

Optical Society Holds Its 50th-Anniversary Meeting

With a larger attendance and more papers than ever before, OSA looked closely at the past and future of optics. Lasers and holograms competed for attention with classical subjects of optics.

SUBJECTS OLD AND SUBJECTS NEW were prominent as the Optical Society of America held its 50th Anniversary Meeting last March in Washington. Looking backward the society distributed its own history, presented a historical exhibit and listened to several papers, both contributed and invited, devoted to history. Looking forward it offered invited papers that represented each of the currently fast-moving subjects in optics. Grants from the National Science Foundation and the Office of Naval Research plus an unusually large investment on the part of the society itself enabled OSA to invite outstanding speakers from Europe as well as the United States.

In several senses the meeting was the largest of all time. Registration, as reported by Executive Secretary Mary Warga, reached a new high of almost 1300 compared with average registrations of 950 and a previous high of 1200. Numbers of papers, too, were greater than before: 14 invited and 150 contributed. 1100 participants attended a reception at the Smithsonian Institution at which the society was host.

Prizes and quasars

Members received their 50-year history of the society as they arrived at the ceremonial dinner over which Van Zandt Williams, president of the society, presided. The booklet, a preprint from the March issue of the *Journal of the Optical Society of*

America, was prepared by Mrs Hilda Kingslake, a scientist herself, the daughter of one lens designer (H. G. Conrady) and the wife of another (Rudolph Kingslake of the University of Rochester and Eastman Kodak). Since only three OSA charter members are alive, Mrs Kingslake had to do painstaking research to find early material.

Prize winners who received their awards at the dinner were C. K. N. Patel, who received the Adolph Lomb Medal (see *PHYSICS TODAY*, April 1966, page 109), Bengt Edlén, University of Lund, Sweden (C. E. K. Mees Medal) and David Richardson, Bausch and Lomb (David Richardson Medal) (see page 111 of this issue).

A principal scientific contribution at the dinner was the announcement by Guglielmo Toraldo di Francia, University of Florence, Italy, that he would discover quasars. After thanking his listeners for celebrating his 50th birthday with their 50th-anniversary meeting, he invited them to his 100th birthday in Florence. By that time, he said, he would have added feats with antilight (called "darkness") to those accomplished with antimatter. With antilight he would develop a "quasar," named for "quanta unlimited of antilight by stimulated absorption of radiation."

Optics and lasers

Although classical subjects (vision, radiometry, spectroscopy, instrumentation, color) occupied most of the tech-

nical program, lasers were prominent among new subjects. Half of the opening day, which is traditionally a review of modern optics, was given to two invited talks by Nobel laureates. Charles Townes spoke on current applications, future prospects and the problems that limit both. Willis Lamb spoke on "The Physics of Laser Oscillators."

In a contributed session Elias Snitzer and Richard Woodcock of American Optical Co. described a self-Q-switching laser that depends on saturated absorption of color centers. Laser pulses can be separated by 200 microsec, last for 35 nanosec and have a power output of 1 joule/pulse.

Sun-pumped lasers may have application in satellites. With this in mind C. G. Young and J. Z. Zdrok of American Optical have devised a sun-pumped system working with a neodymium-doped YAG (yttrium-aluminum garnet) crystal. In a space environment they anticipate a 1-watt output with a 30-cm-diameter collector.

Atmospheric physics was the subject of two contributed sessions, and among the papers were two that dealt with laser beams for communication. Bankim Shah of IBM Poughkeepsie considered atmospheric effects, finding that scattering is more important than absorption and that small-angle spreading, beam bending and low-frequency modulation are also important. R. M. Langer of J. R. M. Bege Co. finds peculiarities in atmospheric absorp-

tion. For example, at many frequencies familiar gases exhibit attenuation coefficients that vary exponentially rather than linearly with frequency.

Academic and practical holography

Theory, practice and applications of holography occupied two sessions at the Washington meeting. Among several possible uses of the technique are three-dimensional mapping. It can be applied to models of manufactured objects and terrain according to B. P. Hildebrand and K. A. Haines of the University of Michigan. They suggest two ways to accomplish the purpose: One is to illuminate the object to be mapped with two collimated beams that have a small angle between them. The other is to use two beams having slightly different frequencies. In both situations the hologram functions as a phase detector.

Two papers suggested using holograms to construct images of objects that do not actually exist. One, by A. W. Lohman and D. P. Paris of the IBM San Jose laboratory, discussed a method whereby holograms are drawn on a large scale and reduced photographically into a transparency that has black and white areas but no greys; the image suffers no degradation. Parker Givens and William Siemens-Wapniarski of the Institute of Optics accomplish a similar purpose by multiple exposure of a photographic plate to a Newton-ring pattern.



PHOTOGRAPHS BY MITCHELL VALENTINE

GATHERING OF OSA in Washington had attendance of 1300. Modern optics

and history were prominent in 14 invited papers and 150 contributed ones.

Two papers foresaw holograms as detectors of small distortions in mechanical structures. At England's National Physical Laboratory J. M. Burch and A. E. Ennos are studying holograms with a view to getting more information from wind-tunnel interference patterns and also for comparing machined components. Karl Stetson of GCA Corp. finds that tiny ripples in a photographic emulsion diffract light preferentially and suggest diffraction as the best way to detect small periodic deformations in metals.

Better holograms might be made with thermoplastic xerography according to John Urbach and Reinhard Meier of the Xerox Corp. Lack of grain permits an unusually low back-

ground. Coding and unscrambling of holograms is also a possibility. George Stroke of the University of Michigan suggests coding with an invisible phase shifter and then decoding with a second hologram. A. A. Friesem and J. S. Zelenka, also at the University of Michigan, have been studying the effect of nonlinearities in photographic response. Nonlinearities generate false targets, suppress weak signals and add noise.

Exhibit of optical history

Visitors to the exhibit that ran as part of the meeting could tune a laser, watch a Rowland engine rule a grating, hear A. A. Michelson discuss the "fun" of physics from a sound film and study samples of op art.

Contributors had been asked to offer only exhibits that displayed optical history, and then the arrangements committee separated the material into 15 groups by subject. The resulting collection of instruments, photographs and memorabilia overflowed the Shoreham Hotel's large Ambassador Room so that visitors could look at two Polaroid exhibits (polarization and development of one-step photography) on their way in.

The tunable laser had a mirror one could move so that, depending on the spacing, the instrument oscillated in three different modes. Another movable mirror allowed one to inspect a multiply folded light path. "Working" exhibits included also two Bell-Labo-



BENGT EDLEN (left) receives Mees Medal from OSA president Van Zandt Williams at society dinner. Other prize winners were C. K. N. Patel, who received the Lomb Medal, and David Richardson, who was the first recipient of a medal named in his honor. It is designated as an award for outstanding work in applied optics. Edlen was one of seven Europeans invited to address the meeting.

ratories—University-of-Michigan holograms that reconstructed multicolor images from white light.

Watching over the Rowland engine as it ruled several inches of aluminum grating during the meeting was Wilbur Perry, who has been running this engine at Johns Hopkins since 1930. Perry was prepared to reminisce about the three Rowland engines and two Strong engines that he has been handling and also about his associations with R. W. Wood, who originally brought him to Hopkins.

The story about throwing a bottle

of alcohol over his shoulder into Wood's face is true, he says; it appears to be a situation in which one practical joker met another. Wood, it seems, made a habit of coming up behind Perry and surprising him in the midst of such delicate operations as polishing a grating blank. But this time Perry anticipated and sprayed the alcohol just before Wood was ready to surprise Perry.

One problem with Wood, according to Perry, was that he had too many ideas—more than one had time to try. But Perry has tried many of

NOSE-CONE and instrument package were part of historical exhibit that traced a century and a half of optics history.

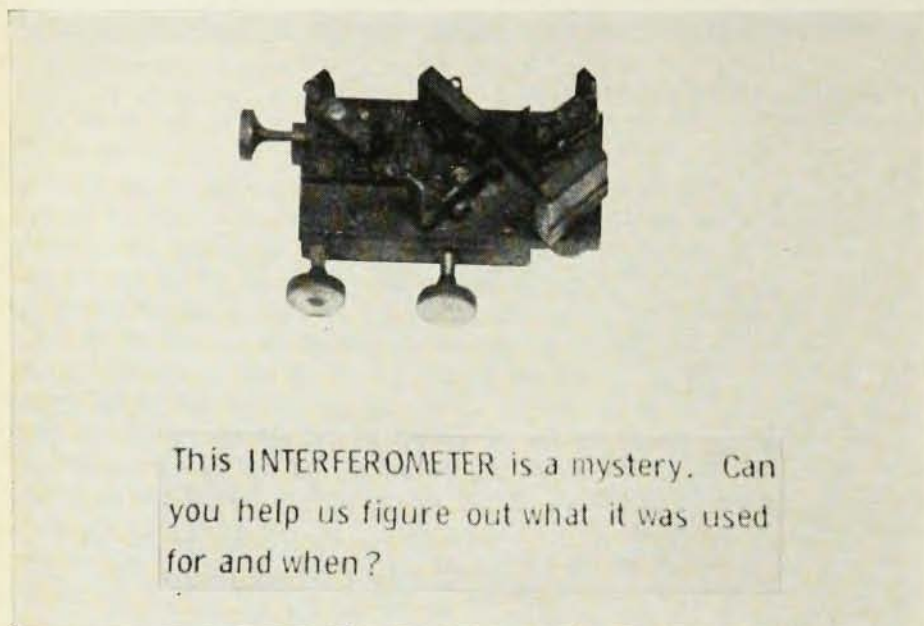


them and is considered largely responsible for such developments as speculum (the copper-zinc-tin alloy used for gratings) and aluminum surfaces that adhere well enough to glass to permit ruling gratings on them.

Another optical technician on hand was Tom O'Donnell who used to work for Michelson. The Michelson exhibit, in addition to the sound film that represented an interview with Michelson, had many of his interferometers and the rotating-mirror apparatus with which he measured the speed of light (and won his Nobel prize).

The astronomy and space part of the exhibit had something old in early telescopes and much that is new in nose-cone instruments and satellite trackers. Microscopy displayed "art in research," a series of color enlargements displaying crystal growth, arc melting and combustion.

History was not limited to the exhibit. In an invited paper, Henry Levinstein of Syracuse University traced the history of infrared detectors before he discussed materials available for the purpose today and developments that can lead to others in the future. Richard Hunter of Hunter Associates gave a contributed paper on the history of photoelectric tristimulus colorimetry and another on the history of gloss measurements (which compare specular and diffuse reflection). Lester Lewis, formerly of the Smithsonian Institution, contributed "Fifty Years of the Spectrophotometer: Its History, both Known and Needed." □



MYSTERY. Tiny interferometer, once used by Michelson, baffles the experts. At

exhibit OSA asked participants for help in finding particular measurement it served.



MICHELSON DISPLAY had sound film in which subject discussed physics and

hobbies. Hall had more than 400 displays of instruments and photographs.