Miscellany

Research Notes

The virtual energy level of the deuteron (the singlet state) has in the past been determined experimentally even though its very existence would seem unlikely in view of the negative binding energy involved. Theoretically a puzzle, the virtual level has been defined both in terms of scattering theory and of the theory of nuclear resonance levels. A "simple connection" has now been derived between these somewhat different definitions by S. T. Ma of the Canadian National Research Council, who discusses the virtual energy level in an article appearing in the most recent issue of *Reviews of Modern Physics* (October 1953).

Another new meson has turned up, according to a report in the January 1 *Physical Review* by a group at the University of Rochester. In scanning a series of emulsions exposed at 102 000 feet during an ONR balloon flight, a track was observed that stopped in the emulsion with a single positive pi-meson track emerging from its end. Mass measurements on the primary gave a mass of about 950 electron masses and it is suggested that the event represents the alternate decay mode of a positive tau meson, which ordinarily breaks up into three pi mesons. In this case the single pi track was taken to mean that two neutral pi mesons were also emitted, since the energy of the emitted charged pi was such as to rule out the possibility of the primary having been either a kappa or a chi meson.

The problem of adequately illuminating museum specimens while avoiding damage from the radiant energy has been considered by Deane B. Judd of the National Bureau of Standards. Ordinary incandescent lamps do no harm but give poor illumination and color rendition; fluorescent lamps produce a high light intensity and "color rendition approaching that of natural daylight", but the ultraviolet radiation they emit is harmful to paper, textiles, and pigments. Comparative studies of the zenith sky, the sun, several types of fluorescent lamps, and the incandescent lamp alone and in combination with filters showed that the most effective artificial illumination with negligible radiation hazard could be obtained with cool-white fluorescent tubes in combination with filters such as Greenish Nultra.

Vision and hearing appear to have many similarities, according to a paper given by S. Smith Stevens of Harvard at the Fall meeting of the National Academy of Sciences. He studied responses to light and sound as a function of their intensity, and finds that "to a crude first approximation, brightness and loudness are proportional to the cube root of the stimulating energy". Further, if visual and auditory responses are both plotted on a decibel scale with the zero point representing the lower limits of sight and hearing, the most satisfactory energy level in each case turns out to be about 80 decibels. Discomfort results from more than 120 decibels of either sound or light energy. Professor Stevens does not attempt to predict whether these similarities will turn out to be merely coincidental or to have some basic physiological significance.

Tritium in the atmosphere has been measured in both molecular hydrogen from the air and in rain water, with the result that there seems to be about a thousand times more tritium in the H_2 of the atmosphere than in the H_2O. Scientists at Temple and Columbia Universities collaborated in this work, and their report in the January 1 *Physical Review* expresses the belief "that this is the only case where the isotopic ratios vary in nature by such a large extent". The tritium is produced by cosmic-ray interaction with air nuclei, and an explanation for the greater proportion of HT than HOT is presented, based on the slow rate of tritium exchange between molecular hydrogen and water in the upper atmosphere.

Education

A bill to authorize the establishment of a permanent nine-member National Advisory Committee on Education in the Department of Health, Education, and Welfare has been introduced by Senator Alexander Smith of New Jersey in response to recommendations regarding education made by the President in his State of the Union message in January. The bill (S. 2724) has been referred to the Committee on Labor and Public Welfare of the Senate. A companion measure, introduced at the same time, would provide funds for the organization of state and national conferences on education.

The Pupin Lectures for 1954 have been announced by Columbia University as part of the observance of the 200th anniversary of the founding of the university. The first talk was held February 19, with H. C. Urey speaking on "Chemical Evidence on the Formation of the Solar System". Future lectures in this series are as follows: March 19, I. I. Rabi on "Molecular and Atomic Beams"; April 2, W. Pauli on "The Connections of Time and Charge Reversal with Statistics"; May 14, H. A. Bethe on "Scattering of pi-Mesons by Nucleons"; October 1, J. Schwinger on "Quantum Field Theory"; November 19, P. A. M. Dirac on "Some Aspects of Quantum Electrodynamics"; and December 10, J. R. Oppenheimer on "Some Outstanding Problems in Theoretical Physics". These lectures will be given in Room 301 of the Pupin Physics Laboratories at Columbia at 5 PM on the dates listed (which are Fridays).

A short course on high temperature properties of materials will be held at The Pennsylvania State University June 21–25, inclusive. Following this course, one on the mechanics of creep will be conducted from

June 28 to July 2. Authorities from industrial, governmental, and educational institutions will give the lectures for both courses. The programs are planned to give a broad coverage of high temperature properties of materials and mechanics of creep by including physical, metallurgical, and design aspects of the subjects. For further information, write to Dr. Joseph Marin, Department of Engineering Mechanics, The Pennsylvania State University, State College, Pennsylvania.

Grants and Awards

Forty-two unclassified physical research contracts with universities, private research institutions, and industrial laboratories have been announced by the Atomic Energy Commission. The contracts, which generally were for a term of one year, were let as part of the AEC's continuing policy of utilizing private research laboratories in conducting research related to atomic energy. Among the contracts awarded are the following: California Institute of Technology, precision nuclear spectroscopy (J. W. M. DuMond); Carnegie Institute of Technology, research on properties of rare metals (J. E. Goldman); Columbia University, microwave spectroscopy (C. H. Townes); Illinois Institute of Technology, investigation of imperfections in solids (T. J. Neubert); University of Pennsylvania, solid state physics at low temperatures (W. F. Love); Purdue Research Foundation, research in nuclear reactions with fast alpha particles, neutrons and deuterons, and a study of nuclear structure (E. Bleuler), basic research using high-energy electrons and x-rays produced by a 300 Mev synchrotron (R. M. Whaley), and linear electron accelerator for nuclear physics (K. Lark-Horovitz); Sylvania Electric Products, Inc., self-diffusion and high-temperature phenomena (W. E. Kingston); University of Tennessee, studies on the direct measurement of the energy changes resulting from plastic deformation and phase transformations (E. E. Stansbury); University of Washington, sixty-inch cyclotron program (J. H. Manley); Washington University, generation of high voltages by means of nuclear radiations (J. W. Kennedy); and University of Wisconsin, low-temperature research (J. R. Dillinger).

Applications for grants in aid of chemical research from the Cyrus M. Warren Fund of the American Academy of Arts and Sciences should be received by the chairman of the committee, Professor Edwin R. Gilliland, Massachusetts Institute of Technology, Cambridge 39, Massachusetts, not later than April 22nd. Grants are generally made for apparatus and supplies needed for research. Application blanks will be sent upon request.

Graduate and advanced industrial research fellowships in electronics are now being offered by MIT under the joint sponsorship of a group of industrial organizations. Applicants for the graduate program must satisfy the requirements for admission to the graduate school on recommendation of the department of physics or the department of electrical engineering. Fellows will pursue programs of study and research leading towards advanced academic degrees in physics or electrical engineering. A few advanced research fellowships will be awarded to candidates with PhD's or the equivalent who wish to pursue advanced studies and research in electronics without enrolling as graduate students. Additional information can be obtained by writing to the Director, Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge 39, Massachusetts.

The department of oceanography, Texas A & M College, has announced graduate and research assistantships in physical oceanography, available to outstanding graduates in physics for 1954–55, amounting to $1800 each. Also, fellowships in engineering oceanography and assistantships in the fields of biological, geological, chemical, and meteorological oceanography, providing $900 to $3000 each, are available. Assistants in physical oceanography take standard curricula leading to the MS or PhD degree. They also take additional graduate work in physics and in the basic sciences or in engineering. In the assistantships, duties with the department would consist of aiding in the program of oceanographic research sponsored by various government agencies and by industry. Applications should be submitted by March 30, 1954. Most awards will be announced April 15, although additional openings are expected to occur after that date. Further information may be obtained by writing to the Head of the Department of Oceanography, College Station, Texas.

Research Facilities

A combustion laboratory is scheduled to be constructed by the General Electric Company at Schenectady this year at a cost of $1.8 million. The new laboratory will be devoted chiefly to basic scientific studies of combustion processes, according to C. G. Suits, director of research at G-E, and is designed to "bridge the gap between theoretical studies and realistic evaluation of these theoretical findings".

General Electric has also announced the construction of a new $300 000 general purpose radiation laboratory at Schenectady for use in programs involving the application of radioisotopes to the solution of industrial problems, development, testing, and application of various types of particle accelerators, studies of radiation damage, development of techniques of radiation shielding and of neutron activation analysis, and calibration of radiation instruments. The building, a part of the General Engineering Laboratory, will house six separate hot laboratories equipped with the latest facilities for safe handling of radioactive materials. Equipment presently planned includes an accelerator neutron source, several isotope radiation sources, remote handling devices, and associated radiation measuring equipment.

Arthur D. Little, Inc., consulting research and engineering concern in Cambridge, Massachusetts, has