

17. Robert Hopkins Sets the Course: 1954–1965

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In 1954, Robert E. Hopkins succeeded Brian O'Brien as Director of The Institute of Optics. Hopkins graduated from M.I.T. in 1937, and received both his M.S. and Ph.D. degrees from The Institute of Optics in 1939 and 1945, respectively. Except for a few years' interruption while president of Tropel, he always has been, and still remains, associated with The Institute of Optics. His own great interest and great distinction has been in lens design, image quality, and geometrical optics in general. However, his appreciation and understanding are wide, so on being made Director, he immediately proceeded to staff the Institute for a greatly increased program of teaching, research, and cooperative efforts in a completely forward-looking approach. He was also convinced of the vital importance of good undergraduate teaching.

David Dexter, appointed by O'Brien, was made Associate Professor to develop a full program of solid state research jointly with physics. Kenneth Teegarden was appointed and at first worked in materials science associated with David Dexter; later he developed a separate section for the study of materials science. Astronomy was encouraged and Malcolm Savedoff appointed, working with physics. Again, these developments were received with considerable doubt, but time has proved the wisdom of the appointments. Between 1954 and 1965, Hopkins made some 20 appointments, many of them already well known, or soon to become so, in their field of concentration.

Robert Boynton of psychology was asked to undertake a cooperative program in vision. The Center for Visual Science was established a little later. Since the loss of O'Brien, there



Robert Hopkins in the mid-50s.

had been no professor of physiological optics. Another appointment was David B. Dutton, interested in MTF and lens testing. Emil Wolf, already distinguished for studies in theoretical optics and co-author of a now well known text, *Principles of Optics*, was an appointment of note. Yet another great appointment was Philip Baumeister, already known for his work in thin films.

It worried Hopkins, whose need was great, that he had to buy outside computer time for his studies in lens design. He probably did more than anyone to urge the University to get its own computer. In 1955, a University computer center was started, first in Taylor Hall with a desk size unit; in 1956, a larger one was installed and instruction in programming was started. Gordon H. Spencer (Ph.D. Optics, 1963) wrote the first significant program, and optics students helped man the machine. In 1961, an IBM 7070 was acquired, to be succeeded as computers and their usage developed. By this time, Cornelis de Kiewiet was president. He reported in 1959 that the computer center was finding its way more and more into research carried on in different departments of the University.

In this same 1958–59 report, de Kiewiet described “a new venture of The Institute of Optics,” something he called “one of the most interesting developments in the field of sponsored research.” It was called the Division of Group Research. Harold Stewart, who was associated as a research assistant with O’Brien through the war and who later took his Ph.D. at Johns Hopkins, was recalled and took charge of the new division with the status of associate professor. The Division was engaged in research projects, many of them



Robert Hopkins in the lab in 1958.

basic, for NASA (the National Aeronautical and Space Administration). Of great interest was the development of the 36-inch reflecting telescope for an orbiting satellite. The whole assembly was limited to 500 pounds in weight and presented considerable problems in optical design. The Division produced semiannual reports.

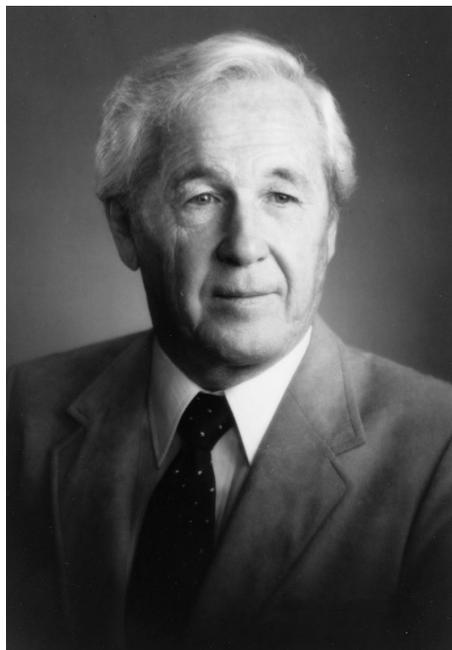
Early in 1960, Hopkins, with Emil Wolf, organized an international conference on coherence, held at the University of Rochester only weeks before the first announcement of the laser. At least seven countries were represented among chairmen of the sessions and speakers. The attendance was excellent. Not losing any time, Hopkins appointed Carol Alley, Michael Hercher and Douglas Sinclair to initiate research on lasers. Also appointed in the early '60s were G. Baldini (Italy), A. Gold, and W. L. Hyde. Again, many of these have become known through their publications.

The year 1961 was a great landmark date in the history of The Institute of Optics. At that time engineering had been given much more prominence in the University, and a College of Engineering and Applied Science, consisting of Mechanical, Electrical, and Chemical Engineering, had recently been established under its own dean. Hitherto, engineering had been a department of the College of Arts and Science. In 1961, it was decided by the administration that The Institute of Optics should become a fourth unit of the College of Engineering, but would retain the name under which it had become widely known. It would have a director, as would the other units of the College of Engineering, and Hopkins would continue as Director. As was, of course, to be expected of any such change, there was some displeasure, but time again has proved it to have been a very sound move. Already, material science was working with other branches of engineering. Two members of the optics faculty who worked theoretically on the physics of optics were invited to join the Department of Physics, namely Emil Wolf and David Dexter, who have become well known in the field of optics.

Hopkins took a sabbatical leave in 1960–61, during which time Stewart acted as director. Late in 1961, a very large alumni meeting was held where Joseph Platt, formerly professor of physics at Rochester, then President of Harvey Mudd College, spoke after dinner on the subject, "The Future of Engineering and Optics."

When the change in status was made, The Institute of Optics remained centered on the top floor of Bausch & Lomb Hall, sharing the building with Physics. By the 1960s, both departments had outgrown their quarters, and in 1962 a wing was added to the building. It was a great improvement for optics, but some divisions still had to remain in other buildings on the Campus.

One very pleasant and useful innovation of the Hopkins years was the publication of an illustrated, very attractive news sheet called *Institute of Optics News*, but popularly known as I.O.N. It came out several times a year with news of people, projects, and alumni



Robert Hopkins in 1971.

achievement. Usually a list of theses, publications, and papers read at meetings was included and gave an excellent idea of the variety of interests of the faculty.

Theses:

- “Rotational Shearing Interferometers” (M.S.)
- “Continuous Second Harmonic Generation” (Ph.D.)
- “Testing of Optical Surfaces” (Ph.D. student from Mexico)
- “Losses in ruby lasers due to crystal deviation from an ideal medium” (Ph.D.)
- “Temporal summation of positive and negative flashes and related problems” (Ph.D. student from Japan)

Publications or papers read:

- “Contributions of threshold measurements to color discrimination theory” (J.O.S.A., 1962)
- “Time resolved spectroscopy of the emission from a ruby laser” (International Conference on Spectroscopy)
- “Use of convergent and divergent illuminations on plane gratings” (J.O.S.A., faculty member from India)
- “Theory of multiphoton ionization” (Phys. Rev. Letters)
- “Methods of altering the characteristics of a multi-layer stack” (J.O.S.A.)

Summer schools became an important feature of the Hopkins years, and have continued to this day. Subjects varied, and sometimes two courses ran parallel or in sequence. With rare exceptions, they have been extremely well attended. Attendees have come from industry, government departments, a few from education, and one or two “just for a vacation.” In addition, they serve to bring industry and government into contact with the faculty.

An extraordinary educational venture of the Hopkins years was known as the “Road Show.” Hopkins and Givens received in 1963 a grant from the National Science Foundation to develop new teaching experiments and demonstrations using the optical laser. Hopkins, Blakney, Dutton, and Givens equipped a traveling unit and, by prearrangement, gave lecture demonstrations to seven colleges in the Northeast on existing uses of gas lasers, as well as of more conventional geometrical and physical optical experiments. These were followed by further demonstrations to an interested company and to the National Science Foundation Institute for High School Teachers in Mississippi, the University of Maryland, and of course to the summer school in Rochester. It was a demanding and interesting episode. Teaching was always a real concern of Hopkins’.

By 1965, sponsored research and related projects amounted to \$500,000, so that most of the faculty could not visualize the very limited financing and opportunities of the early years, not only for the infant Institute of Optics but also everywhere in research.

Hopkins, in 1964, asked to be relieved of his directorship in order to give his whole time to teaching and research at The Institute of Optics. He has since been appointed Professor Emeritus.