

## Appendix C. Milestones

### C.1 New Faculty and Research Staff

**Dr. Thomas J. Greytak** (SB'62, SM'63, PhD'67), professor of physics, has joined RLE's Atomic, Molecular, and Optical Physics (AMO) group as a principal investigator. Professor Greytak, who serves as the Physics Department's associate head for education, conducts research in experimental solid-state physics, spin-polarized hydrogen, superfluid helium, high-resolution spectroscopy with light and x-rays, and cryogenics. His recent collaborations with Professors Wolfgang Ketterle and Daniel Kleppner in the AMO group include pioneering work that contributed to the demonstration of the first atom laser and experiments involving Bose-Einstein condensation of atomic hydrogen for optical clocks.

**Dr. David C. Kring** (PhD'94) was appointed as research engineer in RLE's Circuits and Systems group, effective March 1, 1998. Previously, Dr. Kring was a research engineer in MIT's Department of Ocean Engineering, where he also completed his postdoctoral research. His work in RLE will involve the development of an innovative boundary element code for a project that involves hydrodynamic analysis of large non-rigid offshore structures. Contributing to the Circuit and Systems group's research in time-domain analysis of ship and body motions, this code will help to combine recent achievements in higher-order element and precorrected-fast Fourier transform algorithms. Dr. Kring is a graduate of the Webb Institute (BS'88) and an associate member of the Society of Naval Architecture and Marine Engineers.

**Dr. M. Charles Liberman** was named director of the Eaton-Peabody Laboratory at the Massachusetts Eye and Ear Infirmary in March 1998. He succeeds Dr. Nelson Y.S. Kiang, who served as director of the laboratory from 1962 to 1996. Dr. Liberman is associate professor of physiology in Harvard Medical School's Department of Otolaryngology and Laryngology. He has served as Eaton-Peabody's acting director since 1996. An affiliated faculty member at the Harvard-MIT Division of Health Sciences and Technology, his research interests include auditory physiology, neuroanatomy, and neurophysiology. Dr. Liberman is a Harvard graduate (AB'72, PhD'76) and a member of the Association for Research in Otolaryngology, the American Association for the Advancement of Science, and the Society for Neuroscience.

### C.2 Honors and Awards

**Dr. Raymond C. Ashoori**, assistant professor of physics, was promoted to associate professor, effective July 1, 1998. A graduate of the University of California at San Diego (BA'84) and Cornell University (PhD'91), Professor Ashoori joined the MIT faculty in 1993, after serving as a postdoctoral member of the technical staff at AT&T Bell Laboratories. His research in semiconductor technology focuses on investigations into the behavior of artificial atoms and the development of new spectroscopic probes to observe their unusual characteristics. His earlier efforts in this area yielded the development of a technique known as single-electron capacitance spectroscopy, which allows single electrons to be detected and manipulated in artificial atoms. Currently, Professor Ashoori and his colleagues in RLE's Quantum-Effect Devices group continue to develop a novel technique called subsurface charge accumulation imaging, which can directly observe charge distributions underneath the surface of semiconductor materials (see *RLE currents*, spring 1998).

**Dr. Anantha P. Chandrakasan** was promoted to associate professor in the Department of Electrical Engineering and Computer Science, effective July 1, 1998. Professor Chandrakasan joined RLE's Circuits and Systems group in September 1994. Concurrently, he was appointed as assistant professor and to the Analog Devices Career Development Professorship. Professor Chandrakasan came to MIT from the University of California at Berkeley (BS'89, MS'90, PhD'94), where he completed postgraduate research in low-power integrated circuit design. Professor Chandrakasan's research interests include low-power techniques for portable real-time applications, video compression, computer-aided design tools for VLSI design, and system-level integration. These have applications to digital signal processing and wireless communication technologies. Professor Chandrakasan is a member of Eta Kappa Nu and Tau Beta Pi.

**Dr. Bertrand A.R. Delgutte** (SM'76, PhD'81), research scientist in RLE's Auditory Physiology group, was promoted to principal research scientist, effective July 1, 1998. Dr. Delgutte joined RLE in 1984, after serving as a research engineer at France's Center National d'Etude des Telecommunications. His early investigations involved stimulus coding in the auditory nerve to better understand the

neural signal-processing mechanisms that underlie various psychoacoustic phenomena. This research, which combined techniques used in neurophysiology, mathematical computation, and psychology, focused on speech perception, noise masking, pitch perception, and binaural hearing. Recently, he has used these methods to study the neural coding of acoustic stimuli in the inferior colliculus, which is the principal auditory center of the midbrain. Dr. Delgutte also conducts studies with electric stimuli to determine auditory nerve activity produced by cochlear implant devices. This work seeks to improve the design of new hearing aids and implantable auditory prostheses. A research associate at the Massachusetts Eye and Ear Infirmary, Dr. Delgutte is also an associate professor in the Department of Otolaryngology and Laryngology at Harvard Medical School and teaches at the Harvard-MIT Division of Health Sciences and Technology.

**Dr. Dennis M. Freeman** (SM'76, PhD'86), W.M. Keck Foundation Career Development Professor, was promoted to associate professor in the Department of Electrical Engineering and Computer Science, effective July 1, 1998. Professor Freeman, a principal investigator in RLE's Auditory Physiology group, is involved in developing instrumentation that visualizes the microscopic motion of biological and synthetic structures. He has developed a video-based technique that measures the sound-induced motions of inner-ear structures and is extending this method to other biomedical and engineering applications (see *RLE currents* fall 1997). Professor Freeman, who has been affiliated with RLE since 1974, joined the faculty in the Department of Electrical Engineering and Computer Science in 1995. In addition, he is a research affiliate with the Eaton-Peabody Laboratory at the Massachusetts Eye and Ear Infirmary. A graduate of Pennsylvania State University (BS'73), Professor Freeman is a member of the Association for Research in Otolaryngology, the American Association for the Advancement of Science, the Institute of Electrical and Electronics Engineers, the International Society for Optical Engineering, and the Acoustical Society of America.

**Dr. Qing Hu**, associate professor of electrical engineering and computer science, was awarded tenure, effective July 1, 1998. Professor Hu, a graduate of China's Lanzhou University (BS'82) and Harvard University (MA'83, PhD'87), was a postdoctoral fellow at the University of California at Berkeley before coming to MIT in 1990 as an assistant professor. From 1991 to 1993, he held the KDD Career Development

Professorship and was promoted to associate professor in 1995. Professor Hu's research in RLE's Optics and Devices group has focused on the response of solid-state devices to high-frequency radiation, which involves photon-assisted quantum transport in the millimeter-wave, terahertz, and infrared frequency ranges. His accomplishments include the development of the first millimeter-wave focal plane sensor arrays by using silicon micromachining techniques and the first achievement of terahertz spontaneous emission from a multiple quantum-well structure. He continues to investigate the development of superconducting electronic devices, semiconductor quantum-effect devices, and solid-state infrared lasers, which have applications to space-to-ground communications and high-frequency, high-speed signal processing.

**Dr. Erich P. Ippen** (SB'62), Elihu Thomson Professor of Electrical Engineering and Professor of Physics, was elected vice president of the Optical Society of America for 1998. He will become the society's president-elect in 1999 and serve as its president in 2000. Professor Ippen, a principal investigator in RLE's Optics and Devices group, is widely known for the development of ultrashort-pulse optical sources and measurement techniques. He and his research group have studied femtosecond spectroscopy of solid-state materials, ultrafast nonlinearities in semiconductor waveguides, and ultrashort-pulse optical fiber devices.

**Dr. Marc A. Kastner**, Donner Professor of Physics, was appointed head of MIT's Department of Physics, effective February 1, 1998. He succeeds interim department head Professor Thomas J. Greytak, who was appointed after Professor Ernest J. Moniz was named undersecretary for the U.S. Department of Energy. Professor Kastner joined the MIT faculty in 1973 and served as head of the Division of Atomic, Condensed Matter, and Plasma Physics (1983-1987) and as associate director for the Consortium for Superconducting Electronics (1989-1992). Since 1993, he has been director of MIT's Center for Materials Science and Engineering. As a principal investigator in RLE's Quantum-Effect Devices group, he has contributed to the understanding of the electronic structure of amorphous semiconductors and the physics of high-temperature superconductivity. His recent research on the single-electron transistor has increased understanding of quantum-mechanical processes in semiconductor devices. In 1990, his research group fabricated the first semiconductor single-electron transistor. Profes-

sor Kastner is a graduate of the University of Chicago (BS'67, MS'69, PhD'72) and a fellow of the American Physical Society and the American Association for the Advancement of Science.

**Dr. Wolfgang Ketterle**, professor of physics, was named the winner in the Emerging Technology category as part of Discover magazine's Ninth Annual Awards for Technological Innovation. Professor Ketterle, an investigator in RLE's Atomic, Molecular, and Optical Physics group was cited for the realization of the first atom laser. This novel device, demonstrated by Professor Ketterle's group in November 1996, emits atoms with properties closely analogous to the photons emitted from a laser. This achievement was a result of the group's ongoing investigations into the properties of ultracold atomic matter and their observation of the Bose-Einstein condensate in 1995. The Discover magazine awards, sponsored by the Christopher Columbus Fellowship Foundation, were presented at the Epcot Walt Disney World Resort on June 6, 1998. The winners and four finalists in nine award categories were featured in the July 1998 issue of *Discover*. Professor Ketterle and his colleagues continue to study the Bose condensate, and to work towards the development of a practical, more powerful atom laser. Potential applications for the device include atom interferometry, precision measurements, new atomic clocks, and the creation of microscopic structures by direct-write lithography.

**Dr. Rajeev J. Ram**, Assistant Professor of Electrical Engineering and Computer Science, received an award under the National Science Foundation's Faculty Early Career Development program. Professor Ram, a principal investigator in RLE's Optics and Devices group, plans to develop a noninvasive current probe based on magnetic force microscopy that is capable of monitoring current distribution in electronic devices and circuits. The CAREER program recognizes outstanding new faculty members who intend to pursue academic careers that involve both research and education. Professor Ram's work has focused on the quantum optics of microcavity lasers and on electron dynamics in quantum structures. A graduate of the California Institute of Technology (SB'91) and the University of California at Santa Barbara (SM/PhD'96), Professor Ram joined the MIT faculty in 1997. He has conducted a wide range of theoretical and experimental research, including the development of high-speed semiconductor lasers and studies of the dynamics of microcavity polaritons.

**Dr. Stefanie Shattuck-Hufnagel** (PhD'75), research scientist in RLE's Speech Communication group, was promoted to principal research scientist, effective July 1, 1998. In 1976, Dr. Shattuck-Hufnagel came to RLE as a research affiliate and was awarded a postdoctoral fellowship from the National Institute of Mental Health. In 1980, she was appointed as a research scientist in RLE. As a psycholinguist, her research has sought to provide connections between measurable acoustic-phonetic phenomena, psycholinguistic models of speech processing, and linguistic theories of language structure. Her investigations focus on the speech production planning process, where the models used are based on the prosody (or structure) of spoken utterances and their error patterns. She and her colleagues continue to develop the MIT Digitized Speech Error Database, which will enable the analysis of prosodic constraints on speech error occurrence, detection, and correction. A graduate of Wellesley College (AB'65), Dr. Shattuck-Hufnagel has taught at Cornell and Northeastern universities and currently serves as an advisory editor for the *Journal of Phonetics*.

**Dr. Henry I. Smith**, Joseph F. and Nancy P. Keithley Professor of Electrical Engineering, received the Robert H. Hill Memorial Award presented by Suss Advanced Lithography, Inc., of Waterbury, Vermont. Professor Smith, a principal investigator in RLE's Quantum-Effect Devices group and head of the NanoStructures Laboratory, was cited for his outstanding contributions to the advancement of x-ray lithography. Professor Smith is widely acknowledged for his work in submicron structure technology and his leadership in teaching and promoting submicron structures. A second Hill award was made to Dr. Franco Cerrina, professor of electrical and computer engineering at the University of Wisconsin at Madison and director of its Center for X-ray Lithography. The awards were presented on October 6, 1997, in honor of Robert Hill of IBM, who was a vital contributor to IBM's program in x-ray lithography and whose efforts made it an economical alternative to optical lithography.

**Dr. Kenneth N. Stevens** (ScD'52), Clarence J. LeBel Professor of Electrical Engineering, was one of sixty new members elected to the National Academy of Sciences on April 28, 1998. Election to membership in the National Academy of Sciences recognizes distinguished and continuing achievements in original research. It is considered one of the highest honors accorded an American scientist or engineer. Professor Stevens attended the University of Toronto

(BASc'45, MASc'48) and came to MIT in 1948 as a teaching assistant in the Department of Electrical Engineering. A faculty member of RLE's Speech Communications group since 1958, he has received numerous awards for his fundamental research in speech synthesis and the analysis of speech production processes and has been central to the development of speech communication research at RLE. His recent investigations have focused on the development of models for speech sound generation and on the variability that occurs in speech sounds from different speakers and from different modes of speaking. Using these models, procedures can be developed to recognize words in speech and to assess disorders in speech production. Professor Stevens is a fellow of the American Academy of Arts and Sciences, the Acoustical Society of America, and the IEEE, and is a member of the National Academy of Engineering. Professor Stevens recently published a book, *Acoustic Phonetics* (Cambridge, Massachusetts, MIT Press, 1998).

**Dr. Ngai Chuen Wong**, research scientist in RLE's Optical Communications group, was promoted to principal research scientist, effective July 1, 1998. Dr. Wong joined RLE in 1986 as a research scientist. He conducts fundamental studies to characterize nonlinear optical devices and applies their unique phase and amplitude properties to quantum optics, optical frequency metrology, and optical communication networks. Dr. Wong's accomplishments in this area include a novel scheme to implement an optical-to-microwave frequency chain, the demonstration of optical frequency division by two and three optical divider stages, the development of multi-terahertz-span optical frequency comb generation, and the production of twin beams with strongly correlated noise properties. He holds three patents for the development of his optical devices and systems. A graduate of the University of Rochester (BS/BA'77) and Stanford University (MS'79, PhD'83), Dr. Wong is a topical editor for *Optics Letters* and is a member of the Optical Society of America, Phi Beta Kappa, and Tau Beta Pi.

**Dr. Gregory W. Wornell** (SM'87, PhD'91), associate professor of electrical engineering and computer science, was awarded tenure, effective July 1, 1998. As an investigator in RLE's Digital Signal Processing group, Professor Wornell's research in signal processing includes multi-user broadband and wireless communications and the application of fractal geometry and nonlinear dynamics to these technologies. He and his colleagues have developed a variety of new signal-processing techniques that may have future applications to code-division multiple-access and packet-switched mobile radio networks, indoor spread-spectrum personal wireless systems, and digital audio and television broadcast systems. A graduate of the University of British Columbia (BASc'85), Professor Wornell joined the MIT faculty in 1991 and most recently held the Cecil and Ida Green Career Development chair in the department.

### C.3 Retirement

**Dr. William T. Peake** (SB'51, SM'53, ScD'60), Professor of Electrical Engineering and Computer Science, announced his retirement after serving on the MIT faculty for thirty-nine years. As a principal investigator in RLE's Auditory Physiology group, Professor Peake has investigated signal transmission in normal and pathological auditory systems. His work has emphasized the acoustic, mechanical, and electrophysiological processes of the ear and interspecies comparisons. Professor Peake has also served on faculty at the Harvard-MIT Division of Health Sciences and Technology and as a research associate at the Eaton-Peabody Laboratory (EPL) at the Massachusetts Eye and Ear Infirmary. He plans to continue his research at RLE and EPL, where he and his colleagues are developing a description of the structure and acoustic function of the middle ear for all species of the cat family. This work seeks to develop a theory that would integrate our understanding of signal processing in the ear across several vertebrate species.