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INTEGRATED OPTICS

Lightwave transmission is already in place in many intercity, metropolitan, and on-premises data communication applications. Optical circuits today are almost entirely combinations of discrete components -- lasers, LEDs, fibers, and photodetectors -- comparable to early electronic circuits of discrete transistors, capacitors and resistors. The emerging technology of integrated optics, providing combinations of optical components interconnected by waveguides on thin film microcircuits, will allow for the first time the capability of signal processing in photonic form without intermediate conversion to electronic form as required at present. This talk will explain the techniques for interconnecting optical components, the fabrication processes for hybrid and monolithic integrated optical circuits, and the principles of electrooptic waveguide switching. The lecture will present some highlights of the achievements and most recent work in integrated optics including laser and LED arrays, optical switching matrices; integrated detectors for multi-wavelength channels, wavelength multiplexing filters, high speed integrated laser modulators, integrated optical repeater structures, and the integration of optical and electronic components. In conclusion, approaches to optical gates and logic and the prospects for on-chip digital signal processing will be discussed.

Dr. Giordmaine (SM'70-F'78) received his Ph.D. in physics from Columbia University, New York, NY, taught for two years at the same university, and joined Bell Telephone Laboratories as a Member of the Technical Staff in 1961.

His research has been on lasers, quantum electronics, and nonlinear optics. His contributions to the field include the optical parametric oscillator and the introduction of new optical correlation techniques. At Bell Laboratories, Dr. Giordmaine has been the Head of the Solid State Spectroscopy Research Department and Director of the Chemical Physics Research Laboratory. He is currently Director of the Solid State Electronics Research Laboratory.

Dr. Giordmaine has been a member of the IEEE Joint Council on Quantum Electronics since 1974 and has been involved with numerous International Quantum Electronics Conferences including Chairman of the Program Committee (1974) and General Chairman (1978). He has also served the Conference on Laser Engineering and Applications in various capacities.

He a Fellow of the IEEE, the American Physical Society, the Optical Society of America, and the New York Academy of Sciences. He is also a member of the European Physical Society, the American Astronomical Society, and Sigma Xi.