Newtonian Physics can explain relativistics experiments like mass variation, time dilation, Michelson Morley, Doppler effect, etc.

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Abstract

Using Newtonian Physics we can explain some relativistics experiments like mass variation, time dilation, Michelson Morley, transverse Doppler effect, relation mass-energy, etc.
In some explanations the mathematical equations is of initial level using numeric calculations and some approches and we have a medium agreement. So, we need to continue the development for the complete equations and verify if a better agreement exists.
So, Newtonian Physics needs more research before being considered without validity.

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I. INTRODUCTION

Special relativity is the best fundamental theory since 1905 to today. But SR has some inconsistencies, see Sec.II and we should continue the researches for a more simpler theory, which is what we wanted of the best theory.

In this work we will show that with the concepts of the Newtonian physics we can explain some relativistics experiments like mass variation, Michelson Morley, time dilation, tranverse Doppler effect, mass-energy relation, etc.

All the explanations has physical and mathematical interpretation.

In some explanations the mathematical equations is of initial level, using numeric calculations and some approches and we have a medium agreement. So, we need to continue the development for the complete equations and verify if a better agreement exists.

II. RELATIVITY THEORY

The theory of the relativity is the best theory, unanswerable, and we should continue using it.

But some inconsistencies exist [1-3], see below.

1 – From [1] we have: "Using only the descriptions and the results of the 'thought experiment' contained in Einstein's seminal 1905 paper, proofs are offered which show that the transformation equations of Einstein's special relativity apply only to the joint use in his experiment of point sources of light and point reflectors. Further, it is shown that two different special relativities could have been invented by Einstein and, because they possess differing space and time contraction factors, they cannot co-exist and, therefore, both must be discarded".

2 - From [2] we have: " Last, some recent theoretical findings suggest that the current level of precision of the experimental tests of gravity might be naturally (i.e., without fine tuning of parameters) compatible with Einstein being actually only 50% right !

By this we mean that the correct theory of gravity could involve, on the same fundamental level as the Einsteinian tensor field $g^{*}_{\mu\nu}$, a massless scalar field φ.

Let us first question the traditional paradigm (initiated by Fierz [10] and enshrined by Dicke [15], Nordtvedt and Will [2]) according to which special attention should be given to tensor-scalar theories respecting the equivalence principle. This class of theories was, in fact, introduced in a purely *ad hoc* way so as to prevent too violent a contradiction with experiment. However, it is important to notice that the scalar couplings which arise naturally in theories unifying gravity with the other interactions systematically violate the equivalence principle".

3 – From [3] we have: "Entanglement, like many quantum effects, violates some of our deepest intuitions about the world. It may also undermine Einstein's special theory of relativity". "We term this intuition 'locality'. Quantum mechanics has upended many an intuition, but none deeper than this one. And this particular upending carries with it a threat, as yet unresolved, to special relativity – a foundation stone of our 21st-century physics". " The greatest worry about nonlocality, aside from its overwhelming intrinsic strangeness, has been that it intimates a profound threat to special relativity as we know it. In the past few years this old worry – finally allowed inside the house of serious thinking about physics –

has become the centerpiece of debates that may finally dismantle, distort, reimagine, solidify or seed decay into the very foundations of physics.”

III. NEWTONIAN PHYSICS

The Newtonian physics can explain relativistics experiments, see Table I.
By Table I we see that Newtonian Physics and SR are equivalents for the equations.

Experiment	Section	Newton	SR	Exp. observ.
Mass variation	V	$m = m_0\gamma$	$m = m_0\gamma$	-
Kinetic energy	V	$k = m_0 c^2(\gamma - 1)$	$k = m_0 c^2(\gamma - 1)$	-
Relation mass-energy	VI	$E = m_0 c^2$	$E = m_0 c^2$	-
Time dilation	VII	$\delta t = \delta_0\gamma$	$\delta t = \delta_0\gamma$	-
Transv. Doppler eff.	VIII	$f = f_0/\gamma$	$f = f_0/\gamma$	-
Michelson-Morley	IX	$\delta = 0.012$	$\delta = 0$	$\delta = 0.008$

TABLE 1 Equations of SR and Newtonian Physics

Where $\gamma = 1/\sqrt{1-\beta^2}$, $\beta = v/c$ and v, c, m, m_0 are respectively velocity, light velocity, mass and rest mass.

IV. THE VELOCITY OF LIGHT AND THE GALILEAN TRANSFORMATIONS

In the Newtonian Physics we use the Galilean transformations. From the Galilean transformations we have:
a) The velocity of the light is a constant c with respect to the preferred frame, independently the direction of propagation, and of the velocity of the emitter.
b) An observer in motion with respect to the preferred frame will measure a different velocity of light according to Galilean velocity addition.
c) In this paper the preferred frame is the Cosmic Microwave Background (CMB), and the velocity of the earth with respect to the CMB is approximately 390 km/s (0.0013c).
d) The microwave sky should appear hottest in the direction of motion and coolest in the opposite direction.
e) According to Zeldovich: at every point of the Universe there is an observer in relation to which microwave radiation appears to be isotropic.

V. VARIATION OF MASS AND KINETIC ENERGY EXPLAINED BY NEWTONIAN PHYSICS

The variation of mass with the velocity,

$$m = m_0\gamma \tag{5.1}$$

and the kinetic energy

$$k = m_0 c^2 (\gamma - 1) \tag{5.2}$$

can be obtained by Newtonian Physics as it is shown by Lewis [4]. Lewis received 35 indications to Nobel.

From [4] we have: "Recent publication of Einstein and Comstok on the relation of mass to energy has embolded me to publish certain views which I have entertained on the subject and a fews years ago appeared pure speculative, but which have been so far corrobated by recent advances in experimental and theoretical physics….. In the following pages I shall attempt to show that we may construct a simples system of mechanics which is consistent with all know experimental facts and which rests upon the assumption of the thruth of the threes great conservation laws, namely the law of conservation of energy, the law of conservation of mass and the law of conservation of momentum".

VI. NEWTONIAN PHYSICS AND THE RELATION MASS ENERGY

The relation

$$E = m_0 c^2 \tag{6.1}$$

has been part of the heritage of Newtonian physics since its foundations. See, for example:

a) Newton (Optics, 1717): " Are not gross bodies and light convertible into another, and may not bodies receive much of their activity from the particles of the light which enter their composition? The changes of body into light and light into bodies is very conformatable to the course of Nature, which seems delighted with transmutations."

b) Lewis [4]: " The important equation $P = E/c$ from which $E = m_0 c^2$ comes out, was obtained by Maxwell as a consequence of his Electromagnetic Theory and by Boltzmann throught the direct application of laws of thermodynamics. Poynting has emphasized it again and recently (1903) it has been verified with remarkable precision in the beautiful experiment of Nichols and Hull."

c) De Pretto (1903) [6]: " Given then $E = m_0 c^2$, m_0 = 1 Kg and c= 3 x 10^5 Km/s, anyone can see that the quantity of calories obtained is represented by 10794 followed 9 zeros, that is more than ten thousands billion."

VII. TIME DILATION

The experiments are in agreement with the equation below.

$$\delta t = \frac{\delta t_0}{\sqrt{1 - \beta^2}} \tag{7.1}$$

where, δt_0 is the life time of the particle at rest, and δt is the time dilation.

A. Time dilation explained by Newton theory

This section is in revision phase.

This subject will be explained with larger mathematical details and with less approaches in relation to version 1 of this paper, and it will be written a new paper to be published shortly.

VIII. DOPPLER EFFECT

The experiments are in agreement with the equation below.

$$f = \frac{f_0\sqrt{1-\beta_{rel}}}{1 \pm \beta_{rel}\cos\theta} \tag{8.1}$$

where,

f - frequency measured by the observer
f_0 - frequency of the source at rest in relation to observer.
θ - angle between the line observer-source and the direction of the velocity of the source.
v_{rel} - velocity of the source in relation to observer

and the transverse Doppler effect $\left(\theta = 90^0\right)$ is:

$$f = f_0\sqrt{1-\beta_{rel}^2} \tag{8.2}$$

A. Doppler effect explained by Newton theory

This section is in revision phase.
This subject will be explained with larger mathematical details and with less approaches in relation to version 1 of this paper, and it will be written a new paper to be published shortly.

IX. MICHELSON MORLEY EXPLAINED BY NEWTONIAN PHYSICS

To give a new explanation for the Michelson Morley experiment using Newtonian concepts, we give one equation as a hypothesis for explain the refraction-reflection-refraction of the light ray that has a trajectory inside the semitransparent mirror (air-glass refraction, internal glass reflection and the glass-air refraction). The Michelson Morley laboratory observations (1887) give $\delta = 0.008$, where δ is the displacement of the interference fringes. According to our theoretical calculations, our result is $\delta = 0.012$.

A. MM introduction

The Michelson Morley experiment [6] involves one semitransparent (half-silvered) mirror (M) where the incident ray (ra) is divided into two. See Fig. 4.

The first divided ray follows the trajectory: air-glass refraction (rb), internal glass reflection (rc) and glass-air refraction (rd); the second divided ray follows the trajectory: glass-air refraction (re).

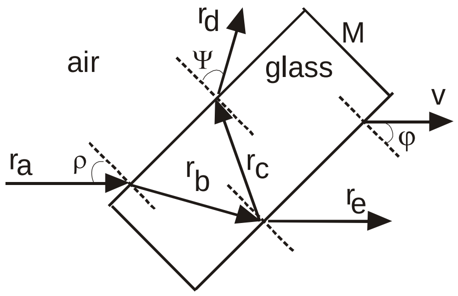

FIG 4 The semitransparent mirror M with velocity v; the incident ray (ra), the refracted-reflected-refracted ray (rd) and the refracted-refracted ray (re).

This refracted-reflected-refracted (rd) ray will be analyzed, and we will start with the equations below as the hypothesis.

$$\cos\left[\Psi\left(\frac{1-\beta^2}{1+\beta^2}\right)^2\right]=\left(\cos\rho\right)\left(\frac{1\pm\beta}{1\mp\beta}\frac{1}{1\pm\beta sin\mu}\sqrt{1+\frac{\beta^2\cos^2(\rho-45)sin^2\mu}{2}}\right) \tag{9.1}$$

where ρ and Ψ are, respectively, the incident and the refracted-reflected-refracted angle with
respect to the normal of the semitransparent mirror M. $\beta = v/c$, where v is the velocity of M and c is the velocity of light. μ is the angle of the incident ray with respect to the velocity v .

The mathematical signs $(\pm +)$ indicate that the mirror is moving towards the incident ray, and $(\mp -)$ indicate that the mirror is moving away. Equation (9.1) is specified for $\varphi = 45^\circ$, where φ is the angle of v with respect to the normal of the semitransparent mirror M.

B. The experiment

The MM experiment uses a light source, a lens, a semitransparent mirror (M), 16 reflection mirrors and a telescope. The lens is used to define the wave front plane.

Another light source is the sun or stars, which has a practically planar wave front when it reaches the earth. The interchange between sun or star light and the laboratory sources in no way alters the results [7-9].

Thus, in this paper, we perform the calculations using sunlight substituting for the light source, with the lens, M, two reflection mirrors (M1, M2) and a screen (B) substituting the telescope (Fig. 5).

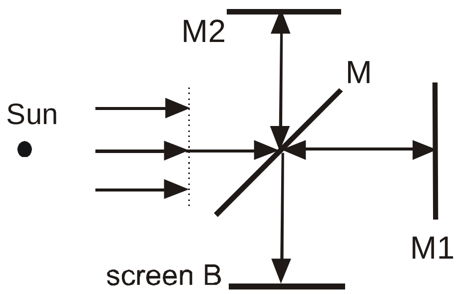

FIG 5 Michelson-Morley experiment with two reflection mirrors, sunlight source and a screen B.

C. Ray reflection in a moving mirror

In the Supplement of the MM paper [6], we show the equations of ray reflection in a moving mirror. Below we have an equivalent and more general equation for any angle of the incident and reflected rays.

$$sin\tau = \frac{sin\eta(1-\beta^2\cos^2\varphi_1)}{\pm 2\beta\cos\varphi_1\cos\eta + 1 + \beta^2\cos^2\varphi_1} \tag{9.2}$$

where η and τ are, respectively, the angles of incidence and reflection of the rays with respect to the normal of the mirror. φ_1 is the angle of the velocity **v** with respect to the normal of the mirror.

The sign is negative when the mirror is moving away from the incident ray and positive when the mirror is moving towards it.

D. Position of the sun

In the calculations below, the position of the sun has an angle Φ with respect to the normal of the interferometer horizontal plane (the xz plane in the Fig. 6 to 11). Four positions of the interferometer are analyzed: north, east, south and west. With a specific Φ and velocity of the interferometer, the calculations are simplified for north, east and west because the rays are parallel to the horizontal plane of the interferometer. Numeric calculations are shown in Sec. IX .

E. Initial position of the interferometer – north

Let us consider north the initial position of the interferometer. The velocity v is perpendicular to mirror M1. Mirror M3 captures the sunlight. See Fig. 6.

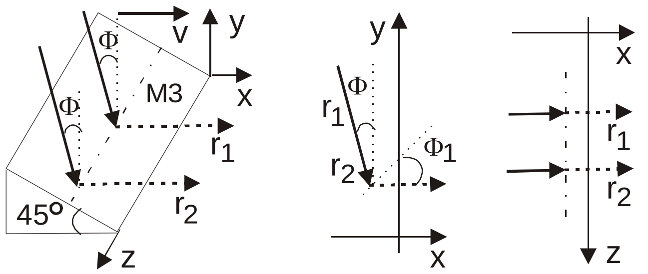

FIG 6 Interferometer position north – The sunlight is incident on mirror M3.

The rays 1 and 2 after the reflection from M3 are parallel to the xz plane, and the trajectory is shown in Fig. 7. The mathematical condition for Fig. 7 is $L_2 > L_1$.

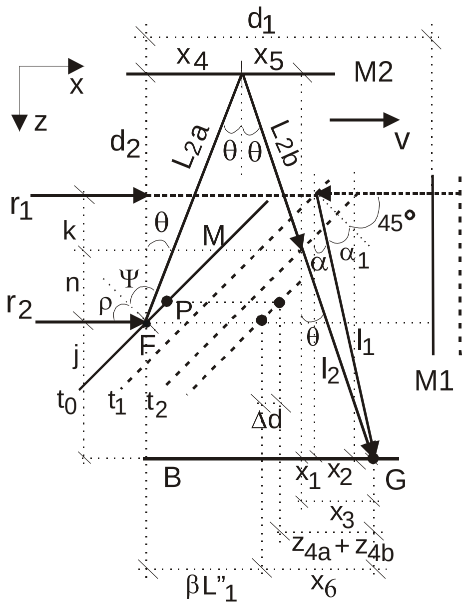

FIG 7 Interferometer position north, the trajectory of rays 1 and 2 in the xz plane of the interferometer.

Interferometer position north – ray 2

From Fig. 7, we see that the distance F to $F(t_2)$ is

$$x_4 + x_5 - n = vt_2 \tag{9.3}$$

Ray 2 travels the distance

$$L_2 = L_{2a} + L_{2b} = ct_2 \tag{9.4}$$

From Fig. 7:

$$tg\theta = x_4 / d_2 \tag{9.5}$$

$$tg\theta = x_5/(d_2 - n) \tag{9.6}$$

$$L_2 = L_{2a} + L_{2b} = (d_2/\cos\theta) + ((d_2 - n)/\cos\theta) \tag{9.7}$$

Equaling (9.3) and (9.4) we have (9.8). Replacing (9.5) and (9.6) in (9.8) we find (9.9). Equaling (9.7) and (9.9) gives

$$n = \frac{2d_2(\beta - sin\theta)}{\beta - \cos\theta - sin\theta} \tag{9.10}$$

Substituting (9.10) in (9.7) we have

$$L_2 = -\frac{2d_2}{\beta - \cos\theta - sin\theta} \tag{9.11}$$

Ray 2 travels the total distance from t_0 to screen B:

$$L_2^{''} = L_2 + l_2 = L_2 + \frac{n + j}{\cos\theta} \tag{9.12}$$

Interferometer position north – ray 1

Ray 1 travels the distance from t_0 to t_1, and from the Galilean transformation is

$$L_1 = \frac{d_1}{1-\beta} + \frac{d_1 - (n+k)}{1+\beta} \tag{9.13}$$

Ray 1 travels the total distance from t_0 to the screen B:

$$L_1^{''} = L_1 + \frac{k + n + j}{\cos\alpha} \tag{9.14}$$

From Fig. 7, we have

$$\alpha = 45 - \alpha_1 \tag{9.15}$$

$$x_1 = k - x_2 \tag{9.16}$$

$$x_2 = \beta(L_2 - L_1) \tag{9.17}$$

$$tg\alpha = (x_3 - x_1)/(k + n + j) \tag{9.18}$$

$$x_3 = tg\theta(n + j) \tag{9.19}$$

By substituting (16) and (17) into (18) we find

$$tg\alpha = \frac{x_3 - k + \beta(L_2 - L_1)}{k + n + j} \tag{9.20}$$

By substituting (9.13) and (9.19) in (9.20) we find k :

$$k\left(tg\alpha - \frac{\beta}{1+\beta} + 1\right) = (n + j)(tg\theta - tg\alpha) + \beta\left(L_2 - \frac{d_1}{1-\beta} + \frac{n - d_1}{1+\beta}\right) \tag{9.21}$$

By substituting (9.21) in (9.14) we obtain $L_1^{''}$.
Now, by turning the interferometer 90 degrees, we have the next position.

F. Second position of the interferometer - east

Let us consider east the second position of the interferometer. The velocity v is perpendicular to mirror M2. Mirror M3 captures the sunlight. See Fig. 8.

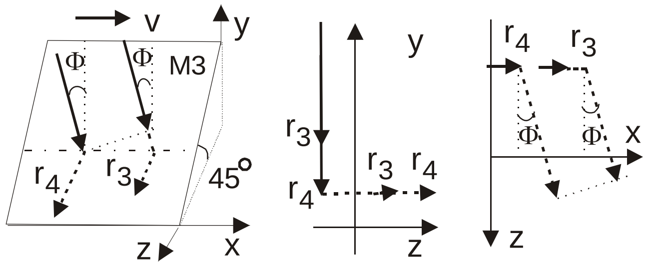

FIG 8   Interferometer position east – The sunlight is incident on mirror M3

The rays 3 and 4 after the reflection from M3 are parallel to the xz plane, and the trajectory is shown in Fig. 9 and 10.

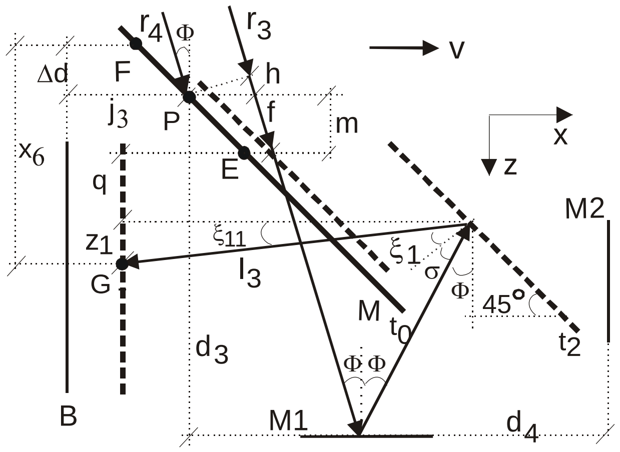

FIG 9 Interferometer position east – The trajectory of ray 3 in the xz plane of the interferometer.

Interferometer position east – ray 3

The condition for r3 and r4 to reach the same point on screen B is

$$z_{4a} + z_{4b} = m + q + z_1 \tag{9.22}$$

L_3 and n are the same as in the previous Equations (9.10) and (9.11), and we have

$$q = \frac{2(d_3 - m)(\beta - sin\Phi)}{\beta - \cos\Phi - sin\Phi} \tag{9.23}$$

$$L_3 = -\frac{2(d_3 - m)}{\beta - \cos\Phi - sin\Phi} \tag{9.24}$$

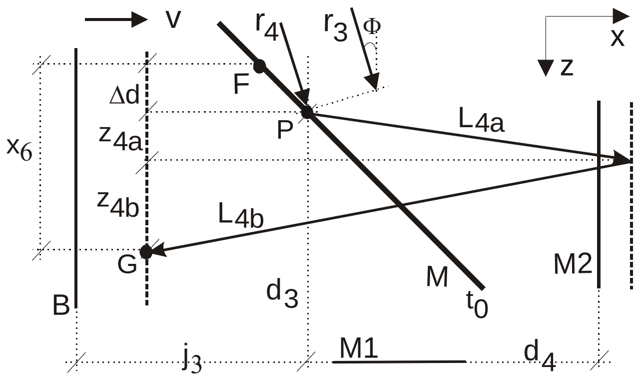

FIG 10 Interferometer position east – The trajectory of ray 4 in the xz plane of the interferometer.

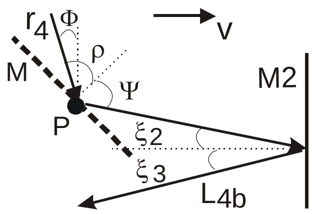

FIG 11 Interferometer position east – Details of the angles for ray 4.

From the Galilean transformation and Fig. 9 we have

$$l_3 = \frac{j_3 + q + m}{\cos \xi_{11} + \beta} \tag{9.25}$$

$$z_1 = l_3 sin\xi_{11} \tag{9.26}$$

Ray 3 travels the total distance from t_0 to screen B:

$$L"_3 = L_3 + l_3 + h + f \tag{9.27}$$

Interferometer position east – ray 4

From Fig. 10 and 11 we see that

$$z_{4b} = L_{4b} sin\xi_3 \tag{9.28}$$

$$z_{4a} = L_{4a} sin\xi_2 \tag{9.29}$$

Calculation of h and f : From Fig. 12 we have $(h + f)/c = a/v$, so

$$a = \beta(h + f) \tag{9.30}$$

where $a = a_1 + a_2$.

$$b_2 = a_1 = a - a_2 = a - mtg\Phi \tag{9.31}$$

$$b_1 = m \tag{9.32}$$

$$sin\Phi = h/(b_1 + b_2) \tag{9.33}$$

By substituting (9.31) and (9.32) into (9.33) we have

$$h = asin\Phi + msin\Phi(1 - tg\Phi) \tag{9.34}$$

From Fig. 12 we have

$$f = m/\cos\Phi \tag{9.35}$$

By substituting (9.34) and (9.35) into (9.30) we have

$$h = \frac{m(\beta sin\Phi - 1 + sin\Phi\cos\Phi + \cos^2\Phi)}{\cos\Phi(1 - \beta sin\Phi)} \tag{9.36}$$

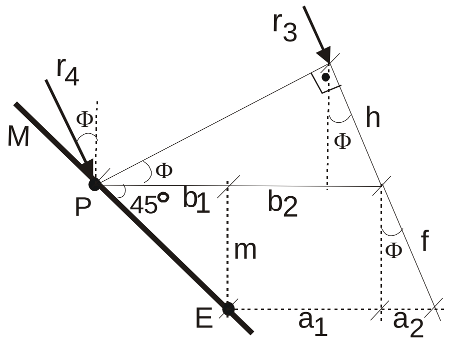

FIG 12 Interferometer position east - Details for ray 3 and ray 4.

From Fig. 10 and 11 and from the Galilean transformations we find

$$L_4^{''} = L_{4a} + L_{4b} = \frac{d_4}{\cos\xi_2 - \beta} + \frac{d_4 + j_3}{\cos\xi_3 + \beta} \tag{9.37}$$

The calculations for south and west are similar to those for north and east, respectively.

G. Calculations for the rays to reach in the same point on screen B

In the experiment, the observations of the displacement of interference fringes are made at a fixed point on screen B.

For the rays to reach at the same point G on screen B (see Fig. 7, 9 and 10), it is necessary that

$$d_3 = d_1 - \Delta d \tag{9.38}$$

$$d_4 = d_2 - \Delta d \tag{9.39}$$

$$j_3 = j + \Delta d \tag{9.40}$$

where, from Fig. 7 and 10,

$$\Delta d = x_6 - z_{4a} - z_{4b} = x_3 + x_4 + x_5 - \beta L''_1 - z_{4a} - z_{4b} \tag{9.41}$$

H. Displacement of the interference fringe

When we rotate the interferometer 90° from north to east, we have a displacement of the interference fringe:

$$\delta = \frac{(L''_1 - L''_2) - (L''_3 - L''_4)}{\lambda} \tag{9.42}$$

where $\lambda = 5.5x10^{-7}$ m is the wavelength of the green light.

I. Numeric calculations

Data: $\beta = 0.0013$, $\Phi = 0.07453294928^\circ$, $j = 21.91$ m, $d_1 = 11$ m, $d_2 = 10.9946$ m, $\Delta d = 0.056705$ m and $m = 0.0002332$ m.

Interferometer North position

From (9.2)(+) and Fig. 6 we have $\varphi_1 = 45^\circ$, $\eta = \Phi + 45^\circ$ and $\Phi_1 = 45^\circ$.

For the semitransparent mirror M, from Fig. 7 we have $\rho = 45^\circ$, $\varphi = 45^\circ$, $\mu = 0^\circ$ and from $(1)(\mp -)$ $\Psi = 45.1488883318^\circ$. From Fig. 7 we have $\theta = \Psi - 45^\circ$. From (10), (11) and (12) we have respectively n, L_2 and $L_2'' = 43.899348219$ m. For the semitransparent mirror M and r1, from (2)(+) and Fig. 7 we have $\varphi_1 = \eta = 45^\circ$, $\alpha_1 = 44.9255638806^\circ$ and $\alpha = 45^\circ - \alpha_1$. From (21) we have $k = 0.0284937535$ m and from (14) we have $L_1'' = 43.9101297371$ m.

Interferometer East position

From (38), (39) and (40) we have $d_3 = 10.943295$ m, $d_4 = 10.937895$ m and $j_3 = 21.966705$ m.

From (23) and (24) we have q and L_3 respectively. For the semitransparent mirror M, from Fig. 11 and (1)(±+) we have $\rho = 45^\circ + \Phi$, $\mu = 90^\circ - \Phi$, $\varphi = 45^\circ$, $\Psi = 45.000376949^\circ$ and $\xi_2 = \Psi - 45^\circ$. For the mirror M2, from Fig. 11 and (2)(-) we have $\varphi_1 = 0^\circ$, and $\xi_3 = 0.00037793^\circ$.

From (37) we have $L_4'' = 43.8140123301$ m.

For the semitransparent mirror M, from Fig. 9 and (2)(-) we have $\sigma = 45^\circ - \Phi$, $\varphi_1 = 45^\circ$, $\xi_1 = 44.999903044^\circ$ and $\xi_{11} = 45^\circ - \xi_1$. From (25), (35), (36) and (27) we have l_3, f, h and $L_3'' = 43.824793854$ m.

Displacement of the interference fringes

The theoretical displacement of interference fringes when we turn the interferometer 90° from the north to the east position (N.-E.) using (42) is

$$\delta = 0.0098$$

The calculations for south and west are similar to those for north and east, respectively.
The results of the complete calculations (not demonstrated in this paper) are shown in the Table 7.

				δ				$\bar{\delta}$
β	Φ	Δd	m	N.-E.	E.-S.	S.-W.	W.-N.	
.0030	.17214542737	.12981000	.00124261000	0.8923	1.1296	1.1350	0.8977	1.0137
.0013	.07453294928	.05670500	.00023320000	0.0098	0.0130	0.0131	0.0100	0.0115
.0001	.00572986444	.00438676	.00000137933	0.0006	0.0007	0.0000	0.0001	0.0004

TABLE 7 Theoretical displacements of interference fringes (δ)

In Table 7, the values of d_1, d_2 and j are the same for the velocities 0.003 c, 0.0013 c and
0.0001 c. The values of Φ are different to simplify the calculations. With these values of Φ the rays are parallel to the xz plane of the interferometer. For rays not parallel to the xz plane the calculation is more complicated.

J. Experimental fringe displacement observation

For the Michelson Morley experiment, according to [6]:
"…; hence the displacement to be expected was 0.4 fringe. The actual displacement was certainly less than twentieth part of this, and probably less than the fortieth part".
Thus, the fringe displacements measured are $2\delta_1 = 0.4/20 = 0.02$, $2\delta_2 = 0.4/40 = 0.01$, $2\bar{\delta} = (0.02 + 0.01)/2 = 0.015$ and $\bar{\delta} = 0.0075$; see [1] Fig. 9. This gives the following Table 8.

MM experimental observation [6]	$\bar{\delta}$=0.0075	$\bar{\delta} \cong 0.008$
Theoretical, from Table 7	$\bar{\delta}$=0.0115	$\bar{\delta} \cong 0.012$

TABLE 8 Displacements of interference fringes (δ): MM experimental observations and theoretical calculations.

K. Considerations on the experiment

The apparatus has a support, and it is possible to turn the interferometer to different azimuthal angles while the observation is in progress.
The interferometer is affected only by the component of the earth's total motion that lies in the horizontal plane of the interferometer. This plane is perpendicular to the radius of the earth at the location of the observatory. A drift perpendicular to the horizontal plane of the interferometer would produce no effect.

The rotation of the earth on its axis would cause the horizontal plane of the interferometer to move as around the surface of a cone and thus to take many different space orientations.

For example, in Fig. 13 we have the projection of the earth velocity (with respect to the CMB) in the horizontal plane of the interferometer, for Cleveland, Ohio, on July 8, 1887, the first day of the MM experiment.

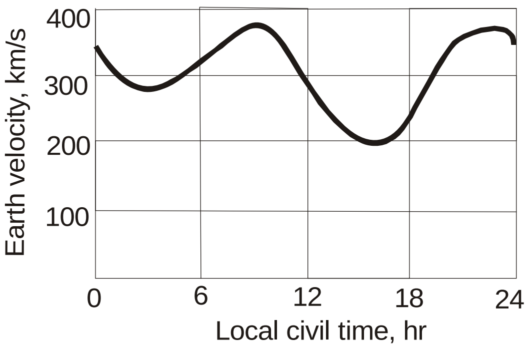

FIG 13 Projection of earth's velocity (with respect to the CMB) on the horizontal plane of the interferometer in Cleveland, Ohio, on July 8, 1887, the first day of the MM experiment.

MM interferometer adjustment

There is a critical angle such that the fringes appears, as described below. From [9]:
a) "In order to produce a series of straight fringes, suitable for the measurements of the displacements, it is necessary that one of the end mirrors be rotated about a vertical axis through a very small angle so that the two virtual interfering planes intersect. The width of the fringes and the number of fringes in the field of view are directly dependent upon this inclination of the end mirror".
b) "Very careful attention is required always to secure that adjustment of this critical angle which causes the arrow-head pointer to appear to the right of the central black fringe when the light-path of the telescope arm of the interferometer increases in effective length."
c) "When the apparatus was first assembled on Mount Wilson, the time required for the approximate adjustment of the distances between mirrors with the wood rods was about one hour, for the centering of the mirrors fifteen minutes, for finding the fringes with white light forty-five minutes, or two hours and a half for the entire operation."
d) "The telescope is focussed on the surface of mirror 8 where, when the adjustments are completed, the interference fringes appear to be located."

L. MM conclusions

By hypothesis we give the equation (9.1) to explain (using Newtonian concepts) the refracted-reflected-refracted ray that travels inside the semitransparent mirror in the Michelson Morley experiment.

The Michelson Morley laboratory observation is $\bar{\delta} = 0.008$, and the theoretical calculation in this paper is $\bar{\delta} = 0.012$.

X. CONCLUSIONS

Special relativity is the best fundamental theory since 1905 to today. But SR has some inconsistencies, see Sec. II and we should continue the researches for a more simpler theory, which is what we want of the best theory.

Newtonian physics as shown in this work it can explain relativistics experiments like mass variation, time dilation, Michelson Morley, transverse Doppler effect, kinetic energy and relation mass-energy.

For time dilation we develop the initial equations and use numeric calculations with some approaches and we have a medium agreement. So, we need to continue the development for the complete equations and verify if a better agreement exists.

So, Newtonian Physics needs more research before being considered without validity.

References

[1] Gerald Mott, Int. J. of Modern Phys. E, Vol. 15, no. 3 (2006) 755 – 760

[2] Thibault Damour, Critical Problems in Physics: proceeding of a conference celebrating the 250th anniversary of Princeton University, Editors Val L. Fitch et al., Princeton University Press (1997) 147 – 164.

[3] David Z. Albert and Rivka Galchen, Scientific American Magazine, February 18, 2009.

[4] G. N. Lewis, Philos. Mag. 16 (1908) 705-717.

[5] O. De Pretto, O.: Proceedings of the Veneto Royal Institute of Science, Letters and Arts. A.A., LXIII, Part 2, 459 (1903-1904)

[6] Michelson A. A., Morley E. W., *Am. J. Sci*., **34** (1887) 333.

[7] Miller, D.C., *Proc. Natl. Acad. Sci*., **11** (1925) 311.

[8] Tomaschek, R., *Ann. Phys. (Leipzig)*, **73** (1924) 105.

[9] Miller, D.C., *Reviews of Mod. Phys*., **5** (1933) 203.