

PROF. ALBERT A. MICHELSON AND HIS CONTRIBUTION TO SCIENCE.

THIS issue of our Journal is dedicated to Prof. Albert A. Michelson, as to the physicist, whose scientific genius in the field of Light research has given the world an enormous increase of most valuable knowledge. It is profoundly regrettable that this eminent scholar has departed from our midst during this year of review, and just at the very moment when he was at work on a new and most significant experiment, which was not destined to be completed by him.

With Prof. A. Michelson's death our Institute has further lost one of its most distinguished Honorary Advisors.

The following is a brief outline of Prof. Michelson's life and activities, as well as a short description of his most significant scientific achievements.

Albert Abraham Michelson was born in 1852 in Stelno near Posen. The family emigrated to the United States, where from 1873 to 1880 A. A. Michelson served in the U.S. Navy, then going to Europe to study at the Universities of Berlin, Heidelberg and Paris and returning to America, where he becomes first Professor at the Naval Academy of Annapolis and then at the Case School of Applied Science in Cleveland. Here in 1887 the now classical 'Michelson Experiment' took place. He then joins the Clark University, Worcester, Mass. and in 1893 the University of Chicago, where he becomes later Distinguished Service Professor and Head of the Department of Physics.

He has been honoured by all scientific organizations of the world, receiving the Nobel Prize for Physics in 1907 and holding the following distinctions: Doctor of Philosophy—Leipzig (1909), Goettingen (1911), Christiania (1911), Paris (1921); Doctor of Laws—Yale University (1901), Pennsylvania (1906), McGill University (1921); and Doctor of Science—Cambridge, Mass (1899), Princeton University (1927).

L'Académie des Sciences de Paris elects him in 1900 Correspondant pour la Section de Physique Générale and in 1920 their Associé Etranger.

His connection with the American Association for the Advancement of Science is also most significant. He joins the AAAS in 1877, is elected Fellow in 1879 and Emeritus Life Member in 1929. He was Vice-President of the

URUSVATI JOURNAL

Section of Physics in 1888, and heads this distinguished institution as President of the AAAS in 1910 (Second Minneapolis Meeting).

In 1928 the Meeting of the American Optical Society is called the 'Michelson Meeting' in honor of this 'Dean of American Optics'.

On May 10, 1931, he succumbed to cerebral hemorrhage. As a true scientist, he continued his research to the very last, trying his utmost to complete his new experiment. Reports state that he dictated scientific datae to the very last moment of consciousness.

Of all the phenomenae of nature, Light has since time immemorial fascinated the minds of those who devoted their lives to scientific research, even long before Roemer in the XVII Century measured the velocity of light by timing the eclipses of the satellites of Jupiter. Amongst the scientists of to-day Prof. Albert A. Michelson no doubt stands out as the most untiring, deep and successful research worker in this field.

It is true that science of to-day, despite whole centuries of persevering labour, cannot give a definite and indisputable reply to the question: 'What is light?' But it is also true that as far as comparative research of light, relative to known scientific datae, can go, Prof. Albert A. Michelson has added to the world's knowledge of light a colossal amount of most valuable material. He has no doubt also laid the foundation stone to what subsequently grew into Einstein's Preliminary Theory of Relativity in 1905, followed by Einstein's General Theory of Relativity in 1915. Prof. Albert A. Michelson is consequently to be regarded as the co-founder of the great discoveries of general physics, unifying the hitherto separate conceptions of electricity-magnetism-gravitation and time-space.

Prof. A. A. Michelson's first important scientific achievement in life was the famous 'Michelson-Morley experiment', which he performed in 1887, whilst at the Case School of Applied Science in Cleveland, in collaboration with his colleague Prof. E. W. Morley. The principle of this experiment, as is generally known, consists of his idea that if the earth moves in what physicists called ether, which was regarded the carrier of light, then a beam of light, moving in the same or opposite direction of motion of our earth, would travel either faster or slower, than light which travels at right angles to this direction.

This apparatus was built by Michelson and is called interferometer. It consists of a glass plate standing under an angle of 45° to a source of light

PROF. MICHELSON AND HIS CONTRIBUTION TO SCIENCE

and dividing the beam of light to travel in two directions perpendicular to each other. The whole device is mounted on a marble or steel base, floating and slowly rotating in a bath of mercury. The two beams of light, after division, are reflected by mirrors and then united, and if an 'ether-drift' exists, should have caused on combining dark bands on account of the interference of light waves. Michelson's interferometer proved that there is no drift from the motion of our planet in ether, and scientists, including Prof. A. Einstein, concluded from this that no such ether as carrier of light and filling space, as was assumed in the last century, exists.

The speed of light being 186,324 miles per second, the interferometer had to be very delicate to make any change visible, but as the earth's motion round the sun is almost 20 miles per second (and the supposed motion of our whole solar system is probably several hundred miles per second) Prof. Michelson succeeded in building an interferometer sufficiently sensitive to show a possible interference due to 'ether-drift' even at a far smaller velocity of our earth.

In 1925 Dr. Dayton C. Miller attacked the accuracy of this experiment, but Prof. Albert A. Michelson, despite serious illness, repeated it again in September, 1928, at the Mt. Wilson Observatory in Pasadena with a still better interferometer, which would have detected a motion fifty times less than that expected and his result was again in the negative, proving the absence of an 'ether-drift'.

Later an experiment was conducted on the same principle by Prof. G. Joos of Jena, Germany, in collaboration with the Zeiss Optical Works, with a most delicate instrument, known as the Joos-Zeiss interferometer, capable of detecting one-hundred-millionth of an inch deviations, and the result again proved Prof. Michelson's experiment to be fully correct.

Prof. Einstein has attended many of Prof. Michelson's experiments and after the results of his second experiment in 1928, Prof. Michelson is reported to have 'accepted all the consequences of Einstein's theory of relativity', yet maintaining his belief in the existence of ether, though he admitted that so far it cannot be proven.

Besides these experiments of 'ether-drift' and velocity of light, many more scientific achievements fall to Prof. A. A. Michelson's credit. He constructed an apparatus with the help of which the apparent diameters of several giant stars, like Alpha Orion, Alpha Bootes and Alpha Scorpion were measured and in general contributed much towards the knowledge of contemporary astrophysics.

His last experiment, so promising, was unfortunately interrupted by his death. At Santa Anna in South California, he had constructed a straight tube,

URUSVATI JOURNAL

about 3 feet in diameter and a mile long, in which the atmospheric pressure was reduced to a few mm., thus permitting light to travel in airless space, similarly to interplanetary conditions. By an arrangement of reflecting mirrors at the ends of the tube, the path of travelling of the ray of light was increased tenfold, giving a total length of about ten miles. Thus prepared to measure with most accurate up-to-date precision the velocity of light and to make further research in this field, he was carried away from us in the full glory and development of his activities by his fatal illness, but having earned forever humanity's gratitude through his enormous contribution to Science.

V. A. SHIBAYEV.