NEW LIGHT ON THE MICHELSON-MORLEY EXPERIMENT

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A new fundamental theory, The Unified Quantum Field Theory, which has been renamed The Absolute Theory, has been used in recent papers, to resolve the enigmas underlying Planck's and Hubble's constant, is now used to unravel the enigmas of the negative result of the Michelson-Morley experiment. It shows conclusively that certain concepts on which the experiment was based are invalid, and indicates precisely what should now be done in order to obtain a positive result.

The Unified Quantum Field Theory uncovers the exact physical characteristics of the smallest quantum of energy, that, in simple and complex arrangement form the whole universe. This unit of energy, referred to as h_e erg symbolically, is numerically equal to Planck's action quantum, h, erg second, and is equal to 6.625×10^{-27} erg. This is not an intuitive guess; the proof has been detailed in the author's referenced papers. Not only the energy but also nine other quantum constants have been discovered and detailed and proved with the relevant equations, including the absolute velocity of the energy quantum, c, which is equal to 2.9979×10^{10} cm/sec. It has been shown that the gravity field consists of 'quanta-links' connected end-on-end, travelling at velocity c, and running between all matter in the universe, that is, in all directions. A small length of this gravity field would run in a straight line. Bending of the gravity field occurs around large masses, and a general bending exists around the whole universe, of radius 1.075×10^{27} cm. All radiant energy travels as transverse oscillations in these gravity field quantum-links. Each oscillation of the radiant energy consists basically of a sine wave in which one additional quantum energy unit (which has been shown to be a link in form of length, Q_1, equal to 1.075×10^{-12} cm long) has been inserted (by the source) per wavelength. This rule applies over the entire radiant spectrum. That is, if one single strand of gravity field contained, say, 100 quantum links per wavelength joined together end-on-end in a straight line, then the sine wave would consist of 100 plus 1, i.e., 101 quantum lengths all in the sinusoical path (i.e., none in the straight gravity path). When a mass moves, the particles, atoms, molecules, of which it consists, commutate with respect to the gravity field links. The world lines of gravity field quantum links, which structure the entire universe, remain basically unaffected with regard to the general vector disposition, as the mass moves through them. The reason for this is that their background quantum energy density per cubic centimeter is approximately 10^{20} per cubic cm, whereas matter is approximately 10^{47} quantum energy units per cu cm. On the other hand, we know from the 'universe equations' that the total energy of the universe is equally divided, one half being matter-energy, and one half being gravity field energy (each being equal to 1.98×10^{102} quantum energy units). From the above

considerations and others, which are readily available from the new theory, it is reasonably apparent that the basic problem of the nature of the aether has now been resolved. It is made from exactly the same energy quantum unit as all matter, and is, in fact, the gravity field itself, with its superimposed vibrations at all frequencies. Since the Michelson-Morley experiment was mounted primarily to resolve the same problem, i.e., the nature of the aether, and, moreover, since Einstein's relativity theories were based on this failure, or negative result, it is proposed in the following discussion to show, not only why this important experiment was a failure, but also how the same experiment can now be carried out so that a significant positive result is achieved. Such a positive result would be evident from either suitable ripple effects from the two light rays as right-angles to each other, or, more significantly, from any regular movement of the light spots (or slits) from the zero position as the M & M interferometer is rotated slowly on its axis.

Let us consider the well-known expressions (obtainable from any physics text-book) for the times taken by the in-line, T_i, and the transverse, T_t, light rays in the M & M experiment, where,

$$T_i = \frac{2d}{c(1 - v^2/c^2)^{\frac{1}{2}}} \tag{1}$$

and

$$T_t = \frac{2d}{c(1 - v^2/c^2)^{\frac{1}{2}}} \tag{2}$$

where d equals distance between mirrors; v, velocity of the Earth; c, velocity of light. The onerous requirements for this extremely precise measurement would have necessitated accuracies of approximately one millionth of a centimeter, and involved mirrors M_1 and M_t, set exactly at right angles to each other and another mirror M_0, set exactly at 45° to both; and the distance between M_0 and M_i, and M_0 and M_t equals d cm. Such extreme accuracies were not available without optics at that time (1887). § It is proposed to show that the major errors in the equipment, apart from that due to the accuracies required, were two-fold: namely, an error in the theoretical concept of (2) above, due to the generally accepted theories at that time and subsequently, and as a direct result of this prime error a major error also occurred in the method of setting up the experiment (and all subsequent experiments of the same type). The aether had been presumed to be stationary and all-pervasive since the 16 th century. Through this the vibrations of light were supposed to be propagated. Hence, by a suitable choice of distance, d, (e.g., 11 m) the theoretical difference in the two times, T_i and T_t, should have given approximately 40% of a fringe (wavelength) and should have been easily discernible, if present. In fact, only about 10% of a fringe or less was observed, and also, unfortunately, this smaller effect has, in all cases of subsequent experiments been presumed to be too small to have any relevant significance. It will be shown that these small fringe movements, when considered in conjunction with the optical movements, when considered in conjunction with the optical method of setting up the three mirrors (which in most references is termed 'make the light beam paths parallel' or 'let the mirrors M_i and M_t be adjusted for parallel light') and also in conjunction with the new facts revealed by the absolute theory, have a profound significance. according to teh absolute theory, once light has been dispatched in a certain direction via the gravity field quanta links,

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§. Editorial Comment: Would the author kindly state precisely with respect to what referent c is defined by him, since it is not the source. If this is left vague, he has no theory.

it will keep going in that direction at velocity c regardless of the source. It can thus be seen that the light source is merely the means of excitation of the oscillation or radiation in the gravity field, already travelling in all directions at absolute speed, c. This velocity c will be quite unaffected by the velocity of the source. However, (and this is obvious from logical considerations alone) if the light travels at an absolute velocity, c, and the light source (together with the interferometer) is also traveling at an absolute velocity, v, then the absolute velocity of the interferometer (and hence the earth with it) can be measured relative to the absolute velocity of light. That is, (c - v) and (c + v) will be available for measurement if suitable steps are taken. Velocity c is known, constant and absolute, hence v can be determined.

This aspect of relativity has already been dealt with in the author's book [1], and forms a convincing proof that the first principle of special relativity is incorrect. This first principle stated that it is impossible to measure the absolute velocity of any body relative to the aether and hence it is impossible to establish the existence of an absolute reference system.

The second principle stated that the velocity of light is constant and independent of its source. The new absolute theory shows that this velocity is not only constant but is also absolute and hence may be used as the reference velocity, and hence reference position (if this were necessary). It can be seen that the theory that the aether was stationary was the major factor in a misleading and incorrect theory which led directly to the toleration of inadmissible and erroneous optical setting-up procedures, that led to the alleged negative results of the famous experiment.

This error, due to the concept of a stationary aether, occurs in (2) where

$$T_t = \frac{2d}{c(1 - v^2/c^2)^{\frac{1}{2}}} ,$$

which was assumed to be correct by Michelson, Lorentz, Einstein, et ali., resulting in the relativity correction $(1 - v^2/c^2)^{\frac{1}{2}}$ being applied only in the in-line direction to make T_i equal to T_t. The new absolute theory states that if a beam of light is admitted exactly at right angles to the direction of motion, from mirror M_0 at spot zero (in the crosswires) then it will keep on travelling in the same direction, and as the mirror M_t, will have moved by the time the light reaches it (after the beam has travelled through distance d at velocity c) the light will strike the mirror M_t, also still at right angles, at a point displaced x cm from the spot that it would have struck if the interferometer (and the Earth) were stationary. The beam will then be reflected by mirror M_t, and will travel back, still at right angles to the mirror and parallel to the original outgoing light beam and strike the 45° mirror, M_0, at a point $2x/\cos 45°$ from the starting point (i.e., spot zero). Assuming that mirrors M_i and M_t have been set up accurately exactly at 90° to their light beams and that the 45° mirror is also accurately set at 45°, without using the existing light beams to zero the go and return spots on mirror M_0, then this displacement of the return spot from the

§. t.u. Com.: The author does not seem to realize that precision in the lengths and angles involved in the light paths or the positioning of the mirrors does not have great significance in the M & M experiment, in the framework of the fixed aether theory, that is. The M & M experiment is tailored to the supposition that a fixed aether exists - a supposition that it proves false up to possible experimental error in theory or performance of it. There are many theories that exist which satisfy the M & M experiment, the author's probably being one of them, but it was not the point that such theories; other experiments would need to be designed to do so.

The author's point seems to be, on reading further along, that in time-dependent geometry, a right angle is no longer a right angle in a moving frame of reference, see figure f(b) p. 3579, so that the right angle determined on the sandstone block would not be a right angle relative to the presumed fixed aether. If this be what he is driving at, it is a valid flaw in the thinking of Maxwell who originally designed the M & M experiment.

mirror M_t to mirror M_0 would have been (and will be today when it is checked) readily measurable, as it is extremely large compared with a light wavelength (which is of the order 10^{-5} cm). If distance, d, was 11 meters (as it was on one occasion) then time T_t would be approximately equal to $2d/c = 2200/3 \times 10^{10} = 7.33 \times 10^{-8}$ seconds. In this time, mirror M_0 will have moved, assuming $v = 30 \times 10^5$ cm/sec:

$$2x = vT_t = 30 \times 10^5 \times 7.33 \times 10^{-8} = 2.2 \times 10^{-1} \text{ cm} = 2.2 \text{ mm}$$

The spot will have moved $2x/\cos 45°$ approximately, neglecting a small period of time due to the 45° mirror being displaced from zero, which equals 3.11 mm on the 45° mirror from zero.

It can thus be seen that, while the spot of light, emitted from mirror M_0 in the direction of mirror M_1 and travelling, theoretically, in the direction of the Earth's velocity will return along the same parallel path to the mirror M_0 and will strike it in the same spot at zero in the crosswires, if a correct 90° mirror set-up has been established, that, the transverse light beam on its return will be displaced by a large amount equal to 3.11 mm or $3.11/10^{-5} = 3.11 \times 10^4$ fringes, which could be measured easily by ruler and an interferometer would not really be necessary. It should be noted carefully that the above calculation is based on the Earth's velocity being 30 km/sec, whereas, in fact, as we shall see later, the Earth's absolute velocity in space is approximately 225.97 km/sec and hence the above figures will be correspondingly larger and the interferometer need be only one meter path (d = 100 cm) for reasonable results.

It is quite clear, now, from the viewpoint of the absolute theory and from the foregoing considerations, that the method used by M & M to adjust the mirrors for so-called parallel light was (automatically and continually) the major cause of the negative results of this vitally important experiment. Such a procedure as bringing the go and return light spots onto the same zero is only a legitimate procedure (from the absolute theory viewpoint) when the beams are in line with the Earth's absolute motion in space, as they are, in theory, for mirrors M_0 and M_1. However, if this paralleling of beams is carried out on the transverse beam from mirror M_0 to M_t and back, so that both go and return spots on M_0 are zeroed, then it is obvious that the fringe movement of 31,000 fringes, or even greater (referred to above) will have been precisely removed, by the scientists whose very object is to measure or detect it (although they were not expecting such a large effect). Nature, in fact, was not given a chance to say: yes, because the scientists had already, although unwittingly, set up the answer: no. The procedure of bringing the two light spots, go and return, together in the transverse motion, involved tilting or moving the mirror, M_t, so that the return beam is at a very slight angle to the go beam (not perceptible to the experimenter) and of the order $0.22/11000 - 2 \times 10^{-5}$ radians or 4.12 seconds of arc, still using the above figures for example. Thus the return beam is tilted forward in the direction of velocity, v, and able to catch up with the moving mirror M_0. The most significant part of the present discussion now emerges. If the simple right angled triangle, made by the light paths of the resulting beams, transverse go-return, from M_0 to M_t back to M_0, is analysed by simple Pythagoras principles, it will be found that with the two return light spots coincident on M_0, (which is undoubtedly the method used up to the present in order optically to parallel the beams) the times T_i and T_t will be the same and both will be equal to $2d/[c(1 - v^2/c^2)]$. It is, thus, manifestly apparent, since the time now taken in both the in-line and the transverse paths is exactly the same ($T_i = T_t$ by experimental adjustment, that there will be no fringe effects, the separate paths being of exactly the same length and occupying the same time at absolute velocity c.

However, if after the beam paralleling and spot zeroing has been carried out, the interferometer is now rotated on its axis, then some fringe effects will ensue,

but will be smaller than even the originally anticipated small variations. They will be, in fact, of the same order as those actually measured by Michelson and others, somewhat less than 10% of the expected value, which were considered to be of no significance.

It is evident from the foregoing that, providing both the in-line and transverse light beams are paralleled when each is separately in-line with the Earth's absolute velocity through space, that the respective go-return beams will then be truly parallel, and may then be used to measure the Earth's velocity. One outstanding difficulty that now remains is that this absolute direction is at present unknown to science. The direction and value of the Earth's velocity around the Sun is known, but the direction of the solar system and the absolute direction of the galaxy through space is not known. However, this difficulty may be overcome, since all that is now required is to rotate the interferometer and measure the displacements of the separate return spots, which will provide a swing, and the center of this swing will provide the required zero for setting-up purposes, and hence the direction of the Earth's absolute velocity vector. It should be noted that vertical rotation is also necessary in order to obtain the exact vector direction. The maximum displacement of the spots (x above) will then provide the exact measure of this velocity from the equation, v = cx/d.

An Historical Footnote Concerning Priority.

Professor István Erdelyi, now deceased, of Sao Paulo University, Brazil, had developed a 'Momentum Theory' from certain new fundamental constants including the fundamental energy quantum, as long ago as 1952. The momentum theory has many points in common with the author's absolute theory, since both originate from the same discovered constants: unit mass, unit energy and absolute velocity, c. Another of these common points is the same prediction of the errors contained in the Michelson-Morley experiment. Erdelyi wrote his book, Is it Possible to Maintain the **Theory of Relativity Without a Foundation?** in 1954 (second edition, 1964). It is most unfortunate that in this book he has so interleaved his momentum theory (which this author considers unacceptable) with his Michelson-Morley concepts which are in accord with both theories. Though this is quite understandable, it makes somewhat difficult and perhaps even unacceptable, reading to some. However, in spite of this aspect, Erdelyi has definitely preceded the author's present endeavour on the Michelson-Morley experiment, and moreover has provided all the necessary mathematical equations covering the various light paths involved. It is for this reason that those finer details have not been included here, as the author wishes to make no claim to priority in this instance, although the concepts and details came to him before he had seen Erdelyi's work.

The author has great pleasure, therefore, in dedicating this paper to the honour of István Erdelyi, who, although his momentum theory differs so profoundly from the author's own absolute theory, he considers it has many moments of great truth, this being one of them.

The purpose in writing this paper has been to make the concepts surrounding the Michelson-Morley experiment patently clear, using only reasonably simple language, so that misconceptions that emerge sometimes from mathematical concepts that are divorced from reality, do not arise. Mathematics without reality can be heady medicine, but humanity, and science, in particular, must realize that at this particular juncture in history, reality, when attainable, by whatever resource, is infinitely preferable to mathematics without reality. Of such is the special theory of relativity. The Lorentz transformations are without foundation and unjustified. The major transformation in reality is energy into matter and matter into energy in all its many forms and in never-ending variations throughout a cyclic, closed, orderly, self-sufficient and eternal universe.