

approaching meteor. Not until the ionized column approximately reaches the point of intersection of the normal from the observing station to the ionized column can the stronger and more enduring broad-side echo be obtained. Secondary reflexions which appeared in the recordings can be attributed to the effects of drifts and diffusion which, as is known from visual meteor data, may cause irregularities in the train a few seconds after its formation. An example of a Giacobinid meteor echo, producing sufficient ionization around it for the track of the approaching meteor to be detected, is illustrated in the accompanying diagram, which is taken from a photographic recording.

These faint tracks resulting from the reflexion from the ionization in close proximity to the approaching meteor enabled the geocentric velocities to be determined without requiring a knowledge of the radiant position. The range-time characteristics, with few exceptions, were found to be representative of a body moving with uniform velocity in a straight line. The range R at any instant T is then given by

$$R^2 = R_0^2 + V^2 (T - T_0)^2,$$

where R_0 and T_0 represent the range and time when the range is a minimum and V is the geocentric velocity. From the analysis of twenty-two tracks, the

weighted mean of the computed velocities was found to be 22.9 km./sec., with root-mean-square deviation of 1.3 km./sec., the weighting factor being made proportional to the duration of the track. This mean value is in close agreement with the theoretical velocity of 23.7 km./sec. given by Dr. J. G. Porter, director of the Computing Section of the British Astronomical Association.

Sir Edward Appleton and R. Naismith, who in 1932 noticed the general occurrence of the transient ionospheric radio (or radar) echoes which are now known to arise from the ionization trails of meteors, took part in the discussion. The results which they obtained on the occasion of the Giacobinid Shower of October 10 were described in these columns a few weeks ago (*Nature*, 158, 936; 1946). Moreover, as a result of their systematic study of the diurnal and seasonal variations of both meteor ionization trails and sporadic ionization in the E layer of the ionosphere, they have been led to the important conclusion that the fine dust of sporadic meteors contributes substantially to the irregularities of ionization which have long been known to exist in the E layer. An account of these phenomena, and the descriptions of the investigations of the other radar workers mentioned above and of 60 Group R.A.F., are being given at a meeting of the Physical Society on January 31. J. S. HEY

NEWS and VIEWS

Gold Medal of the Royal Astronomical Society: Prof. M. G. J. Minnaert

PROF. MARCEL GILLES JOZEF MINNAERT, director of the Sonnenburg Observatory, Utrecht, has been awarded the Gold Medal of the Royal Astronomical Society for his outstanding contributions to solar physics and in particular to solar spectrophotometry. A pupil of Julius, he was later at Utrecht a colleague of Ornstein and Moll, and an early worker in the field of spectrophotometry, both developing the technique and applying it to a wide range of solar problems. He has taken part in a number of eclipse expeditions: to Sumatra in 1926 and 1929, and to Canada in 1932, all spoilt by clouds; his one successful expedition was to Lapland for the eclipse of 1927, where he obtained the first absolute values of the intensities of the chromospheric lines. He produced during the early days of the War a "Photometric Atlas of the Solar Spectrum", a most valuable contribution to solar spectroscopy. His later years in the War were spent in a concentration camp, from which he has emerged with his scientific enthusiasms undamped. He is chairman of the Commission on Spectrophotometry of the International Astronomical Union, a position for which he is well qualified by both experimental and theoretical studies. The distribution of energy in the sun's continuous spectrum and in that of the corona, the law of darkening of the sun's limb, and the polarization of the corona are among other subjects to which he has made valuable contributions. He has also worked on the direct photometry of Venus, the moon and red stars. His work is throughout characterized by a thoroughness, accuracy and care which have secured him a leading position in his own field. He was elected an associate of the Royal Astronomical Society in 1945.

Cadman Medal of the Institute of Petroleum: Mr. R. P. Russell

THE Council of the Institute of Petroleum has awarded the Cadman Memorial Medal to Mr. Robert Price Russell, president of the Standard Oil Development Co., the central technical and research organization of the Standard Oil Company (N.J.). Great services were rendered by Mr. Russell and his associates during the War in the production of high-octane aviation fuels, synthetic rubbers and toluene for explosives, and in the development of flame throwers, incendiaries and smoke generators. More than half the American output of aviation petrol for war-planes was manufactured by the catalytic cracking process, in which Mr. Russell played a notable part. Nine tenths of the American output of petroleum-based butadiene, the starting material in the manufacture of synthetic rubber, came from the process which Mr. Russell directed into large-scale production. In recognition of his war-time work, Mr. Russell was awarded the Medal for Merit, the highest civilian award in the United States. In 1946 he received the gold medal of the American Institute of Chemists for "noteworthy and outstanding service to the science of chemistry". Mr. Russell is well known personally in Great Britain, for he came here in 1944 as chairman of the Petroleum, Chemical and Rubber Division of the U.S. Strategic Bombing Survey. A team of scientific workers under his supervision entered Germany on the heels of the front-line troops to survey the enemy's vast oil-chemical industry.

Born in Massachusetts in 1898, Mr. Russell saw military service in the First World War; on resuming his studies, he obtained a master's degree in chemical engineering at the Massachusetts Institute of Technology in 1923. After holding some academic