

microwave frequencies) when received at the earth's surface. W. Dieminger, Institut für Ionosphärenforschung, Lindau, Germany, discussed the "Origin of Ionospheric Scattering". Several types of scattered signal may be distinguished: E, single-hop F, double-hop F, and G. Under proper conditions strong multiple ionospheric echoes are obtained which may be attributed to back scatter from the ground. Back scatter from distant locations, such as remote mountains, may easily be observed.

With respect to motions of ions in the atmosphere at ionospheric altitudes, K. Weekes, Cambridge University, Cambridge, England, presented "Ionospheric Winds". From an analysis of fading phenomena found at appropriately spaced receivers, Dr. Weekes found wind velocities of about 210 km/hr with a maximum speed of about 288 km/hr. A diurnal variation in direction was found, which during June indicated a west wind (in the meteorological sense—from the west) from 06 to 18 local mean time, and an east wind from 18 to 06 LMT. Such daily variations are to be expected from the theory on geomagnetism. During a magnetic storm an apparent speed of 1800 km/hr was estimated for the wind. In discussing "Diffusion Processes in the Ionosphere", M. H. Johnson, Naval Research Laboratory, Washington, D. C., noted that the results of his theory indicate that the scale height near 250 km is greater than 100 km and that the number density at 250 km is about  $10^6/\text{cm}^3$ . A marked change of the atmospheric state between the altitudes of 200 and 250 km is indicated. In a strong magnetic field, no pressure diffusion is possible. Analyzing data for Huancayo, Peru, Dr. Johnson found that the virtual height of the F ionospheric region fell rapidly during the darkness period.

D. F. Martyn, Australian Council for Scientific and Industrial Research, Canberra, discussed his recent work in "Traveling Disturbances in the Ionosphere". He found electron clouds which show vertical movement and, over both England and Australia, distinct horizontal motions. Vertical motions of the electrons indicated speeds of about 250 km/hr. Average F region electron velocities, observed over Australia during the interval 06–18 local mean time, revealed winds from the south and southwest during August and from the northwest and north during November. August speeds were about 480 km/hr. During April an abrupt change in wind direction from the southwest to the northwest was observed; the reverse effect was noticed during October.

In a second paper, Dr. Martyn presented "The Mechanism of Magnetic Storms and Aurorae". Idealized current systems found in the upper atmosphere were presented after the fashion of Chapman and Ferraro; on the basis of these currents, magnetic effects and the aurorae could be explained. Extending these theories, Dr. Martyn visualized the stream of particles flowing from the ring current to the upper atmosphere and then leaving at the opposite side a small circle forming the aurora. Thus the aurora is visualized as being formed by particles which are first trapped or forced to remain for a short time in the ring current, then join the auroral current, and then leave the aurora.

In two papers, "The Motions of Very Slow Electrons in Air" and "Ionospheric Cross Modulation", L. G. H. Huxley, Adelaide University, Adelaide, South Australia, developed the theory and presented results of experiments dealing with the Luxembourg Effect. Dr. Huxley noted the rise in temperature in an electric field and from considerations of the drift velocity and relaxation time, obtained the theoretical basis for interpreting this cross-modulation experiment.

Two papers dealt with ion reactions and mechanisms in the ionosphere. The first paper dealing with this vitally important subject, "Evidence on Recombination Processes from Laboratory Measurements of Ionized Gases", was presented by J. Sayers, The University, Birmingham, England. Employing an electrode discharge in high purity Argon, a recombination coefficient of the order of  $10^{-30} \text{ cm}^3/\text{sec}$  was obtained. This value, of the same order of magnitude as that found in the F<sup>2</sup> ionospheric region, is pressure independent. However, some doubt exists regarding the actual recombination process involved and the effect of contaminants. D. R. Bates, University College, London, England discussed "Ionization and Recombination Processes in the Ionosphere". The possibility of resonance scattering of sunlight by  $\text{N}_2^+$  atoms in the high atmosphere was mentioned. Cross sections for various photoionization processes possible in the ionosphere were examined. The probability of such mechanisms as predissociation of molecular oxygen and photodetachment of electrons from atomic and molecular oxygen was discussed. Radiative and neutralization recombination processes possible in the high atmosphere were investigated. Dissociative recombination, attachment, detachment and charge transfer mechanisms among the important atmospheric constituents were examined to determine most probable reactions. It was concluded that the main reaction in the E ionospheric region involved dissociative recombination of an electron with molecular oxygen; for the F regions the probable reaction is yet in doubt.

A most important aspect of the conference was the three symposia held during the afternoon or evening. The first symposium, moderated by S. K. Mitra, dealt with "The Physical Characteristics of the Upper Atmosphere". The second, presided over by D. R. Bates, encompassed "The Characteristics of and Processes in Ionized Media". The third, under the direction of D. F. Martyn, considered "The Dynamic Characteristics of the Ionosphere". In each symposium a lively discussion ensued with the audience vigorously participating.

The conference was very fortunate in having as an after-dinner speaker, L. V. Berkner, Carnegie Institution of Washington, Washington, D. C. Dr. Berkner addressed the group on "Signposts to the Future of Ionospheric Research" and in his enthusiastic fashion portrayed the growth of the science. Important milestones in past progress of ionospheric research were outlined, as well as the importance of determining, for example, such factors as coupling between the lower and upper atmospheric regions. The utility of such sciences as paleontology in estimating past atmospheric conditions and the possible suddenness of changing atmospheric composition and subsequent effects on life were vividly presented.

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## MEETINGS TO BE HELD

### AAAS SESSION ON SOCIAL PHYSICS

Four papers falling under the general category of "social physics" will be presented during a special session of the Cleveland meeting of the American Association for the Advancement of Science in December. The program is being sponsored jointly by the sections on engineering and social science and will include the following papers: "What is Social Physics?" by John Q. Stewart of Princeton University; "Dynamics of Economic Growth" by W. F. Sutherland of the Toronto Hydro-Electric System; "Dimensional Analysis in Social Physics" by Stuart Carter Dodd of the University of Washington; and "The American Chemical

Industry—Empiric Regularities in its Production, Distribution, Competition, and Product Distribution" by George Kingsley Zipf of Harvard.

#### CYBERNETICS

The French National Center of Scientific Research is to sponsor an international colloquium on calculating machines and human thought from January 8th to 12th in Paris. A number of Americans interested in the subject have been invited to attend. These include H. H. Aiken of Harvard, E. W. Cannon of the National Bureau of Standards, Norbert Wiener of the Massachusetts Institute of Technology, and E. C. Berkeley of New York City.

#### HIGH FREQUENCY MEASUREMENTS

The second conference on high frequency measurements, to be held under the joint sponsorship of the American Institute of Electrical Engineers, the Institute of Radio Engineers, and the Bureau of Standards January 10-12, will have its headquarters at the Hotel Statler in Washington. Technical sessions will be held in the auditorium of the Department of the Interior.

#### ELECTRON EMISSION

A second symposium on electron emission is to be held at New York University next January 30 and 31 under the joint sponsorship of the American Physical Society's division of electron physics and the panel on electron tubes of the Research and Development Board of the Military Services. The first such symposium was held in January 1950 and was devoted exclusively to thermionics. For the forthcoming meeting, papers will be accepted on all types of emission, such as thermionic, field, photoelectric, and secondary emission. Those interested in contributing papers or attending should communicate with R. L. Sproull, Department of Physics, Cornell University, Ithaca, N. Y. for further information.

#### DATES CHANGED

The 1951 Pittsburgh conference on analytical chemistry and applied spectroscopy, sponsored jointly by the Spectroscopy Society of Pittsburgh and the Pittsburgh section of the Chemical Society, will be held from March 5th to 7th, instead of in February as previously announced. The conference will be held at the William Penn Hotel in Pittsburgh and will feature an exposition of modern laboratory equipment.

#### BUILDING RESEARCH CONGRESS

Plans have been announced for a congress on building research to be held from September 11th to 20th, 1951 in London. Sponsored by a number of professional institutions and learned societies of Great Britain, including the Physical Society, the Department of Scientific and Industrial Research, and the Illuminating Engineering Society, the Congress is intended to review all aspects of building science. The program will include a session on room acoustics with papers to be given by L. L. Beranek, F. Canac, W. Furrer, C. W. Kosten, F. Ingerslev, E. Meyer, and others. Additional sessions will deal with structural research, soil mechanics and foundations, building materials, and problems in lighting and temperature control. The Congress will take place during the period of the Festival of Britain, 1951, and visitors attending the Congress will therefore be able to attend the various exhibits planned in connection with the Festival. Correspondence should be directed to the Organizing Secretary, Building Research Congress 1951, Building Research Station, Watford, Herts., England.

# Calendar of events

## December

- 5 Society for Applied Spectroscopy, New York City
- 5-7 American Meteorological Society, Tallahassee, Florida
- 7-9 American Institute of Mining and Metallurgical Engineers, Pittsburgh, Pennsylvania
- 16 Institute of Aeronautical Sciences' 14th Wright Brothers Lecture, Washington, D. C.
- 16-19 American Academy of Optometry, Chicago, Illinois
- 26-30 American Association for the Advancement of Science, Cleveland, Ohio
- 27-31 American Astronomical Society, Haverford, Pennsylvania
- 28-30 National Convention of Sigma Pi Sigma, Berea College, Berea, Kentucky
- 28-30 American Physical Society, Los Angeles, California
- 30 Mathematical Association of America (34th Annual Meeting), Gainesville, Florida

## January

- 8-12 French National Center of Scientific Research International Colloquium on Calculating Machines and Human Thought, Paris, France
- 8-12 Society of Automotive Engineers, Inc. (Annual Meeting), Detroit, Michigan
- 9 Society for Applied Spectroscopy, New York City
- 10 Sectional Meeting of World Power Conference, New Delhi, India
- 10-12 High Frequency Measurements Conference (Sponsored by American Institute of Electrical Engineers, Institute of Radio Engineers, and National Bureau of Standards, NBS Semiconductors), Washington, D. C.
- 18-20 Society of Plastics Engineers, Inc., New York City
- 22-26 American Institute of Electrical Engineers (Winter Meeting), New York City
- 29-1 Institute of Aeronautical Sciences (19th Annual Meeting), New York City
- 30-31 Division of Electron Physics of American Physical Society and the Panel on Electron Tubes of Research and Development Board Electron Emission Symposium, New York University, New York City

## February

- 1-3 American Physical Society, New York City
- 1-3 American Association of Physics Teachers, New York City
- 6 Society for Applied Spectroscopy, New York City
- 28 Inter-Society Color Council, Washington, D. C.

## March

- 1-3 Optical Society of America, Washington, D. C.
- 5-7 Conference on Analytical Chemistry and Applied Spectroscopy, Pittsburgh, Pennsylvania
- 5-9 American Society of Testing Materials, Cincinnati, Ohio
- 8-10 American Physical Society, Pittsburgh, Pennsylvania
- 13-16 National Association of Corrosion Engineers, New York City

## April

- 2-5 American Society of Mechanical Engineers, Atlanta, Georgia
- 5-7 Southeastern Section, American Physical Society, Chattanooga, Tennessee
- 26-28 American Physical Society, Washington, D. C.
- 26-28 Division of High Polymer Physics, American Physical Society, Washington, D. C.

## May

- 10-12 Acoustical Society of America, Washington, D. C.
- 13-16 American Institute of Chemical Engineers, Kansas City, Missouri
- 23-24 American Society for Quality Control, Cleveland, Ohio
- 28-6 Third World Petroleum Congress, The Hague, Netherlands

## June

- 11-15 American Society of Mechanical Engineers, Toronto, Canada
- 14-16 American Physical Society, Schenectady, New York
- 18-22 American Society for Testing Materials, Atlantic City, New Jersey
- 25-26 American Society for Engineering Education and Mathematical Association of America (Joint Meeting), Michigan State College, East Lansing, Michigan
- 25-28 American Physical Society, Vancouver, Canada
- 25-29 American Institute of Electrical Engineers, Toronto, Canada
- 27-3 International Union of Crystallography, Stockholm, Sweden

## July

- 16-21 Conference on Automatic Control (Sponsored by Department of Scientific and Industrial Research), London, England

## August

- 21-1 International Union of Geodesy and Geophysics, Brussels, Belgium