



NEWS

and VIEWS

APS at Thanksgiving

The American Physical Society was founded in 1899 in New York City, with a proviso in its first set of by-laws which read as follows: "The meetings shall ordinarily be held in New York." However, it wandered as far afield as Denver in the summer of 1901, with a meeting in which four (4) papers were presented; and in succeeding years it met in Pittsburgh, Washington, St. Louis. The Society did not discover Chicago until the spring of 1905, but then liked it so well that another Chicago meeting was held on the first of December, 1906. This was the first of the Thanksgiving meetings in Chicago. Neither the president nor the vice president turned up, and there were only two at the council meeting; but at the meeting of the Society "a resolution was adopted, urging upon the council the desirability of holding a meeting annually in Chicago or some other point in the Middle West. The point was raised that this meeting should come at some uniform time so that western members could make their plans accordingly." No more potent resolution can ever have been presented: never thenceforward has there been a year without a meeting of the American Physical Society at some point in the Middle West—oftenest at Chicago (which should for this purpose be taken as including Evanston, whatever the Evanstonians may feel) but sometimes elsewhere; and almost always at a "uniform time" which has proved to be the Thanksgiving weekend.

At the spring meeting of 1905 no fewer than thirty-seven papers were presented, which seems very remarkable. At the first Thanksgiving meeting (1906) twenty-one were offered, which is more nearly normal for the period. At the latest Thanksgiving meeting, which was held at the University of Chicago on 26 and 27 November 1948, there were one hundred and six ten-minute papers, most of which would have been unintelligible to the audiences which assembled in 1905 and 1906. The scene of those early meetings, and of many thereafter, was the Ryerson Physical Laboratory. In 1948 this historic structure was not yet entirely freed of the vestiges of its wartime occupation, and would not have served us if it had been, since its one large lecture-room (too small anyhow for most of our sessions) had in the meanwhile been curtailed in size when the University built its new Eckhart Laboratory. This also was insufficient for us; we held simultaneous sessions in Eckhart, in Kent Theatre, in Mandel Hall and in the Oriental Institute. Mandel Hall by itself would have contained the entire American Physical Society in 1906, with three-quarters of the chairs left over.

Three-fifths of the papers contributed in 1948 were in nuclear physics, a subject which did not exist in 1906. Someone innocently asked whether the papers on non-nuclear physics could not have been scheduled to coincide in time with papers in nuclear physics, rather than with one another: all that could be done along this line was

done,—that is, there was no session on nuclear physics which did not coincide with at least one session devoted to some other field. The Division of Solid-State Physics contributed nobly toward diminishing the unbalance: it provided a symposium composed of discussions of transistors, of diffusion in solids and of the effect of cold-work on the conductivity of metals. W. H. Zachariasen, who was chairman and apparently the whole of the local committee (our best thanks to him!), reminded the Society that the study of crystal structure by x-ray diffraction is still a part of physics. M. von Laue gave an interesting and at times a distressing account of the present state of physics in Germany, providing the Society with mimeographed sheets which carried a statement of the staffs of the institutions presently existing so far as known to him. D. E. Gray introduced to the members the project of the American Institute of Physics for the study of the problem of abstracting the periodical literature of physics: the congestion of the programme impaired the round-table discussion of this topic by requiring that it be simultaneous with four other sessions (we can perhaps do better at Cleveland). Four hundred and fifty-five people registered for the intellectual feast which was spread before them. Two hundred and fifty-two, the utmost that the dining-room could hold, attended the material feast, and were gratified by a speech of Enrico Fermi on modern cosmogonic theories. Probably none of those who voted for the motion of 1906 was present at this meeting; their work lives and flourishes after them.

—K. K. Darrow

Astronomers Meet

In a torrential downpour—such as drenched New Haven during the meetings of the American Astronomical Society, December 28–31, 1948, at Yale University, everyone looks more or less the same—but this alone could not account for the difficulty I had in distinguishing astronomers from physicists. In less terrifying terms, it may be said that astronomers have turned the whole universe into a gigantic physics laboratory which provides extremes of temperature, density, energy generation, magnetic fields, distance and time beyond the fondest hopes of experimental physicists. Papers and discussion at this meeting ranged from the normal astronomical topics of a new determination of the distance to the sun and studies of variable stars, through the use of radar in observing meteors and the latest observations of cosmic radio waves, on to studies of distant galaxies and relativistic theories of the universe.

Typical of the physical problems which are occupying astronomers is the explanation of a new class of magnetically variable stars discovered by Horace Babcock at the Mt. Wilson Observatory. In one of these, the magnetic field of several thousand gauss changes polarity every nine days, and must produce effects in the highly ionized atmosphere of the star not unlike the electrical forces in a betatron. Martin Schwarzschild, from Princeton, reported on his first approximate theory of "hydro-magnetic" oscillations, according to which the changes in magnetic field are accompanied by violent currents in the

body of the star, reaching several miles per second in velocity.

Even more physical are the recent investigations of cosmic radio noise, which are being undertaken with large radio receivers, some of them converted from wartime radar antennae. A review of the observational data, and the theoretical efforts to understand them, was undertaken in a special symposium by John Hagen of the Naval Research Laboratory in Washington, Ralph Williamson of the David Dunlap Observatory, and Jesse Greenstein of the California Institute of Technology. It seems that the sun is a more powerful radio transmitter than might have been expected; radiating as if it had a temperature of a million degrees Centigrade, with bursts up to a billion degrees. This can probably be explained as the result of the peculiar physical conditions in the corona for which spectroscopic measurements show a million-degree temperature.

The whole sky is being surveyed by radio telescopes tuned to high frequencies of ten to hundreds of megacycles (corresponding to radio waves from a few meters down to a few centimeters in length), and it has already been found that our galaxy—the Milky Way—is also an extraordinarily strong source of radio waves. This cannot be due to the myriads of stars broadcasting like our sun—it is over a billion times too strong. Either there are a large number of stars far more efficient than the sun, or these radio waves come from interstellar material, possibly by some process stimulated by a weak magnetic field between the stars.

There is a strong, broad source of cosmic radio noise in the direction of the center of our galaxy—which can be explained by either of these two hypotheses—and a strong localized source in another part of the sky (in the constellation Cygnus) where no stars are to be seen—which probably favors the latter alternative. In fact, Greenstein suggested that this dark radio broadcaster in Cygnus is our end-on view of a long streamer of interstellar gas, which extends along a spiral arm of our galaxy.

With all these rapid and remarkable developments in the subject, it is not surprising that astronomical textbooks are all sadly out of date. Moreover, it is no longer clear just what parts of the subject and of its new developments are required in a sound training of astronomy students. Another special symposium, led by Freeman Miller of the University of Michigan, was devoted to these problems. It was agreed by most that would-be astronomers must study a good deal of physics. One possible solution of the textbook problem is to encourage the summarizing of articles and books, each covering one broad astronomical problem completely, rather than attempt to cover the whole subject of astronomy—whatever it may include.

Or, since the boundary between physics and astronomy has become so ill defined, perhaps the physicists should extend themselves, take full advantage of the astronomer's laboratory-universe, and write a few physics texts which cover stellar energy generation along with nuclear reactions, stellar structure along with thermodynamics,

and the generation of cosmic radio noise (when it is better understood) along with electrodynamics. Such, at least, is the fond hope of some astronomy teachers.

—Thornton Page

A.S.X.R.E.D.

The winter meeting of the American Society for X-ray and Electron Diffraction was held at Battelle Memorial Institute, Columbus, Ohio, December 16–18, 1948. It was attended by about 125 crystallographers and x-ray diffractionists from universities and industrial research laboratories in many sections of the country, as well as by several foreign visitors. The extraordinary strides made in this field in the quarter-century of its existence were emphasized by the presence of the guest of honor—the "father" of x-ray diffraction—M. von Laue of Germany, who received the Nobel prize in physics for his discovery in 1912.

The successful analysis of samples available only in minute quantities was described by W. H. Zachariasen of Argonne National Laboratory and the University of Chicago. Prof. Zachariasen determined the crystal structures of a large number of oxides, fluorides and other compounds of actinium, thorium, protoactinium, uranium, and the transuranic elements at a time when only microgram quantities were available and conventional complete microchemical analysis was impossible. The crystal structure analysis served to identify the compounds and establish their relationship to general crystal chemistry. Many of the compounds have never been analyzed by chemical methods. In addition to the problems introduced in working with such tiny samples, the work was further complicated by the radioactivity of some of the compounds (which raised the background on the film) and by the very short half-life of others.

D. F. Clifton and Cyril S. Smith of the University of Chicago's Institute for the Study of Metals described equipment for obtaining specimens for x-ray analysis down to one-tenth microgram by use of a sharp diamond tool. The polished metal section is viewed with a metallographic microscope and the sample chosen from the desired portion. Quartz fibres one-thousandth inch in diameter were used for mounting the samples and the powder camera was evacuated to reduce the background from air-scatter which may be relatively high, due to the long exposures required with such tiny samples.

I. Fankuchen of Polytechnic Institute of Brooklyn described several types of x-ray microcameras for back-reflection, small-angle scattering and single crystals. A microcamera has a specimen holder that allows study of the specimen under a microscope. The holder is then transferred to the camera and the collimated x-ray beam passes through only the preselected portion of the specimen. In this way the change in structure over various portions of the specimen can be studied. Prof. Fankuchen also described several ingenious devices and techniques he developed with H. Kaufman for x-ray studies at low temperatures. For the Geiger counter x-ray spectrometer, the material under investigation (which is liquid at room