# TECHNICAL PROGRAM

## Monday, December 4, 10:00 a.m.

### International Ballroom—Center

**Formal Opening:** D. P. Kennedy, General Chairman

**Special Presentation:** 1972 J. J. Ebers award for an outstanding contribution to electron devices.

Invited Paper Session

Chairman: Roland Haitz

1.1 **INTEGRATED OPTICS,** Amnon Yariv, California Institute of Technology, Pasadena, California (invited paper)

In order to enable optical systems to operate with a high degree of compactness and reliability it is necessary to combine large number of optical functions in small monolithic structures. A development, somewhat reminiscent of that that took place in Integrated Electronics, is now beginning to take place in optics. The initial challenge in this emerging field, known appropriately as "Integrated Optics", is to demonstrate the possibility of performing basic optical functions such as light generation, coupling, modulation, and guiding in Integrated Optical configurations.

The talk will review the main theoretical and experimental developments to date in Integrated Optics. Specific topics to be discussed include: Material considerations, guiding mechanisms, modulation, coupling and mode losses. The fabrication and applications of periodic thin film structures will be discussed.

1.2 **ELECTRON EMISSION FROM NEGATIVE AFFINITY SEMICONDUCTORS,** B. F. Williams, Electro-Optics Laboratory, RCA Electronic Components, David Sarnoff Research Center, Princeton, New Jersey (invited paper)

Negative electron affinity (NEA) electron emitters are presently being used in every general area requiring electron emitting devices, photocathodes, secondary electron emission dynodes, and cathodes simply for electron sources. NEA emitters are semiconductor devices whose surfaces have been treated so that the bottom of the conduction band in the bulk of the device lies at an energy higher than the vacuum energy. Thus, any electron present in the conduction band within a minority carrier diffusion length of the surface has a reasonable chance of escaping into vacuum with no further application of energy. The performance of the devices can be accurately described by conventional semiconductor theory, and the limitations are reasonably well understood as will be described. The properties of the emitted electron beams are somewhat different from those released from conventional electron emitting surfaces. These differences affect device performance and, in some cases, may lead to devices which otherwise would not be practical. The present state of the art will be described both with respect to commercial devices which are now available and also developments which are likely to result in devices for the near future.

1.3 **MICROELECTRONICS AT LIQUID HELIUM TEMPERATURES,** Prof. Umberto Fernández-Morán, University of Chicago, Chicago, Illinois (invited paper)