

Scanning the Issue

THIS ISSUE represents an interdisciplinary experiment. Whether we think of ourselves as scientists or engineers, working in physics or electronics, most of us have one or two favorite journals that we try to follow regularly, and a few others that we may glance at when we are in the library, and we are aware that there are many other journals that we will probably never look into unless somehow called to our attention. Similarly, if we are professionally inclined we have one favorite society whose meetings we attend, and we seldom go to any other society meetings. For example, except for a handful of brand-new workers, most people working today with lasers (or quantum optics) are former microwave or maser workers, who think of the IEEE and its journals as their logical forum; or researchers in physical or classical optics, who similarly look to the Optical Society and its journals; or a variety of solid-state physicists and spectroscopists who think fundamentally in terms of the Physical Society and such journals as the *Journal of Chemical Physics* and *Applied Physics Letters*. E. V. Ashburn, who has now published (in the *Journal of the Optical Society of America*) five bibliographies of the open literature on lasers, recently checked the 1699 authors or co-authors of his lists against the membership directories of APS, OSA, and the IRE (an IEEE directory had not then been published). Of the 1699, there were 540 members of APS, 281 members of IRE, and 193 members of OSA. He further determined that 113 were members of both APS and IRE, 61 members of both APS and OSA, 20 members of both IRE and OSA, and another 27 were members of all three organizations. There are also small groups of other laser workers scattered in other fields such as astrophysics, chemistry, biology, and so on, but fundamentally

there appear to be these three major groups with not too much overlap between them.

A year or so ago, Karl Willenbrock of the IEEE suggested to us that *Proceedings of the IEEE* and *Applied Optics* sometime have a joint issue on quantum optics. This idea appealed to us, although it presented many problems. The *Proceedings* has a much larger circulation (around 40 000) than *Applied Optics* (which is around 6000)—although the number of laser papers in the two journals is more or less the same. The problems were mostly mechanical, rather than philosophical: the two journals have different editorial departments, different printers, different advertising, different publication dates, and slightly different sizes.

The Board of Directors of the Optical Society and the officers of the American Institute of Physics both welcomed this interdisciplinary (and inter-Institute) experiment, as did the IEEE Editorial Board. The domains and purviews of the various technical societies are mostly established by history and tradition, and it is both refreshing and stimulating for a scientist of one domain to make an occasional visit to a foreign land. Once the language barrier is broken the chemical physicist finds he is really not unreconcilable with the physical chemist, and the same may be true with these various groups in optics. The electrical engineer may not be sure what is meant by an oscillator strength or a transition probability in atomic spectra, just as his near-field and far-field patterns escape the average spectroscopist, but now and then comes a glimmer of recognition which is good for them both. Perhaps we can find other common meeting grounds in the future.

Once we had decided to attempt this joint venture, the

philosophic problems were easily solved; each journal selected a Guest Editor: Ivan Kaminow for the *Proceedings* and Donald Herriott for *Applied Optics*. These Guest Editors are both experienced interdisciplinarians, having published in both journals in times past, and both being located at the same organization facilitated correspondence with authors. The papers were invited for the most part, although some contributed papers reflecting the interdisciplinary nature of the issue are included. When *Applied Optics* has a guest editor, the Editor defers to his judgment and wisdom on technical matters, but we must confess that we felt also rather relieved to discover that both journals have similar policies on symbols, terminology, and units, and that the IEEE also prefers metric units. This happy circumstance left the Editor (and his IEEE colleague) very little to do on this issue.

The reader may have some interest in how the practical problems (that is, apart from the editorial procedure) of producing the joint issue were managed. The manuscripts, once accepted for publication, were sent to the IEEE editorial office, where they were processed and sent to the *Proceedings* printer, who produced that issue according to the usual routine. Then negatives of all the pages, except those containing letters and advertising, were sent to the *Applied Optics* printer, who added the *Applied Optics* cover and advertising pages and printed the issue on paper of the usual size. The two journals were then mailed essentially at the same time, each to its own list of subscribers. This simultaneous publication explains why *Proceedings* subscribers are receiving this issue about two weeks earlier and *Applied Optics* subscribers a few days later than usual.

In our first discussions of such an issue, we had considered several interesting alternatives. One suggestion was

that we print the issue like a bilingual cookbook: start with the blue *Proceedings* cover and half the issue of its articles; but then turn the issue over and have the yellow *Applied Optics* cover and the other half of the issue reading the other way. But we decided this would hopelessly confuse librarians, and probably the printer, and the pagination would be impossible.

Then we considered a cover like that of the Post Toasties cereal box: a blue *Proceedings* cover showing (in its illustration panel) a smaller yellow *Applied Optics*, which in turn showed in its illustration panel a blue *Proceedings*, and so on. For *Applied Optics* we would have a similar sequence, starting with yellow. But editorial departments lack humor (or perhaps humour), and we settled for more conventional individual covers.

Every other month or so we utilize this column to preach a vigorous sermon to the 6000 sinners of the *Applied Optics* audience on the advantages of the metric system in science and in general. As a recently reformed sinner we have phrenetic evangelical zeal, and our first reaction to a joint issue reaching 40 000 new readers was what a chance to save souls (as surely there are sinners even among these 40 000). But, no, we should not proselyte except in our own see.

The one group to whom this joint issue will probably not appeal is that small segment that already receives both journals. There will be some of them who, as they read this issue, are going to have a vague uncomfortable feeling that they have somewhere read all this before. For them we can only hope that understanding will improve on the second reading.

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THE DEMONSTRATION of the laser five years ago has had a remarkable effect on electronics and optics. The laser is different from many previous developments in that it provides something that had been completely unavailable: coherent light at significant power levels. The maser, although a novel concept, merely represented an improvement in the well-explored field of coherent microwaves, and could be applied immediately. The application of the laser, on the other hand, awaits further developments in many related fields. After five years of intense activity, it is still not clear where the major applications of the laser will be.

We have collected in this issue a series of papers that describe the state-of-the-art of various types of lasers.

Two other papers review the broad applications areas of communications and computers. Gaussian beams and resonators, solid-state and electron tube detectors, and nonlinear optical effects are discussed in other articles. The remaining papers deal with some of the methods being considered for light modulation and beam deflection. The coverage is by no means complete and, for one reason or another, we have decided to leave out such relevant topics as holography, metrology, machining, welding, noise and communication theory, and scientific, medical, military, and space applications.

Although the intended scope is evident from the foregoing paragraphs, it was difficult to find a definitive title for the issue. *Quantum Electronics*, *Nonlinear* or *Co-*