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Haedo, December of 1988

"PHYSICS TODAY" MAGAZINE
335 East 45 Street
NEW YORK, N.Y. 10017
U.S.A.

Attn. Editor Gloria B. Lubkin

Dear Madam,

I would be very grateful if you would kindly publish in your "Letters" section the work herewith enclosed.

If, for any reason,you consider it to be unconvenient please let me know your decision as soon as possible.

Otherwise, if you agree to publish it, please inform me the estimated date of publication.

Thanking you in anticipation for your attention

yours sincerely,

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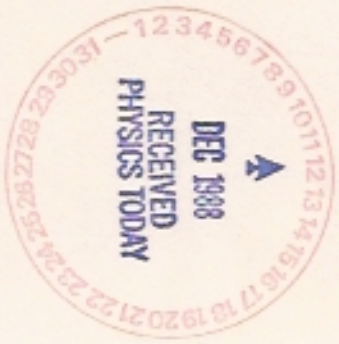

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ETHER, LIGHT, RELATIVITY

4083L

"PHYSICS TODAY" MAGAZINE
New York - U.S.A.

Dear Sir,

I am going to refer to the article "A Modern Test for the Ether?" published in the "Letters" section of the issue dated last March, 1988 (41 (3), 132) and to the material quoted in its reference 3) (E.W. Silvertooth, "Nature" 332, 590 (1986)). In his letter, Mr. H. Aspden says it would be convenient to make another experiment in order to test once again the existence of ether. This convenience is stated in homage to A. Michelson's anxiety as regards this subject and as a way to celebrate the centennial of his famous experiment (1887-1987). Mr. Aspden interprets that the negative result of that experiment may well bedue to reasons not foreseen at that time -stated in the article-, rather than to the inexistence of ether. He also mentions the recent experiment of E.W. Silvertooth. He considers it one of the possible achievements within the indicated way. The referred Silvertooth's experiment resulted in apreliminary anisotropy in light propagation equivalent to the Earth's movement through space at a velocity of 378 km/sec. Afterwards, Mr. Aspden says: "It is of course all too easy to discredit such claims in view of the overwhelming evidence supporting the theory of relativity. However, in deference to Michelson's conviction about the ether, as shared by Morley, 1987 is perhaps a time when we should be more open to such possibilities" (sic).

This paragraph made me not only think of an experiment which responds to that challenge, but also reply, respectfully, to Mr. Aspden.

Indeed, in my modest opinion, Einstein's Theory of Relativity has not been properly proved so far. When Mr. Aspden says "... the overwhelming evidence supporting the theory of relativity", I think he is referring to the experimental results foreseen by the theory rather than to the theory itself. This is the key, the Gordian Knot of the matter. One of the most outstanding aspects of Einstein's Theory of Relativity (T.R.) giving rise to Einstein's own pride is the simplicity and scarcity of its postulates. I am in full agreement with this point. However, a very large building has been constructed supported by only two columns -its two basic hypotheses. The marvelous stability of this building and the lack of knoledge about other possible columns made us accept them as exclusive, although reason has provoked opposition right from the beginning.

A real dynamite charge for these two columns would be the existence of ether, that long time dreamed of hypothetical spatial seat for light propagation. If ether exists, and if it behaves with light in the same way as air behaves with sound, the T.R. is not valid, notwithstanding whatever demostrations of its predictions have been made. In this case, another hypothesis or hypotheses which may produce the same predictions must be elaborated, which is not as difficult as it may appear at first sight.I believe that there cannot be doubts about what I am saying. Let us have a look at the T.R. postulates and see if they admit the existence of ether:

i "The laws of physical phenomena are the same for all systems of reference in uniform linear relative movement. Therefore, no privileged system of reference exists."

ii "Light velocity in vacuum is the same for all observers and independent of the movement state of the source."

As postulate "ii" refers to movement of the source only, The existence of ether would not be incompatible with this postulate, since light in an ether would always propagate at the same speed in the eyes of any fixed observer. The difference appears if the observer is the one who moves with respect to the source and the ether. Nevertheless, postulate "i" is warning us that there is no difference between one case and the other and that there exists no "privileged" system of reference. We consequently see that the existence of ether for light propagation and for other electromagnetic phenomena is intrinsically incompatible with the Theory of Relativity. That is why I felt astonished when I read Mr. Aspden's above statement in reference to Mr. Silvertooth's work.

In the first chapter of his book "Basic Concepts in Relativity and Early Quantum Theory" (1972 Edition)(I am referring to the Spanish translation published in 1977 by the Mexican "Editorial Limusa S.A."), Robert REsnick observes that is often stated that every important theory starts as a heresy and ends as a prejudice. He also says that, after over half a century of experiences and applications, the Theory of Relativity has left the stage of heresy to be placed on solid theoretical and practical bases. To this statement I would add that T.R. has entered the stage of prejudice.

As an amateur scholar of Science, I cannot provide a categorical opinion because I am not in touch with the published present scientific works and I have no knowledge of latest achievements. Nevertheless, this same position allows me to start a discussion about these ideas, beyond any sort of prejudice, being exempted from any compromise.

Therefore, dear sir, I would like to emphasize that if it were discovered by some experiment that ether is an actual fact, there would be no doubt in affirming that T.R. is not valid. Of course, we should have to review said experiment one hundred times, as the case might be, and to carry out other experiments, as many as possible, taking into account different bases.

I have already told you that Mr. Aspden's letter made me think of an experiment which might be employed to detect the possible existence of ether. Before reading this letter I believed that Michelson-Morley's experiment was fully convincing in that sense, in such a way that if I did not agree with T.R. it was because I considered the negative result as a consequence of a possible emissivity feature of light. But Mr. Aspden's Letter made me think again about the problem and I finaly designed a very simple experiment -without underestimating Mr. Silvertooth's, whose details I do not know- that would run as follows:

Experiment to detect Ether: Using a Laser-ray apparatus, a beam is directed from North to South. Now, let us suppose that ether exists. The Earth turns to East in its daily rotation and it moves in the like direction (on the side opposing the Sun) during its annual revolution around the Sun. Briefly, let us suppose the light speed to be c = 300,000 km/sec, and that the Earth moves at a speed of v = 30 km/sec. Let us neglect the tangential speed resulting from the daily rotation around its axis.

If we perform the experiment at noon, the Earth's surface, at a given point, moves 30 km/300,000, i.e., 100 mm to the West per each kilometer that the ray moves towards the South. Since we suppose that the ray is a disturbance of the ether and that ether is at rest, the ray will have been shifted the same distance towards East. Consequently, if we place a screen at 1 km, the ray impact will be at 10 cm to the East from the theoretical point (the one arising if the Earth were unmoved or if the ether did not exist). And how will be able to know the position of this theoretical point? It doesn't matter, because the Earth turns and, together with it, so does the screen against which the laser ray "strikes". Therefore after 12 hours, at midnight, the impact will now be at 10 cm towards the West from to that theoretical point, to return to its initial position at next noon. If this experiment is performed at the equator, the impact will discribe a circle (radius 10 cm) around the above theoretical point on the screen, every 24 hours. And the circle will flatten as we move towards the poles, until it approaches a straight line of 20 cm length in their neighborhood.

If ether existed, we would thus have an evidence of its existence, and, what is more exciting and attractive, an accurate record of the rotation and orbital movement of the Earth, i.e., a combination of Foucault's Pendulum experiment and the Aberration Phenomenon observed and explained by Bradley.

The foregoing would occur because we created a system fixed to the Earth, composed of laser equipment and recording screen, and because we let this system turn within the "ether wind" (Michelson's dream) produced by the orbital movement. However, in order to refine the experiment, we would carry it out in the highest possible vacuum to prevent the influence coming from the partial drag of air, or from its light wave re-emission.

Nevertheless, this will not cause major difficulties since our system can be fully compacted by means of multiple reflections (not affecting the impact shift because, in the orientation of maximum elongation, the surfaces of mirrors are parallel to the current of ether). Note that if for 1 km distance we had a maximum impact spread of 20 cm, in the case of 100 m we sall still have a very good 2 cm long one. With 100 reflections, we would be able to operate in a closed area of only 1 m of length. Having such a compact system, we would also be able to turn it, joining it by proper pivots, without having to wait for the 24 hours of the Earth's rotation period.

(If ether were a reality, through this device we would possess a marvelous instrument for navigation purposes, i.e., navigation by sea, air and throughout space, since it is easy to realize that, in the first two cases, we will be able to know the craft's orientation and position, and, in the last case, to know the orientation and velocity corresponding to the absolute movement of the craft).

Facing a possible new negative result: Dear sir: the preceding paragraphsdescribe a very simple and direct way to detect the possible existence of ether. It is so simple and sensitive that it makes me think of a negative result. Otherwise, how could the laser ray be successfully used to align certain constructions? At different times of the day, the ray would show a different run. If not, how could the ray be used as the sight of sophisticated weapons? The bullet, as a perfect example of an emissivity phenomenon, would have a trajectory other than that marked by the laser, and, in accordance with its orientation, a different error would be given, impeding its systematic correction. Nevertheless these examples are not developed in the vacuum and air might upset the theoretical results as it drags light in its movement together with the Earth (partially, to an insignificant extent, according to Fresnel's Formula, but totally, according to the Extinction Theorem. This dichotomy would be a good basis to carry out this experiment outdoors and in vacuum).

And how would we explain the negative result? Evidently, the existence of absolute ether as seat for luminous disturbances would not have any logical ground, and other alternative explanations would even be possible before accepting the T.R. postulates. Among these additional explanations I consider the following two to be the most interesting ones:

a) Emissivity character of light propagation.

b) An important gravitational center forms a privileged system of reference.

One of the ways to test alternative b) would consist in performing the above-explained experiment, duly sensibilized and compacted, on board an artificial satellite of the Earth and a spacecraft traveling towards another planet, so that our device could be exposed to two types of "ether winds" either cutting "gravitational force lines" or moving away from or approaching an important gravitational center. In the first case, "v", instead of Earth's shift velocity, would be the tangential velocity of the satellite, and, in the second case, it would be the linear one referred to an important mass star.

As stated above, I had always considered alternative a) as valid.Such alternative led me to develop a series of experiments under very different condition but in such a way that they could avoid the problem of light re-emission. That problem involved and discredited most of the experiments carried out for equal purpose. If I deem it convenient, I will give a clear exposition of the mentioned series in the future as it only makes sense if it is precisely proved that ether does not exist, since, if not, any experiment made to test the emissivity feature of light would show a null result.

Dear sir, I know it is not usual to publish projects of experiments. I think the canonic way is to publish the experiments once performed together with their corresponding results. That was my intention with respect to the series of the previous paragraph. But experience has taught me that unfortunately I have litle time to develop the experiments properly due to my daily scope of business. Another cause preventing any satisfactory development is the lack of adequate financial support due to the poor budgets for research purposes in this country.

When I read Mr. Aspden's article I found a new pathway. I quickly designed the above-explained experiment for ether. Due to lack of time and the need of a translator, it took me four months to write this letter. If my intention were to make that experiment person ally perhaps two years would pass, and the Centennial of Michelson-Morley's experiment (1887-1987) would be much far away in time. My modest tribute to a great genius such as Albert A. Michelson, whom I admire very much, is to make my ideas known. Perhaps someone having more opportunities than I deems such ideas interesting and decides to put into practice.

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December of 1988