the Stanford six million electron volt linear electron accelerator which presages a two billion electron volt one. Bradner, Bishop, Barkas, and Smith are applying improved techniques to make more precise meson mass determinations. Miller, Henderson, Potter, and Todd have made a careful study of the meson and proton momentum spectrum at three and four-tenths kilometers altitude. Lanczos has made an approach to a unified field theory by a logical extension of Einstein's field equations.

A good time. . . . —S. Neddermeyer

SCINTILLATION COUNTERS

CONFERENCE AT OAK RIDGE

During the past year, the scintillation counter has received widespread acceptance as a fundamental tool of nuclear research. It offers three advantages over previous counters: The light output is proportional to the amount of energy lost by the particle, thereby supplementing the beta proportional counter in the high energy region; it detects gamma rays about a hundred times more efficiently than Geiger counters, without a corresponding increase in cosmic ray background; and the time of passage of the primary particle can be measured to a hundred millionth of a second.

This was brought out at a conference on scintillation counters, held in Oak Ridge on June 3 and 4, the second of a series of conferences sponsored by the Oak Ridge National Laboratory, the first being the low temperature symposium of last summer. The scintillation conference was attended by approximately one hundred and seventy-five people which included one hundred and twenty-five out of town visitors from universities, industries, and government agencies throughout the country.

A conference on this same topic was held at Rochester a year ago, and so it is possible to review the progress made in this brief time. The theory of scintillation phosphors has been considerably advanced, chiefly by F. Seitz (of Carnegie Institute of Technology) and the Purdue group. Photomultipliers with much higher gain have been made experimentally and may soon be available in limited quantities. Several new phosphors have been discovered and the characteristics of all are much better known. The most commonly used transparent phosphors are anthracene, stilbene, and sodium iodide. Sodium iodide has a higher sensitivity to gamma rays per cubic centimeter of crystal than anthracene, but decays more slowly. Stilbene is faster than anthracene but the light output is not as great.

The first day of the conference was devoted chiefly to four lectures. H. Kallmann, of the Signal Corps laboratories, reported on the work that led to his discovery that naphthalene could be used in conjunction with a photomultiplier to count beta particles. He also described his subsequent investigations of other phosphors. Seitz discussed the possibility of obtaining crystals that would exhibit multiplication properties similar to a Geiger counter. George Morton, of the RCA Research Laboratories, reviewed the design and characteristics of present day photomultiplier tubes, particularly with reference to scintillation counting. P. R. Bell, physicist at the Oak Ridge National Laboratory, described his scintillation spectrometer and showed examples of its use for measuring the beta spectrum of several isotopes. This apparatus was demonstrated at the conclusion of the session.

Over one hundred members attended a dinner after which Dr. Kallmann told of some of his work at the Kaiser Willhelm Institute, and the tremendous difficulties of obtaining apparatus.

The second day's session was devoted to a discussion of the various aspects of scintillation counting. Several experiments in which scintillation counters were the primary tool were described: R. Hofstadter showed that gamma rays are scattered as predicted by the Klein-Nishina formula; L. F. Wouters described some of the work going on at Berkeley with fast neutrons and protons; and Martin Deutsch, who served as chairman of both sessions, gave an account of his work on the time of decay of the positron in various gases. Most of the second day was spent in discussing photomultiplier tubes, phosphors, light collectors, and electronic circuits.

—W. H. Jordan

THIN SLICES

FOR THE MICROSCOPE

Slices of metal and biological specimens less than two millionths of an inch thick may be cut with a new high-speed microtome developed by E. F. Fullam of the General Electric Company's research laboratory. The specimen is sliced by the shock wave which forms in the sample ahead of a knife blade moving with the speed of sound. A screw device feeds the specimen and its embedding material into the path of the knife which, mounted on a wheel spinning at sixty-five thousand revolutions per minute, is driven through the air at speeds up to seven hundred and fifty miles per hour.

Another method in ultramicrotomy for use in preparing very thin sections of biological tissue has been developed by S. B. Newman, Emil Borysko, and Max Swerdlow of the National Bureau of Standards. It provides for polymerizing an optically clear and easily cut embedding medium around the specimen. Smooth and continuous thermal expansion of the metal specimen holder towards the knife of a slightly modified conventional microtome can provide sections of tissue having uniform thickness of fractions of a micron over a large area, according to an announcement from the Bureau.

THIN FILMS

INTERNATIONAL CONFERENCE REPORTED

There are very few people who spend much time on the optical properties of thin films and a large percentage of them attended an international conference on the optical properties of thin films held at Marseille from April 19 to 23. The conference was sponsored by the French Centre National de la Recherche Scientifique and was organized by P. Rouard, the director of the physics laboratories of the Faculté des Sciences at Marseille. Among the representatives were A. Vasicek from Czechoslovakia, P. Jacquinot, M. Perrot, and P. Rouard from France,

K. Greenland, O. S. Heavens, H. Kuhn, and S. Tolansky from England, P. Van Alphen and B. Blaisse from Holland, M. Ballerini from Italy, M. Schaetti from Switzerland, B. Billings, J. Strong, N. Scott, and A. Turner from the United States. Twenty-five people contributed papers.

Although few scientists are actually studying these thin layers, there are many people who use the optical properties of these films. The nonreflection coating which is becoming standard equipment on binoculars and camera lenses, the silver interference filters, and the aluminized mirrors of astronomical telescopes and of spectrographs are all examples of the application of the optical properties of thin films.

At the conference it was possible to see where thin films are likely to become more useful to scientists. Part of this increased usefulness will arise from new devices which utilize thin films. Part will arise from methods which have been devised for making films more permanent.

For the spectroscopists, a method was discussed which would make it possible to get still higher resolution than is obtained with standard interference spectroscopes. This was accomplished successfully by using two Fabry-Perrot etalons in series. In another paper this same idea was applied to interference filters. The simple interference filter consists of a thin film of transparent material which is between two semi-transparent layers of silver. Light reflected from one side of the filter interferes with light reflected from the other side. In the new filter discussed at the conference, two filters could be considered as coalesced into one. There are two dielectric layers each between a layer of silver with one layer of silver common to both. The filter gave a narrower passband and higher peak transmission than the common filter.

Professor Tolansky of England described an application which should be particularly interesting to those studying piezoelectricity. He photographed the fringe pattern formed on an oscillating quartz plate in a Fabry-Perrot interferometer. The fringe pattern made a series of loops and nodes from which one could deduce the manner in which the crystal was vibrating.

A series of slides of various telescope mirrors which he had aluminized were shown by Professor Strong of the United States. The slides were arranged in chronological order, beginning with some small mirrors and ending with the Mount Palomar two hundred-inch. Professor Strong was present in at least one photograph of each mirror and one could see that as the mirrors got larger Professor Strong's hair became greyer.

Professor Rouard of France discussed the reflectivity of thin metal films. When light goes through a plate of glass there is reflection from both sides of the plate. A thin metal coat of the proper thickness will reduce the reflection at the back side of a glass plate to zero. Professor Rouard gave an unusual demonstration of this phenomenon. The metal coating was wedge shaped. Where the filter was of the correct thickness to reduce the reflection, it appeared black.

In the form of thin films, matter in general no longer possesses its bulk properties. The properties of a film of any given material can be made to cover a wide range of values simply by changing some of the conditions under which the film is prepared. Another series of papers was concerned with the measurement of the index of refraction and thickness of thin films. The polarimetric method seems to be one of the most powerful. In this technique, polarized light is reflected from the sample and a measurement made of its phase and intensity change. Film thicknesses as low as ten angstroms can be measured.

The collected papers presented at this symposium are being published by the French Centre National de la Recherche Scientifique. Professor Rouard of Marseille is collecting the manuscripts and arranging for the publication.

The choice of Marseille as a conference center was a particularly happy one. The weather was magnificent and the Marseille group organized several trips which provided relaxation from the strain of the sessions. One whole day was taken for a visit to the observatory of Saint Michel. Those who attended the conference were particularly impressed with the overwhelming hospitality of the Marseille scientists. The banquets and dinners were culinary masterpieces. In conclusion, the American team is happy to report that the bathing suits reported in Life (January, 1949) can actually be seen walking on the beach in Marseille. —Bruce H. Billings

PHOTOGRAPHY IN SCIENCE

CLOSING DATE SOON

Entries for the 1949 international photography-in-science salon, conducted by the Scientific Monthly and the Smithsonian Institution and open to scientists everywhere, will be received by the editor of the Scientific Monthly until September 14, 1949.

AMERICAN GEOLOGICAL INSTITUTE

EXECUTIVE DIRECTOR NAMED

David M. Delo, formerly of the Army logistic division's research and development group, has been named the first executive director of the American Geological Institute.

The American Geological Institute is a new organization, established in November, 1948, to represent the geology profession. A union of eleven geological societies whose members total more than ten thousand professional geologists, its headquarters will be in the National Research Council building in Washington and the activities of the Institute will be carried on in conjunction with those of the Division of Geology and Geography, NRC, of which Dr. Delo is executive secretary.

The initial member organizations are: The American Association of Petroleum Geologists, the American Geophysical Union, the American Institute of Mining and Metallurgical Engineers, the Geological Society of America, the Mineralogical Society of America, the Paleontological Society, the Seismological Society of America, the Society of Economic Geologists, the Society of Economic Paleontologists and Mineralogists, the Society of Exploration Geophysicists, and the Society of