Caltech336

T F S S M T W T F S S M T W

The campus community biweekly

April 19, 2001, vol. 1, no. 8

Computer gurus gather

At last week's symposium celebrating the 25th anniversary of Caltech computer science, pioneer, alumnus, and professor emeritus Carver Mead spoke to the multiple interests of the participants.

Caltech takes stand on diversity

Statement on Gender Equity in Academic Science and Engineering

Institutions of higher education have an obligation, both for themselves and for the nation, to fully develop and utilize all the creative talent available. We recognize that barriers still exist to the full participation of women in science and engineering. To address this issue, we have agreed to work within our institutions toward:

1. A faculty whose diversity reflects that of the students we educate. This goal will be pursued in part by monitoring data and sharing results annually.

2. Equity for, and full participation by, women faculty. This goal will be pursued in part by periodic analysis of data concerning compensation and the distribution of resources to faculty. Senior women faculty should be significantly involved in this analysis.

3. A profession, and institutions, in which individuals with family responsibilities are not disadvantaged.

We recognize that this challenge will require significant review of, and potentially significant change in, the procedures within each university, and the scientific and engineering establishment as a whole.

We will reconvene to share the specific initiatives we have undertaken to achieve these objectives.

Caltech, MIT, University of Michigan, Princeton, Stanford, Yale, UC Berkeley, Harvard, and University of Pennsylvania.

Diversity Statement for Caltech

By accepting a world-class group of students, Caltech assumes the enormous responsibility of their education. Part of that responsibility is providing an environment that recognizes and reflects the diversity of people who make up American society. Caltech, then, must be responsive to the needs of a diverse community and reach out to include people of diverse ethnic, racial, economic, and gender groups. We also understand that unless we can more effectively welcome and incorporate women and minority scholars, we will not be providing training for the full pool of potential talent.

To the end of assuring diversity, Caltech has long promoted policies of nondiscrimination. But we also recognize that simply pledging nondiscrimination is insufficient. We must make positive efforts to reach out to groups that have traditionally been underrepresented, and who can enrich and be enriched by the Caltech experience. The full inclusion of groups that have experienced historic exclusion requires action—it is not sufficient to simply state the principle.

Caltech is undertaking efforts to make our environment increasingly responsive to the needs of minorities and women and to encourage more minority and female students, faculty, and staff to join our community. We will examine our

see Diversity, page 6

Distant explosion reveals hidden star factory

Robert Tindol

A gamma-ray burst detected in February has led astronomers to a galaxy where star formation equal to that of 500 new suns is taking place each year.

The discovery of the "starburst galaxy," made by researchers at Caltech and the National Radio Astronomy Observatory, provides support for the theory that gamma-ray bursts are caused by exploding young massive stars. Details of the discovery were presented at the Gamma 2001 Conference on April 4.

"This is a tremendously exciting discovery, since gamma rays can penetrate dusty veils, and thus gamma-ray bursts can be used to locate hitherto difficult-to-study dust galaxies at high redshifts," says Fiona Harrison, Caltech assistant professor of physics and astronomy. "Gamma-ray bursts may offer us a new way to study how stars are formed in the early universe."

Radiation from this gamma-ray burst was first detected in the constellation Boötes by the Italian satellite observatory BeppoSAX on February 21. Within hours, astronomers worldwide received news of the burst and began looking for a visible-light counterpart. The burst was one of the brightest recorded in the four years BeppoSAX has been standing watch.

First detected by satellites monitoring the Nuclear Test Ban Treaty in the 1970s, gamma-ray bursts were thought for many years to represent relatively modest outbursts on nearby neutron stars. The events have now been shown to originate in the universe's farthest reaches. They produce, in a matter of seconds, more energy than the sun will generate in its entire 10-billion-year lifetime, and represent the most luminous explosions in the cosmos.

After the February event, astronomers at the U.S. Naval Observatory discovered the visible-light counterpart, pinpointing the location of the event. An international collaboration, led by Dale Frail of the National Radio Astronomical Observatory and Harrison and Shri Kulkarni of Caltech, conducted a variety of observations using the Hubble Space Telescope, the Very Large Array radio telescope, the Chandra X-ray Observatory, Institut de RadioAstronomie Millimétrique (IRAM), and the James Clerk Maxwell Telescope (JCMT).

Pivotal to the detection of the starburst galaxy was the JCMT, which sits high atop Mauna Kea in Hawaii and is designed to make measurements at the shortest radio wavelengths capable of penetrating Earth's atmosphere; these wavelengths make up the so-called "submillimeter" portion of the electromagnetic spectrum. Only five and a half hours after

see Stars, page 6

Gas also rises in power crunch

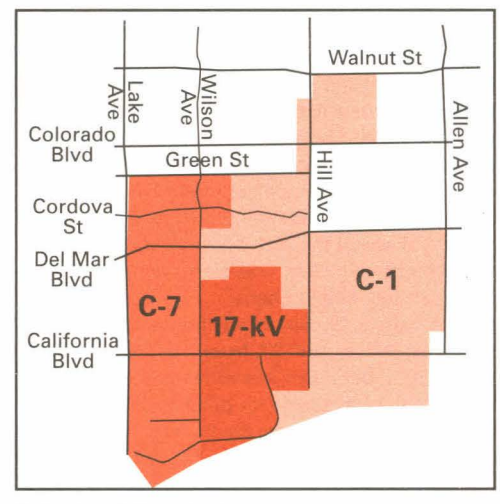
While California's electricity crisis continues to dominate media headlines, the related issue of rising natural gas prices has been lurking in the shadows. According to Caltech Physical Plant director Bill Irwin, it appears likely that these problems will continue through the summer—and possibly for several years—and the Institute is taking steps to ease the situation as much as possible.

Although relatively unaffected by the electricity shortage so far, Caltech has begun to feel the repercussions. Some campus offices along Hill Avenue and Del Mar Boulevard suffered power outages in March, when the city of Pasadena—from which the Institute receives most of its power—implemented rolling blackouts to help relieve the pressure on the beleaguered state grid. (Research and other essential buildings are all linked to a commercial-strength 17-kV feeder and should not be affected by any such blackouts.)

The other aspect of the crisis, Irwin explains, is the rising cost of gas, which for Caltech is "married to the electricity shortage, because much of our power is produced using gas." Most of the gas used on campus powers a turbine that generates electricity, and boilers that produce steam for heating and air conditioning. Irwin has been eyeing gas futures online daily, anticipating the potential cost. Gas prices averaged about 40 cents per therm last summer, but in December and January shot up as high as $1.63 per therm. The purchase price for gas in March was $1.40 per therm.

Still, that figure is more than triple the amount that Caltech had budgeted for. The Institute's gas bill was about $2.6 million in fiscal year 2000, but Irwin estimates it could reach up to $8 million this year. Thus, he emphasizes, it's imperative for all members of the campus community to develop a conservation mind-set and to cut down on unnecessary power usage. "The bottom line is that we all have to conserve," he says.

see Power, page 6



Caltech buildings in Pasadena power zones C-1 and C-7 (residential zones) may be subject to rolling blackouts, while those in the 17-kV (commercial) zone should not be affected.

NewsBriefs

Former U.S. labor secretary Robert Reich was honored at a recent reception given by Caltech Institute Relations, the Industrial Relations Center, and the Division of Humanities and Social Sciences.

Honors and awards

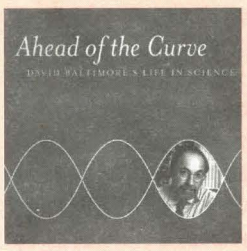
Linda Hsieh-Wilson, assistant professor of chemistry, has been selected to receive a 2001 Beckman Young Investigators award. The award program "helps provide research support to the most promising young faculty members in the early stages of their academic careers in the chemical and life sciences." This year marks the 10-year anniversary of the program, which is funded by the Arnold and Mabel Beckman Foundation, an independent, nonprofit foundation established in 1977.

Anneila Sargent, professor of astronomy and director of the Owens Valley Radio Observatory and of the Interferometry Science Center, has been elected a foreign associate of the Royal Astronomical Society "in recognition of her inspiring leadership and outstanding service to the promotion of astronomy."

OPE wins grant

Caltech's **Office of Public Events** recently received an award from the Pasadena Showcase House for the Arts. The award includes a grant in the amount of $2,500 that will be applied to Caltech's Cultural Expedition program. The outreach program promotes literacy and exposes high school students to the arts. This year, more than 600 Pasadena high school students attended performing arts engagements and artist's workshops at Caltech.

The PSHA hosts the annual Pasadena Showcase, a house and garden tour that raises money for musical and cultural events for young people. This year's Showcase opens April 22 and runs through May 20.



Baltimore biography to be published

Caltech president **David Baltimore** is the subject of a new biography to be released by the University of California Press. Written by Shane Crotty, *Ahead of the Curve* covers the milestones of Baltimore's career: completion of a PhD at Rockefeller University in 18 months; taking part in the anti–Vietnam War movement; receiving a Nobel Prize at age 37 for his codiscovery of reverse transcriptase; his accomplishments in administration and his influence on national science policy; and his exoneration from a scientific fraud scandal after surviving a decade of character assassination. "A fascinating history of the life and science of one of the 20th century's most important scientists," writes 1993 Nobel laureate and MIT professor Phillip Sharp.

The Caltech Bookstore will hold a signing by Crotty on Friday, April 27, from 3 to 5 p.m. at the Athenaeum. Copies of *Ahead of the Curve*, at $29.95, will be available for purchase. The book can also be ordered from the bookstore at http://bookstore.caltech.edu/html/bk_baltimore_curve.html; by e-mail at citbook@caltech.edu; by phone at (626) 395-6161; by fax at (626) 795-3156; or by mail at 1-51, Pasadena, CA 91125.

Banks remembered

A memorial service was held on Saturday, April 7, for **Jeffrey Banks**, professor of political science and executive officer for the social sciences, who died December 21 at age 42, of complications from a bone-marrow transplant. Friends and colleagues filled Dabney Lounge, following a conference in his honor, in which students and colleagues presented papers related to Banks's work on the role of incomplete information and repetition in models of political processes.

John Ledyard, chair of the Division of the Humanities and Social Sciences, introduced those who spoke at the memorial about Banks's life and work. **Richard McKelvey**, the Wasserman Professor of Political Science (and Banks's thesis adviser), spoke first, remembering convincing this "really smart UCLA student" to come to Caltech for grad school in 1982.

Others who had known Banks as a fellow grad student, as a faculty member at the University of Rochester from 1986 to 1997 (where he held a unique appointment, tenured in both political science and economics), and as a professor back at Caltech again, recalled his enthusiasm for his work and the "sheer pleasure" and "deep joy" he found in doing research. He was a "careful and rigorous thinker," who cared about the details. And he was easygoing, warm, and generous, someone whom everyone thought of as a friend; "Jeff wanted everyone to enjoy life."

Banks was diagnosed with leukemia in 1995. He returned to Caltech in 1997, where he continued to teach and left a number of papers yet to be published. He was "considerate and gracious" even when ill. On behalf of his family, Banks's wife, Shannon, thanked the anonymous bone-marrow donor, "who allowed the extra time," and also all those in the audience who had signed up on the bone-marrow registry.

Ledyard announced the creation of the Jeff Banks Memorial Seminar Fund and said that the new seminar room in Baxter Hall would be named in his memory.

Women's Center director sought

Caltech is currently conducting a nationwide search for a new director of its campus Women's Center. Provost **Steve Koonin** has appointed **Melany Hunt**, associate professor of mechanical engineering, and **Sharyn Slavin Miller**, assistant vice president for student affairs, as cochairs of the search committee. A new director will be in place by the beginning of the next academic year. Interested candidates can view the job description by going to www.caltech.edu and selecting Job Opportunities under Quick Campus Links.

The search committee also includes **John Schwarz**, Brown Professor of Theoretical Physics; **Tracy Johnson**, biology postdoctoral scholar; **Kevin Austin**, dean of health and counseling services and director of the counseling center; **Elizabeth Krider**, assistant director of government and community relations; **Ellis Meng**, electrical engineering graduate student; **Anupama Venkataraman**, geological and planetary sciences graduate student; and **Eric Tuttle** and **Amy Duello**, undergraduate students. **Beverly Kenworthy** has served as the center's acting director since former director Kathleen Bartle-Schulweis resigned in September.

For more information or questions, please contact the committee cochairs. Hunt can be reached at ext. 4231 or hunt@caltech.edu, and Miller at ext. 6321 or sharyn@caltech.edu.

Study: Majority thinks tax cuts favor rich

A national study found that seven in 10 Americans believe the Bush administration's proposed tax cuts benefit the wealthiest taxpayers. The poll was taken by the Center for the Study of Law and Politics, a joint Caltech-USC venture.

However, polling conducted while the Senate was debating Bush's planned tax cuts revealed that 44 percent said the size of the cut was "just right," 41 percent thought Bush's cuts were "too big," and 15 percent saw the cuts as "too small."

"To see so much ambivalence in the American public about tax cuts shows how much work President Bush still has to do," noted **Michael Alvarez**, Caltech political science professor and one of the principal investigators of the study.

Edward McCaffery, of Caltech and USC, and a principal investigator of the study, said that the desire for tax cuts is experiencing a snowball effect. "Everyone wants something from Uncle Sam, even if they know that others will get more," he noted.

Sakurai prize rewards quantum work

Particle physicists immerse themselves in a subatomic world. They deal with the quirkiest bits of matter—particles infinitesimally small, often unstable and short-lived, and sometimes so elusive they can't be seen at all but are only theorized to exist. For his work in this area, the American Physical Society has awarded Mark Wise, McCone Professor of High Energy Physics at Caltech, the J. J. Sakurai Prize for Theoretical Particle Physics. Symbolic of the admiration of a physicist's peers, the prize was endowed in 1984 both as a memorial to and in recognition of the accomplishments of the late theoretical physicist J. J. Sakurai.

In describing the fundamental aspects of subatomic particles and how they interact to make the physical world, physicists like Wise look for laws of nature and express them using mathematical equations. Such equations can then serve as a basis for other measurements and calculations. One such law governs the "strong interactions": that is, the forces between quarks (the fundamental constituents of matter) that bind them into protons and neutrons, which, in turn, make up the atomic nucleus.

The law for the strong interactions of quarks is called quantum chromodynamics. It implies that quarks can only exist when they are bound together with other quarks. Such bound states constitute particles called hadrons. Wise was cited for his work in developing a new method for making predictions for the properties of hadrons that contain a so-called heavy quark (heavy in terms of its atomic weight). His work lets physicists understand the behavior of hadrons without actually having to solve the equations of quantum chromodynamics.

Wise has held a Sloan Fellowship and is a member of the American Physical Society. The awarding of the Sakurai Prize will take place at a meeting of the American Physical Society in Washington, D.C., on April 28.

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Sargent receives highest AAS honor

Deborah Williams-Hedges

The American Astronomical Society (AAS) has awarded Wallace Sargent, Caltech's Bowen Professor of Astronomy and a former director of Palomar Observatory, with its highest honor, the Henry Norris Russell Lectureship. This honor, which is given annually by the AAS, recognizes "a lifetime of eminence in astronomical research."

The 2001 Henry Norris Russell Lectureship was awarded to Sargent specifically for his contributions to astronomical spectroscopy. His work in the stellar spectroscopy of A-type stars led to the discovery of the He-3 isotope in the star 3 Centauri. Sargent has involved many of his students in his work in extragalactic spectroscopy, which produced the first evidence for a black hole in the galaxy M87. Considered by the scientific community a world authority on intergalactic gas, Sargent's renowned work has provided primary insight into the detection of primeval gas in the early universe.

Born in Elsham, Lincolnshire, England, Sargent was educated at Manchester University in England, earning his bachelor of science degree in physics in 1956, his master's degree in astrophysics in 1957, and his doctorate in astrophysics in 1959.

Sargent has been affiliated with Caltech since 1959, serving as executive officer for astronomy for over seven years. Throughout his career, Sargent also has been a visiting fellow at international academic institutions such as the Institute of Astronomy at Cambridge University, the Department of Astrophysics at Oxford University, and the Institut d'Astrophysique in Paris.

In 1997, Sargent was appointed to the position of director of Palomar Observatory, near San Diego. He served until 2000, and then returned to full-time teaching at Caltech. Sargent has many professional affiliations and has been the recipient of numerous distinguished honors and awards throughout his career.

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Atmospheric insights win medal

Mark Wheeler

The chemical constituents of Earth's atmosphere are linked together in a complex way. A subtle alteration of one can make significant, often counterintuitive changes to another. For his work in unraveling some of the knotty complexity involved in such atmospheric processes, John Seinfeld, Nohl Professor and professor of chemical engineering at Caltech, has been awarded the Desert Research Institute's 2001 Nevada Medal.

An autonomous research division of the University of Nevada and Community College System, the Desert Research Institute is one of the world's largest multidisciplinary environmental research organizations. The Nevada Medal recognizes outstanding scientific and engineering achievements that have led to a better understanding of the global environment.

As a young investigator in the 1970s, Seinfeld developed the first mathematical models of air pollution. Use of these models is now stipulated in the Federal Clean Air Act, and they remain the basic tool employed by scientists around the world to simulate urban and regional air quality.

His career has spanned everything from the "micro" of urban air pollution to the "macro" of global climate change. Seinfeld was one of the first scientists to describe the chemical processes that produce ozone in urban areas. Ozone is the gas in the upper atmosphere that forms a protective layer against excess ultraviolet radiation, but is also a key ingredient of photochemical smog. He has also advanced our insight into such things as acid rain, the global influence of aerosols in climate and cloud formation, and the production and evolution of aerosols in the atmosphere.

A member of the National Academy of Engineering, a fellow of the American Academy of Arts and Sciences, and the former chair of the Division of Engineering and Applied Science at Caltech, Seinfeld is the recipient of numerous honors and awards. The minted, silver Nevada medallion and $10,000 prize were awarded to Seinfeld in ceremonies in Reno last month. Former recipients of the medal include Charles Elachi, director of JPL; astrophysicist and former Caltech associate professor John Bahcall; mathematician Benoit Mandelbrot; biologist Lynn Margulis; and 1995 Nobel Laureate in chemistry F. Sherwood Rowland.

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April 23–29, 2001

M T W T F S S

Events in roman type are open to the public
Events in italic type are open to the Caltech community only

Monday, April 23

Special Seminar in Applied and Computational Mathematics
302 Thomas Laboratory, 11 a.m.—"Vorticity Dynamics," John Steinhoff, professor of engineering science, University of Tennessee Space Institute.

Inorganic-Electrochemistry Seminar
147 Noyes, Sturdivant Lecture Hall, noon—"Chemistry with Platinum(IV) Hydride Complexes," Professor Joseph L. Templeton, department of chemistry, University of North Carolina, Chapel Hill.

Aeronautics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 1 p.m.—"Managing at Boeing Satellite Systems," Mark Thomas, Boeing Satellite Systems.

Computation and Neural Systems Seminar
24 Beckman Labs, 4 p.m.—"Mechanisms of Associative Learning in the Young and the Aging Hippocampus," John Disterhoft, professor of cell and molecular biology, Institute for Neuroscience, Northwestern University Medical School. Refreshments.

Geological and Planetary Sciences Seminar
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—"Volcanism in Nature's Bathtubs: The Caldera Lakes at Aniakchak and Crater Lake," Charles R. Bacon, research geologist, USGS. Refreshments, 151 Arms, 3:45 p.m.

Applied and Computational Mathematics Colloquium
306 Firestone, 4:15 p.m.—"Finite-Volume Methods and Software for Hyperbolic PDEs and Conservation Laws," Randall J. LeVeque, professor of applied mathematics and mathematics, University of Washington. Refreshments, 204 Firestone, 3:45 p.m.

Astronomy Tea Talk
106 Robinson, 4:15 p.m.—"Transient Neutron Stars in Quiescence, Their Emission and Radii," Robert Rutledge, postdoctoral scholar in physics, Caltech.

Tuesday, April 24

Caltech Library System Presents
Sherman Fairchild Library, multimedia conference room, noon to 1:30 p.m.—"Introduction to Endnote 4.0 Citation Management Software." Learn how to build a database, search a database, and build a bibliography using Endnote version 4.0. Advanced techniques can be covered if requested in advance. Registration: http://library.caltech.edu/learning/form.htm.

Theoretical Astrophysics and Relativity Seminar
106 Robinson, 2 p.m.—"Gravity Waves, Chaos, and Black Holes," Janna Levin, Advanced Fellow, department of applied mathematics and theoretical physics, Cambridge University. Information: www.tapir.caltech.edu/tapir_seminars.html.

Ulric B. and Evelyn L. Bray Seminar
25 Baxter, 4 p.m.—"Do People Have a Taste for Doing Good, or Do They Have a Taste for Punishing Others for Not Doing Good, Which Is Why They Do Good?", Susanne Lohmann, professor of political science, UCLA. Refreshments.

Carnegie Observatories Colloquium
William T. Golden Auditorium, 813 Santa Barbara Street, 4 p.m.—"Evolution of Field Spheroidal Galaxies," Dr. Felipe Menanteau, Carnegie Observatories. Information: 577-1122.

Chemical Physics Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—"Free Energy and Viscosity Dependence of Forward and Backward Electronic Transfer," Professor A. I. Burshtein, department of chemical physics, Weizmann Institute of Science, Israel.

General Biology Seminar
119 Kerckhoff, 4 p.m.—"Induction and Evolution of the Neural Crest," Marianne Bronner-Fraser, professor of biology, Caltech.

Mathematics Colloquium
151 Sloan, 4:15 p.m.—"Superexponential Growth of the Number of Periodic Points Is Generic, But Has Probability Zero," Vadim Y. Kaloshin, Princeton University.

Wednesday, April 25

Mathematical Physics Seminar
351 Sloan, noon—"Spectral Analysis on Certain Fractals," Alexander Teplyaev, NSF Postdoctoral Fellow, department of mathematics, UC Riverside. Information: www.math.caltech.edu/events/mathphys.html.

Thesis Seminar
151 Crellin, 2 p.m.—"Reactions of Heme Proteins in Solutions and Crystals," Akif Tezcan, graduate student in chemistry, Caltech.

Astronomy Colloquium
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—"The Role of Supernovae in Galaxy Formation," Professor George Efstathiou, Institute of Astronomy, Cambridge University.

William Bennett Munro Memorial Seminar
Judy Library, 110 Baxter, 4 p.m.—"Talking Pictures: Manet, Flaubert, and the Stain of Modernism," Arden Reed, professor of English, Pomona College. Refreshments.

Organic Chemistry Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—"A New Strategy for Modulating Protein–Ligand Interactions," Professor Thomas J. Wandless, department of chemistry, Stanford University.

Special Computation and Neural Systems Seminar
24 Beckman Labs, 4 p.m.—"Understanding the Role of the Prefrontal Cortex in Attentional Selection," Dr. Andrew Rossi, Laboratory of Brain and Cognition, National Institute of Mental Health, National Institutes of Health.

Thursday, April 26

Thesis Seminar
151 Crellin, 2 p.m.—"Investigations of Zirconocenes as Models of Ziegler-Natta Catalysts," Christopher Brandow, graduate student in chemistry, Caltech.

Civil Engineering Seminar
206 Thomas, 4 p.m.—"Simulation Methods for the First-Excursion Problem with Applications to Performance-Based Earthquake Engineering," Siu Kui Au, graduate student in civil engineering, Caltech. Refreshments, 210 Thomas, 3:45 p.m.

Physics Research Conference
201 E. Bridge, 4 p.m.—"Manipulating and Storing Quantum Information in Semiconductors," David D. Awschalom, professor of physics, and director, Center for Spintronics and Quantum Computation, UC Santa Barbara. Refreshments, 110 East Bridge, 3:45 p.m. Information: www.pma.caltech.edu/~physcoll/PhysColl.html.

Science, Ethics, and Public Policy Seminar
25 Baxter, 4 p.m.—"Rethinking 'Dehumanization': Laboratory Science, Clinical Practice, and the Grounding of Modern Medicine," Dr. John Harley Warner, professor of history of medicine and science, history, and American studies, Yale University. Refreshments. Information: www.hss.caltech.edu/ses/SEPP.html.

Mathematics Colloquium
151 Sloan, 4:15 p.m.—"The Mathematics of the Second Law of Thermodynamics," Elliott H. Lieb, professor of mathematics and physics, Princeton University.

Friday, April 27

Computer Science Seminar
070 Moore, 2 p.m.—"Computational Aspects of Gene Assembly in Ciliates," Dr. Grzegorz Rozenberg, Institute of Advanced Computer Science, Leiden University, and department of computer science, University of Colorado, Boulder. Refreshments, 3:45 p.m.

Fluid Mechanics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 3 p.m.—"Dynamics of Swimming Bacteria and Their Fluid Habitat," John Kessler, professor emeritus, department of physics, University of Arizona. Information: www.galcit.caltech.edu/Seminars/Fluids/CurrentFluids/index.html.

Institute for Quantum Information Seminar
102 Steele, 3:30 to 5 p.m.—"Theory (and Practice) of Noiseless Quantum Subsystems," Lorenza Viola, Los Alamos National Laboratory.

Caltech/JPL Association for Gravitational-Wave Research Seminar Series
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—"LIGO End-to-End Model: Application to LIGO I," Hiro Yamamoto, member of the professional staff, LIGO project, and Matt Evans, graduate student in physics, Caltech.

William Bennett Munro Memorial Seminar
Judy Library, 110 Baxter, 4 p.m.—"Science and an African Logic," Dr. Helen Verran, department of history and philosophy of science, University of Melbourne, Australia. Refreshments.

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April 30–May 6, 2001

M T W T F S S

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Monday, April 30

Aeronautics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 1 p.m.—Topic to be announced. Stephen Knok, Los Alamos National Laboratory.

Inorganic-Electrochemistry Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—"Bio-Inspired Organic Frameworks Around Metal Ions: Applications to Dioxygen and Nitric Oxide Binding," Andrew S. Borovik, associate professor, department of chemistry, University of Kansas.

Shirley A. Kliegel Lecture in Geology
155 Arms, Robert Sharp Lecture Hall, 4 p.m—Topic to be announced. Sir Nicholas Shackleton, professor of earth sciences, University of Cambridge. Refreshments, 151 Arms, 3:30 p.m.

Solid State Sciences Seminar (S^5)
102 Steele, 4 p.m.—"Ultrasensitive Force Detection and Biological Applications," Professor Thomas Kenny, department of mechanical engineering, Stanford University. Refreshments, Watson foyer, 3:45 p.m. Information: www.its.caltech.edu/~s5.

Applied and Computational Mathematics Colloquium
306 Firestone, 4:15 p.m.—"Numerical Simulation of Processes from Science and Engineering," Gabriel Wittum, director of technical simulation, University of Heidelberg, Germany. Refreshments, 204 Firestone, 3:45 p.m.

Galileo Meets Venus Seminar
24 Beckman Labs, 4:30 to 6 p.m.—Topic to be announced. David Perrett, professor of psychology, University of St. Andrews, Scotland. Presented in collaboration with the Art Center College of Design. Refreshments. Information: http://hss.caltech.edu/~steve/galileo_meets_venus.htm.

Tuesday, May 1

Lee Center Minicourse: An Introduction to Large Deviations for Queueing and Communication
080 Moore, 3 to 5 p.m.—Lecture 1, "Chernoff's Theorem, Large Deviations Principle (LDP), Poisson Processes and Basic Martingales, Kurtz's Theorem," Dr. Alan Weiss, Bell Labs, New Jersey.

Ulric B. and Evelyn L. Bray Seminar
25 Baxter, 4 p.m.—"Coordination in Turnout Games," Daniel Diermeier, professor of managerial economics and decision sciences, Northwestern University. Refreshments.

Carnegie Observatories Colloquium
William T. Golden Auditorium, 813 Santa Barbara Street, 4 p.m.—"The Cosmic Infrared Background," Professor Ned Wright, department of astronomy, UCLA, and Institute for Advanced Study. Information: 577-1122.

Special Geological and Planetary Science Seminar
151 Arms, Buwalda Room, 7 p.m.—"What Can We Learn from a Collection of Old Clarinets?", Sir Nicholas Shackleton, professor of earth sciences, University of Cambridge, and collector and historian of clarinets. Information: www.gps.caltech.edu/seminars/gps_seminars.html.

USGS Public Lecture Series
Baxter Lecture Hall, 8 p.m.—"Pent-up Stress Puts the Squeeze on L.A.," Ken Hudnut, geophysicist, Western Earthquake Hazards Team, U.S. Geological Survey, Pasadena. Information: http://pasadena.wr.usgs.gov/lectures/.

Wednesday, May 2

Lee Center Minicourse: An Introduction to Large Deviations for Queueing and Communication
080 Moore,10 a.m.—Lecture 2, "Introduction to Sample-Path LDP," Dr. Alan Weiss, Bell Labs, New Jersey.

Caltech Library System Presents
Sherman Fairchild Library, multimedia conference room, 12:30 to 1:30 p.m.—"Online Resources for Electrical Engineering and Computer Science." A quick review on how to access electrical engineering and computer information resources, including IEEE, INSPEC, ACM, NCSTRL, and caltechCSTR. Registration: http://library.caltech.edu/learning/form.htm.

Astronomy Colloquium
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—"Globular Cluster Formation," Ralph Pudritz, department of physics and astronomy, McMaster University, Canada.

Micro-G and You: Space Research and Its Benefits on Earth
California Science Center, Los Angeles, 4 to 5:45 p.m.—Microgravity scientists will discuss the latest discoveries in the area of physical, chemical, and biological processes related to microgravity and the space environment, and will reach out to students, educators, and researchers to share their aspirations for future space research. Information: 395-6339 or http://space.hsv.usra.edu/ppbws_2001/programs.html. (See article in right-hand column this page.)

Thursday, May 3

Lee Center Minicourse: An Introduction to Large Deviations for Queueing and Communication
080 Moore, 3 to 5 p.m.—Lecture 3, "Freidlin-Wentzell Theory, Anick-Mitra-Sondhi Model, Analysis via Sample-Path Large Deviations," Dr. Alan Weiss, Bell Labs, New Jersey.

Civil Engineering Seminar
206 Thomas, 4 p.m.—"Seismic Demands for Performance Assessment of Buildings," Helmut Krawinkler, professor of civil engineering, Stanford University. Refreshments, 210 Thomas, 3:45 p.m.

Physics Research Conference
201 E. Bridge, 4 p.m.—"Protein Polymers, Crawling Cells, and Comet Tails," Julie Theriot, assistant professor, department of biology and department of microbiology and immunology, Stanford University School of Medicine. Refreshments, 108 East Bridge, 3:45 p.m. Information: www.pma.caltech.edu/~physcoll/PhysColl.html.

Friday, May 4

Fluid Mechanics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 3 p.m.—"The Effects of Vortex Ring Formation and Pinch Off on the Dynamic Properties of Starting and Fully Pulsed Jets," Paul Krueger, graduate student in aeronautics. Information: www.galcit.caltech.edu/Seminars/Fluids/CurrentFluids/index.html.

Inorganic-Organometallics Seminar
151 Crellin, 4 p.m.—"DNA-Mediated Charge Transport between Intercalated Transition Metal Complexes and Proteins," Matthias Pascaly, postdoctoral scholar in chemistry, Caltech.

LIGO Science Seminar
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—"Comparison of a Steady-State Numerical Model Simulation Code with an FTT Model," Erika D'Ambrosio, LIGO Laboratory, Caltech. Information: www.ligo.caltech.edu.

Micro-G and you

The Second Pan-Pacific Basin Workshop on Microgravity Sciences and the California Science Center are joining forces in an outreach program to help students, educators, researchers, and the public learn more about how physical and life sciences research in space benefits research—and, in fact, life—here on Earth.

Microgravity, or "Micro-G," is a state of very weak gravity—one-millionth of what is felt on Earth. Conducting research in such an environment gives scientists unique opportunities to study processes that are obscured by gravity on Earth. In the coming era of the International Space Station—the largest space structure and most multinational space endeavor in history—the term "microgravity" will become increasingly commonplace.

The microgravity outreach is geared toward researchers, educators, and high school and college students, as well as to the public. It will take place on Wednesday, May 2, from 4 to 5:45 p.m. at the California Science Center, 700 State Drive (in Exposition Park), Los Angeles. Speakers will include Gerard Faeth, professor, University of Michigan, on combustion; Nicholas Bigelow, professor, University of Rochester, on micromeasurement (atomic clocks); and Chiaki Mukai, astronaut and surgeon, on living and working in space. The event will also include demonstrations, taped segments with opinions from communities in various Pan Pacific nations, and a live global town meeting with audiences in Australia, New Jersey, and Hawaii. For more information, visit http://space.hsv.usra.edu/ppbws_2001/.

The program is an initiative of the Second Pan-Pacific Basin Workshop on Microgravity Sciences, a gathering of scientists who will discuss the latest physical, chemical, and biological discoveries related to microgravity and the space environment. One of the workshop's stated goals is to "take upon itself the challenge to reach out to society in an effort to understand first-hand the pulse of humanity and earnestly address ways that scientists could contribute to the betterment of the world we live in."

This year's workshop takes place May 1–4 in Pasadena. Caltech president David Baltimore is an honorary cochair, and vice provost David Goodstein is an organizing committee cochair. Participants will include NASA, the National Space Development Agency of Japan, the Chinese Academy of Sciences, the Canadian Space Agency, and the Russian Space Agency. The first workshop was held in 1998 at Waseda University in Tokyo; China will host the next in 2003.

CampusEvents

Monday, April 23

Badminton
Brown Gymnasium, 9:30 a.m. to noon—Bring your own racket. Information: 355-6158.

Baby Furniture and Household Equipment Pool
234 S. Catalina, 10 a.m. to 1 p.m.—Loans of kitchen and household necessities and baby furniture are made to members of the Caltech community. Information: 584-9773.

Men's and Women's Track and Field
SCIAC championships, at Occidental, 3 p.m.

Ballroom Dance Club
Winnett lounge, 7:30 to 9:30 p.m.—American tango for beginners. Fourth of five weekly lessons taught by a professional instructor. No partner or experience is required. $4 per class for Caltech undergraduates, $6 for others. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Ballroom Mini Dance Party
Winnett lounge, 9 to 11 p.m.—Open dancing; make requests or bring your own music. No admission charge and no partner needed. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Tuesday, April 24

Men's and Women's Track and Field
SCIAC championships, at Occidental, 4 p.m.

Wednesday, April 25

Baby Furniture and Household Equipment Pool
234 S. Catalina, 10 a.m. to 1 p.m.—Loans of kitchen and household necessities and baby furniture are made to members of the Caltech community. Information: 584-9773.

Spring Two-Day Blood Drive
Winnett lounge, 10 a.m.—The blood supply is low. Give the gift of life. Appointments: 395-6001 or Diana.Alvarez@caltech.edu. Walk-ins are welcome.

Health Fair 2001
Winnett quad, 11 a.m. to 2 p.m.—Caltech's health providers will offer a variety of services, including body-fat testing, cholesterol testing, and blood-pressure checks. Local and regional vendors will showcase their products and services with samples, product information, and healthy snacks. The event will also include a climbing wall and a live jazz band. Sponsored by the Caltech Y, Human Resources, and Student Affairs.

Caltech Y Noon Concert
Winnett quad, noon—Our own Dr. Evil (the student jazz band, that is) will kick off the Health Fair activities. Information: 395-6163. Visit the Caltech Y at www.y.caltech.edu/.

Ballroom Dance Club
Winnett lounge, 7:30 to 9:30 p.m.—East Coast swing for beginners. Fourth of five weekly classes. No partner or experience is required. Free for Caltech freshmen, $1 per class for others. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Thursday, April 26

Campus Architectural Tour
Athenaeum, 11 a.m. to 12:30 p.m.—Meet in the entry hall of the Athenaeum. Led by members of the Caltech Architectural Tour Service. Reservations: 395-6327 or suze@caltech.edu.

Take Our Children to Work Day 2001
Beckman Institute courtyard, 10 a.m. to 2 p.m.—Children of Caltech employees who are students in the 4th through 12th grades are invited to attend. Get registration forms from Employee Services, 399 S. Holliston Avenue, or online at http://cit.hr.caltech.edu/Jobs-HTML/HR%20Forms/Human%20Resources%20forms.htm. Information: 395-6001 or Diana.Alvarez@caltech.edu.

Spring Two-Day Blood Drive
Winnett lounge, 10 a.m.—The blood supply is low. Give the gift of life. Appointments: 395-6001 or Diana.Alvarez@caltech.edu. Walk-ins are welcome.

Amnesty International Monthly Meeting
1052 E. Del Mar Boulevard (top floor, GSC Penthouse), 7:30 to 9:30 p.m.—The Caltech/Pasadena chapter of Amnesty International will discuss new and ongoing activities. Information: lkamp@lively.jpl.nasa.gov, (818) 354-4461, or www.its.caltech.edu/~aigp22/home.shtml.

Introduction to Modern Dance
Braun Athletic Center, aerobics room, 9 to 10:30 p.m.—A free modern dance class for beginners, taught by a professional instructor. Sponsored by the Caltech Dance Troupe. No experience or special clothing or shoes are required. Open to all adult members of the Caltech community.

Friday, April 27

Badminton
Brown Gymnasium, 9:30 a.m. to noon—Bring your own racket. Information: 355-6158.

Baltimore Biography Booksigning
Athenaeum, 3 to 5 p.m.—Shane Crotty, author of *Ahead of the Curve: David Baltimore's Life in Science*, will sign books in the main lounge of the Athenaeum. The book will be available for purchase courtesy of the Caltech Bookstore. Information: 395-6161 or www.bookstore.caltech.edu.

Baseball
vs. Pomona-Pitzer, 3 p.m.

Falun Gong: The Real Story
125 Baxter, 7:30 to 9:30 p.m.—Through video documentaries and discussion, learn about what Falun Gong is and why it is persecuted in China.

Saturday, April 28

Coleman Chamber Ensemble Competition
Ramo Auditorium, 9 a.m. to 5 p.m.—Competition for young, nonprofessional performers. Information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD).

Men's and Women's Track and Field
Cal-Nevada State Meet, at UC Irvine, 9 a.m.

Baseball
at Pomona-Pitzer, 11 a.m., doubleheader.

Ballet Dance Class
Braun Athletic Center, aerobics room, 1 to 4 p.m.—A free ballet class, sponsored by the Caltech Dance Troupe. Beginners: 1 to 2 p.m. Intermediate: 2 to 3 p.m. Advanced: 3 to 4 p.m. No special clothing or shoes are required for the beginners' class. Open to all adult members of the Caltech community.

Ballet Folklorico Los Lupeños
Beckman Auditorium, 8 p.m.—With a repertoire that highlights diverse regional dances, Los Lupeños presents programs that feature authentic stories, tableaus, and folkloric dance suites that capture the color and vibrancy of the Mexican experience. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Sunday, April 29

Men's and Women's Track and Field
Cal-Nevada State Meet, at UC Irvine, 9 a.m.

Skeptics Society Lecture
Baxter Lecture Hall, 2 p.m.—"Nothing! The Hole in the Universe: How Scientists Peered Over the Edge of Emptiness and Found Everything," K. C. Cole, science writer, *Los Angeles Times*. Donation: $8 for nonmembers, $5 for members and non-Caltech students. Free to the Caltech/JPL community. Tickets and information: 794-3119 or skepticmag@aol.com.

Coleman Chamber Ensemble Competition Winners Concert
Ramo Auditorium, 3:30 to 5:30 p.m.—Winners from the April 28 competition will perform. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Monday, April 30

Badminton
Brown Gymnasium, 9:30 a.m. to noon—Bring your own racket. Information: 355-6158.

Baby Furniture and Household Equipment Pool
234 S. Catalina, 10 a.m. to 1 p.m.—Loans of kitchen and household necessities and baby furniture are made to members of the Caltech community. Information: 584-9773.

Ballroom Dance Club
Winnett lounge, 7:30 to 9:30 p.m.—American tango for beginners. Last of five weekly lessons taught by a professional instructor. No partner or experience is required. $4 per class for Caltech undergraduates, $6 for others. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Ballroom Mini Dance Party
Winnett lounge, 9 to 11 p.m.—Open dancing; make requests or bring your own music. No admission charge and no partner needed. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Wednesday, May 2

Baby Furniture and Household Equipment Pool
234 S. Catalina, 10 a.m. to 1 p.m.—Loans of kitchen and household necessities and baby furniture are made to members of the Caltech community. Information: 584-9773.

Ballroom Dance Club
Winnett lounge, 7:30 to 9:30 p.m.—East Coast swing for beginners. Final class. No partner or experience is required. Free for Caltech freshmen, $1 per class for others. Refreshments. Information: 791-3103 or www.its.caltech.edu/~ballroom/index.html.

Thursday, May 3

Introduction to Modern Dance
Braun Athletic Center, aerobics room, 9 to 10:30 p.m.—A free modern dance class for beginners, taught by a professional instructor. Sponsored by the Caltech Dance Troupe. No experience or special clothing or shoes are required. Open to all adult members of the Caltech community.

Friday, May 4

Badminton
Brown Gymnasium, 9:30 a.m. to noon—Bring your own racket. Information: 355-6158.

Caltech Environmental Task Force
Chandler Dining Hall, noon—Members of the Caltech community and interested public are welcome to discuss campus, community, and global environmental concerns. Look for the CETF sign on an outside table between Chandler and the Red Door.

Caltech Presents: The Capitol Steps
Beckman Auditorium, 8 p.m.—The Capitol Steps are congressional staffers-turned-comedians who travel the country satirizing the very people who once employed them. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Saturday, May 5

Ballet Dance Class
Braun Athletic Center, aerobics room, 1 to 4 p.m.—A free ballet class, sponsored by the Caltech Dance Troupe. Beginners: 1 to 2 p.m. Intermediate: 2 to 3 p.m. Advanced: 3 to 4 p.m. No special clothing or shoes are required for the beginners' class. Open to all adult members of the Caltech community.

Caltech Presents: The Capitol Steps
Beckman Auditorium, 8 p.m.—The Capitol Steps are congressional staffers-turned-comedians who travel the country satirizing the very people who once employed them. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Sunday, May 6

Paco A. Lagerstrom Chamber Music Concert
Dabney Lounge, 3:30 p.m.—The Jeff Hamilton Trio will perform jazz. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

From left, Ecphonema's Jon Hunt, Jason "Chewie" Chua, Scott Van Essen, and Joe Cook vocalize their anti–Valentine's Day feelings at the 4th annual Love Sucks concert.

The new wave in Caltech a cappella

"This is the story of a girl . . . " The catchy tune pulses through the air and your feet start tapping to the percussion beat. But . . . wait a second. Where are the drums? The guys in purple T-shirts on stage are totally sans instruments, save for a couple of microphones.

That's the newest story of a cappella music, and Caltech has several groups that are playing a part. No longer limiting themselves to the strains of choral music or doo-wop, today's vocal groups cover everything from classical and jazz to rock and world beat. And they whistle, hum, and click into microphones to produce sounds amazingly similar to percussion, horns, or guitars. Among the forces credited with the modern a cappella movement are Bobby McFerrin, best known for his 1988 hit "Don't Worry, Be Happy," and groups such as the Bobs, the Nylons, and Take 6.

At Caltech, the Glee Clubs and Chamber Singers have long performed all-vocal choral music. It wasn't until May 1997, however, that a modern, entirely student-initiated and student-run a cappella movement began. It started with the formation of the Treble Makers, a group of women from the Caltech and JPL communities. The all-male group Ecphonema was born four months later, and the coed Out of Context followed in the spring of 1998. According to Joe Cook '01, a member of both Ecphonema and Out of Context, Caltech's groups are unusual in the collegiate scene.

"A cappella is big on the East Coast," he says, "but there are only a few dozen or so West Coast groups. On the East Coast, they might have that many at one school." In addition, Ecphonema's use of microphones and "percussion" and its edgier sound stand out among more standard glee club–type groups. Covering songs from the likes of Metallica and Meatloaf, "we're going for a harder sound—we're trying to be a vocal rock band," Cook says.

Ecphonema's end of year concert is becoming a tradition, and they're also known for performing at commencement, on the pre-commencement Ditch Day video, and with Out of Context and the Treble Makers at Decompression and the annual Love Sucks concert in February.

The three groups will open for renowned world jazz a cappella group SoVoSó—originally assembled in 1986 by McFerrin—on Saturday, April 21, at 8 p.m. in Beckman Auditorium. Although excited at the opportunity, Cook says the Caltech vocalists are looking forward even more to the afternoon workshop that SoVoSó members will conduct.

Caltech community members can purchase tickets to the performance for $10.00 (Caltech students, $5.00). Contact Public Events at 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD).

More information on Caltech a cappella can be found at www.ugcs.caltech.edu/~ecphon, www.ugcs.caltech.edu/~ooc, and www.its.caltech.edu/~treble.

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***Diversity**, from page 1*

community for measures we can take that will encourage inclusiveness in governance and address particular needs (especially those of families). We recognize that we must be willing to modify our traditional assumptions to create a more welcoming environment. We will do this while keeping in mind our fundamental goal of academic excellence, recognizing that intellectual achievement is Caltech's premier contribution to the world.

Increasing diversity at Caltech

David Baltimore

On the front page of this issue of *336*, you can read two new statements that affirm Caltech's commitment to increasing diversity in our community. The "Statement on Gender Equity in Academic Science and Engineering" was adopted by nine leading universities, including Caltech, at a meeting at MIT at the end of January. The "Diversity Statement for Caltech" is our own articulation of the need to increase diversity on our campus. Our Board of Trustees, the Faculty Board, and the Caltech administration have endorsed this diversity statement.

I would like to add a few words about Caltech's efforts to increase diversity. By *diversity* I mean the involvement of members of traditionally underrepresented American groups in the various components of the university community, particularly women, African Americans, Latino Americans, and Native Americans.

The three points in the "Statement on Gender Equity" relate mainly to professorial faculty. By signing this statement, I have committed Caltech to difficult goals. The first of these goals includes a faculty whose gender diversity reflects that of the students we educate. A measure of that challenge is that while female undergraduates constitute over 30 percent of our undergraduate body, women currently constitute only 11 percent of our professorial faculty. The second goal, that of giving female faculty a larger role in Institute life, should be easier. Finally, emphasizing the need to support individuals with family responsibilities commits Caltech to a concern for the personal lives of all faculty, a commitment that will be of value to both men and women.

The "Diversity Statement for Caltech" is a short and general statement that emphasizes the Institute's fundamental commitment to all elements of diversity. While Caltech has long promoted policies of nondiscrimination, it is evident that simply stating the principle has not been sufficient. With this statement, we at Caltech explicitly recognize that we must undertake new efforts to more effectively reach out and incorporate minority and female students, faculty, and staff into our community. This is a great challenge because it involves surmounting historical barriers and requires moving forward in sometimes difficult and often innovative ways.

There are many staff, faculty, and students who have long been involved in the efforts to increase diversity, both through activities on campus and with surrounding communities. I am very appreciative of this ongoing work and of all the individuals who have shared their commitment, time, and passion with the Institute. I am well aware that the Institute benefits from new ideas and resources, and that our institutional effort is enhanced when we facilitate opportunities for our students, staff, and faculty to become involved. To this end, I am happy to announce the formation of a President's Diversity Initiative Fund, supported in part by the recent diversity award to Caltech from the James Irvine Foundation. The fund will provide support for new initiatives brought forth by faculty, staff, or students related to increasing diversity on campus. These initiatives may cut across campus or involve single divisions, offices, or houses. Proposals may involve seed money for a program or funding for a single event. Individuals interested in applying to the fund should contact my office directly.

Increasing diversity on the Caltech campus is something that will only happen through the committed efforts of many members of the community. I have emphasized diversity as a goal both because its realization will increase the pool of talent from which Caltech can draw and because it will make the atmosphere on the campus a more realistic model of the world outside. Moreover, I personally feel that achieving diversity is the moral responsibility of a university in contemporary America.

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Heads up!

One of the resident Throop Pond turtles soaks up the springtime sunshine.

***Stars**, from page 1*

the first sighting, a submillimeter source was found at the burst location.

Astronomers had expected to see a rapidly brightening signal with JCMT, a sign that the shock generated by the burst was moving through the dense gas surrounding the burst. Instead, to everyone's surprise, the signal stayed constant, never varying during this time. Furthermore, observations conducted at a slightly lower frequency on the IRAM telescope in Spain showed a much fainter source, strongly suggesting that the submillimeter observation was not simply detecting the explosion's afterglow.

"The simplest explanation is that we have detected the light from the host galaxy of the burst," says Frail, explaining that it is rare to detect galaxies at submillimeter wavelengths. Only about one in every thousand that are visible with optical telescopes are observed by short-wavelength radio telescopes.

Astronomers in Arizona found the gamma-ray burst to lie roughly 8 billion light-years from Earth. This was also confirmed almost simultaneously by the Caltech group, using one of the 10-meter Keck Telescopes on Mauna Kea. The light we see from the burst shows the galaxy when the universe was less than half its present age. At this distance, the observed submillimeter brightness implies a prodigious rate of star formation—roughly 500 solar masses of material must be turning into stars each year, meaning that one or two new stars shine forth each day. The galaxy in which the burst occurred, then, may provide a glimpse of what the Milky Way looked like in its youth.

The discovery of a bright gamma-ray burst in a starburst system is exciting for two reasons: it strongly supports one model for the bursts themselves—the explosive destruction of a young, massive star—and it suggests a new way to locate such galaxies. With their enormous penetrating power, the energetic gamma rays punch right through the dusty veil, pinpointing the location of vigorous star-forming activity.

By following up on the hundreds of bursts that will be detected in the next few years, astronomers will be able to collect an unbiased sample of starburst galaxies at different distances in time and space, enabling them to explain the star-formation history of the universe.

The members of the Caltech team also include Professor of Astronomy George Djorgovski; postdoctoral researchers Derek Fox, Titus Galama, Daniel Reichart, Re'em Sari, and Fabian Walter; and graduate students Edo Berger, Joshua Bloom, Paul Price, and Sarah Yost. Astronomers from several other institutions are also involved in the collaboration.

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***Power**, from page 1*

A number of actions have been taken, including replacing incandescent bulbs with compact fluorescents, which use fewer watts; replacing old fluorescent lights with newer, more efficient ones; and installing more than 1,500 "phantom" fluorescent bulbs, in which only two of four tubes actually work, but give off nearly as much light as four. Physical Plant is also investigating using timers or photocells to keep lights off in surface parking lots and under covered walkways during the day, and soon will be installing motion sensors in targeted building spaces.

In addition, a new chiller and cooling tower are planned for Physical Plant's satellite location, next to the Holliston parking structure. The chiller incorporates a variable frequency drive on the chilled water distribution pump, and Irwin estimates the new facility, which will be in operation this summer, will allow Caltech to cut its current electricity consumption by about 10 percent. And by October, he plans to complete a campuswide installation of electric meters that will identify inefficient buildings by allowing real-time energy-usage monitoring.

In the meantime, Irwin urges everyone in the campus community to do their part by observing the following guidelines:

- Turn off lights that aren't in use or aren't essential, such as corridor lights and desk lamps.
- In the summer, set thermostats at 78 degrees, the optimum recommended setting. Irwin requests people not to supplement air conditioning with fans. "If we can all accept a slight bit of discomfort, it will make a difference in helping the situation."
- Minimize the use of screen savers and set computers to "sleep" when not in use during the day, and shut them down completely at night.
- When purchasing new equipment, look for Energy Star models, certified by the U.S. Department of Energy and the Environmental Protection Agency as energy-efficient.

Some conservation-minded Caltech folk have queried Irwin about campus features, such as ponds and fountains, nighttime tree lighting, and outside lighting. He says that he appreciates their concerns and Physical Plant is looking into these suggestions, yet he notes that there must be a balancing of priorities. The Institute's landscaping and water features add to its attraction for potential students and community members. In addition, exterior and parking structure lighting are important for security and safety.

"The trick," Irwin says, "is to balance energy conservation with the appeal of the campus and especially with safety. We want to be as energy-efficient as possible, but community safety is our highest priority."

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Caltech 336

T F S S M T W T F S S M T W

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