Astrophysicists’ work supports Big Bang theory

Georges Smoot

NASA’s COBE satellite, provides increased support for the Big Bang theory of the origin of the universe. The COBE (Cosmic Background Explorer) measurements also mark the inception of cosmology as a precise science. For the first time, cosmological calculations could be compared with data from real measurements.

According to the Big Bang scenario, the cosmic microwave background radiation is a relic of the earliest phase of the universe. Immediately after the Big Bang itself, the universe can be compared to a glowing body emitting radiation at a temperature of almost 3,000 degrees Celsius.

Since then, the radiation has cooled as the universe has expanded. The background radiation we can measure today corresponds to a temperature that is barely 2.7 degrees above absolute zero. The new Nobel laureates were able to calculate this temperature thanks to the COBE measurements.

COBE also had the task of seeking small variations of temperature in the cosmic background radiation in different directions. Extremely small differences of this kind—in the range of a hundred thousandths of a degree—offer an important clue to how the galaxies came into being. The variations in temperature measured by COBE show us how the matter in the universe began to “aggregate.” This was necessary if the galaxies, stars and, ultimately, life forms like us were to be able to develop.

Smoot received B.S. degrees in mathematics and in physics in 1966 from MIT. He also received the Ph.D. in physics in 1970 from the Institute working with the late Professor David Fisch, who was on the MIT faculty for some 40 years. Smoot is currently a professor at the University of California, Berkeley.

Calling this work “the most important and exciting breakthrough of the last decade, perhaps multiple decades,” when the phenomenon was named “breakthrough of the year” by Science magazine. Fire and Mello “have changed the future of biological science by providing insights into the ability of RNA to regulate gene expression,” Sharp said at the time.

The genome operates by sending instructions for the manufacture of proteins from DNA in the nucleus of the cell to the protein-making machinery in the cytoplasm. These instructions are conveyed by messenger RNA (mRNA).

In 1998, Fire, now a professor at Stanford University’s School of Medicine, and Mello, a professor at the University of Massachusetts Medical School in Worcester, published their discovery of a mechanism that can degrade mRNA from a specific gene. This mechanism, RNAi, is activated when RNA molecules occur as double-stranded pairs in the cell. Double-stranded RNA activates biochemical machinery that degrades those mRNA molecules that carry a genetic code identical to that of the double-stranded RNA. When such mRNA molecules disappear, the corresponding gene is silenced and no protein of the encoded type is made.

RNAi, which occurs in plants and animals, including humans, is key in regulating gene expression. It protects against RNA virus infections, especially in plants and invertebrate animals, and secures the web is awash with conspiracy theories about voting machine hacks and trickery. And with the midterm elections approaching, many mainstream politicians are voicing concern about ensuring that every ballot will be counted correctly on Election Day.

But, as an upcoming conference at MIT will show, efforts to ensure the integrity of the American electoral system must begin long before the polls open.

The Voter Identification/Registration Conference, sponsored by the Caltech/MIT Voting Technology Project, to be held Oct. 5-6 at MIT, will delve into the crucial issue of how to effectively register and/or identify voters so they will be able to walk into their polling places and cast ballots efficiently and securely.

A host of nationally recognized experts, academics and researchers are scheduled to participate, including Paul S. DeGregorio, chair of the U.S. Election Assistance Commission, who will give the keynote address; and Marc Rotenberg, executive director of the Electronic Privacy Information Center in Washington, D.C. MIT President Emeritus Charles Vest will welcome participants.

“In the 2000 election, we found that two to three times as many errors were caused by registration than by any other problem,” said Ted Selker, MIT Media Lab associate professor and co-director of the Caltech/MIT Voting Technology Project, which was launched in December 2000 to promote new technology for elections. “Two to three million voters were lost in 2000 because of registration issues.”

Indeed, key sections of the Help America Vote Act of 2002 focused on registration reforms, Selker said. For example, as of Jan. 1, 2006, all states were required to have a statewide registration database available. The goal, purportedly, is to help local election officials ensure a person is not registered more than once or that someone who...
Hispanic Heritage winner sets sights high

Sasha Brown
News Office

Setting high goals and achieving them is crucial, says Freshman Elethera Flores of Maryland, the recipient of the 2006 Hispanic Heritage National Youth Award for Engineering and Mathematics.

More than 12,000 high school students from across the country applied for the award. Only nine students were selected in the various categories. MIT freshman Luis Flores (no relation) also received one of the awards in the sports category. The award winners receive $8,000 plus a laptop computer.

Elethera Flores’ commitment to excellence started early. “Either I go all the way or I don’t do it,” said Flores, who set her sights on MIT at the beginning of her high school career. “I knew it was the top engineering school in the country.”

Throughout high school, Flores maintained a 4.2 grade point average and consistently challenged herself with summer programs such as MIT’s Minority Introduction to Engineering and Science (MITES) and an internship in space robotics at NASA.

As the middle child between two brothers and a child of divorce, her time at home was not always easy, Flores said, adding that her high school was not as challenging as she might have wished. Still, she found hardship motivating. “It gave me such a perspective on what life could be.”

Flores’ Mexican heritage has also provided motivation, she said. As a very young child, she attended a Spanish immersion school, but after the family moved to Maryland, her mother was unable to find one. She lost some of her skill in speaking Spanish, which is something she said plans to get back while she is at MIT.

Flores’ love of engineering and mathematics started early when she was enrolled in programs for academically gifted students. Still, she made a conscious decision to pursue her goals with unusual fervor. “I asked myself: ‘Do I want to live just happen to me?’”

Without a strict plan of what you want to do, you end up where it takes you.

In recent years, she has found inspiration from her older brother, an engineer-

ing student at Texas A&M. “He is very creative and has really inspired me to move her into engineering,” she said. “He taught me not just to enjoy the cell phone but to actually take it apart and see what made it go.”

One of her older brother’s most valu-

able lessons was teaching her to drive a car with standard transmission. “Not many girls can do that,” she said. “It means a lot to me.”

Through the years, Flores kept her sights set on MIT. “It was always at the end of my tunnel,” she said. When she received the MIT acceptance letter earlier this year, she was thrilled. “I felt like MIT was inviting me to come help make a difference in the world.”

While she is at MIT, Flores said, she hopes to dance—“especially Latin dance,” she said. She also wants to study Japanese and go to Japan. “Japan just feels right to me,” Flores said. Eventually, she hopes to get her Ph.D. in electrical engineering. “I am extremely excited to be at MIT this year,” she said.

MIT was named the fourth-best engineering school for Hispanics by Hispanic Business Magazine.

MEMORIALS

William Dickson

A memorial service for William R. Dickson, retired senior vice pres-

ident, will be held Friday, Oct. 6 at 3 p.m. in Memorial Amphitheater in the Stata Center.

Elizabeth Whittaker

A remembrance service for Elizabeth "Betsy" Whittaker, retired associate secretary of the MIT Corporation, will be held Wednes-

day, Oct. 11 at 11 a.m. in Great Dome (Room 14W-111). A reception will immediately follow. Inquiries should be directed to the MIT Chairman’s Office at az3-4601.

SMOOT

Continued from Page 1

California at Berkeley. CowINNER Mather is currently at NASA’s Goddard Space Flight Center.

George Smoot is a distant relative of another Smoot in MIT lore. In 1958 that Smoot, Orville R., was the first person to cross overheads by his fraternity brothers across the Harvard Bridge to measure the span in body lengths. That distance was found to be exactly 364 smoots plus an ear. Today, Mather says that the new Nobel laureate was often confused with his predecessor. George Smoot wrote about the experience in a short digest on the web.
The Executive Committee of the MIT Corporation has approved promotion for 17 faculty members to the rank of full professor. All appointments were effective July 1.

Frank B. Gertler

Biology
Education: B.S. 1985, Ph.D. 1992 (both from University of Wisconsin at Madison)

Gertler is a leader in the field of cell motility. His major contribution has been to decipher a fundamental new mechanism by which signaling pathways that control remodeling of actin cytoskeleton can have profound effects on cell motility and morphol.

Mitchel J. Resnick

Media Arts and Sciences

Resnick’s research focuses upon rethinking learning and education in the context of new computational technologies. He has concentrated particularly on development of new educational technologies that encourage and support learning through designing and experimenting.

Alexandre Megretski

Electrical Engineering and Computer Science
Education: B.S. 1985, Ph.D. 1988 (both from Leningrad University)

Megretski has established himself as one of the world’s top research-

ers in systems and control theory. He is well known for his work on Integral Quadratic Constraints (IQC), a methodology for the analysis and design of feedback systems with nonlinearity, non-convexity, and uncertainty.

Daniela Rus

Electrical Engineering and Computer Science
Education: B.S. 1985 (University of Iowa), M.S. 1986, Ph.D. 1992 (both from Cornell University)

Rus is a world leader in the area of self-organizing sys-
tems, which may be com-
prised of mobile robots, mobile or stationary sen-
sors and actuators. She has built novel hardware devices, invented new algorithms and developed many of the first recong-

uring robots.

17 faculty members promoted

David W. Miller

Aeronautics and Astronautics

Joined MIT faculty: 1997
Tenured: 2002

Miller is an international-
ally recognized leader in the development of tech-
nologies, processes and tools required to produce cost-effective designs of space telescope missions. His work has significantly increased the resolving power of telescopes and led to replacement of thrusters with electromag-

nets to control spacecraft.

Paula T. Hammond

Chemical Engineering
Education: S.B. 1984 (MIT), M.S. 1988 (Georgia Tech), Ph.D. 1993 (MIT)

Joined MIT faculty: 1995
Tenured: 2002

Hammond is a world-

renowned expert in the synthesis of tailored, func-
tional materials. Her work is characterized by inter-
esting chemical synthesis, careful understanding of the fundamental second-

ary interactions that guide poly-

mer self-assembly, development of novel pro-
cesses and the choice of important problems.

Janet Sonenberg

Music and Theater Arts
Education: B.A. 1971 (Tufts University), M.F.A. 1978 (New York University)

Sonenberg focuses on handcraf-

work in the the-

ater. She has developed an original method that direct-

ly engages with the actor’s imagination and offers a rich alternative to the necessity of drawing upon firsthand experience to convey character and emo-

tional depth. Her method has since been adopted by the Royal Shakespeare Company in England.

Michael Greenstone

Economics

Greenstone is a leader in the field of environ-

mental economics. He is best known for his empirical research on topics related to air pollution policy, including the Clean Air Act, and he has made important contributions to the economic analysis of pollution policy, house-

hold risk tolerance and the health effects of varying pollution levels.

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prised of mobile robots, mobile or stationary sen-
sors and actuators. She has built novel hardware devices, invented new algorithms and developed many of the first recong-

uring robots.

Martin Rinard

Electrical Engineering and Computer Science
Education: Sc.B. 1984 (Brown University), Ph.D. 1994 (Stanford University)

Joined MIT faculty: 1997
Tenured: 2002

Rinard is one of the top researchers in three areas: program analysis, compiler design and programming language design. In recent years, he has made signifi-
cant intellectual contribu-
tions to formal analysis of programs, object-oriented programming and com-
puter security. His recent work on failure-oblivious computing is a novel way of improving the reliability and security of computing systems.

Diane E. Henderson

Literature
Education: B.A. 1979 (College of William and Mary), M.A. 1980, M.Phil. 1983, Ph.D. 1989 (Columbia University)

Joined MIT faculty: 1995
Tenured: 1999

Henderson, a scholar in Shakespeare and Renaissance studies, will soon publish a book con-

sidering reworkings of Shakespearean plays and situations in fiction and film from the early 18th century to contemporary times. Henderson also reg-

ularly edits and contributes to edited volumes, new edi-
tions of Shakespeare texts and encyclopedias.

Elizabeth A. Wood

History

Wood is at the forefront of an emerging new genera-
tion in the field of Soviet history. She aims to go beyond sterile debates and pursue inten-
sive empirical research made possible by the recent opening of the Soviet archives. She also focuses on the experience of ordinary people and on how language shapes social identity.

Alexandre Megretski

Electrical Engineering and Computer Science
Education: B.S. 1985, Ph.D. 1988 (both from Leningrad University)

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Data mining helps predict crystal structures

The same computer methods used by online sales sites to suggest books to customers can help predict the crystal structures of materials, an MIT team has found. These structures are key to designing new materials and improving existing ones, which means everything from butterflies to airplane wings could be influenced by the new method.

The scientists report their findings in a recent online edition of Nature Materials.

Using a technique called data mining, the MIT team preloaded the entire body of historical knowledge of crystal structures into a computer algorithm, or program, which they had designed to make correlations among millions of x-rays used for detailed noninvasive brain imaging. They then added the new information to the program.

Harnessing this knowledge, the program then delivers a list of possible crystal structures for any mixture of elements whose structure is unknown. The team can then try to narrow down the list to a list of possibilities by searching a second database that uses quantum mechanics to calculate precisely which structure is the most energy commuter—a standard technique in the computer modeling of materials.

We had at our disposal all of what is known about nature," said Professor Gerbrand Ceder, director of the Department of Materials Science and Engineering, leader of the research team. Ceder compared the database of crystal structures to the user database of an online bookseller, which can calculate correlations among millions of new titles that customers with similar interests. "If you tell me you've read these 10 books in the last year and these 10 next year, I can make some prediction about the next book you will be interested in," he said.

The data-mining algorithm captures the knowledge of the materials database created over time (provided by the preloaded database) and makes sophisticated correlations to generate lists of possibilities that may contain the true structure based on historical knowledge. These candidate structures were previously assembled in a time-consuming and subjective process that often involved synthesis and subjective project that often amounted to a year or more. Ceder said that quantum mechanics, combined with a computer algorithm, forms a two-pronged strategy that will make the process faster and more accurate.

Given their computers, computational modelers can already determine, in the space of just a few days, atomic structures that might take months or even years to elucidate in the lab. And just as key structures of just two elements, Ceder's group found the new algorithm could select five structures from 3,000-4,000 possibilities with a 90 percent chance of having the true structure among the five.

"It's all about probability and correlations," Ceder said. "Our algorithm gives us the crystal structure with a certain probability. The key was realizing we didn't need more than that. With a short list of candidate structures, I can solve the problem precisely with quantum mechanics."

According to Ceder, the new technique will enable a big leap forward in true computational design of materials with specific properties. For example, "if somebody wants to know whether a material is going to have the right bandgap to be a solar cell, I can't calculate the bandgap if I don't know the structure," he said. "Bandgap determines many properties such as electronic conductivity." And if I calculate the bandgap using the wrong structure, I may have a totally irrelevant answer. Properties depend on structure.

Contributing to the work were graduate students Sarah Brown, Catherine burgers, and Eric Guyer (S.M. 1974, Sc.D. 1977), the CEO of Climate Energy, during a recent MIT Energy Club talk.

NASA astronaut Buzz Aldrin (Sc.D. in aeronautics and astronautics, 1963) became the first MIT graduate to walk in space during the Gemini 12 mission in 1966. Three years later, on July 20, 1969, Aldrin and fellow astronaut Neil Armstrong conducted the first extravehicular activity (EVA) on the lunar surface during the Apollo 11 mission.

Three other MIT graduates, David Scott (S.M. in aeronautics and astronautics, 1962), Charles Duke (S.M. in aeronautics and astronautics, 1964), and Edgar Mitchell (Sc.D. in aeronautics and astronautics, 1964) conducted a total of nine extra lunar surface EVAs during the Apollo program. Russell Schweickart (B.S. and M.S. in aeronautics and astronautics, 1963) conducted the first EVA in the Apollo program in 1969.

During the space shuttle program, seven other MIT graduates completed a total of 21 EVAs including Franklin Chang Diaz (Sc.D. in nuclear engineering, 1977), Mark Lee (S.M. in mechanical engineering, 1980), Joy Apt (Ph.D. in physics, 1976), John Grunsfeld (S.B. in aeronautics and astronautics, 1980), Charles Duke (S.M. in 1966. Three years later, on July 20, 1969, Aldrin and fellow astronaut Neil Armstrong conducted the first extravehicular activity (EVA) on the lunar surface during the Apollo 11 mission.

NASAs first EVA was conducted by the second astronaut to walk in space in support of the Apollo 11 mission. The astronauts were assigned a total of 11 space shuttle missions, Sept. 9 through Sept. 21.

Stefanyshyn-Piper spent more than 13 hours on two extravehicular activities (EVAs) outside of shuttle Atlantis while it was docked with the International Space Station. She was responsible for assembling a major truss segment, which includes a new set of photovoltaic solar arrays that provide power to the space station.

Stefanyshyn-Piper and fellow astronaut Joseph Acaba (S.B. in aeronautics, 1986) conducted the first EVA to spend the night in the space station’s Quest airlock module as part of a new procedure to help purge nitrogen from their bloodstream. This procedure helps prevent decompression sickness, commonly referred to as the “bends,” when the astronauts perform space walks in a spacewalk that is pressurized at a significantly lower pressure than the space station.

“One of the things about doing EVAs in space is you have the opposite effect of going diving,” she said in a recent interview. “When you go diving, you go from the Earth’s atmosphere to a higher atmosphere, and so when you come back up you have to decompress. Well, the same thing happens when you go out on a spacewalk because you’re inside the space station at 14.7 psi nominally, and when you go out on your spacewalk, you’re only at 4.5 psi.”

Stefanyshyn-Piper was also the prime operator of the space station’s robotic arm and was the overall lead for transferring supplies from the shuttle’s cargo module to the space station.

Stefanyshyn-Piper received an S.B. in mechanical engineering in 1984 and an M.S. in mechanical engineering in 1985. As an MIT undergraduate, she was a member of the womens varsity crew team and received its Most Valuable Player Award in 1982.

Stefanyshyn-Piper participated in MITs Navy ROTC Program and received her commission in 1992. She graduated from MIT with a B.S. in mechanical engineering in June 1985. She gained extensive experience as a diver and salvage officer and currently holds the rank of captain in the U.S. Navy.

She was chosen as a NASA astronaut in May 1996 and trained for more than a decade for her first mission into space. The STS-115 crew was selected in February 2002, one year before the Columbia accident, and spent more than four years training for its mission.

Only six other women astronauts and one woman cosmonaut have walked in space. Since the space station assembly effort began in 1998, a total of 72 EVAs have been conducted by 63 astronauts and cosmonauts from six different countries. Stefanyshyn-Piper is only the fifth woman astronaut to walk in space in support of the space station assembly effort.

A research team led by scientists at the Broad Institute of MIT and Harvard has developed a new kind of genetic road map that can connect human diseases with potential drugs to treat them, as well as predict how new drugs will work in human cells.

The “Connectivity Map,” the new tool and its uses are described in the Sept. 26 issue of Science and in separate papers in the Sept. 28 early edition of Cancer Cell.

The three papers show the map’s ability to accurately predict the molecular actions of novel therapeutic compounds and to suggest new applications for existing drugs. Based on these initial results, the researchers propose a public project to expand the Connectivity Map—in the spirit of the Human Genome Project—to accelerate the search for new drugs to treat disease.

“The Connectivity Map works much like a Google search to discover connections among drugs and diseases,” said senior author Todd Golub, the director of the Broad Institutes cancer program, an investigator at the Dana Farber Cancer Institute, an associate professor of pediatrics at Harvard Medical School, and an investigator at the Howard Hughes Medical Institute. “These connections are notoriously dif- ficult to find, in part because drugs and diseases are characterized in completely different scientific languages.”

A key challenge in biomedicalicine is to connect each human disease with drugs that effectively treat it while understanding the molecular basis for the drugs effects. To solve this problem systematically, the scientists described the effects of drugs and diseases in the common language of “genomic signatures,” meaning the full complement of genes that the drugs turn on and off.

To create a first-generation Connectivity Map, the scientists measured the genomic signatures of more than 160 drugs and other biologically active compounds. They next developed a computer program to compare the signatures of the drugs with each other and also with the signatures seen in diseases. In this way they were able to discover the mechanisms underlying a novel drug candidate for prostate cancer, and that a drug currently used to treat one disease may be useful in another.

“This is a powerful discovery tool for the scientific community,” said Justin Lamb, the lead author of the Science paper and a senior scientist at the Broad. “By analyzing just a small fraction of available drugs, we have already confirmed several biological connections between drugs and human disease, and made entirely new ones, too.”

Like other scientific databases, the true value of the Connectivity Map lies in its capacity to be queried by nearly any researcher with a computer, the genomic signature of a particular disease, drug or other aspect of human biology serves as the “search word.” Potential functional connections are revealed through a ranked ordered list of reference compounds in the database that have matching signatures.

One of the surprising results to emerge from the Connectivity Map involves gedunin, a plant derivative that, despite a long history of medicinal use, is not well understood molecularly. The researchers identified gedunin as a molecule that disrupts hormone signals in prostate cancer cells. They then used the Connectivity Map to help uncover its precise molecular action. As confirmed through additional work, gedunin disrupts a key quality control mechanism in the cell.

Another key finding suggests a new way to overcome drug resistance in cancer. Using the Connectivity Map, a team led by Scott Armstrong, an assistant professor at Harvard Medical School and Childrens Hospital Fostion and an investigator at the DanaFarber Cancer Institute, identified the FDAapproved immunosuppressant drug, sirolimus (also known as rapamycin), as a therapeutic candidate for overcoming drug resistance in a form of human leukemia.

Although the first use of the Connectivity Map is limited primarily to drugs, the same concepts could be applied universally across all facets of human biology,” said Eric Lander, an author of the Science paper, director of the Broad Institute and MIT professor of biology. “Expanding this initial map to encompass all aspects of human biology would provide a valuable public resource for the scientific community. Such an effort would parallel the sequencing of the human genome, both in its scope and in its potential to accelerate the pace of biomedical research.”

Data from this work are publicly available at www.broad.mit.edu/cmap. A webbased tool for scientists to perform their own analyses using the Connectivity Map is also freely available at this site.
In cooperation with the Ford-MIT Alliance, MIT Information Services and Technology (IST) has acquired a 2006 Ford Escape Hybrid as the first step in replacing all IST’s fleet of vehicles. The Escape Hybrid is intended to be a more efficient and environmentally-friendly cars and vans over the next several years. The MIT was the first U.S. campus to receive the 1997 Ford Escape cargo van. The Escape Hybrid has an Environmental Protection Agency (EPA) city mileage rating of 36 miles per gallon versus 4 miles per gallon for a new Ford Escape.

In keeping with PresidentSusan Hockfield’s vision of MIT as a sustainable institution, energy conservation and environmental fields, IST has been evaluating alternatives to standard cars and vans as it goes through the normal cycle of vehicle end-of-life and replacement. IST examined several options for “green” vehicles including biodiesel, electric, compressed natural gas, and hybrid technology. Hybrid technology has the advantage of being available commercially and offering both increased gas mileage and reduced emissions.

One of the challenges in purchasing an alternative-energy vehicle is the high cost of the technology. After reviewing the driving profile for IST’s use (vehicles are used by network, telephone and customer support staff to deliver computers, respond to service calls and perform other related activities), IST determined the savings in per mile cycle would yield a hybrid technology payback cost that offset the added cost of acquiring the hybrid vehicle for several years. While there were significant environmental advantages associated with the hybrid, there would also be increased costs.

IST’s commitment to being at the forefront of ener

gy conservation led it to work in partnership with MIT’s Industrial Liaison Program to find a corporate partner to assist in the purchase of the Escape Hybrid. Kyle Pyne, manager of the IS&T Departmental Information Technology Resource Team (DITR), worked to gain the sponsorship of computer manufacturer Dell and technology company Intel. Co-executive directors of the Ford-MIT Alliance, to assist in the purchase of the Ford Escape Hybrid. The Ford-MIT Alliance contributed funds to cover the difference in purchase price between a hybrid and nonhybrid vehicle. This contribution allowed IST to purchase an initial cost hurdle of hybrid ownership and focus on the fuel savings and benefits to the environment.

If the Escape Hybrid had been replaced with a new van of similar type, IST could expect EPA gas mileage ratings of around 30 mpg. For the majority of MIT’s driving, the department’s driving is done. The Escape Hybrid’s gas mileage rating is 36 mpg in the city. This means with an expected driving profile of 5,000 miles per year, the Escape Hybrid will emit only 28 percent as much carbon dioxide based on the Green Vehicle Guide, www.epa.gov/greenvehicles.

The Ford Escape Hybrid is a shared vehicle between IST DITR and PC Services. Further investigation on the purchase of similar classes of hybrid or other new technology vehicles will be reviewed as each vehicle comes up for replacement.

The Ford Escape Hybrid has been designated a U.S. Environmental Protection Agency (EPA) SmartWay vehicle. The SmartWay label is EPA-certified SmartWay vehicle. The SmartWay label is assigned to vehicles which people who had recently moved were in danger of being the best environmentally- and energy-efficient wireless protocols. His research in computer networking has the world’s most complex voting process, Voter ID: “We would like to see an example delivered in this country. With the MIT we have in this country is full of vulnerabilities and we need to pay more attention to improve the quality,” Rivest said.

For information on the Oct. 5 Voter Identification/Registration Conference, go to www.vote.caltech.edu.
Composer Child offers insights on music

New work to premiere at Kresge Oct. 15

Mary Haller
Office of the Arts

“Punkie Night,” a Halloween-like custom in parts of England, is the inspiration for a new piece with the same name by British-born Professor of Music Peter Child. The piece will receive its world premiere by the New England Philharmonic Orchestra under the baton of music director Richard Pittman on Oct. 15 at 3 p.m. in Kresge Auditorium.

The recipient of numerous prizes and commissions, Child recently returned from an artist’s residency in Alaska, where his commissioned work, “Promenade,” received its world premiere at the Crossroads Music Festival.

He is currently the “Music Alive” composer-in-residence with the Albany Symphony Orchestra, which will premiere another of his works in spring 2007. Other upcoming premieres this season include commissions by two local ensembles, Boston Musica Viva and Winsor Music.

Mary Haller of the Office of the Arts recently asked Child about “Punkie Night,” his music and his MIT teaching.

Q: Tell us a little about “Punkie Night.”
A: This is very much an audience-friendly piece. It belongs in a genre of other orchestral works that depicts the Gothic and the supernatural—including, famously, Tchaikovsky’s Symphony Fantasque, which will also be performed at the October 15 concert. It is spooky and—hopscotch—dun to listen to.

Q: What do you say when you’re asked to describe your music?
A: There is a pronounced tendency toward transparency and directness in my recent music, both in terms of its form and its emotional rhetoric. I have also become very interested in folk themes and incorporating these into my pieces. I think that in both of these respects I am influenced by my English upbringing.

Q: Do you consider the audience when you’re working on a composition?
A: Very much so. I see composing as a communication process among composer, performer and listener—and not just a one-way communication either. I am attentive to how players and audiences respond to my music and what those responses can tell me about my own music.

Q: Do you have suggestions about how to listen to new music?
A: Listen with an open mind and an open heart. Be curious. Accept some disappointments in the service of those moments that happen frequently to me—as an artist teaching at a preeminent environment that contribute to your work as a composer?

Q: Are there aspects of the MIT environment that contribute to your work as a composer?
A: Because they are generally so inquisitive, intelligent and challenging, what I mostly learn is how to think the fundamental principles that I teach them. MIT is a special place, of course, and I do enjoy those moments when I can be with them—an as artist teaching at a preeminent scientific institution—when the roles of teacher and student are reversed, when they share their knowledge and expertise about biology—computer science, etc., with me.

Tickets for the Oct. 15 concert are free to the MIT community with ID and are available at the door. Regular prices are $5, $10 senior citizens, $15 students. For more information, call 617-868-1222.

HST professor explores anesthesia

Lora Maurer
Harvard-MIT Division of Health Sciences and Technology

Raise your hand if you are more afraid of the prospect of general anesthesia than of surgery itself. If you raised your hand, you are not alone, according to Dr. Emery N. Brown, a faculty member at the Harvard-MIT Division of Health Sciences and Technology (HST).

A professor of health sciences and technology and of computational neuroscience in the Department of Brain and Cognitive Sciences (BCS), Brown explores what happens to the brain during anesthesia.

“We say we induce anesthesia and then ‘wake up the patient,’” Brown said. “But in French the patient is réanimé, or brought back to life. We haven’t yet begun to precisely consider what we do, however. Anesthesia is not like sleep. It’s not the same process.”

Brown added, “Under anesthesia, one is insensitive to pain. If you were asleep, you would wake up if you had pain. Anesthesia has four aspects: loss of consciousness, analgesia, amnesia and loss of movement—all while remaining hemodynamically stable, i.e., alive.”

These are the basic principles behind Brown’s investigation into what happens in the brain as it undergoes anesthesia and later is “reanimated.”

“We have a vast array of questions,” Brown said. “The way we give anesthetics now, it is a bit like dumping it into the whole brain so it acts everywhere in the brain. But if we can pinpoint the areas of the brain that are affected or not affected to free us from pain, we could conceivably think about designing a drug or a way to administer a drug that, for example,…”

See ANESTHESIA

Page B

Professor Emeritus Alan Davison of chemistry is one of two recipients of the 2006 Jacob Heskel Gabbay Award in Biotechnology and Medicine. Davison and Alan Gareth Jones of Brigham and Women’s Hospital will share the award for their role in the development of contrast agents used in cardio-diagnostic procedures.

The award, which consists of $15,000 cash prize and a medal, was established at Brandeis University in 1989 by the Jacob and Louise Gabbay Foundation to recognize outstanding research in the biomedical sciences. An award ceremony and symposium will be held Nov. 6.

Subrah Suresh, Ford Professor of Engineering, will receive an honorary doctorate degree from Sweden’s Royal Institute of Technology in Stockholm on Nov. 17. Suresh was selected in recognition of his pioneering and multidisciplinary research that encompasses materials science and engineering, mechanical engineering, biological engineering and mechanics.

Anne M. Mayes, professor of materials science and engineering, will receive the 2007 Carl S. Marvel Creative Polymer Chemistry Award. She is being recognized for her “unique ability to blend theoretical and experimental studies to elucidate the behaviour of polymers.” She will receive the award, which consists of a plaque and an honorarium of $2,000, at a symposium held in her honor at the spring 2007 meeting of the American Chemical Society.

Two MIT students, Rocco Cicchini and Peter Oates, were recently honored in Washington, D.C., as Environmental Protection Agency-Science to Achieve Results (EPA STAR) graduate fellows. The graduate fellowship program is designed for students pursuing advanced degrees in environmental sciences.

Fair showcases international development opportunities Sept. 29

Sasha Brown
New Office

Roughly 50 departments, programs and student groups highlighted their international work at the fifth annual International Development Fair, held in Lobby 13 on Friday, Sept. 29.

Awards and Honors

PHOTO / HARRvard-MIT DIvI sion OF HEaltH SCIENCES AND TechnologY

Dr. Emery N. Brown, professor in the MIT-Harvard Division of Health Sciences and Technology, studies what happens to the brain during anesthesia.

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Studio glass artist will give 2006 Hazlegrove lecture

Richard Marquis, one of the pioneers of the American studio glass movement, will present the Ninth Annual Page Hazlegrove Lecture on Glass Art on Tuesday, Oct. 10, at 7 p.m. in Wong Auditorium.

Marquis, from Whidbey Island, Wash., was one of the first American artists to work in the fabled Venini studio in Venice, Italy, where he traveled after receiving a Fulbright-Hazes Fellowship. He has shared this knowledge and expertise throughout the United States, Europe, Japan, Australia and New Zealand,-exchanging technical vocabularies, combining Venetian techniques with new and experimental approaches, and redefining glass as an artistic medium.

For more information, call x5-3099 or visit web.mit.edu/glasslab.

Reddy Kilowatt, right, a glass sculpture by Richard Marquis, combines classical and contemporary glass techniques then adds a good dose of whimsy.

MIT Sloan alum succeeds in business ... of fiction

Amy MacMillan
Leaders for Manufacturing Program

Procrastination has paid off pretty well for Cynthia Blair, an alumna of the MIT Sloan School of Management. Back in 1977, when Blair was supposed to be working on her master's thesis, she instead spent winter break scrumchating out the opening 50 pages of a novel.

That first book, “Once There Was a Fat Girl,” was published in 1981, inspiring Blair to quit her job to write full time. She managed to churn out 29 young-adult books and 13 women’s novels between the early 1980s and the mid-1990s.

It really snowballed into a writing career that kept me going financially,” she said. At least it did for a while.

Mobile vet

In the mid-1980s, Blair’s steady writing career stalled. Smaller publishing houses were gobbling up by larger companies, and the new conglomerates focused on fewer books by big-name authors. Blair’s career stalled. Smaller publishing houses focused on fewer books by big-name authors.

Cynthia Blair, an alumna of the MIT Sloan School of Management, points to the theory of gravity.

A head for business

If fiction writing and an M.B.A. from MIT Sloan seem incongruous, Blair points out that as an author it helps to know something about the outside world. Her first few books were set in a business environment. “Working in business gave me an understanding of how the world works,” she said.

Now, and living on Long Island, her memories of MIT are some of the happiest of her life, she said. She experienced a lot of firsts in Cambridge—first apartment, first time living in a city and her first time living independently. “Cambridge was such a vibrant place. There were so many clubs at MIT—yoga, ballroom dancing, drama. I couldn’t believe how much there was to do.”

Last year, Blair added travel writing to her resume. She’s done several travel pieces for honeymoon.com and has traveled to Tahiti and Bora Bora. But she said she enjoys fiction writing more than any other kind of writing. “Nonfiction is easier, because it’s fact. But, in fiction writing, you create your own world ... it’s almost as much fun as reading, and you’re in control. I find it really exhilarating.”

Blair and her husband, Michael Bell, live in Stony Brook, N.Y., and have four adult children between them. Blair is on the board of the MIT Long Island Alumni Association, and is also president of the New York/Tri-State Chapter of the national writers’ organization, Sisters in Crime.

French hip-hop artist will perform

Mary Haller
Office of the Arts

Acclaimed French hip-hop composer and choreographer Franck Ilouine will present a talk and demonstration at MIT tonight titled, “Konnecting Souls: Hip Hop and New Technologies,” at 7 in Kresge Little Theater.

Set to premiere in Paris at the end of October, “Konnecting Souls” transforms dancers into musical instruments using motion sensors.

A pioneer of the French hip-hop scene, Louise has composed music for some of France’s top hip-hop companies and is co-writer of the film “Un Kid à l’Opera.”

In 2001, he began working with new technologies through the Konnecting Souls research project. In his latest work, dancers are fitted with sensors linked to a musical interface so that they can compose the music of the show in real time and become, in effect, instruments. The event is part of a series, “Hip Hop in French: Contemporary Theater, Film, Dance, Comedy and Cinema,” sponsored by MIT foreign languages and literatures section, the MIT Contemporary French Studio, and the MIT Center for Bilingual/Bicultural Studies. For more information, call x3-4771.

ANESTHESIA

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Anesthesiology is being practiced today in much the same way it was when it was first developed at MGH 160 years ago,” he said. “To me, anesthesiology is one of the most fascinating fields in medicine. If you look at the deep question—where did this person go under anesthesia— we can get insights about consciousness, about sleep, about meditation. These are interesting, exciting medical and philosophical questions.”