Proceedings of the American Physical Society

MINUTES OF THE MEETING OF THE NEW YORK STATE SECTION AT HAMILTON, NEW YORK, APRIL 13, 1946

THE Spring Meeting of the New York State Section of the American Physical Society was held at McGregory Hall, Colgate University, on Saturday, April 13, 1946. This meeting was sponsored jointly by the section and the New York State Science Teachers Association. One hundred and twenty-five members and visitors registered at the meeting. The following program of invited papers was presented:

MORNING SESSION

Address of Welcome. SIDNEY J. FRENCH, *Dean of Faculty, Colgate University*

Recent Developments in Color Photography. JOHN A. TIEDEMAN, *Ansco Corporation*

Nuclear Physics in the Atomic Bomb Development. ROBERT F. BACHER, *Cornell University*

The Atomic Bomb and International Relations. CHARLES R. WILSON, *Colgate University*

AFTERNOON SESSION

The Physics of Radar. JOSEPH B. PLATT, *University of Rochester*

General Electric Fellowships for Science Teachers

The 1945 Summer Session

1. **Administrative Viewpoint.** V. ROJANSKY, *Union College*
2. **Teachers' Viewpoint.** ANNA M. PEARSALL, *Ithaca High School*
3. **Discussion**

Recent Developments in Procuring War Surplus Equipment. C. W. GARTLEIN, *Cornell University*

In addition to the above program a radar unit was demonstrated through the courtesy of the Signal Corps.

W. R. FREDRICKSON
Secretary

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MINUTES OF THE SPRING MEETING AT CAMBRIDGE, APRIL 25–27, 1946

THE 1946 Spring Meeting of the American Physical Society, the 271st of our meetings, was held in the buildings of Harvard University and of the Massachusetts Institute of Technology on Thursday, Friday, and Saturday, April 25–27, 1946. With eleven hundred registrants, this proved to be the greatest meeting we had ever held by ourselves, and second only to the joint convention four months earlier of our Society and the Association of Physics Teachers. Instructed by our advance underestimate of the previous December, we were not taken unawares; and the Local Committee—headed by J. C. Slater and J. H. Van Vleck—had at least a warning of the burden it might be expected to assume. This burden it carried admirably, and its arrangements were adequate in every detail. The Secretary has thanked many a Local Committee in the past, but some of his adjectives ought to have been reserved for the administrators of these postwar meetings, so much more demanding of labor than any that have gone before.

The circumstances of the time conspired to make this the outstanding "radar and microwave meeting" of the Society. Clearance, or declassification as the term is, had recently been granted to much of the work done in the fields so denoted during the war. What was even more important, the clearance had in many cases come so early that it was feasible for an informal committee of physicists familiar with the wartime work to organize a representative programme of invited papers, to solicit suitable contributed papers, and to sift the material apt for our meeting from the even greater amount more appropriate to other societies. Among those who thus helped to build the programme were J. B. Fisk, A. G. Hill, J. B. Kellogg, J. B. Knipp, J. C. Slater, and J. H. Van Vleck.

Three unified groups of invited papers were arranged by the informal committee, their topics

H11. A Convenient Dosage Unit for Radioactive Isotopes Internally Administered. G. FAILLA, *College of Physicians and Surgeons, New York.*—When irradiation equilibrium exists at a point in a mass of tissue, the rate of energy absorption is $3.7\times10^{10}qV$ ev/sec./gram, q being the concentration of isotope in the tissue in curies per gram and V the average energy per disintegration in ev. By incorporating the isotope in the "walls" of an ionization chamber, suitably constructed, it is possible to determine this quantity without knowing q and V. Since this quantity forms the basis of all biological dosage, it is convenient to express it in *roentgen-curies*. One roentgen-curie then represents the amount of any radioactive isotope that emits energy at the rate of 5.35×10^{13} ev/sec. (this being the amount of energy released by one roentgen in one gram of air). Since q and V (especially V) are difficult to measure accurately, the practical advantages of the scheme are obvious. For a given isotope, measurements of this type need be made only once. Thereafter ordinary methods suffice.

H12. A Radium Source Ion Gauge. G. L. MELLEN, *National Research Corporation* (Introduced by R. L. McCreary).—An ion gauge using a radioactive source is described. Constructional details are given and a brief coverage is made of the d.c. amplifier circuits associated with the gauge. Designed to measure pressures between one micron and ten millimeters, the gauge is not harmed by exposure to any pressure. Ionization is produced by the alpha-particles from a small "source" plaque containing approximately 200 micrograms of radium. The active deposit is a gold-radium alloy bonded to a silver backing and is only a few microns in thickness so that it is a highly efficient alpha-emitter. Since ionization is the mode of pressure measurement, the gauge response is a linear function of pressure throughout its operating range. Extension of the range allows for calibration at any higher pressures. By suitable choice of gauge constants, a measuring device may be made for any pressure interval. Of rugged mechanical construction, this gauge has found immediate use in the high vacuum field.

J1. A Pulsed Mass Spectrometer with Time Dispersion. W. E. STEPHENS, *University of Pennsylvania.*—Advances in electronics seem to make practical a type of mass spectrometer in which microsecond pulses of ions are selected every millisecond from an ordinary low voltage ion source. In travelling down the vacuum tube, ions of different M/e have different velocities and consequently separate into groups spread out in space. If the ions are collected in a fixed Faraday cage and the current amplified, then pulses of current corresponding to different ion M/e will be dispersed in time. If the amplified current pulses are put on the vertical plates of an oscillograph whose sweep is synchronized with the pulses, then an M/e spectrum of the ions will be exhibited. This type of mass spectrometer should offer many advantages over present types. The response time should be limited only by the repetition rate (milliseconds). The indication would be continuous and visual and easily photographed. Magnets and stabilization equipment would be eliminated. Resolution would not be limited by smallness of slits or alignment. Such a mass spectrometer should be well suited for gas composition control, rapid analysis, and portable use. A mass spectrometer of this type is being constructed.

J2. The Ionization Potential of CH_2. A. LANGER AND J. A. HIPPLE, *Westinghouse Research Laboratories, East Pittsburgh, Pennsylvania.*—The free radical, CH_2, was produced in the ionization region of a mass spectrometer by the thermal decomposition of diazomethane. The arrangement was similar to that used previously[1] in the measurements of the ionization potentials of CH_3 and C_2H_5 from the decomposition of $Pb(CH_3)_4$ and $Pb(C_3H_5)_4$. Only preliminary measurements of the ionization potential of CH_2 are available since events have intervened which temporarily prevent the completion of the experiment. This preliminary value is $I(CH_2)=11.9\pm0.2$ volts. From the process in methane

$$CH_4+e\rightarrow CH_2^++H_2+2e$$

it is predicted that $I(CH_2)\leqq12.0$ volts.[2] The agreement of this value with that measured directly indicates the formation of CH_2^+ in methane occurs with little excitation or kinetic energy of the fragments.

[1] J. A. Hipple and D. P. Stevenson, Phys. Rev. 63, 121 (1943).
[2] L. G. Smith, Phys. Rev. 51, 263 (1937).

J3. Scattering and Absorption of High Voltage X-Rays in Steel. HERMAN FESHBACH AND JOHN A. HORNBECK,* *Physics Department, Massachusetts Institute of Technology.*—The passage of a parallel x-ray beam through steel has been investigated theoretically and experimentally. The x-rays were produced by electrons striking a thick gold target. The electron energy varied from one to two Mev. Using steel thicknesses up to twelve inches, intensity measurements were made of the total radiation immediately below the steel and of the "direct radiation" coming directly from the x-ray source. The difference between these is scattered radiation. The absorption coefficient of the total radiation approached a value independent of steel thickness. This, it can be shown, equals the absorption coefficient of the maximum energy x-ray present in the beam. The Klein-Nishina formula was verified. It was found that the ratio of scattered to direct radiation was proportional to steel thickness. The theory begins by resolving the incident beam into "equilibrium" energy distributions; distributions whose absorption coefficients are independent of steel thickness. An integral equation for these distributions was derived and solved approximately. Using the experimental data for the total radiation it was possible to compute the scattered radiation. The agreement with measured values was good. The effects of filtration and the angular distribution of the scattered radiation could then be calculated.

* Now at the Bell Telephone Laboratories, Inc., Murray Hill, New Jersey.

J4. Measurement of Betatron Radiation with G-M Counter. C. O. MUEHLHAUSE AND H. FRIEDMAN, *U. S. Naval Research Laboratory.*—The pulses of x-rays from a betatron are of shorter duration than the deadtime of