Einstein Upheld At Optical Meeting

Physics

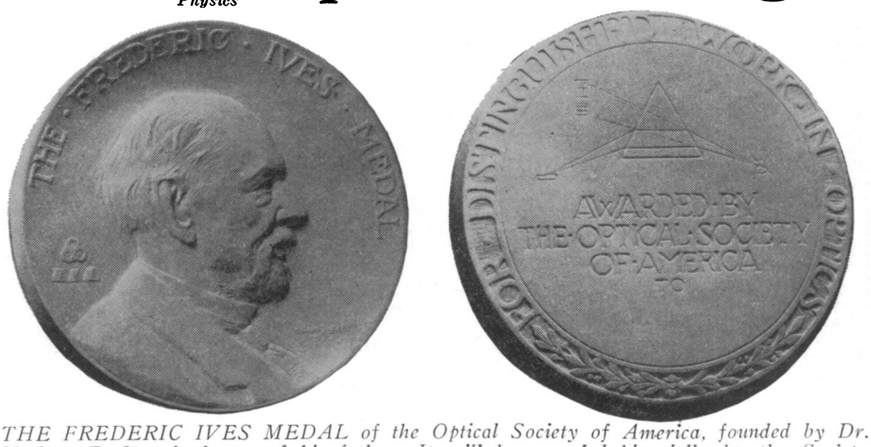
Following are reports of some of the interesting papers presented at the thirteenth annual meeting of the Optical Society of America at the U. S. Bureau of Standards, November 1 to 3. The meeting was known as the Michelson meeting, in honor of Prof. A. A. Michelson, "Dean of American Optics."

Although the theory of relativity has been claimed as dispensing with the need of the old-fashioned ether, permeating all space, and through which light, X-rays, radio waves, etc., are supposed to be transmitted, it does no such thing. This was the assertion made at the meeting of the Optical Society of America by Dr. Paul R. Heyl, physicist of the U. S. Bureau of Standards.

Speaking by invitation on present-day views of the nature of light, Dr. Heyl told how Einstein had suggested that gravitation could be explained, not as a real force, but as a manifestation of "curved space." An ant walking on a sheet of paper might not be able to tell whether the paper was curved or flat, and similarly our space might be curved in some unknown way without our knowing it. Since this would dispense with the need of believing in the ether as a means of transmitting gravitational force, it has been stated that the theory of relativity has done away with the ether.

"If relativity ignores the ether, does it not introduce what is to all intents and purposes its equivalent?" said Dr. Heyl. "The ether was supposed to be a medium filling all space that otherwise would be empty. Einstein supposes space itself to be enough of an entity to have a curvature, and to be 'empty' only where and when it is flat. But if space can be bent and straighten out again, why can it not repeat this process with sufficient rapidity to be called a vibration? And what difference does it make whether it is space itself that vibrates, or something that fills space? Back in every one of our heads is the idea that there is something which philosophers call a 'thing-in-itself' which is responsible for our sensations of light and electricity; and whether we spell it E-T-H-E-R or S-P-A-C-E, what does it matter?"

Einstein's theory of relativity still stands. The Michelson-Morley experiment, which many years ago failed to show an expected motion of the earth through the ether of space, and led to the relativity theory as an explanation, still fails to show any such motion. At the meeting Prof. A. A. Michelson, physicist of the University of Chicago and Nobel prize-winner, announced the final results of a repetition of his classic experiment.



THE FREDERIC IVES MEDAL of the Optical Society of America, founded by Dr. Herbert E. Ives in honor of his father. It will be awarded biennially by the Society "for distinguished work in optics"

Working at the Mt. Wilson Observatory in Pasadena with much improved apparatus, capable of detecting a motion as much as 2 per cent. of that expected, none was found. The very slight effect found was less than that to be expected by experimental error and not more than a tenth of what he found before.

Physicists hail this announcement as showing that Prof. Dayton C. Miller, of the Case School of Applied Science in Cleveland, was mistaken in supposing a few years ago that he had found such an effect, though smaller than originally expected. So far, however, they are unable to explain the source of Prof. Miller's error.

Cathode Rays for Laboratory

The wonder-working cathode rays, first obtained in large quantities in the open air two years ago by Dr. W. D. Coolidge, of the General Electric Company's research laboratory, are now at the disposal of any well-equipped research institution. The effects of the rays on all sorts of living and mineral matter can now be studied.

This is possible with a new form of the tube, simpler than an X-ray tube, and hardly more complicated than an electric light bulb, which has been perfected by Dr. C. M. Slack, of the Research Department of the Westinghouse Lamp Company, at Bloomfield, N. J.

Cathode rays were first studied as they were produced inside glass tubes made by the English scientist, Sir William Crookes. Then, in 1894, a German, Prof. P. Lenard, first succeeded in getting them in feeble quantities in the air. Dr. Coolidge, in 1926, invented a tube in which they were obtained in large quantities in the open air.

The rays consist of speeding electrons, the "atoms" of an electric current, and of which the atoms of matter are supposed to be built. In the Coolidge cathode ray tube they are produced by a glowing electric light filament, and given their great velocity by the application of an electric potential of several hundred thousand volts. This is sufficient to drive them through a thin nickel window at the end of the tube, where they cause the air to glow and produce other curious effects.

Dr. Slack's improved tube dispenses with the nickel window and uses a bubble of glass, but so strong is it that the pressure of the air on the outside is not sufficient to break it, and destroy the essential vacuum within. Some of these windows are only one five-thousandth of an inch thick and an inch in diameter.

They are made by drawing in a bubble of molten glass on the end of the glass tube, and then allowing it to freeze. Thus it automatically assumes the shape so that the air pressure afterwards is the same as that during its formation, and it will stand surprisingly high pressures. The glass is so thin that the electrons, or cathode rays, can sneak through the spaces between (*Turn to next page*)

Optical Society Meeting—*Continued*

the glass atoms, even though these spaces are not large enough for the air atoms to squeeze through in the other direction.

"Portrait" of Spectrum Shown

A "portrait" of the rainbow-like spectrum of the sun, painted by a prominent artist, was one of the features of the meeting.

The painting is the work of Charles Bittinger, of Boston, and was made in one of the laboratories at the Bureau. With the assistance of Dr. Irwin G. Priest and other scientists of the Bureau, he was able to select colors that most accurately represent the actual spectrum. The spectrum is of the "normal" type, obtained with a grating consisting of thousands of fine lines scratched on a polished metal surface. Instead of a grating a glass prism is often used to form a spectrum.

Jupiter Rotates on Movie Screen

Scientists attending the meeting paused from listening to papers on research to see a movie. They applauded it with as much vigor as any screen star ever received in a theater. The star of this movie was a heavenly "star"—the planet Jupiter, appearing on the screen for the first time in America.

Jupiter came into view, slowly and steadily turning as if driven by an electric motor. The great red spot and other details of its surface familiar to astronomers passed across its face. One of the moons of Jupiter came on to the screen from the side, rapidly approached the planet, then its shadow appeared on the planet's surface. Finally the grayish disc of the moon itself was seen silhouetted against the bright planetary background, though not as dark as the shadow.

These motion pictures, the first of their kind ever made, are the work of Prof. W. H. Wright, of the Lick Observatory, in California, and Dr. C. E. K. Mees, director of the research laboratory of the Eastman Kodak Company. Every minute or so during the whole of one night, Dr. Wright made photograph after photograph of Jupiter with the observatory's great 36-inch reflector. Jupiter turns completely in 10 hours, but as the best results could only be obtained when the planet was fairly high in the sky, it was necessary to repeat this on several other nights. Thus every aspect of Jupiter left its record on the sensitive emulsion.

Dr. Wright then turned the negatives over to Dr. Mees, and he combined them on a motion-picture film. This was particularly clever work, for each successive image must be in exactly the same place, or else the planet will seem to wabble when shown on the screen.

At a meeting of the Royal Astronomical Society in London last summer, Dr. Wright showed these for the first time. There they proved a genuine sensation to the astronomers.

Camera Makes "Solid" Photos

A new camera that makes photographs that appear solid to the eyes and which shows different sides of the object, depending on which way one looks at the picture, was shown.

Dr. Herbert E. Ives, under whose auspices television was developed by the Bell Telephone Laboratories, described the new camera, which he designed. The pictures made with it are called "parallax panaramograms." They differ from the double stereoscopic pictures, used in the old-fashioned twin lens hand stereoscope, because no optical aid is required between the eye and the picture. Also, the old style stereograms only show the subject as it would appear to a pair of eyes in one position. With a panaramogram of a person's head, for instance, if one looks at it from directly in front, he sees a full view of the face. If the picture is looked at from the side, one side of the face is seen. It is in full stereoscopic relief all the time.

The pictures are a modification of an invention of Dr. Ives' father, Frederic E. Ives, pioneer in the invention of the halftone process of reproducing photographs. With this parallax stereogram, as it was called, two pictures were taken with two cameras separated by the distance separating the average pair of eyes. These were then combined on a glass transparency, so that the picture consists of fine vertical strips, about 200 to the inch. One strip shows part of the picture seen by the left eye, the one next to it that of the right eye, then the left eye picture again, and so on.

Another glass is firmly mounted a short distance in front of the picture and on it are alternate clear and opaque vertical strips the same width as those of the picture. When the stereogram is held at arm's length and viewed against a light, the right eye sees only the strips of the picture made with the right-hand camera. Those of the left-hand picture are covered by the dark strips. But for the left eye the case is reversed. It sees only the left-hand picture, and the right-hand one is covered. Thus the two views are combined, and the picture is seen in stereoscopic relief.

How New Camera Works

In the new method, which is the invention of Dr. C. W. Kanolt, formerly of the U. S. Bureau of Standards—although Dr. Ives designed the camera that makes them—the picture is made from different angles. The Ives camera moves along a track in front of the subject during the exposure, so that the center of the subject is always on line with the center of the plate and the center of the lens. Just in front of the plate is a glass grating of alternate vertical light and dark strips, but the clear spaces are only one-tenth the width of the dark ones. The finished picture consists of strips, but one part of each strip shows the picture from one angle, while another part shows it from another angle. A similar grating is placed over the finished transparency, and so no matter what angle the picture is viewed from the proper picture appears. Unfortunately, so far as can be foreseen, there is no practicable way of applying the method to the movies.

Medal Honors Halftone Pioneer

Frederic Eugene Ives, of Philadelphia, one of the pioneer inventors to whom the now universally used halftone process of reproducing photographs in newspapers and magazines is due, was the recipient of a new honor when the Frederic Ives Medal was presented to the Optical Society of America. The medal will be awarded by the society biennially, "for distinguished work in optics." It is founded by Dr. Herbert E. Ives, Mr. Ives' son, and television expert of the Bell Telephone Laboratories. He presented the society with the dies for the medal and an endowment for its upkeep.

Science News-Letter, November 10, 1928

Sweden has more radio sets in comparison with its population than any other European country.

A life insurance statistician says that we eat 30 per cent. more food than our grandfathers and 374 per cent. more sugar.