# NEW EVIDENCE HELD TO UPSET EINSTEIN

## Formula Based on Overlooked Optics Law Offered Here by Prof. Cartmel.

## EXISTENCE OF ETHER SEEN

### Difference in Speed of Light Observed From Earth Urged as Relativity Challenge.

By WILLIAM L. LAURENCE.

New evidence that it is possible to detect the motion of the earth in space by purely terrestrial experiments which, if corroborated by further experiments, would knock out one of the two main pillars upon which rests Einstein's special theory of relativity was presented yesterday at Columbia University before the joint meeting of the American Physical Society and the Optical Society of America.

The new evidence, which might result in a great upheaval in scientific thought, consists of a mathematical formula and is "based," it was asserted, "on a very simple principle in optics that has heretofore been overlooked." It was presented by Dr. William B. Cartmel of the University of Montreal.

The two basic foundations of the special theory of relativity, from which, in turn, the general theory of relativity grew, are, one, that no purely terrestrial experiment can be devised to detect the motion of the earth in space; and, two, that the speed of light is independent of the speed of the observer. By knocking out the first prop the whole structure of relativity must fall, it was said by some eminent physicists present, including the general theory.

**Corroborates Professor Miller.**

Dr. Cartmel's findings furnish, he says, definite corroboration to the findings of Professor Dayton C. Miller of the Case School of Applied Science, Cleveland, that the motion of the earth in space can be detected by measuring its effect on the variation in the speed of a ray of light.

Professor Miller's findings are regarded by him as definite proof of the existence of a stationary all-pervading element known as the ether, which, being stationary, can be used as an absolute reference frame for measuring the earth's motion in space.

The famous Michelson-Morley experiment, performed in Cleveland in 1887, led to the conclusion, later almost universally accepted, that no stationary ether exists. Einstein used the Michelson-Morley results as a "springboard" for his special theory of relativity, in which he made his famous postulate that no absolute reference frame for the earth's motion could be found.

Mr. Miller's findings, on the other hand, led him to conclude that a stationary ether does exist, and he claimed actually to have measured the earth's motion, with a split beam of light as his measuring rod.

**Challenges Michelson Experiment.**

Dr. Miller's experiments, however, entailed so much physical labor and were otherwise so complex, that very few, if any, have attempted to repeat them. Dr. Cartmel himself has not repeated them. He claims, however, that by "taking into account the simple principle in optics

**Continued on Page Twenty-one.**

The New York Times
Published: February 23, 1936

# NEW EVIDENCE HELD TO UPSET EINSTEIN

Continued From Page One.

that had so far been neglected" he is able to prove that Dr. Miller is right.

The Michelson-Morley experiment was performed to settle the question whether the velocity of a ray of light is affected by the motion of the earth. If affected, that would be evidence of the existence of a stationary ether.

For the purpose of his experiment, Dr. A. A. Michelson, a Nobel Prize winner in physics, devised the instrument known as the interferometer, an exceedingly delicate instrument capable of measuring the most minute changes in velocity.

By means of the interferometer a ray of light is split into two rays, which travel along the two arms of the instrument, the arms being at right angles to each other.

One arm is placed along the direction of the earth's motion, the other arm thus being at right angles to that motion. The rays of light are then made to travel back and forth along the arms.

### Existence of Ether Doubted.

The idea was that if an ether existed, and if a beam of light travels through the ether in the same direction as the earth does, then, to an observer on the moving earth, the light will seem to be slower than when it is going in the opposite direction.

The first case may be compared to a slow train being overtaken by a fast one, and the second to the rush of two trains passing each other while going in opposite directions.

Dr. Hendrick Lorentz, Nobel Prize winning Dutch physicist, figured out, on the assumption that an ether exists, that it should take a longer time for the ray to travel back and forth in the arm along the direction of the earth's motion than in the other arm. He also figured the amount of the increase in time for the one ray as compared with the other.

The Michelson-Morley experiment did show an increase, but the amount was so much smaller than that calculated by Lorentz that it was taken to be the result of experimental error and discarded. The experiment was taken as proof that there is no difference in time between the two light rays, and from this the conclusion was drawn that no such thing as an ether existed. This conclusion in turn led to relativity.

### Evidence Seen Discarded.

Dr. Cartmel told the physicists he found "that there is a mistake in the calculation of Lorentz," and that "by taking account, a very simple but neglected optical principle he has succeeded in showing that the time of passage of a ray of light in the arm of the interferometer at right angles to the earth's motion is exactly the same as the time required for a ray of light to go back and forth in the arm that lies along the direction of the earth's motion."

"It is strange but true," Dr. Cartmel stated, "that the increase in time that was expected in the arm that lies along the direction of the earth's motion is also found in the other arm, and this is the explanation why a difference in time of the two rays was not found."

Here Dr. Cartmel reported another result upon which he bases his conclusion that the results of Dr. Miller are right.

The small increase found by Michelson and Morley and discarded by them as due to experimental error, Dr. Cartmel stated, is not due to an error at all but is the actual result of the effect of the earth's motion on the ray of light. The experimenters really had obtained the results they had been looking for and threw them away without knowing their significance, he contends.

### *Perfect Adjustment a Defect.*

The trouble with Michelson and Morley and other experimenters, Dr. Cartmel reported having discovered, lies in the very nature of the interferometer. They all tried to get a perfect adjustment, he said, but if you get a perfect adjustment the results must be exactly the same, by the very nature of things, for both arms. If you want to get the real difference in time between the two beams of light it is absolutely essential to avoid perfect adjustment of the instrument.

"The most remarkable results," Dr. Cartmel said, "are those obtained by Professor Miller, who was not interested in adjusting the instrument with such perfection as to obtain true results. What he wanted to find out was the meaning of the experiment when the instrument was so adjusted as to give some positive results.

"After many discouraging years of hard work he made the important discovery that at 6 o'clock in the evening in the month of September he obtained only a quarter of the effect he obtained at any other time, indicating some sort of change in the earth's velocity at that particular time every year.

### Two Motions of Earth.

"Professor Miller has been able to show that the earth, in addition to its motion of thirty kilometers per second in its orbit around the sun, has another motion at right angles to its orbit with a velocity of 200 kilometers per second. This motion affects the sun also and the whole solar system is flying through space with this enormous velocity.

"The combination of the two motions of the earth, one the orbital motion around the sun and the other its motion through space with the rest of the solar system, gives the earth a motion along a spiral path, the motion at any instant of time being along a tangent to this spiral.

"The variation of the direction of the earth's motion along this spiral path satisfactorily explains the fact that the effect of the earth's motion on a ray of light at 6 o'clock in the evening in the month of September in only a quarter of its usual value.

"This result so marvelously deduced by Professor Miller from his measurements of the behavior of a ray of light in the Michelson interferometer is destined to become one of the greatest contributions to scientific knowledge."

Dr. Paul R. Heyl, Bureau of Standards physicist, stated that if Dr. Cartmel's deductions are substantiated experimentally it will mean that the theory of relativity will have to be discarded. Until such experimental proof is available, he added, Dr. Cartmel's work must be classed along with similar attempts to challenge the Einsteinian concepts, upon which rests in large part our present understanding of the physical universe.

The New York Times
Published: February 23, 1936