

*Enclosure B*

**James R. Killian, Jr., Faculty Achievement Award 2001-2002  
Citation for Erich P. Ippen**

The James R. Killian, Jr., Faculty Achievement Award was established in 1971 "to recognize extraordinary professional accomplishments by full-time members of the MIT faculty." It is the greatest honor the faculty can bestow on one of its members. The recipient is chosen by a faculty committee from candidates nominated by their peers for outstanding contributions to their fields, to MIT and to society.

The selection committee is pleased to announce that the recipient of the Killian Award for 2001-2002 is Erich P. Ippen, Elihu Thomson Professor of Electrical Engineering and Professor of Physics.

Professor Ippen is a 1962 graduate of MIT who went on to earn his Ph.D. degree from the University of California at Berkeley. He began his remarkable career at Bell Laboratories and then joined MIT as Professor of Electrical Engineering in 1980.

While at Bell Laboratories, Professor Ippen and Dr. Charles Shank, the latter now professor at the University of California, Berkeley, established the field of femtosecond optics. They pioneered the generation of ultrafast laser pulses and their use in ultrafast spectroscopy. Since this initial technological breakthrough of the production of subpicosecond optical pulses, which are pulses of coherent light with durations of less than 10-12 seconds, Prof. Ippen has continued to eclipse his own achievements. He and his MIT research group have pushed the pulse durations into the single digit femtosecond or 10-15 second regime. They currently hold the record with pulses of 5.5 femtoseconds duration. Whereas the pulses emanating from Doc Edgerton's strobe light are able to "freeze" or capture the motion of macroscopic, mechanical objects, Professor Ippen's pulses are of sufficiently short duration to capture the motion of particles in the atomic and subatomic regime. For example, Professor Ippen and his students have used these pulses to study the relaxation of excited electrons in semiconductor materials and to study the interactions of these electrons with the vibrations in superconducting materials, to measure the rate at which a rotating molecule relaxes and to monitor the flow of energy within large molecules. These investigations have resulted in seminal and fundamental contributions to the fields of nonlinear optics, quantum optics, and quantum electronics.

Many of the phenomena discovered by Professor Ippen constitute the fundamental bases of today's technologies. His pioneering success in mode-locking a semiconductor laser is of particular importance to optical communications and to making ultrafast techniques universally accessible to the scientific community. He holds 7 patents, including one for the fiber ring laser that has recently been commercialized. The laser emits pulses of spectral width exceeding the spectral width of the amplifier presently used in optical fiber communications. The filtered output of such a laser can provide pulse streams equivalent to the output of hundreds of separate lasers for use in multiplexed optical communication systems. Professor Ippen's 5.5 femtosecond pulses are key to the development, by his colleague Professor James G. Fujimoto, of optical coherence tomography, a technique in which the unprecedented resolution of single cells has been achieved in the imaging of tissue.

With a continuous stream of pioneering contributions, Professor Ippen is to this day the world leader in the field of femtosecond optics. His techniques are employed in countless physics, chemistry and biology laboratories. They have enabled many new scientific frontiers such as femtosecond spectroscopy and chemistry, the photochemistry of vision,

nonlinear spectroscopy and the interactions of ultrahigh light intensities with matter. Several of these frontiers have culminated in Nobel Prizes. These ultrafast optical techniques continue to have enormous implications for a broad range of scientific and technological fields. In today's world of specialization, the breadth of the impact of Professor Ippen's contributions to science, engineering, and society is truly extraordinary.

Professor Ippen's scientific and technological achievements have been recognized by numerous awards and honors, including the Arthur Schawlow Prize from the American Physical Society, the Quantum Electronics Award from the Institute for Electrical and Electronic Engineers, the Harold E. Edgerton Award from the Society of Photo-Optical Instrumentation Engineers, the Edward Longstreth Medal of the Franklin Institute, and the R. W. Wood Prize from the Optical Society of America. He is a member of the National Academy of Sciences, the National Academy of Engineering, and the American Academy of Arts and Sciences.

Professor Ippen has a distinguished record of service both to the scientific community and to MIT. His superb statesmanship and leadership, as well as his dedication to these roles are well recognized. He is continually sought as the head and has served as the head of many National Academy committees, award committees, and review boards. He has served as the President of the Optical Society of America and as associate editor of three major journals. He has given willingly of his time to participate in numerous institute and departmental committees, including chairing the Lincoln Laboratory Advisory Board. As a member of the personnel committee in EECS, his wisdom, thoughtfulness, breadth of knowledge and sheer hard work are especially valued and appreciated.

Perhaps most telling of his humanity, he has taken it upon himself to attentively mentor and advise junior faculty not only in EECS, but in other departments as well. These faculty members consider themselves most fortunate indeed. His perpetual optimism and constant belief that 'good things will happen in the end' have buoyed many junior (and senior) faculty colleagues. Professor Ippen's kindness, generosity, and collegiality are models for all to follow.

Professor Ippen's intense commitment to research and service has been coupled consistently with his excellence in teaching. He is an outstanding lecturer in both graduate and undergraduate courses and a superb mentor of graduate students.

Professor Ippen's exemplary record of professional accomplishments makes him 'ultra' deserving of the distinction of the J. R. Killian, Jr., Faculty Achievement Award!

The James R. Killian, Jr., Faculty Achievement Award Selection Committee for  
2001-2002:

Julian Beinart  
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September 2001

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