

**RLE**

undercurrents

Volume 11, Number 2 • Fall 1999

A Newsletter for the RLE Community at MIT

Behind the Scenes in Ultrafast Optics

The fall issue of *RLE currents* highlights the research of Professors Erich P. Ippen, Herman A. Haus, and James G. Fugimoto in RLE's Optics and Devices group on ultrast optics. This issue of *RLE undercurrents* goes "behind the scenes" to talk with those people who provide backup for the research including the support staff, postdoctoral associates, and research assistants.



From left, Senior Secretary Mary C. Aldridge and Administrative Assistants Donna L. Gale and Cynthia Y. Kopf.

Administrative Assistant **Donna S. Gale** was born in Rochester, NY, and has been living in Somerville since she was four years old. She began working for MIT in 1977 as a senior secretary for the Registrar. In 1978, Donna transferred to the office of the assistant director of administration of the MIT Libraries. In 1980 she began working full-time for Professor Ippen. Donna currently works part-time for Professor Leslie A. Kolodziejski's group in RLE, assisting Executive Assistant Diane Hagopian.

"I'm an avid coupon user; I love to save money by using coupons," Donna says. "I also love to walk and walk with friends around Lake Quannapowitt in Wakefield three times a week. I'm looking forward to my annual trip to Las Vegas with my best friend Cindy Lewis, who is administrative assistant to Professor Henry I. Smith." As a White Cross coordinator at the Community Baptist Church in Somerville, Donna shops for specified items and puts packages of materials together for distribution to needy people in the South. A graduate of Somerville High School, Donna is on the reunion committee.

Donna has two children, Julianne, 17 1/2, and Christopher, 14. Julianne, who is a senior at Somerville High School, is considering going to a community college to prepare for a career in nursing. Donna enjoys spending time with her mother, a widow who lives in Reading. Donna says that, "Another important member of my family is my lovely dog, Rosie, a mix of golden retriever and greyhound."

Cynthia Y. Kopf, part-time administrative assistant to Professors Haus and Fujimoto since 1973, is from Russell, PA. She graduated from Lake Erie College with a BFA degree and a major in illustration. Cindy attended the Columbus College of Art and Design in Columbus, OH for one year to continue her study of illustration.

Cindy owns a home in Dedham that was built in the 1920s. She has always wanted to work with wood and has a woodworking shop in her cellar. "Although I am a novice, I love working with all types of wood. Right now, I am trying to make frames and covers for the radiators in my home. I also really enjoy gardening and often attend talks on gardening."

"Listening and watching musicals is another one of my enduring interests, and I collect recordings and try to go to New York City at least once a year."

She loves all kinds of dogs, and Cindy's Portuguese water dog, Emma, keeps her busy and brings her joy.

On Thursdays, Cindy assists a conservator who restores old oil paintings, helping her prep the paintings. When she retires, Cindy wants to go back to using her major in illustration.

Mary C. Aldridge has been a senior secretary with RLE's Optics and Devices group since 1989 and works for Professors Hermann A. Haus and James G. Fujimoto. She managed the 6.013 web page in fall 1999 and is working with Professor Haus to develop an optics group web page.



Ingmar Hartl, postdoctoral associate with Professor James Fujimoto since October 1999, is a native of Munich, Germany. Ingmar received his diploma (1995) and PhD degree (1999) in physics from Ludwig Maximilian University in Munich. In the past, his research was more involved in physical chemistry; now he designs ultrafast lasers and experiments with new modelocking techniques.

Ingmar has many interests including the theatre, classical music and jazz, and literature; he especially likes reading novels. "Computing is also a special interest of mine," he says. Ingmar played volleyball in Germany and looks forward to finding a volleyball league at MIT. Ingmar says that, "Boston is not so different from Europe," and that it's easy to get around in Boston area. Ingmar plans to travel around the United States next year. Recently married in August 1999 to Wiltrud Simbürger, Ingmar lives in Cambridgeport.

A native of Queens, New York, Research Assistant **John M. Fini** received the M.Eng. and B.S. degrees in electrical engineering from MIT in February 1997. He works for Professors Hermann A.

Haus and Peter L. Hagelstein on the theory of photon configuration space methods in quantum optics. John also works with Professor Haus on polarization mode dispersion. He plans to graduate in 2001 or 2002 with a Ph.D.

John and Kavitha Dulai, from Manhattan and a recent graduate of Emerson College in writing, have been married for three years. The couple are resident assistants at Senior House, one of MIT's undergraduate dorms. John says, "One of the fun aspects of the position is periodically baking lots of cookies and then sharing them with the students. This is great because it obligates you to spend time with people on a personal level."

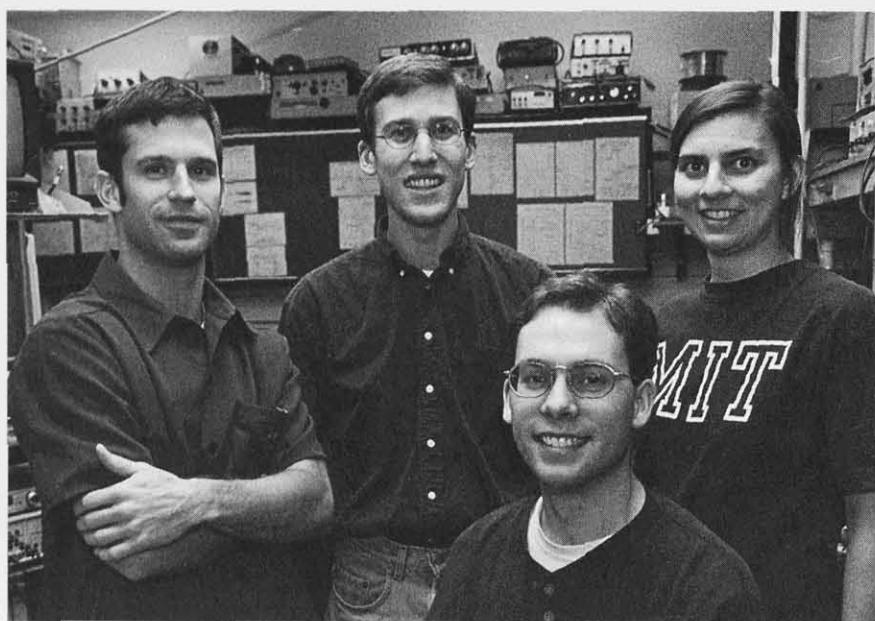
A member of MIT's Tae Kwon Do Club, John has been doing Tae Kwon Do for four-and-a-half years, practicing two to three times a week. "Tae Kwon Do is challenging and helps me overcome my own barriers so that I become unafraid to struggle against things that seem daunting at first. It's a great form of relaxation and helps me build up for other strenuous physical activities such as tennis and hiking."



Research Assistant **Leaf A. Jiang** has been working for Professor Erich Ippen on noise in modelocked lasers since February 1998. A native of New York City, Leaf holds the BS and MEng degrees from MIT.

Leaf says that his hobbies and interests are "thinking, swimming, chasing dogs, and eating very hot foods."

(continued on page 2)



From left, Research Assistants Matthew E. Grein, Daniel P. Ripin, Erik R. Thoen, and Juliet Gopinath, work with Professor Erich P. Ippen.

Research Assistant **Matthew E. Grein** is a native of Bay City, TX, a small town located near Houston. Matt attended Texas A&M University where he earned the BS degree in electrical engineering in 1993. After graduating, Matt lived in Japan for six months under the U.S. government's Eagle Japan program, which featured an intensive study of the Japanese language and culture preparing graduating seniors for living and working in Japan.

Matt returned to the United States in fall 1994 to study at MIT under a National Defense Science and Engineering Graduate fellowship. In fall 1995 he joined the Ultrafast Optics research group in RLE under Professors Erich Ippen and Hermann Haus. He received the MS at the end of the summer of 1997 on his work on harmonically mode-locked fiber lasers (HMLFL). In his doctoral work, Matt is continuing to work on HMLFLs, studying laser dynamics and laser noise in fiber lasers. In addition, he has begun working on noise in modelocked semiconductor lasers. Some of his other interests include quantum optics and devices for high-speed optical communications systems.

Outside of the lab, Matt is an avid road cyclist, often riding with the Boston Road Club and MIT Cycling Club. He says that, "I enjoy the competitive and social aspects of road cycling, and it keeps me in shape. Pierre Villeneuve [of RLE's Surfaces and Interfaces group] and I often ride together." Matt also enjoys hiking and the outdoors—he spent a week trekking across Iceland last summer. He enjoys visiting the museums and galleries around Boston and browsing the many bookstores and coffee houses in Cambridge. He is an avid reader and enjoys watching an occasional independent film.

Daniel J. Ripin received the BS in physics from Emory University in Atlanta, GA, in 1995. He came to MIT in fall 1995, where he worked as a joint research assistant with Professors Daniel Kleppner and David E. Pritchard in RLE's Atomic, Molecular, and Optical Physics group. Dan began working as a research assistant in Professor Ippen's group in 1996.

In his primary area of research, Dan studies photonic crystals in collaboration with Professors Leslie A. Kolodziejski and John D. Joannopoulos' RLE research groups. He says that all the groups work together on planning and design of the crystals, then his group studies the crystals fabricated by Professor Joannopoulos' group. Dan also works on ultrafast laser development. "At the moment, I'm working with Juliet Gopinath to make a laser whose wavelength is used for fiber-optic communication. We are trying to make a laser with the fastest pulses to date for that wavelength." Dan plans to finish his Ph.D. in one-and-one-half to two years.

Once a week, along with Erik Thoen and Elizabeth Koontz, Dan tutors Boston elementary school children at the Children's Haven afterschool program. "I find the experience very rewarding and fun. The tutoring helps kids concentrate on their work, and getting to know the kids is special for me. I find it a nice break from the lab work."

Dan also likes to read novels; he recently read *Memoirs of a Geisha*. In the summer, he plays on the group softball team with group members John Fini, Matt Grein, Leaf Jiang, and Erik Thoen. Interested in genealogy, Dan is presently tracing his family's history from the town of Ripin, Poland. In August 1999, Dan was married in Chicago. His wife Laura is a graduate student in genetics at Harvard University and will receive her master's degree in summer 2000.

From Sioux Falls, SD, **Erik R. Thoen** graduated from Swarthmore College in Pennsylvania with a BS degree in 1995. Since fall 1995, Erik has been working as a research assistant with Professor Erich Ippen. He earned the MS degree in electrical engineering and computer science in 1997. Erik works on applying semiconductor saturable absorber mirrors to mode-lock fiber lasers. In his research, he collaborates with Professor Leslie Kolodziejski's RLE research group. "I expect to receive my degree in 2000, but I'm not sure yet what I plan to do after graduation."

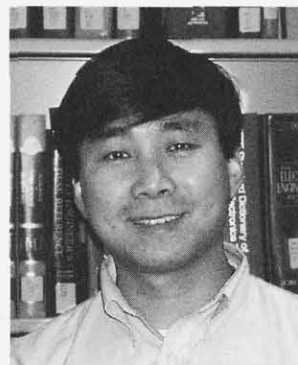
Although very busy with his research, Erik has found time for some outside activities. Since September 1998, Erik, Dan Ripin, and Research Assistant Elizabeth Koontz from Professor Kolodziejski's group have been tutoring Boston elementary school students at the Children's Haven after-school program. "The weekly interaction makes a huge difference in the students' lives. We see them improve very quickly with our attention."

Erik is learning to play the acoustic guitar and likes to play many kinds of music. "I like music in general and love to attend concerts. I like Boston because it's a town for younger people; there are lots of students and exciting activities."

A June 1998 graduate with a BS in electrical engineering from the University of Minnesota in Minneapolis, MN, Research Assistant **Juliet Gopinath** began working with Professor Erich Ippen in September 1998. Juliet is working on two projects: building an ultrafast laser and performing spectroscopy experiments focusing on semiconductor mirrors. Juliet finds her work very interesting and likes interacting with other members of her group.

"Playing the viola is one of the things I most enjoy," says Juliet. Last year she played with the MIT Symphony Orchestra and is now playing with a trio that includes a flutist and violinist. "I practice every day, finding it relaxing and challenging. I began playing the violin at eight, then seven years ago switched to the viola. My sister plays the violin; our parents were very encouraging about our interest in music. In college I considered majoring in music, but I found that I was more interested in playing than in learning theory and music history. The music programs here are very good with a lot of support for music students."

"I like living in Boston, but I love the winter and miss the snow and cold of Minneapolis, where I enjoy cross-country skiing while on vacation. It is a great privilege to be at MIT where the work is so challenging."



Xingde Li is a native of Dalian, a harbor city in northeastern China. He earned the B.S. degree from the University of Science and Technology of China (USTC) in Hefei in 1990. In 1998, Xingde received the PhD degree from the University of Pennsylvania in Philadelphia in physics, where his research topic was biomedical optics. In June 1998, Xingde joined Professor James Fujimoto's research group as a postdoctoral associate. In his work, he experiments with ultrafast lasers for biomedical applications, using a broadband light source to achieve high resolution tomographic imaging. He is also attempting to miniaturize the size of the instruments and to develop a 400 micron needle probe. Using the broadband spectrum light source, his group hopes to extract physiological and biochemical information in addition to architectural data now accessible. Xingde says, "I really like the MIT environment. It is high tech, and I find the experience here broadening. It's great to work with so many smart people."

Xingde loves hiking and camping. He has hiked Mt. Washington in New Hampshire, Humphreys Peak in Arizona, Mt. Sugarloaf in California and many others since 1996. His next stop will be Mt. Elbert in the Rocky Mountains of Colorado.

An avid stamp collector, Xingde has almost all U.S. stamps issued since 1992 as well as stamps from around thirty other countries.

Xingde has been married to Hui Zhang, a microbiologist with New England Biolab since 1991. The couple resides in Beverly, MA, with their eight-month-old son, Jason Li. Xingde finds having a baby is a joyful experience that makes him use his time more efficiently.



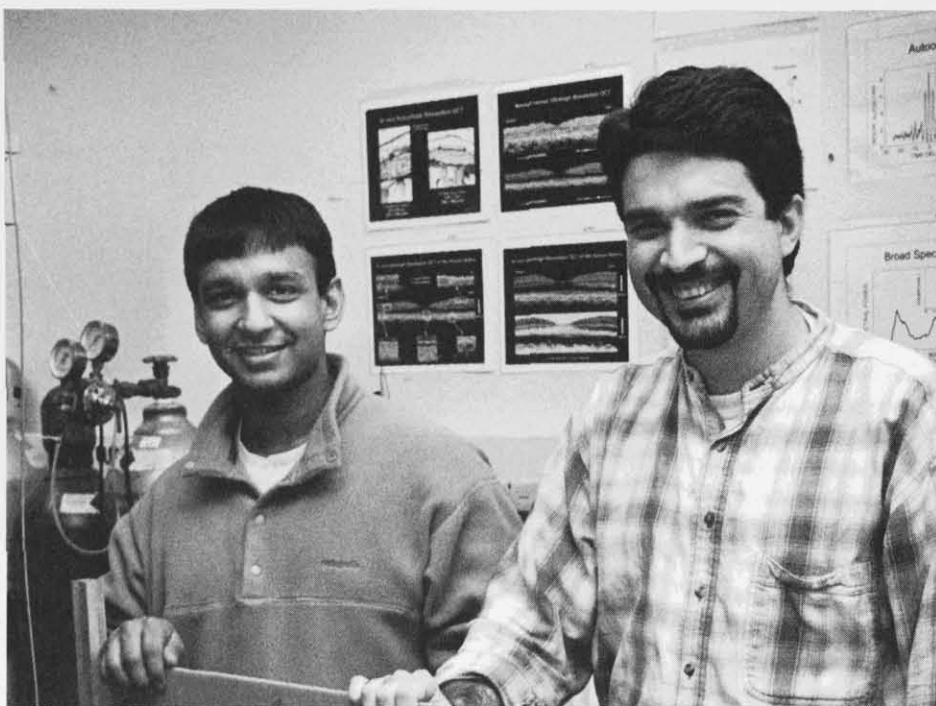
RLE undercurrents is a published two times a year by the Research Laboratory of Electronics for the RLE community at MIT.

RLE undercurrents is written and edited by Barbara Passero, with production and additional editing by Jonah Sacks.

All photographs except as noted by John F. Cook Photography. Our special thanks to all contributors and to Joseph F. Connolly and Dorothy Fleischer.

Inquiries may be addressed to:
RLE undercurrents
Massachusetts Institute of Technology
Research Laboratory of Electronics
77 Massachusetts Avenue, Room 36-412
Cambridge, MA 02139-4307
(617) 253-2566
<http://rleweb.mit.edu>

(continued on page 3)



Ravi Ghanta, left, and Costas Pitris work with Profesor James Fujimoto.

Research Assistant **Ravi K. Ghanta** comes from Oakdale, a small town in central Louisiana. He received the bachelor of science degree in May 1997 from Cornell University in Ithaca, NY, where he majored in applied engineering and physics. In August 1997, Ravi began pursuing a degree in medicine from Harvard Medical School. As a student in the Harvard-MIT Division of Health Sciences and Technology, he joined Professor Fujimoto's group in January 1998 to help develop medical applications for optical coherence tomography (OCT). He has finished two years of medical school and is currently pursuing research full-time through a Howard Hughes Fellowship.

Ravi says that, "Working with Professor Fujimoto gives me the opportunity to do some pretty exciting work in cutting edge technology to study the limits for optical techniques in medical diagnosis." He is now helping to develop the technology for ultrahigh resolution OCT to study eye diseases and coronary artery disease. "In general," Ravi says, "I'm interested in developing and integrating novel technologies, such as OCT, into clinical practice to hopefully improve clinical outcomes."

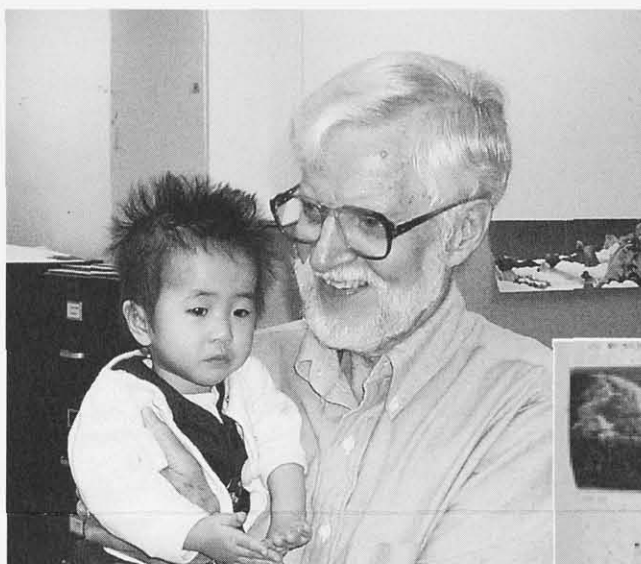
Ravi enjoys running, sculling, and mountain biking, especially in the Finger Lake Trails region in upstate New York. He also enjoys reading history, following political science, and playing the guitar. Ravi is interested in promoting entrepreneurship. With his college roommate, he has formed a company that won business plan competitions both at MIT and the Wharton School of Business and that will soon begin full commercial operation.

A native of Cypress, **Constantinos Pitris** is a research assistant in the MIT-Harvard Health Sciences and Technology program. He is planning to transfer to the medical degree program at Harvard Medical School in the summer of 2000. Costas has a bachelor's degree in electrical engineering (1993) and master's degree in biomedical engineering (1995) from the University of Texas at Austin. Since fall 1995, Costas has been working with Professor Fujimoto's group on optical coherence tomography (OCT). "I find medical imaging fascinating, and OCT even more so. It is remarkable how a single fiber, delivering laser light, can produce cross-sectional images of tissue. OCT could potentially be used to catch cancer and precancerous lesions before they become invasive and could allow timely and more successful therapy."

"I like the outdoors," Costas says, "especially big, open spaces. I also enjoy traveling. I have traveled a lot around the United States to attend conferences and for vacations. But, because I took two courses, fall term was very busy, and I could only take a little time off. Fortunately, one of my favorite destinations, New York City, is close enough to visit often."

Costas plans to graduate from MIT in 2000. His ultimate goal is to split work between engineering and clinical research. Costas plans to return to Cypress in two years, where he intends to settle down permanently. "Cypress is a safe place to live, and the weather is much nicer than New England's!"

New Faces

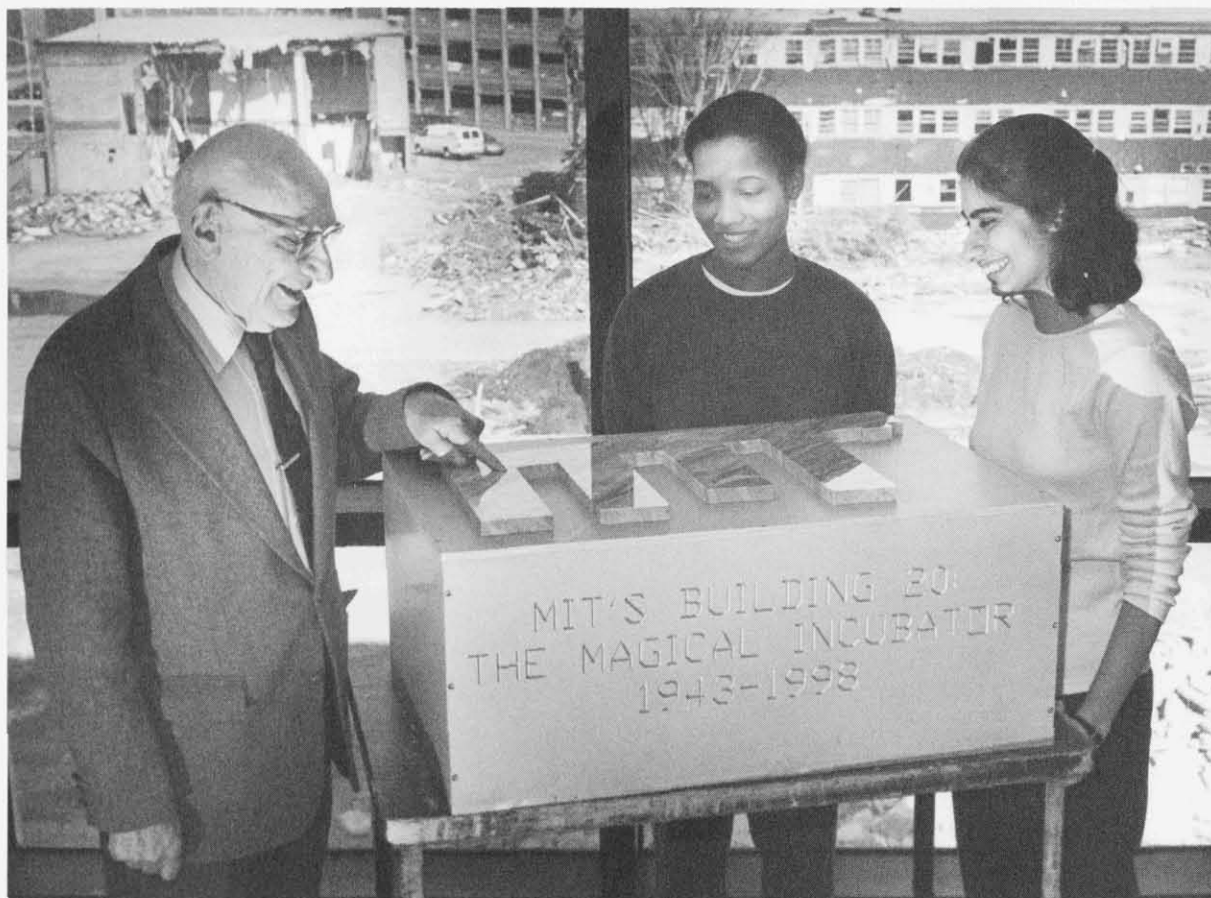


Left: RLE Professor Ken Stevens poses with his new daughter Kendra.

Right: former RLE employee Ahsaki Hardy with her daughter Keylia.



A Monument to Building 20



As part of the March 1998 Building 20 celebration, Professor Paul Penfield and his celebratory committee suggested the building of a time capsule to commemorate the building's rich history. Professor Emeritus J. Francis Reintjes, a member of the committee, recruited the students and supervised the project. The time capsule will be on display in the new Ray and Maria Stata Center.

Professor Emeritus Reintjes and undergraduate students Tanisha Lloyd, '99 (center) and Sonia Tulyani, '00, savor completion of the Building 20 time capsule which the students designed and constructed during 1998 as a UROP project. Professor Reintjes points to the location of his office in Building 20 during the 1950s. In the background, in this March 1999 photo, the real Building 20 is being demolished. (Photo by John F. Cook)

Short WWWWWWWaves



Professor Emeritus William M. Siebert walking beside grandchildren Isabel and Sam Kuniholm who are riding his 1/8th scale model train as it crosses the bridge over his driveway in Jackson, NH. Isabel and Sam are the children of Bill's daughter, Terry. The bridge is raised and lowered by hand.

Professor Emeritus William M. Siebert's Black Mountain Doublehead and Dundee Railroad (BMD&D) runs through his yard in Jackson, NH. Named for the mountains adjacent to his 2.5 acre property that looks out on Mt. Washington and a local small town, the 1/8th scale railroad presently includes three cars, an engine, flatbed car, and caboose. Bill built the red caboose from 1916 blueprints from the Pennsylvania Historical Society five years ago. The engine, with a hydraulic transmission, runs by a lawn mower motor fueled by gasoline and has a singe control.

For the past two years, Bill has been building a real steam engine, a 2-6-0 mogul, Baltimore and Ohio prototype, from a kit. He expects to finish the engine in two more years. "A steam engine is a complicated thing. I'm becoming a fairly good machinist, but I also rely on a local man for his superb precision work. I'm going to get someone else to build the boiler because it has an enormous amount of plumbing including valves, levers, and all kinds of complicated apparatus."

"I've always been interested in trains, and, in fact, everyone in my family including my wife Sandy, my children Terry and Peter, and my grandchildren loves trains," Bill remarks. "As a boy, I owned a set of Lionel trains. But after a trip to the Museum of Science and Industry in New York City at age ten, I became excited about HO gauge trains and sold the Lionel set. And as an undergraduate at MIT during World War II, I rode trains often. The stretch of track that runs by MIT was very important in those days if you wanted to stop in Boston." Bill says that there is a lot of interest in trains in New Hampshire because many areas were not accessible by road until this century.

This month RLE says goodbye to longtime employee Barbara Passero. We thank her for her many years of service and wish her the best.

At a ceremony at the Faculty Club on March 31, 1999, Professor **Marc A. Kastner**, Administrative Assistant **Cynthia Y. Kopf**, Principal Research Scientist Dr. **Joseph S. Perkell**, Principal Research Scientist Dr. **Philip W. Rosenkranz**, and Professor **Jeffrey H. Shapiro** were inducted into MIT's Quarter Century Club.

Administrative Assistant **Darla J. Chupp** and graduate student **Matthew J. Secor**, both from RLE's Digital Signal Processing group, were married on May 22 1999, in Smithville, OH. After the wedding, Darla and Matt traveled in New Mexico and Utah. The couple currently resides in Somerville.

Administrative Assistant **Francis M. Doughty's** beautiful new CD *Among Trees* is available from him (Room 36-277, x8-6484) or from University Stationery, 311 Mass. Avenue, Cambridge, MA (617/547-6650). Fran was interviewed by DJ Bob Cannon and performed live on WUMB Boston on August 29, 1999. Check out Fran's website: <http://www.fdoughty.com>

Research Scientist Dr. **James G. Goodberlet** of RLE's Quantum-Effects Devices group ran in the Boston Marathon for the second time on April 19, 1999, and finished within the top 800 at a time of three hours and 32 seconds.

Postdoctoral Associate **Andrew E. Grumet** was married to Lara Asmundson on June 6, 1998 at the Oliver Lodge in Meredith, NH. Andrew recently finished his PhD and is working with Professor John L. Wyatt on retinal implant research. Lara is currently working as a physical therapist at the Shaughnessy Kaplan Rehabilitation Hospital in Salem, MA. The couple resides in Beverly, MA with their two cats.

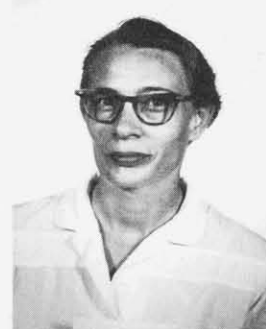
Dr. **Julie E. Greenberg** and Ron Chaney are the parents of a baby girl Isabel Bailey Chaney who born on May 25, 1999. Julie is a research scientist with RLE's Sensory Communication group. The couple has an older son, Benjamin.

Kimberly C. Howard, daughter of RLE Headquarters Administrative Assistant **Maureen C. Howard** and her husband Anthony, graduated on May 13, 1999 from New York University with her master's degree in Educational Theatre. Kim recently

completed acting in a commercial for Merrill Lynch. She is teaching drama in local high schools in New York City while continuing to work on her acting career.

Professor **John L. Wyatt, Jr.**, principal investigator in RLE's Circuits and Systems group, and Christie I. Baxter had a baby girl Julia Anne Wyatt on March 8, 1999. Christie is a principal research scientist and lecturer in MIT's Department of Urban Studies and Planning.

In Memoriam



Arbella P.C. Williams, 76, of Dayton, OH, a former senior secretary in RLE, died on May 25, 1999. Born in Concord, NH, Mrs. Williams, who was called

Penny, was employed as a technical assistant with Dr. Helen L. Thomas from 1963-1966, before working as senior clerk for Professor Jerome Y. Lettvin until her retirement in 1987.

Professor Lettvin remembers Mrs. Williams as "more than a secretary. She was a wonderful woman, straightforward, honest, and very intelligent with good taste in music and literature. I owe a great deal to her because she kept things in order for me and saved me from administrative details. Everyone liked Penny; she was a complete friend to the graduate students and treated them as part of the family."

Mrs. Williams is survived by her husband, Thomas S.; a son, Peter Chase of Dayton; and two grandchildren. Donations in her memory may be made to the Artemis Center for Alternatives to Domestic Violence, 310 W. Monument Ave., Dayton, OH 45402.

RLE Outreach

On Monday, December 6, 1999, eight students from the Citizens Middle School in Boston and their teachers Peter DiSilva and Bruce Gray toured Professor Henry I. Smith's NanoStructures Laboratory and then gave a presentation on nanostructures to Professor Smith's RLE Quantum-Effects Devices research group. Professor Smith is a world expert on nanostructures.

From left, Angel Haywood peers into an optical microscope; Besoni Cohen and Rachel Alexander with a scanning electron microscope. Also present were Natick Middle School students Bryson Sicotte and Andrew Smith-Freedman. (Photos courtesy of the NanoStructures Laboratory.)

