editorial

Electro-optics: field for our times

In this special issue we pay our respects to electro-optics—without doubt one of the fastest growing areas in physics. In seeming contradiction to this statement the last National Register survey reported (PHYSICS TODAY, October 1971, page 40) that unemployment was higher among optical physicists than for any other branch of physics. Some now believe this conclusion may have reflected transient effects at the time from the shutdown of some large government-supported R&D centers. But in any case authoritative sources in the Optical Society of America tell us that as of now positions are going unfilled for PhD-level physicists with solid training in modern optics.

This demand is easy to understand when one considers the prospects in view for the electro-optics field. Over the past decade progress in solid-state physics together with the development of the laser have brought us to an astonishingly sophisticated understanding of the mechanisms by which light is absorbed and emitted. This new knowledge has made possible devices, such as the light-emitting diode and phototransistor, which are highly efficient and reliable in emitting or sensing light and yet can be manufactured cheaply and in extremely small sizes. These and other developments have led to the promising concept of "integrated optics" in which operations would be carried out on light beams in tiny optical cells resulting in signal modulation, frequency changes or logic outputs for information or control systems.

In other directions the development of holography has led to the whole new branch of Fourier optics, while a burgeoning interest in nonlinear optics has still further extended the progress of the electro-opticists. Still another promising line of inquiry is that of liquid crystals, which are providing challenging problems for theoretical physicists and also have already led to a new generation of electronic display devices.

All this progress has brought electro-optics to the position where people working in the field can point to many kinds of commercially or socially useful applications on the verge of feasibility. To mention one example, with the new electro-optical technology we can expect that automated optical character recognition will become more and more economical and practical, sparking a clerical revolution in the business world.

From the viewpoint of the research physicist, electro-optics is a field ideally suited to the times. The work leads to obviously useful applications while at the same time it involves some of the most fundamental problems to be found in all of physics.

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