac{Us - Ue}{c^2} - \frac{\upsilon^2 s - \upsilon^2 e}{2c^2}\right) \qquad (3)$$

where Us, υs - gravitational potential and the velocity related to the satellite;
Ue, υe - gravitational potential and the velocity related to ground chronometer.

III. Non-Gravitational Manifestation of Dark Matter in Near-Earth Space according to the Detector AMS-2

Alpha-magnetic spectrometer AMS-02 is designed to measure high-energy charged particles with a set of large statistics (an average of 2-3 orders of magnitude more than the "standard" measurements in cosmic rays). The detector AMS-02 was placed on the International Space Station (ISS) and during 2011-2015, it carried out a wide range of studies of cosmic radiation in the near-Earth environment (Figure 3).

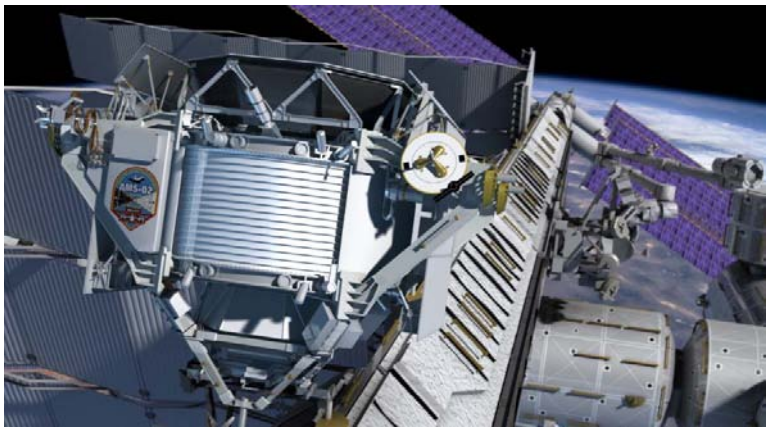

Figure 3: AMS-02 detector at the International Space Station (ISS)

AMS-2 has the largest track magnetic spectrometer (with an area of 6.7 m^2), built for space research. Precision measurements of the spectra of electrons and positrons were made in the energy range 0.5-700 GeV for electrons and 0.5-500 GeV for positrons. The employee Massachusetts Institute of the Technology Yu.V. Galaktionov analyzing the results of studies, notes that "neither electronic nor positron spectra can be described by a power law with a single exponent in the entire energy range under study" [8]. Dr. Galaktionov managed to distinguish the presence of a resonance maximum (peak) in the full energy spectrum of secondary electrons and positrons [8, Fig. 16], as well as maxima (peaks) in the energy spectra obtained separately for positrons [8, Fig. 21] and electrons [8, Fig. 22] at energie Wp≈ 15 –20 GeV. According to Dr. Galaktionov himself, "one of the most important goals of the AMS-02 physical research program was to detect dark matter in the near-Earth environment in its non-gravitational manifestations". One of such non-gravitational manifestations could be the resonant generation of secondary electron-positron pairs during polarization of quantum vacuum (dark matter) under the influence of cosmic radiation and relativistic protons [9]. Analysis of the resonance curves shown in [8, Fig. 16, 21, 22] allows to determine the photon frequency corresponding to the natural frequency of the structural element of the space medium (dark matter) and its wavelength. The frequency corresponding to the resonance energy of the photon (ν) and the natural frequency of the structural element of the dark matter is defined as the frequency of the Schrodinger and de Broglie wave functions (for resonance, they describe the same probability density) [9]:

$$\nu = W / h \text{ or } \quad \omega = W / \hbar \quad \text{and} \quad \lambda = 2\pi c / \omega \qquad (4)$$

where W - the photon energy
h - Planck constant $h = 6.6260 \cdot 10^{-34}$ J / Hz . $\hbar = h / (2\pi)$ $\hbar = 1.0546 \cdot 10^{-34}$ J / Hz
c - the speed of light $c = 299792458$ m / s

Thus, it is possible to determine the natural frequency of the structural element of the dark matter (quantum vacuum) and wavelength:

$$W_r \approx 20 \text{ GeV} = 33 \bullet 10^{-10} \text{J}, \quad \nu_r = 4.7 \bullet 10^{24} \text{ Hz}, \quad \omega_r = 2.82 \bullet 10^{25} \text{ Hz}, \quad \lambda_r = 6.39 \bullet 10^{-17} \text{ m} \qquad (5)$$

IV. Gravitational Waves

For the dark energy and dark matter, the generalized vector Lame wave equation is valid. This equation is equivalent to two simpler wave equations, which describe elastic waves of two types: longitudinal waves that propagate with phase velocity *Vp* and transverse waves with phase velocity *Vs*. It can be gravitational, electromagnetic, and torsion waves. The speed of propagation of longitudinal waves is higher than the transverse. Gravitational waves can be attributed to the longitudinal waves since according to

the calculations of Laplace, their speed should exceed the transverse electromagnetic waves at least 7000000 times. Otherwise, the retarded gravity of the Sun to cease to be strictly central and the planetary system fall apart very quickly due to cyclic torque [10]. In the work "Elastic Model of Physical Vacuum" Professor V.A. Dubrovsky in 1985 presented an estimate of the speed of gravitational waves based on the fact that the ratio of the interaction forces according to the Coulomb law for transverse electromagnetic waves and longitudinal gravitational waves is determined by the ratio of the corresponding elastic modules, which is equivalent to the ratio of their square of velocities. It follows that the speed of gravitational waves exceeds the speed of electromagnetic waves by 10^9 times [11]. In 1994, when July 16, 1994, the great nucleus of the comet Shoemaker-Levy collided with the Jupiter gas sphere, radial oscillations gave rise to the surface gravity waves, instantly resulted in fluctuations in several geodetic satellite command-measuring complex of Russia. Typically, geodetic satellites have an orbit inside a tube with a diameter of about 1 km. And their orbit control is carried out with very great accuracy - the error in the coordinate is up to a 1meter, and the error in speed is up to 1 cm /sec. During the collision period, the diameter of the tube path increased by 5–8 times. Unfortunately, the author does not have similar information from the USA from NASA. Speed gravitational waves, formed by the collision of a comet with Jupiter, significantly exceeded the velocity of electromagnetic waves (light spreads from Jupiter to Earth is 43.2 min). Professor from the Pulkovo Observatory N.A. Kozyrev in 1976 in time of his astronomical observations of the star Procyon using a telescope, equipped with a special signalling sensor, found unknown radiation [12]. Herewith the telescope was not focused on a place, which was seemingly emitting visible light, but the place where the star was actually located at that time, taking into account the light speed of light and a direction and speed of the star motion star. A propagation velocity of unknown radiation was significantly higher than the light speed (a signal reaches the earth almost instantly).

Figure 4: Procyon Star (HIP 37279) - Alpha Lesser Dog

Procyon consists of two stars that can be observed without optics. The name of the second star is Gomiza. After assigning Procyon the status of a double star, the main object is defined as Procyon A, the satellite Procyon B (Figure 4*)*.The satellite Procyon B is located at a distance of 4.6 sv. of the year. This is a white dwarf. Procyon is located by galactic standards not far from Earth. Only 11.41 light years from Earth. Procyon shines like 8 of our Suns, its radius is 1.9 from the radius of our Sun. It moves towards the solar system at a speed of 4500 m per second. Procyon refers to the stars subgiants. From the brightness of the glow, we can conclude that the reaction between helium and hydrogen in its bowels no longer occurs and the process of star expansion has already begun. Over time, the Procyon will increase approximately 150 times from its current volume, turn red and become the category of red giants. At the same time, it generates gravitational waves discovered by professor N.A. Kozyrev. In 1976, at the symposium in Byurakan, N.A. Kozyrev reported on his unusual astronomical observations obtained by scanning the celestial sphere with a reflector telescope, closed by a light-tight lid. Unusual sensors were in the focal plane of the telescope: torsion scales and a small thin-film resistor embedded in the arm of a balanced Wheatstone bridge. Kozyrev found that when the telescope is aimed at certain areas of the celestial sphere, the torsion scales pointer deviates from the zero position, and the resistance of the resistor changes. At the time of registration of the signals, the orientation of the telescope did not coincide with the direction of the astronomical object (Procyon) visible in the optical telescope. Kozyrev argued that when observing the vicinity of the Procyon, signals arose in two directions of the telescope [12]. Since gravitational fields are not possible to screen by material bodies, the propagation path of the gravitational waves will differ from electromagnetic waves and they penetrate the telescope, covered by a lid. The first direction, taking into account the correction for the refraction of light in the atmosphere, corresponds to the optical image of the object, i.e. the position of the object at the time of emission reached the observer of the light. The second direction corresponded to the true position of the object, its position at the time generation of superlight radiation of unknown nature. N. Kozyrev recognised the time as a radiation source, as in math aspect he concluded that in the star all the forces were balanced to such an extent that there was just nowhere for power to come from [12]. However today, after the discovery of gravitational waves in September 14, 2015 via LIGO gravitational detectors in the USA, we can argue that this radiation is gravitational waves generated in the process of star expansion Procyon. Thus, Professor N.A. Kozyrev in 1976 discovered gravitational waves emitted during the expansion of the super giant Procyon with the help of his

imperfect detector. Under the influence of gravitational waves, a decrease in the coefficient of elasticity of the suspension of the torsion pendulum was observed, which led to an increase in its period, marked in the fourth digit. The gravitational surge can also significantly change the resistance of the resistor introduced into the sensitive Wheatstone bridge.

Consider the famous "Einstein Field Equation" which governs the behavior of general relativity. The left-hand side describes the curvature of space-time, while the right-hand side describes the distribution of matters [2]:

$$R\mu\nu - \frac{1}{2}g\mu\nu = \frac{8\pi G}{c^4} T\mu\nu \qquad (6)$$

Where $R\mu\nu$ is the Ricci tensor; $g\mu\nu$ is the event space metric tensor; $T\mu\nu$ is the energy-momentum tensor of matter.

Einstein is talking about gravitational waves propagating in the free space, which means there is no matter, not even electromagnetic field, consequently the right hand side should be zero. So the equation is simplified to Rμν-1/2 gμνR=0, which is equivalent to a more concise form Rμν=0, which is also known as "Vacuum Einstein Field Equation". Both EFE and VEFE are nonlinear partial differential equations, while in the weak field setting, they can be approximated with linear equations. The linear EFE is similar to other wave equations like Maxwell's Equations, so Einstein predicted the existence of transverse gravitational wave and predicted that the speed of the gravitational waves is equal to speed of light. However, there is no free space in galaxies, there is dark matter there, which is five times more than baryonic matter and the right side of equation (6) cannot be equated to zero [13]. Therefore, Einstein's predictions regarding the type and the speed of gravitational waves in the new cosmology need to be clarified. A more complete equation of the field, taking into account the polarization medium of quantum vacuum (dark matter), was presented in 1998 by professor of the Institute of Mathematics of the Russian Academy of Sciences V. Dyatlov [14]. The new equations include the density of matter and its speed as independent variables, their closure is possible only with the use of continuum mechanics.

V. Conclusion

"Do you know that relativism (STR and GRT) is not a true science? - true science necessarily relies on causality and the laws of nature, given to us in physical phenomena (facts). In contrast, SRT and GRT are built on axiomatic postulates, that is, fundamentally unprovable dogmas, which the followers of these teachings are obliged to believe. That is, Einstein's relativism is a form of religion". These are the words of Professor Stefan Marinov from the Institute of Fundamental Physics (Graz, Austria), which he said in the article "Experimental violations of the principles of relativity, equivalence and conservation of energy" reflect the state of theoretical physics today.

Here i will cite bring an exhaustive explanation for the absence of a shift in the interference fringes in the Michelson-Morley experiments of 1881-1887 due to the presence of a halo of dark matter (ether) rotating with the Earth.

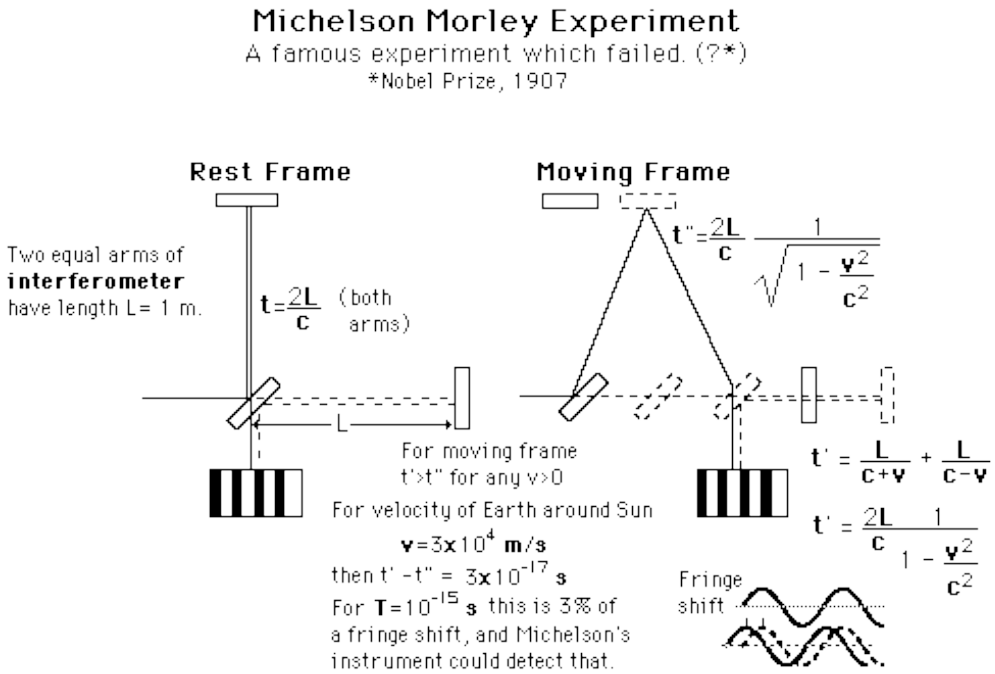

Figure 5: Michelson-Morley experiment

Michelson's experiment (Fig. 5), was aimed to detect earth's motion with respect to the fixed ether and it was performed on the surface of the earth. The device Michelson designed, later known as an interferometer, sent a single source of white light through a half silvered mirror that was used to split it into two beams travelling at right angles to one another. After leaving the splitter, the beams travelled out to the ends of long arms where they were reflected back into the middle on small mirrors. They then recombined on the far side of the splitter in an eyepiece, producing a pattern interference fringes. If the Earth is traveling through an ether medium, abeam reflecting back and forth parallel flow ether take longer than beam reflecting perpendicular ether because time gained from traveling downwind less than lost traveling upwind, what result be delay in one of light beams that could be detected when beams were recombined through interference. Any slight change spent time would then observed, as shift in positions interference fringes. If a ether were stationary relative the Earth, then would be detected produce shift 4% size single fringe. In Michelson-Morley experiment, the light was repeatedly reflected back and forth along the arms of the interferometer, increasing the path length to 11 m. At this length, the drift would be about 0.4 size single fringe. In both cases, as in all subsequent more accurate experiments, the result was negative, i.e. the absence of a shift in the interference fringes says that there is no ether. But who says the ether would be at rest on the surface of the earth? He can move with the earth like the atmosphere. Observations astrophysicist Vivek Venkatraman Krishnan have proven this January 30, 2020 and buried Einstein's Special and General Relativity theory. Like the Earth's atmosphere, the halo of dark matter rotates counterclockwise with the planet — from west to east. Due to rotation, it, like the Earth, takes the form of an ellipsoid, that is, at the equator its thickness is greater than at the poles. A superfluid medium ^{3}He-B simulating dark matter is characterized by internal degrees of freedom, the absence of shear (linear) viscosity and availability rotational viscosity. The effect of involving a halo of dark matter by a rotating planet and the formation of a sphere of dark matter is described in the work of Dr. L. Boldyreva [15]. It has been experimentally established that the radius of the Earth's gravity is approximately 900000 km. Therefore, the size of the sphere of dark matter should correspond to this value.

In the framework of the new cosmological model, I propose to reconsider Einstein's "vacuum field equation" and admit that, unlike Einstein's "geometric" concept, "field" concept of the nature of gravity based on dark matter gives the key to a real understanding of gravity and the nature spheres of dark matter around rotating planets and stars.

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