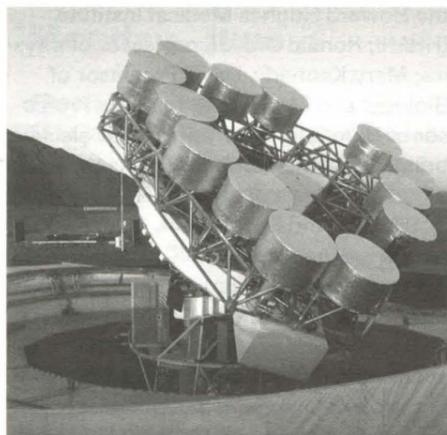


Caltech 336

T L S S M T W T L S S M T W

The campus community biweekly
May 30, 2002, vol. 2, no. 11



The Cosmic Background Imager is located on a Chilean plateau at 16,700 feet.

The universe, up close and personal

Using a special instrument high in the Chilean Andes, Caltech cosmologists have uncovered the finest detail so far in the cosmic microwave background radiation (CMB), which originates from just 300,000 years after the Big Bang. The new images, in essence, are photographs of the cosmos before stars and galaxies existed, and reveal for the first time the "seeds" from which clusters of galaxies grew.

The observations were made with the Cosmic Background Imager (CBI), designed especially to make detailed, high-precision pictures to measure the geometry of space-time and other fundamental cosmological quantities.

The CMB provides a crucial experimental laboratory for understanding the universe's origin and eventual fate, because in that remote epoch, matter had not yet formed galaxies and stars. Tiny density fluctuations at that time grew to produce all the structures in the universe today, including galaxy clusters, galaxies, stars, and planets. These density fluctuations gave rise to temperature fluctuations seen in the microwave background.

First detected in 1965, the CMB arose when matter had cooled enough for electrons and protons to combine to form atoms, at which point the universe became transparent. Before that time, the universe was an opaque fog because light couldn't travel very far before hitting an electron.

The photons seen today with instruments like the CBI, the earlier COBE satellite, the BOOMERANG and MAXIMA experiments, and the DASI instrument (a sister project to the CBI that also makes high-precision interferometry measurements), have been traveling through the universe since first emitted from matter about 14 billion years ago.

Temperature differences observed in the CMB are so slight (about one part in 100,000) that it's taken 37 years to get such finely detailed images as those from the CBI. Though first detected in 1965, the microwave background appeared to be smooth due to the limitations of the

see CBI, page 6

Commencement 2002 draws near

As the academic year comes to a close, Caltech's 108th commencement and its related activities will offer graduates, their families, and friends numerous opportunities to celebrate.

For graduates, commencement will be the culmination of their many years of hard work and achievement. An estimated 254 candidates will receive the BS degree, 111 the MS, and 134 the PhD. This year's ceremony takes place on Friday, June 14, at 10 a.m. on the Beckman Mall, and features actor Alan Alda as keynote speaker. A longtime friend of science and of the Institute, Alda is best known for portraying Hawkeye Pierce in the television series *M*A*S*H*, and currently stars as the late Caltech Nobel laureate Richard Feynman in the play *QED*. The ceremony is open to the public; overflow parking and shuttle service will be available at the Huntington Library, 1151 Oxford Road, San Marino, from 8 a.m. to 3 p.m.

see Commencement, page 6

Forum opens up arts dialogue

Jane Dietrich

The "level of artistic dialogue at Caltech," probably never very high to begin with, rose several notches on May 21 when members of the Caltech community met in Beckman Auditorium to discuss the Richard Serra sculpture, *Vectors*, proposed for the Beckman Institute lawn (see 336, May 16). David Kremers, a conceptual artist in biology, started things off with an art-history slide show on Serra's work and suggested that, along with raising the dialogue level, "the controversy and confrontation associated with this sculpture may be its most valuable aspect."

If so, the meeting was a great success, with much passionate controversy in evidence. Robert Rosenstone, professor of history and chairman of Caltech's Institute Art Committee, served as moderator as a long parade of students, faculty, and staff aired their opinions about *Vectors*, almost all of them critical.

The symbolism and the size of the sculpture—four 60-foot-long steel plates that will rise from ground level to eight feet in height, zigzagging diagonally across the lawn—drew the most flak. "*Vectors*, despite its scientific name, is a wall. It's a wall symbolizing division," said Jack Roberts, Institute Professor of Chemistry, Emeritus. It is also symbolic of suspicion, distrust, hiding, secrecy, and fear, he said. "Caltech stands for none of these things." Another speaker questioned whether the massive industrial-machinery look of Serra's work was

A cast of characters



This year's Ditch Day ritual—May 22—brought a bevy of unusual visitors to campus, including this rideable mechanical elephant, a life-size papier-mâché cow, and a film crew from the Tonight Show.

the right message for a high-tech institution to be sending.

Affection for the lawn itself, which has in recent years been reincarnated as a parking lot and a construction site, seemed to run deep among some of the speakers, who claimed it was a work of art in itself and a much-needed open green space on a campus that already has too few of them.

Determined not to come off as philistines, a couple of commentators praised Serra's work but thought this particular piece wasn't right for Caltech or the site. A lone grad student risked stoning by stating, "I like it." Imagining all the "creative" treatments the sculpture would receive (and which he thought Serra would not object to), he urged fellow students to think of it "as an opportunity, not a travesty."

Safety was an issue for some. Several women pointed out that the sculpture would offer convenient cover for midnight muggers, while one father saw it as a hazard for children who might be tempted to use the three-inch-wide panels as a balance beam. A neighbor commented that dogs would welcome it as the longest fire hydrant on campus.

The outlay of \$2 million for the sculpture at a time of Institute-wide belt-tightening, even though raised from private sources for just this purpose, concerned many speakers, as did the alleged suddenness and "secrecy" of the deal without consulting the campus community.

see Arts dialogue, page 6

Caltech after dark: Snapshots of the night life

After observing Caltech's unusually placid, low-key daytime atmosphere, one would be led to conclude that the place is pretty dead once evening sets in. *Au contraire*.

"That's when the campus really comes alive," says Loren Kajitani, assistant security chief, who notes that evenings can keep her staff quite busy. On any given night, the action might include students heading to class, the library, the lab, or the gym; joggers and dogwalkers; and visitors here for the swing lesson, Italian film, and Watson Lecture taking place. And behind it all are employees who keep everything running smoothly and safely.

7:35 p.m., Office of Telecommunications
In the soft darkness of twilight, bright light streams from the windows of 124 Dabney Hall. Inside, Javier Solorzano is working at his computer, keeping an ear open for incoming calls.

Solorzano has been an evening switchboard operator for more than a dozen years. (He also works two nights a week as a computer operator at the Administrative Technology Center.) He started in Telecommunications in 1986 as a daytime temp and became permanent in 1988, later moving to the swing shift.

see Night life, page 6

NewsBriefs



A wave of Caltech graduates washed over campus for the 2002 Alumni Reunion Weekend and 65th annual Seminar Day, held from May 16 to 19.

Personals

Welcome to Caltech

April

Amy Vu, lab assistant, environmental science and engineering.

May

Annette Asp, research and administration coordinator, humanities and social sciences; **Gabriel Coja**, equipment operator, Physical Plant; **Bruce Cohen**, scientist, biology; **Jasmin Farrone-Mennella**, **Timo Jacob**, and **Pierre Kennepohl**, postdoctoral scholars in chemistry; **Herbert Khare**, assistant desktop support, Administrative Technology Center; **Miguel Lobato**, bus person I, Athenaeum; **Qisheng Ma**, postdoctoral scholar in chemistry; **Timothy McHugh**, security shift supervisor, Security Office; **Roobik Minasian**, control specialist, Physical Plant; **Linda Miranda**, department clerk, Human Resources; **Osamu Miyakawa**, postdoctoral scholar in physics; **Lesley Ortiz**, assistant storekeeper, Campus Auxiliary and Business Services; **Danny Petrusek**, senior postdoctoral scholar in applied and computational mathematics; **Traci Provenzano**, department assistant, mechanical engineering; **Yeeman Koomar Ramtohol**, postdoctoral scholar in chemistry; **Tetsuya Uda**, postdoctoral scholar in materials science; **Wendy Ward**, department aide, Center for Advanced Computing Research; **Benjamin Welander**, research assistant I, geological and planetary sciences.

June

Danny Calegari is joining Caltech as an assistant professor of mathematics, effective June 1. Noted for his work in geometry and topology, and particularly foliation theory, he received his BA from the University of Melbourne in 1994 and his PhD from UC Berkeley in 2000.

Tapio Schneider is starting with Caltech as an assistant professor of environmental science and engineering, effective June 1. A specialist in climate dynamics, he has developed statistical and numerical tools for analyzing geophysical data as well as atmospheric models that can account for observed complex dynamics. He received his PhD from Princeton in 2000.

New positions

May

Susan Gray, formerly of the Office of the General Counsel, has joined the Office of Public Relations as administrative assistant to the vice president for public relations. She received her BA in humanities from Cal State Northridge in 2000, after working nearly a decade as a paralegal, and she came to the Institute in July 2001.

Retirements

Charlene Chindlund, manager of donor relations, is retiring on June 1, after 20 years at Caltech.

Barbara Mattenley is retiring on June 1. A junior accountant in asset accounting, she has been at Caltech for 23 years.

Honors and awards

Jim Eisenstein, professor of physics, has been invited to present a series of Morris Loeb Lectures at Harvard next winter. These lectureships, dealing with research topics of special interest to the lecturers, usually involve talks for both specialized and less-specialized audiences.

Charles Elachi, Caltech vice president and director of the Jet Propulsion Laboratory, has received the Wernher Von Braun Award from the German Organization of Air and Space Travel. The honor, given in recognition of the Shuttle Radar Topography Mission team, was awarded at a parliamentary meeting in Berlin.

Symposium celebrates a dozen years of innovation

In recognition of 12 years of scientific innovation under the leadership of founding director **Harry Gray**, Beckman Professor of Chemistry, the Beckman Institute Symposium will take place on Wednesday, June 12, in the Beckman Institute auditorium. The daylong event will be free and open to the public.

A welcome by **Barbara Wold**, professor of biology and current director of the BI, will open the symposium at 9 a.m. The program will feature presentations by researchers **Jerry Solomon**, **Eric Tillman**, **Mel Simon**, **Jack Beauchamp**, **Jackie Barton**, **Vaidehi Nagarajan**, **Eric Davidson**, **Scott Fraser**, and **Jay Winkler**, who will represent each of the BI's nine resource centers—the major programs housed within and partly supported by the institute. An open house and tours of the resource centers are also scheduled, and the day will conclude with remarks by Gray at 5 p.m.

Dedicated in 1989 with funds from the Arnold and Mabel Beckman Foundation, the BI is a multidisciplinary center for research in the chemical and biological sciences. Its mission is to promote new methods, instrumentation, and materials for innovative chemical and biological research, particularly that deemed too high-risk for normal funding sources, and to further Caltech's educational goals by actively involving students in its work, with the hope of ultimately benefit humankind in practical ways through the resulting research.

For more information and a detailed schedule of events, visit the Beckman Institute Web site at www.its.caltech.edu/~bi/.

Four from Caltech among top 100

Michelle Effros, associate professor of electrical engineering, **Stephen Quake**, associate professor of applied physics, and two Caltech PhDs, **Kelvin Lee** and **Suzie Hwang Pun**, have been named to the TR100, the world's top 100 young innovators according to *Technology Review* magazine, which is published by the Massachusetts Institute of Technology.

The theme for the 2002 TR100 selection has been the transformation of existing industries and the creation of new ones, particularly in "hot spots" such as information technology, biotechnology and medicine, nanotechnology and materials, energy, and transportation.

Effros, who is director of Caltech's data-compression lab, conducts research on information compression and communication, with applications to the World Wide Web, signal processing, wireless communications, Internet and wireless networks, data storage devices, and speech recognition.

Quake's work involves biophysics and microfluidic devices. He uses biological molecules as model systems for studying physics, and his work in microfluidics has led to the development of "lab on a chip" devices that will enable advances in biology and medicine.

Lee, who received his PhD in chemical engineering from Caltech in 1995, is an assistant professor in Cornell University's School of Chemical and Biomolecular Engineering. As a Caltech postdoc, he discovered a marker protein for identifying Creutzfeldt-Jakob disease (CJD) in humans and, later, for "mad cow disease" in cattle, and he is looking for indicators for variant CJD and for Alzheimer's disease.

Pun received her PhD in chemical engineering from Caltech in 2001. She uses polymers—rather than viruses, which can be intercepted by the immune system—to carry injected genes through the bloodstream to precise locations, which, in addition to gene-therapy applications, opens up the possibility of accurate drug delivery; the Pasadena company Insert Therapeutics was founded primarily to exploit her work.

The judges for the TR100 nomination and selection process included Caltech president **David Baltimore**.

New recycling center opens

Caltech's long-awaited recycling center, located at the former fire station site on Del Mar Boulevard between Michigan and Wilson Avenues, is now open for use by the campus community and the public.

According to Delmy Emerson, Physical Plant's associate director of buildings and grounds, the center's hours are 8 a.m. to 6 p.m. Monday through Friday and 10 a.m. to 6 p.m. Saturday and Sunday. As before, the center accepts a wide variety of recyclables, including office paper, mixed paper, cardboard, glass, and plastic. Emerson requests that recyclers sort their items carefully before depositing them.

A grand opening celebration with giveaways will be held on Thursday, June 6, from 11 a.m. to 1 p.m. Access to the recycling center is through the parking lot south of the center; entrances are located off of Wilson and Michigan Avenues. The lot has also been expanded with a number of additional parking spaces behind the center.

Academy elects five professors

Five members of the Caltech faculty have been elected to the American Academy of Arts and Sciences, joining the 177 Fellows and 30 Foreign Honorary Members in the academy's "class of 2002." The academy honors "intellectual achievement, leadership, and creativity in all fields," and this year's class includes such luminaries as Senator Edward M. Kennedy, violinist Itzhak Perlman, and Academy Award winner Anjelica Huston.

Those from Caltech are Richard Andersen, Boswell Professor of Neuroscience; David Anderson, professor of biology, as well as an investigator with the Howard Hughes Medical Institute (HHMI); Ronald Drever, professor of physics; Mary Kennedy, Davis Professor of Biology; and Mark Wise, McCone Professor of High Energy Physics. Their election brings to 80 the number of Caltech faculty who are Fellows of the academy.

Richard Andersen's work focuses on neural mechanisms for visual-motor integration, spatial perception, and visual-motion analysis, and his lab recently discovered and is currently studying a specific area of the brain that is involved in the planning of eye movements. Andersen received his BS from UC Davis in 1973 and his PhD from UC San Francisco in 1979, and he joined Caltech's faculty as Boswell Professor in 1993.

David Anderson's laboratory currently encompasses three major areas of investigation: the development of the nervous system, the development of the circulatory system, and the functional neuroanatomy of fear, with initial studies focusing on innate fear as a behavioral system. Andersen came to Caltech in 1986 as an assistant professor, after earning his bachelor's degree from Harvard in 1978 and his PhD from Rockefeller University in 1983. He achieved the rank of full professor in 1996 and of full investigator with HHMI in 1997.

Ron Drever's research interests include experimental gravitation and the detection of gravitational waves, which were predicted by Albert Einstein in his work on general relativity. Drever has been involved with the Laser Interferometer Gravitational-Wave Observatory, a joint Caltech and MIT project. He first came to Caltech as a visiting associate in 1977, and joined the Institute's faculty as full professor in 1979. He earned his BSc (1953) and PhD (1958) from the University of Glasgow, Scotland.

Mary Kennedy and her lab are looking into the question of how brains store new information, and in particular are studying molecular organization in synapses of the central nervous system. She joined the Institute in 1981 as an assistant professor, rose to full professor in 1992, and was named Davis Professor this year. She received her BS from St. Mary's College in 1969 and her PhD from Johns Hopkins in 1975.

The interests of Mark Wise are wide-ranging, including particle physics, nuclear physics, and cosmology on the one hand, and finance, specifically risk management, on the other. He arrived at Caltech in 1982 as an assistant professor of theoretical physics, having earned his BSc from the University of Toronto in 1976 and his PhD from Stanford in 1980. He became full professor in 1985 and was named McCone Professor in 1992.

Founded in 1780, the American Academy of Arts and Sciences is composed of leading scientists, scholars, artists, business people, and public leaders from around the world.

June 3–23, 2002

M T W T F S S

Monday, June 3

Thesis Seminar

151 Crellin, 2:30 p.m.—“Crystallographic Studies of Iron Proteins,” Andrew Yeh, graduate student in chemistry, Caltech.

Astronomy Tea Talk

106 Robinson, 4 p.m.—“Kinematics of Gamma-Ray Burst Lightcurves with Structured Jets,” Jay Salmonson, Lawrence Livermore National Laboratory. Information: www.astro.caltech.edu/~kartik/tea_talks/.

Geology and Planetary Sciences Seminar

155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“Mars, Panspermia, and the Origin of Life: Where Did It All Begin?,” Joe Kirschvink, professor of geobiology, Caltech. Information: www.gps.caltech.edu.

Tuesday, June 4

Institute for Quantum Information Seminar

74 Jorgensen, 3 p.m.—“Projective Measurements and Linear Optics: For Fun and Profit,” Jonathan Dowling, JPL.

Chemical Physics Seminar

147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Inter-System Crossing in Acetylene: Mechanism Uncovered by a ‘Herzberg’s Demon,’” Professor Robert Field, professor of chemistry, MIT.

General Biology Seminar

119 Kerckhoff, 4 p.m.—“Measuring the Meaning of Genomics Data as Evidence: Polymorphisms, Gene Structure, and Alternative Splicing,” Christopher Lee, Molecular Biology Institute, UCLA.

Wednesday, June 5

Mathematical Physics Seminar

351 Sloan, noon—“The Step-by-Step Case Sum Rules for Jacobi Matrices,” Andrej Zlatoš, graduate student in mathematics, Caltech. Information: www.math.caltech.edu/events/mathphys.html.

Astronomy Colloquium

155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“The Universe at Redshift 1,” Judy Cohen, professor of astronomy, Caltech. Information: <http://astro.caltech.edu/~jlc/colloquia.html>.

Thursday, June 6

Samuel Epstein Memorial

Athenaeum, 2 p.m.—A memorial service to celebrate the life of Samuel Epstein, Caltech’s Leonhard Professor of Geology, Emeritus. Friends and family, colleagues, students, and students of students are invited to gather to recognize the many contributions made by Sam to science and to our understanding of the environment. Information and reservations: Marcia Hudson, 395-6111 or marcia@gps.caltech.edu.

Physics Research Conference

201 E. Bridge, 4 p.m.—“Light at Bicycle Speed S and Slower Yet!”, Lene Vestergaard Hau, Harvard University. Refreshments, 108 E. Bridge, 3:45 p.m. Information: www.pma.caltech.edu/~physcoll/PhysColl.html.

Science, Ethics, and Public Policy Seminar

25 Baxter, 4 p.m.—“Lost Wanderers in the Forest of Knowledge: Some Thoughts on the Discovery/Justification Distinction,” Don A. Howard, professor of philosophy and director, program in history and philosophy of science, Notre Dame. Refreshments. Information: www.hss.caltech.edu/ses/index.html.

Friday, June 7

Inorganic-Organometallics Seminar

151 Crellin, 4 p.m.—“Ruthenium-Catalyzed Enantioselective Olefin Metathesis,” William Ward, graduate student in chemistry, Caltech.

Kellogg Seminar

Lauritsen Library, 4 p.m.—“First Results from KamLAND,” Robert McKeown, professor of physics, Caltech.

Saturday, June 8

Richard D. McKelvey Memorial

Dabney Lounge, 2:30 p.m.—A memorial service for Richard McKelvey, Caltech’s Wasserman Professor of Political Science and director of the William D. Hacker Social Science Experimental Laboratory. Information: Heather Guyett, 395-3829 or heather@hss.caltech.edu, or see www.hss.caltech.edu/rdm.html.

Monday, June 10

General Biology Seminar

119 Kerckhoff, 4 p.m.—“Cell Death, Spermatogenesis, and the RNA World: It’s a Small World,” Bruce Hay, assistant professor of biology, Caltech.

Tuesday, June 11

Institute for Quantum Information Seminar

74 Jorgensen, 3 p.m.—Topic to be announced. Alex Russell, assistant professor, department of computer science and engineering, University of Connecticut.

Carnegie Observatories Colloquium Series

William T. Golden Auditorium, 813 Santa Barbara Street, 4 p.m.—“Starburst and Merger Histories of QSO Host Galaxies,” Dr. Gabriela Canalizo, Lawrence Livermore National Laboratory. Refreshments, 3:30 p.m.

General Biology Seminar

119 Kerckhoff, 4 p.m.—“Assembly of an Apical Junction Signaling Nexus Controlling Epithelial Cell Polarity,” James Nelson, department of molecular and cellular physiology, Stanford University School of Medicine.

Wednesday, June 12

Thesis Seminar

106 Spalding Lab, Hartley Memorial Seminar Room, 10 a.m.—“Instrument Development and Characterization of Atmospheric Aerosol Physical Properties through Airborne Measurements,” Jian Wang, graduate student in chemical engineering, Caltech.

General Biology Seminar

24 Beckman Labs, 4 p.m.—“Some Like It Hot: The Genetic Basis of Thermosensation in *C. elegans*,” John Satterlee, department of biology, Brandeis University.

Thursday, June 13

Herbert Newby McCoy Award Seminar

153 Noyes, Sturdivant Lecture Hall, 3:30 p.m.—“Olefin Cross-Metathesis Using Ruthenium Alkylidene Complexes,” Arnab K. Chatterjee, graduate student in chemistry, Caltech.

Herbert Newby McCoy Award Seminar

153 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Images of Quantum Confinement from Optical and POWER NMR,” James Kempf, postdoctoral associate, Yale University.

Herbert Newby McCoy Award Seminar

153 Noyes, Sturdivant Lecture Hall, 4:30 p.m.—“The Acyl-Claisen Rearrangement. Development of a Novel Metal-Catalyzed Claisen Rearrangement and Enantioselective Variants of the Acyl-Claisen Rearrangement,” Tehshik P. Yoon, graduate student in chemistry, Caltech.

Friday, June 14

108th Annual Commencement

Beckman Mall, 10 a.m.—The speaker will be Alan Alda.

Tuesday, June 18

General Biology Seminar

119 Kerckhoff, 4 p.m.—“The Genetics of Complex Behavior: Investigating the Contribution of the X Chromosome and Imprinted Genes to Cognition,” Anthony Isles, neurobiology program, the Babraham Institute, Cambridge, England.

Thursday, June 20

Von Karman Lecture Series

JPL, von Karman Auditorium, 7 p.m.—“Comets, Asteroids, and the Interplanetary Shooting Gallery,” Don Yeomans, manager, NASA’s Near Earth Object Program Office, JPL. Admission is free. Information: www.jpl.nasa.gov/lecture/.

Friday, June 21

Von Karman Lecture Series

Pasadena City College, 1570 E. Colorado, the Vosloh Forum (south of Colorado on Bonnie), 7 p.m.—“Comets, Asteroids, and the Interplanetary Shooting Gallery,” Don Yeomans, manager, NASA’s Near Earth Object Program Office, JPL. Admission is free. Information: www.jpl.nasa.gov/lecture/.

Saturday, June 22

Caltech/MIT Enterprise Forum

Baxter Lecture Hall, 7:45 a.m. to 12:30 p.m.—“The State of Wireless: California Opportunities in a Global Market.” This program will discuss the state of the wireless industry in California, and includes a discussion with panelists from Qualcomm Ventures, Hughes Network Systems, Windward Ventures, and the Canadian Consulate. Registration and information: 395-3916, entfor@caltech.edu, or www.entforum.caltech.edu.

CampusEvents

Monday, June 3

Ballroom Dance Club

Winnett lounge, 7:30 p.m.—Fox-trot for beginners, professionally taught. This is the last of a five-week series running on Mondays. Fee: \$6 per lesson for Caltech students; \$8 for others. No partner is required. Refreshments and a half-hour practice period will follow each class.

Ballroom Dance Mini Party

Winnett lounge, 9 p.m.—Open dancing; make requests or bring your own music. Refreshments provided, no partner needed. The first half-hour coincides with the fox-trot practice session.

Tuesday, June 4

Preschool Playgroup

Tournament Park, 10 a.m. to noon—Song and storytime, crafts and free play for toddlers and preschoolers (from walking to age 4). Information: (323) 550-8075 or jmph-p@pacbell.net.

Caltech Tai Chi Club

Winnett lounge, 7:15 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Caltech Folk-Dancing Club

Dabney Lounge, 7:30 p.m.—Meets every Tuesday until midnight. Drop-ins are welcome. Donations accepted.

Wednesday, June 5

Wednesdays in the Park

Tournament Park, 10 a.m. to noon—Conversation and coffee for parents and caregivers, and playtime for children. Information: 744-9919 or cdd@its.caltech.edu.

Laboratory Safety 101

118 Keith Spalding Building, 3 p.m.—This course is designed to prepare incoming researchers to work in a laboratory at the Institute. Issues include laboratory organization, emergencies, injuries, general laboratory safety, and more. Reservations: 395-6727.

Ballroom Dance Club

Winnett lounge, 7:30 p.m.—Argentine tango for beginners, amateur-taught. This is the last of a five-week series running on Wednesdays. Fee: \$1 per lesson; free for freshmen or those taking it for PE credit. No partner is required. Refreshments and a half-hour practice period will follow the class.

Thursday, June 6

Samuel Epstein Memorial

Athenaeum, 2 p.m.—A memorial service to celebrate the life of Samuel Epstein, Caltech's Leonhard Professor of Geology, Emeritus. Friends and family, colleagues, students, and students of students are invited to gather to recognize the many contributions made by Sam to science and to our understanding of the environment. Information and reservations: Marcia Hudson, 395-6111 or marcia@gps.caltech.edu.

Friday, June 7

Caltech Tai Chi Club

Winnett lounge, 7 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Falun Dafa Workshop

125 Baxter, 7:30 to 9:30 p.m.—This free workshop includes video documentaries explaining what Falun Dafa (also known as Falun Gong) is and why it is persecuted in China, as well as five sets of Falun Gong exercises.

Saturday, June 8

Richard D. McKelvey Memorial

Dabney Lounge, 2:30 p.m.—A memorial service for Richard McKelvey, Caltech's Wasserman Professor of Political Science and director of the William D. Hacker Social Science Experimental Laboratory. Information: Heather Guyett, 395-3829 or heather@hss.caltech.edu, or see www.hss.caltech.edu/rdm.html.

Sunday, June 9

Skeptics Society Lecture

Baxter Lecture Hall, 2 p.m.—"The Power of Babel: A Natural History of Language," John McWhorter, associate professor of linguistics, UC Berkeley. Donation is \$8 for nonmembers, \$5 for members and non-Caltech students. Free to the Caltech/JPL community. Tickets and information: 794-3119 or skepticsmag@aol.com. Book signing to follow the lecture.

Tuesday, June 11

Preschool Playgroup

Tournament Park, 10 a.m. to noon—Song and storytime, crafts and free play for toddlers and preschoolers (from walking to age 4). Information: (323) 550-8075 or jmph-p@pacbell.net.

Caltech Tai Chi Club

Winnett lounge, 7:15 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Caltech Folk-Dancing Club

Dabney Lounge, 7:30 p.m.—Meets every Tuesday until midnight. Drop-ins are welcome. Donations accepted.

Wednesday, June 12

Wednesdays in the Park

Tournament Park, 10 a.m. to noon—Conversation and coffee for parents and caregivers, and playtime for children. Information: 744-9919 or cdd@its.caltech.edu.

Laser Safety Orientation

118 Keith Spalding Building, 11 to 11:45 a.m.—All laser operators and individuals working in areas where there may be exposure to laser radiation from Class 3b or Class 4 lasers are required to attend this training. Class size is limited; call 395-6727 to reserve a place.

Friday, June 14

108th Annual Commencement

Beckman Mall, 10 a.m.—The speaker will be Alan Alda.

Caltech Tai Chi Club

Winnett lounge, 7 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Saturday, June 15

Caltech Y Community Service—Union Station

6 to 9 p.m.—Caltech Y volunteers will help prepare and serve meals for homeless men, women, and children at the Union Station Shelter in Pasadena. Information: 395-6163, gregf@caltech.edu, or www.caltechy.org. Or visit the Caltech Y at www.caltechy.org.

Monday, June 17

Adult First-Aid and CPR Training

Brown Gym classroom, 8 a.m. to 5 p.m.—Adult first-aid and CPR training will be offered by Caltech's Safety Office in conjunction with the American Red Cross. Fee: \$15 for materials. Class size is limited; call 395-6727 to reserve a place.

Tuesday, June 18

Preschool Playgroup

Tournament Park, 10 a.m. to noon—Song and storytime, crafts and free play for toddlers and preschoolers (from walking to age 4). Information: (323) 550-8075 or jmph-p@pacbell.net.

Adult, Child, and Infant First-Aid and CPR Training

Brown Gym classroom, 5:30 to 10 p.m.—Adult, child, and infant first-aid and CPR training will be offered by Caltech's Safety Office in conjunction with the American Red Cross. Fee: \$15 for materials. This is a two-day class; to receive certification, you must attend today and on June 20. Class size is limited; call 395-6727 to reserve a place.

Caltech Tai Chi Club

Winnett lounge, 7:15 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Caltech Folk-Dancing Club

Dabney Lounge, 7:30 p.m.—Meets every Tuesday until midnight. Drop-ins are welcome. Donations accepted.

Wednesday, June 19

Adult First-Aid and CPR Training

Brown Gym classroom, 8 a.m. to 5 p.m.—Adult first-aid and CPR training will be offered by Caltech's Safety Office in conjunction with the American Red Cross. Fee: \$15 for materials. Class size is limited; call 395-6727 to reserve a place.

Wednesdays in the Park

Tournament Park, 10 a.m. to noon—Conversation and coffee for parents and caregivers, and playtime for children. Information: 744-9919 or cdd@its.caltech.edu.

Emergency Preparedness Training

118 Keith Spalding Building, 3 p.m.—This course will describe the campus emergency operations plan, including information about the emergency operations center, evacuation, fire prevention and protection techniques, behavioral principles during an emergency, and personal preparedness. Call 395-6727 to reserve a place.

Thursday, June 20

Adult, Child, and Infant First-Aid and CPR Training

Brown Gym classroom, 5:30 to 10 p.m.—Adult, child, and infant first-aid and CPR training will be offered by Caltech's Safety Office in conjunction with the American Red Cross. Fee: \$15 for materials. This is the second of a two-day class; to receive certification, you must attend both classes. Class size is limited; call 395-6727 to reserve a place.

Friday, June 21

Adult First-Aid and CPR Training

Brown Gym classroom, 8 a.m. to 5 p.m.—Adult first-aid and CPR training will be offered by Caltech's Safety Office in conjunction with the American Red Cross. Fee: \$15 for materials. Class size is limited; call 395-6727 to reserve a place.

Caltech Tai Chi Club

Winnett lounge, 7 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Advances in chemistry subject of alumni lectures

Free radicals surround us, sources of renewable energy tantalize us, and emerging pharmaceuticals beguile us. We may not realize it, but chemistry is happening all over the place: our labs, our homes, our bodies. Gaining a better understanding of the current state of the chemical sciences, and how we can make them work for us, is the goal of Chemistry in Context, a two-day Alumni College program organized by Caltech's Alumni Association.

Assembling authorities from the chemistry and chemical engineering fields, the program is designed to address issues affecting modern life. One lecture, presented by Jack Beauchamp, Ferkel Professor of Chemistry, will address ways that new technologies can help counter and minimize the impact of terrorist attacks.

The genetic mapping and sequencing phenomenon that's all the rage today will offer unforeseen challenges and opportunities. This area, where chemistry and biology meet, is what Peter Dervan, Bren Professor of Chemistry, will address in his talk, "Toward Genetic Medicine."

Newly developed metal catalysts that can lead to the manufacture of materials with wide-ranging functions—from baseball bats to pheromones—are being developed at Caltech. Robert Grubbs, Atkins Professor of Chemistry, will provide a peek at the latest findings.

The rest of the program includes lectures by Julia Kornfield, professor of chemical engineering, Nathan Lewis, professor of chemistry, David MacMillan, associate professor of chemistry, and Mitchio Okumura, associate professor of chemical physics. These presentations address technological innovations such as a new understanding of the dynamics of polymers that could lead to implantable plastics and gels easily manipulated from outside the body; recent developments in the conversion and utilization of renewable energy; a novel approach to chemical catalysis that has streamlined the production of chiral pharmaceuticals; and advances in the study of the ubiquitous free radicals.

The lectures will take place on Friday and Saturday, June 21 and 22. Alumni and their guests have priority, but the Caltech community is invited to attend. The deadline for registration and entry fees is May 23. For further information, visit the Alumni Association Web site at www.cco.caltech.edu/~alumni/ and click on Alumni College.

City of Hope hosts stem cell cloning forum

The City of Hope Cancer Center invites Caltech faculty, staff, and students to a free public forum exploring the scientific and ethical implications of stem cell cloning, on Wednesday, June 12, from 6:30 to 8:30 p.m.

Featured speakers will be Stanford University biologist Irving Weissman, chair of the National Academy of Sciences Committee on Stem Cell Cloning and recipient of the 2002 California Scientist of the Year award, and theologian and professor James Walter, chair of bioethics and director of the Bioethics Institute at Loyola Marymount University. The moderator will be Stephen Forman, chair of City of Hope's Bone Marrow Transplantation Program and co-editor of *Hematopoietic Cell Transplantation*. For more information or to register, call (800) 535-1390, ext. 65669.

Deverell named CCH chair, Haynes Fellow

"We had hard times here. 'Course it'll be all different out there—plenty work, an' ever'thing nice an' green, an' little white houses an' oranges growin' aroun'."

Pa Joad's words refer to California in John Steinbeck's novel *The Grapes of Wrath*. It tells the story of the Joad family, which loses its farm in 1930s Oklahoma, then heads west to the promised land of California in the hope of finding a better life. It is a story that still resonates today, says Caltech associate professor of history William Deverell, who has been elected chair of the California Council for the Humanities (CCH).

As chair, Deverell will be working to ensure the success of a new three-year program the council will launch this June. "California Stories" is an initiative to refresh the story of California with the stories of today's citizens and to strengthen the sense of community across the state. The first project, "Reading *The Grapes of Wrath*," will encourage Californians to read the Pulitzer Prize-winning novel.

The CCH hopes its initiative will create opportunities for people to read and discuss the book, and to consider its parallels with the contemporary California experience. The resulting conversations and reminiscences will ideally lead to increased understanding, tolerance, and community bonds among Californians.

"I'm particularly excited about the opportunities provided by this unprecedented statewide effort," says Deverell. "The story of the Joad family still resonates powerfully in a state where 50 percent of the residents are immigrants. Through this project, we will be giving Californians a chance to reflect on their own family experiences, the dreams and disappointments shared by immigrants then and now, and a chance to consider the place of their own stories in the larger story of California."

It will be a busy year for Deverell. This month he was also named the 2002-03 Haynes Fellow by the John Randolph Haynes and Dora Haynes Foundation, a leading supporter of social science research in Los Angeles. In that capacity, Deverell will help guide the Haynes Foundation and keep its trustees "attuned to developments in the social sciences research community," says foundation president Donn Miller.

"Dr. Deverell's research continues to enhance our understanding of the events and relationships that have helped to shape California," Miller says. "We are delighted to welcome him to the foundation."

Says Deverell, "I'm deeply honored by the appointment. The Haynes Foundation is an extraordinary regional institution with a rich and important history. I look forward to the challenges of this position with great personal and professional excitement."

Founded in 1926, the Haynes Foundation supports social science research on policy issues in Southern California. The California Council for the Humanities, established in 1975, is a state affiliate of the National Endowment for the Humanities and an independent, nonprofit funder and creator of programs that seek to enrich California's cultural and community life.

Service Awards recognize Caltech family members' years of dedication

Caltech will thank its employees for their commitment and service to the Institute at the 47th Service Awards ceremony next week. This honor is bestowed on the employees' tenth anniversary and every five years after that. President David Baltimore and Vice President for Business and Finance Al Horvath will pay tribute to 158 loyal employees.

Of those, the one staff member this year with 45 years of service to Caltech is Nick Nichols, director of the Industrial Relations Center, a job he's held since 1983. It was back in 1957 when he read an ad in the paper. "I thought 'Gee, rockets, Buck Rogers. The new era.' Though I was not a scientist, I had an economics degree." Just out of college, Nichols started at JPL at a pivotal point in the country's space race. The Soviets launched Sputnik in October of 1957, to which the United States responded by forming NASA and sending contracts to JPL. "That was a very exciting time. I worked on many of the space programs." These included the Ranger, Mariner, and Surveyor unmanned

missions. Later, Nichols moved on to participate in Caltech's efforts to establish a technology institute for the Indian government and an applied research institute in Saudi Arabia before dedicating himself to executive education. "I like to characterize my time here as a number of careers under Caltech."

Maggie van Genderen, the administrative assistant to Horvath, has worked here for 35 years. She remembers single-handedly typing up the general budget for the entire institute on a manual typewriter. Not bad for an immigrant from Holland with limited English skills. "When I first came to the U.S., there was an enormous language barrier. Caltech gave me a chance and I had to prove myself," she says. While working full time and raising two young children, she took English courses at night. "It was hard but it was all worth it," she says. "Caltech has been a bowl of cherries."

Patrick Koen has spent much of his 35 years here underground, missing so many days of sun that, he says, "It's felt like only

eight or nine years." He mans the biology division's cell sorter and electron microscopes in the basements of Alles and Kerckhoff, where he makes infinitesimally small things look big. Koen fled the chill of Canada for Pasadena's golf-friendly climate, and says he would pick the golf clubs made of Liquidmetal, a substance invented by Mettler Professor of Engineering and Applied Science William Johnson, if they were only included in the employee gift catalog.

The Service Awards will be held on Tuesday, June 4, at 10 a.m. in Beckman Auditorium, with a reception to follow in the Beckman Institute courtyard. The ceremony is open to the Caltech community. Following the ceremony, staff members with 20 years or more of service are invited to a special lunch at noon in the Athenaeum's Hall of Associates. It will be hosted by Tom Schmitt, assistant vice president for human resources.

Below follows a list of the staff members who will be honored for their service.

10 years

Ofelia Aliwanag
Dan Anguka
Lee Armus
Gregory Atrian
Gary Ray Belford
John Bennett
Lorianne Bowers
Ruth Brambila
Ronae Brooks
Daniel Buckelew
Judith Capron
Luis Cardenas
Chin Cheng
Suzanne Chiarchiaro
Ernest Croner
Greta Davidson
Andres Ductoc
Jesus Esqueda
Mary Flowers
Henry Frederick
Ann Frey
Phillip Gennaro
Eugean Hacopians
Joseph Haggerty
Gayle Hammer
Mary Johnson
Parandeh Kia
Jonathan Ma
Derek McCallan
Martin McCay
Kathleen McGregor
David Miller
Kathy Montes
Jose Nunez-Anzueto
Carlos Ovando
Shirley Pease
Linda Pharr
Cherylinn Rangel
Mauricio Retana
Victor Sanchez
Casimir Scislowicz
Stacey Scoville
Martin Shepherd
David Shupe
Anne Marie Simoneau
Lauren Stolper
Joan Sullivan
Carolina Sustaita
Regina Ude
Nagarajan Vaidehi
Lisa Winiacki
Hiroaki Yamamoto
Anita Yanes
Zenaida Zoleta

15 years

Ricardo Ang
Petros Arakelian
Mary Ellen Barba
James Bennett
Alejandrina Burgueno
Javier Cabral
Richard Canny
Carol Casey
Hector Chico
Tom Currier
Hall Daily
Eleanor David
Jose Delgado
Elena Escot
Michael Farquhar
Kathryn Finigan
Jesus Flores
Carol Garland
Patsy Gougeon
Allen Guyer
Philip Harter
Theodore Helland
Christopher Henderson
Leila Javaheri
Cesar Labarca
Lena Lenore
Sean Lin
Tina Lowenthal
Julie Malmquist
Mary Marsh
Victoria Mason
Jorge Mata
Josefa Meraz
Miguel Meraz-Villarreal
Paul Messina
Vinh Nguyen
Robert O'Rourke
Patricia Perrone
Inocencia Portela
Judy Post
Lloyd Roberson
Anastacia Rutherford
Lynn Salmon
Alejo Sanchez
Anthony Solyom
Rene Stone
Long Van Tran
David Wernitz
Moty Zahavi

20 years

Pamela Albertson
Jesus Ayala
Thomas Brennan
Teesa Chmielewski
Timothy Conrow
Pamela Croomes
Maria Delgado
Michael Doyle
Kathleen Dutton
Rudy Francisco
Catherine Funaro
Rosana Gatti
Belen Gelle
Rita Gonzalez
Salvador Gonzalez
Jocelyn Keene
Barbara Mattenley
Rodolfo Mendez
Henry Ngo
Irene O'Bradovich
Carolyn O'Keefe
Su Potts
Vincent Riley
Randy Rose
Kathleen Scharf
Christina Smith
Virginia Tormey
William Wheaton
Lorrie Yamazaki

25 years

Michael Alexander
Nils Asplund
Wendy Brown
Lynne Bush
Susan Davis
John Fowler
Elias Gonzalez
Sandra Koceski
Adela Mendez
Lawrance Mossbarger
Sergio Mujica
Kent Potter
Skip Staples
Susan Yamada



Gretchen Bellin
ATC



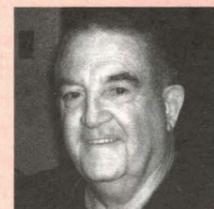
Allen Taylor
Transportation



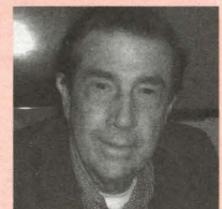
Judy Bennett
IPAC



Maggie van Genderen
Financial Services



Patrick Koen
Biology



Nick Nichols
Industrial Relations Center

30 years

Lawrence Begay
Nelson Ishida
Helen Tuck
Michael Walsh

35 years

Gretchen Bellin
Judy Bennett
Eloise Kennedy
Patrick Koen
Allen Taylor
Maggie van Genderen

40 years

Gerry Stapfer

45 years

Nick Nichols

Night life, from page 1

A typical evening on the 4 p.m. to midnight shift finds Solorzano fielding calls from parents trying to reach students; helping students send faxes; and directing visitors to the Ath or to campus events. In between, he'll update the database of student telephone accounts, revise various departmental forms, or work on special projects such as tabulating results from a recent ATC student survey. And sometimes, of course, there are earthquake calls.

The evenings following the 1994 Northridge shaker were some of his most eventful, Solorzano recalls. "People were calling for weeks, asking, 'Are we going to fall in the ocean?' 'Can't your scientists predict when the next earthquake will happen?'" At other times, he says, people call in to report quakes, or even forecast them. "I'll get someone saying, 'My dog Sparky has been acting strange. I think there's going to be an earthquake.' I tell them, 'Sorry, we don't take predictions.'"

8:10 p.m., Braun Athletic Center
Outside, shouts and splashes fill the air as the women's water polo team battles it out against Chapman College. Inside the glass-walled lobby, Jennifer Worrell is at the front desk, a pile of neatly folded white towels before her.

Here since 6 p.m., she'll stay until closing time at midnight. The first two hours are always busy, she says, with an inflow of JPL employees coming in after work. Toward the end, things slow down, "but you'd be surprised at how many people there are," she says, referring to students who tend to hit the weight room or basketball court for late-night workouts.

A student at Pasadena City College, Worrell works 32 hours a week at the athletic center. The evening shift includes one other desk person at adjacent Brown Gym, and a roving staffer who oversees

the two. "There's only a few of us, so we try to help each other out," she says.

That sense of Caltech's small community has added to her enjoyment of the job, Worrell says, allowing her to get to know many people. As though in affirmation, a number of arriving guests greet her, including Mark Chavez and Ryan Maynes. "Jennifer is the best employee here," Chavez says, adding that she "always greets us with a warm smile, and is always willing to go the extra distance."

Like other employees, Worrell gets free use of the athletic facilities—a perk that has a slight downside. "The gym access is a great benefit," she says, "but it's hard to bring yourself here on your day off, since it's where you work."

10:43 p.m., Holliston parking structure
In the dim amber glow of the almost deserted garage, the security office is a hub of fluorescent light and activity. Supervisor Brett Miller has just begun his shift, which lasts until 7 a.m. tomorrow morning.

Prior to arriving at Caltech, Miller worked for 17 years as a supervisor for an alarm response company, and so is used to working the night shift. "I enjoy working nights, but days more," he says, noting he would rather be home with his kids.

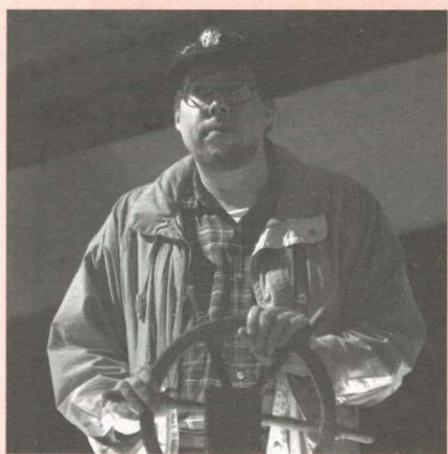
Miller starts by setting priorities for the evening's tasks and delegating them to the other security staff. These tasks might include setting up No Parking signs, escorting staff members to their cars, and unlocking building doors for students and other late-night researchers. In addition, as the only staff member authorized to go off site, he's responsible for checking up on the off-campus housing complexes. In his four-plus months here, he says, "things have been pretty quiet, which means we're doing our job."

The best part of the job, says Miller, has been working with the people. "This is very much a people campus," he says. "Everyone that I've had the privilege to work with has been a lot of fun, and extremely professional."

Arts dialogue, from page 1

Rosenstone replied that no secrecy was intended and that the campus community was represented by the art committee, whose existence appeared to be a revelation to much of the audience. "For 25 years nobody has given a damn about what we do. Now suddenly it's an *issue*," said Rosenstone.

No formal contract has yet been signed with the artist, and the Pasadena Arts Commission must still grant its approval of *Vectors*. The "artistic dialogue" will continue on May 30 in another noon-time discussion in Beckman Auditorium.

TACIT on the docks

JPL staff member Craig Peterson portrayed Skippy in TACIT's recent production of *Lakeboat*, David Mamet's play about dockworkers, held at the Central Receiving loading dock.

CBI, from page 1

instruments available. The COBE satellite first demonstrated the CMB's slight variations in the early 1990s.

The CBI results provide independent confirmation that the universe is "flat," and also yield a good measurement of the amount of nonbaryonic "dark matter"—which differs from the stuff everyday objects are made of—in the universe. In addition, the results confirm the importance of "dark energy" in the universe's evolution.

According to Anthony Readhead, Caltech's Rawn Professor of Astronomy and principal investigator for the CBI, "These unique high-resolution observations give a powerful confirmation of the standard cosmological model. Moreover, this is the first direct detection of the seeds of clusters of galaxies in the early universe."

The flat universe and the existence of dark energy add empirical credence to the "inflation" theory, which states that the universe grew from a tiny subatomic region during a period of violent expansion a split second after the Big Bang.

Because it sees finer detail in the CMB sky, the CBI verifies and goes beyond the recent successes of the BOOMERANG and MAXIMA balloon-borne experiments and the University of Chicago's DASI experiment at the South Pole.

The BOOMERANG experiment, led by Andrew Lange, Caltech's Goldberger Professor of Physics, demonstrated the universe's flatness two years ago. Those findings, along with data from MAXIMA and DASI, also bolstered the inflation theory with accurate measurements of many cosmological parameters.

The fact that the CBI observations when compared with others are at very different resolution, and that the various observations are made with widely differing techniques, at different frequencies, and covering different parts of the sky, and yet agree so well, gives the findings great confidence.

The CBI is a microwave telescope array comprising 13 separate antennas, each about three feet in diameter, set up to act together as an interferometer. Located at Llano de Chajnantor, a Chilean plateau at 16,700 feet, it is the most sophisticated scientific instrument ever used at such an altitude—so high that the researchers must carry bottled oxygen.

The CBI hardware was designed primarily by Stephen Padin, the project's chief scientist, and its software by senior research associate Timothy Pearson and staff scientist Martin Shepherd. Postdoctoral scholar Brian Mason and graduate students John Cartwright, Jonathan Sievers, and Patricia Udomprasert also played critical roles.

In five papers submitted to the *Astrophysical Journal*, the Caltech team, along with collaborators from CITA, the National

Radio Astronomy Observatory, the University of Chicago, Universidad de Chile, the University of Alberta, UC Berkeley, and the Marshall Space Flight Center, reports on observations of the CMB obtained since the CBI began operation in January 2000.

The CBI is supported by Caltech, the National Science Foundation, and the Canadian Institute for Advanced Research, and has also received generous support from Maxine and Ronald Linde, Cecil and Sally Drinkward, Stanley and Barbara Rawn, Jr., and the Kavli Institute.

Images and other information are available at www.astro.caltech.edu/~tjp/CBI/press/press.html.

Commencement, from page 1

The festivities begin on Thursday, June 13, with a full day of events. First-time visitors can take a self-guided tour of campus between 8 a.m. and 5 p.m., starting at the Office of Public Relations, 315 South Hill Avenue.

At 11 a.m., International Student Programs will host a reception at the Center for Student Services for all graduating international students and their families. Over at Avery House, the deans and directors of Student Affairs will welcome visiting families with a buffet lunch, starting at 11:30.

The popular "Slices of Caltech Student Life," giving visitors a look at what undergrads *really* do in their time here, will begin at 1 p.m. in Ramo Auditorium. The program will include a presentation by Professor Erik Antonsson, inventor of Caltech's renowned Mechanical Engineering 72 design competition; award-winning speakers from the 2001 Summer Undergraduate Research Fellowships; and videos of the infamous Ditch Day rite of passage. Photos and relics from Ditch Day "stacks" can be seen from 3 to 5 p.m. between Dabney and Parsons-Gates halls.

At 4 p.m., President David Baltimore, Alice Huang, faculty associate in biology, and the Alumni Association will host a reception in the President's Garden for all grads and their families. Afterward, starting at 6 p.m., seniors will host a banquet for family and friends at the Athenaeum, while grad students and their guests will attend a banquet at the Doubletree Hotel, given by the Graduate Office and Graduate Student Council. The day will conclude with a free public concert by the Caltech Chamber Singers and other student performers, at 8:30 p.m. in Dabney Lounge.

On Friday, following the commencement ceremony, a final reception and luncheon will be held for all graduates and their guests, starting at noon on the Athenaeum lawn. Lunch will be served at 12:30, and the festivities will end at 2 p.m.

For more information on Commencement, visit <http://pr.caltech.edu/commencement/02/> or e-mail commence@caltech.edu.

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