

# Caltech336

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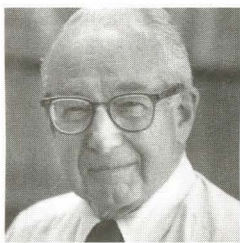
The campus community biweekly

December 9, 2004, vol. 4, no. 18

## In memoriam



Recognizing World AIDS Day, December 1, eight sections of the famed memorial quilt were on view in Brown Gym. Since 1987, the quilt has grown to over 45,000 panels that remember more than 88,000 individuals lost to AIDS—including Caltech's own Bruce Kahl, former director of the Counseling Center. Caltech Athletics and the Cultural Programming Group sponsored the display.



## Physicist Robert Bacher dies

Renowned Caltech physicist Robert Fox Bacher, who headed experimental physics at the Los Alamos Laboratory during the Manhattan Project, died Thursday, November 18, in Montecito, California. He was 99.

Affiliated with MIT's Radiation Laboratory when the Manhattan Project began, Bacher took a leave of absence to head the experimental physics division and, later, the bomb physics division. After the war he was one of the first members of the U.S. Atomic Energy Commission, and served on the President's Science Advisory Committee during the Eisenhower Administration.

Bacher joined Caltech in 1949, three years after Lee DuBridge, his close associate at MIT, had become president. Bacher remained at Caltech for the rest

see *Bacher*, page 6

## Groundskeepers reap high praise

Visitors to Caltech often marvel at the flora on campus, from the groves of soaring eucalyptus to the grand lawns and the graceful wisteria vines that seem to bloom all at once. The beauty of the ornamental plants and trees that grow here is no accident. It is a result of the groundskeepers' careful and exacting attention, and that attention is of such a high caliber that Caltech recently won recognition by a national grounds management group.

The Professional Grounds Management Society (PGMS) presented the Institute with a coveted Green Star, giving Caltech a Grand Award in the university and college grounds category.

"This particular award is very prestigious in the green industry," says Delmy Emerson, a manager in Buildings and Grounds who supervises some 30 staff members. "They work from 6:30 in the morning to three in the afternoon. The campus looks so good because each one of them takes ownership. Whether it's pouring down rain or it's 100 degrees outside, they're out there maintaining the grounds."

And doing so is no small feat. The workers maintain all the landscaping as well as the sidewalks, the courtyards, the

see *Grounds award*, page 6

## Caltech quadruples Internet speed

For the second consecutive year, the High Energy Physics Team, a group of physicists, computer scientists, and network engineers, has won the Supercomputing Bandwidth Challenge with a sustained data transfer of 101 gigabits per second (Gbps) between Pittsburgh and Los Angeles. This is more than four times faster than last year's record of 23.2 gigabits per second, which was set by the same team.

The team hopes this new demonstration will encourage scientists and engineers in many sectors of society to develop and deploy a new generation of revolutionary Internet applications.

The international team is led by Caltech and includes partners from institutions throughout the world. The group's "High-Speed TeraByte Transfers for Physics" record data transfer speed is equivalent to downloading three full DVD movies per second, or transmitting all of the contents of the Library of Congress in 15 minutes, and it corresponds to approximately 5 percent of the rate at which all forms of digital content were produced on Earth during the test.

The new mark exceeded the sum of the entire throughput marks submitted in the present and previous years by other BWC entrants. The extraordinary achieved bandwidth was made possible in part through the use of the FAST TCP protocol developed by Caltech associate professor of computer science and electrical engineering Steven Low and his Netlab team.

The Bandwidth Challenge allowed the scientists and engineers involved to preview the globally distributed grid system that is now being developed in the United States and Europe in preparation for the next generation of high-energy physics experiments at CERN's Large Hadron Collider (LHC), scheduled to begin operation in 2007. Physicists at the LHC will

see *Internet*, page 6

## Murray to leave E&AS chair

Richard Murray, professor of mechanical engineering, will step down from his appointment as chair of the Division of Engineering and Applied Science in May 2005. A search committee is being formed to name candidates for the post.

"I am sure you share our appreciation for the excellent job he has done the past few years, both in leading the Division and in contributing to the welfare of the Institute," Provost Paul Jennings wrote about Murray in a letter to the division's faculty. Murray's term as division chair began in 2000.



## Palomar laser points to future

The Palomar Observatory's 200-inch Hale Telescope has been gathering light from the depths of the universe for 55 years. Now, it's beginning to send some back with the help of Caltech, JPL, and University of Chicago astronomers, who have created an artificial star by aiming a 4-watt laser beam from the telescope into the night sky.

The beam is the first step in a program to expand the area of sky observed with adaptive optics—a technique that allows astronomers to correct for fuzziness produced by Earth's moving atmosphere, and to gain a view that often surpasses those of smaller space-based telescopes.

Palomar astronomers currently can use adaptive optics only if a moderately bright star is close enough to their object of interest; they then use the star as a source by which to correct atmospheric distortion. Now they can place an artificial guide star wherever they see fit by shining a narrow sodium laser beam up through the atmosphere. At an altitude of about 60 miles, the beam makes a small amount of sodium gas glow, and the faint reflected light from the glow serves as a guide star.

"We have been steadily improving adaptive optics using bright natural guide stars at Palomar," says Richard Dekany, associate director of development for the Caltech Optical Observatories, and leader of the adaptive-optics team. "As a result, the system routinely corrects for atmospheric distortions. Now we will be able to go to the next step."

Palomar currently employs the world's fastest adaptive-optics system on the Hale Telescope, correcting for atmospheric changes 2,000 times per second. Caltech, JPL, and Cornell University scientists have used the system to discover brown-dwarf companions to stars, study the weather on a moon of Saturn, and see the shapes of asteroids. Achieving adaptive-optics correction with the laser guide star is expected next year and will make the observatory just the third worldwide to deploy such a system.

Richard Ellis, Steele Family Professor of Astronomy and director of the Caltech Optical Observatories, says, "This a terrific technical achievement which not only

see *Palomar*, page 6



# NewsBriefs



Chief Anthony Morales, right, of the Gabrieleno (Tongva) tribe—the original inhabitants of the Los Angeles basin—and Native American activist Dee Dominguez spoke on campus about the proposed Playa Vista development near Marina del Rey and its impact on a Tongva burial ground discovered on the site. Held in recognition of Native American Heritage Month, the event was sponsored by the Cultural Programming Group.

## Personals

### Welcome to Caltech

#### October

**Elizabeth Beck**, resident associate, Campus Life.

#### November

**Nicolas Altounian**, electrician's aide, Electrical Shop; **Jon Bergengren**, visitor in planetary sciences; **Tony Chan**, Oracle HR/payroll systems lead analyst, Administrative Technology Center; **Terrondus Chaney**, JPL floating cook, Dining Services; postdoctoral scholars **Jihong Cheng** and **DeMichael Chung**, both in chemistry, **Kieran Cleary**, in JPL's gravitation and cosmology research element, **Avigdor Eldar**, in biology, and **Bernard Guest**, in geology; **Min Hubbard**, data quality assessment analyst, space astrophysics; **Ernest Carl Johanson**, assistant network security analyst, ITS Infrastructure; **George Lee**, research associate, computer science; postdoctoral scholars **Zhuo Li** and **Axel Lindner**, both in biology; **Maria Lopez**, senior administrative secretary, Health/Counseling Center; postdoctoral scholars **Vlad Manea**, in geophysics, **Eric Matson**, in environmental science and engineering, **Claus Mogensen**, in JPL's experimental science group, and **Zoltan Novak**, in chemistry; **Sylvia Ramirez**, custodian, Facilities Management; **Yvette Santana**, human resources administrator, Dining Services; **Marie-Odile Stotzer**, programmer, Seismology Lab; **Tadao Takada**, postdoctoral scholar in chemistry; **Leopoldo Villanueva**, utility mechanic, Facilities Management; **Victoria Wakefield**, host, Dining Services; **Haiqing Wang**, postdoctoral scholar in biology; **Masanori Yoshida**, visitor in chemistry; **Ying Zhou**, postdoctoral scholar in geophysics.

#### January

**Angelike Stathopoulos** will join Caltech as assistant professor of biology, effective January 8. Noted for her innovative research in the area of molecular genetics of development, she has used bioinformatic approaches to revise current knowledge of *Drosophila* development and has published in what are considered the most selective biology journals. She received her BA from UC Berkeley in 1992 and her PhD from Stanford University in 1998.

## Honors and awards

**Frances Arnold**, Dickinson Professor of Chemical Engineering and Biochemistry, has been elected to the Institute of Medicine (IOM) of the National Academy of Sciences. Candidates for membership are "nominated for their professional achievement and commitment to service," according to the institute, and, "with their election, members make a commitment to devote a significant amount of volunteer time as members of IOM committees, which engage in a broad range of studies on health policy issues." Arnold received her BS from Princeton University in 1979 and her PhD from UC Berkeley in 1985. She joined Caltech's faculty as an assistant professor in 1987, becoming professor in 1996 and Dickinson Professor in 2000.

**Shri Kulkarni**, MacArthur Professor of Astronomy and Planetary Science, has been chosen as this year's Marker Lecturer at Pennsylvania State University. He will give three lectures: on cosmic explosions ("Gamma-Ray Bursts and More"), space interferometry ("Planets and Parallaxes and More"), and millisecond pulsars ("Extreme Physics, Extreme Matter, and More"). Kulkarni received his MS from the Indian Institute of Technology in 1978 and his PhD from UC Berkeley in 1983. He came to Caltech as a Millikan Research Fellow in 1985, became assistant professor in 1987, professor in 1992, and MacArthur Professor in 2001. He served as executive officer for astronomy 1997–2000.

**Anneila Sargent**, professor of astronomy and director of the Owens Valley Radio Observatory, has been invited to be the 2005 Oort Professor at Leiden University, the Netherlands; she will give the Oort Lecture in April and then will visit for approximately a month in the summer. A graduate of the University of Edinburgh who received her PhD from Caltech in 1977, Sargent has served as a member of the Institute's research faculty or professional staff ever since, being appointed professor in 1998 and director of the Owens Valley Radio Observatory that same year. She also served as director of the Interferometry Science Center from 2000 to 2003.

**Nai-Chang Yeh**, professor of physics, has been elected a fellow of the American Physical Society, with her citation reading: "For her contributions to the understanding of cuprate superconductors, vortex dynamics and phase transitions of extreme type-II superconductors, and physical properties of ferromagnetic perovskite oxides." She received her BS from National Taiwan University in 1983 and her PhD from MIT in 1988, and she joined Caltech the following year as assistant professor. She was appointed professor in 1997.

## Media minute

### Caltech HR, health care profiled

Caltech associate vice president for human resources **Tom Schmitt** was featured in the November issue of *Business Officer*, published by NACUBO (the National Association of College and University Business Officers). The magazine profiles the human resources staff's process in deciding to change the Institute's 2004 health-care plans due to rising costs. "We met with our benefits committee and resolved to look at every option," Schmitt is quoted as saying. The article goes on to describe the staff's ensuing struggle to "balance costs and quality," and the negotiations that resulted in Caltech's switching from Blue Cross to HealthNet in 2004 and back again in 2005. Yet the challenges of health-care costs are likely to continue in the years to come, Schmitt concludes. "In this field, everything changes. It's a never-ending job to stay on top of it."

### Hi-tech sight

**Wolfgang Fink**, visiting associate in physics at Caltech, and a researcher at JPL and USC, says there is hope for blind people to see. A recent *Pasadena Star-News* article about a lecture given by Fink discussed a system he developed with colleagues from Caltech and at USC's Biomimetic MicroElectronic Systems center. The system uses a camera, an electrode implant, and a processing unit to send images from the retina to the brain. Six patients have undergone clinical testing, and though they see blurry black-and-white images with 4 x 4 pixel resolution, Fink predicts technological advances within the next decade will improve the system.

### Global warming as Pandora's box

"Global warming resulting from increased carbon dioxide in the atmosphere is a major challenge facing modern society," said **Yuk L. Yung**, professor of planetary science, in an article that appeared recently in the *South China Morning Post*. Killer floods, like the one in the movie *The Day After Tomorrow*, could become a reality, he said, if global warming intensifies. "When it gets warmer, the sea level rises, hurricane typhoons become more intense and frequent, and mosquitoes extend their zone of activity," he said.

### La Belle looks back

The December 3 issue of the *Chronicle of Higher Education* profiles several women in academia, including Professor of English Jenijoy La Belle. "Women in Higher Education: Where Are They Now?" follows up a 1970 *Chronicle* article on the status of female scholars; while most faced "both overt and subtle discrimination," worked on small campuses, and were paid less than men, some such as La Belle were succeeding. Then Caltech's first female professor, she would also become the first tenured woman—but not without a long struggle. Denied tenure twice in the mid-1970s, even with an arbitrator ruling in her favor, she filed a grievance with the U.S. Equal Employment Opportunity Commission in 1977. The commission ruled for her and also charged Caltech with discriminating against female faculty. After settling with the Institute, she finally received tenure two years later. In the earlier article, La Belle had said, "In general, it seems to me that women have equal opportunity. As far as the rest of it is concerned, I like to have men open doors for me. I'm not about to throw away my eyelashes or lingerie." Looking back from her vantage point in 2004, she admits, "I was unaware of the very real problems for women." She has tried ever since to help other women seeking tenure, and says Caltech's administration today is "very concerned and sensitive."

## Full-spectrum honors for students

Wei Lien Stephen Dang, Joseph Jewell, and Nathan Hodas, all currently or recently students at Caltech, have been honored with a spectrum of top scholarships and awards. Also, this marks the first time ever that a Rhodes and a Marshall scholarship have gone to students at Caltech the same year.

Dang, a senior in applied physics, has been awarded the Marshall scholarship. As a Marshall Scholar, he will head for Cambridge University, England, next September to continue his work in nanoscience as he seeks two master of philosophy degrees, one in nanoscience, the other in nanotechnology management. His particular interest is nanotechnological applications such as carbon nanotube devices.

"I'm really excited about the opportunity," he says. "The nanotechnology programs at Cambridge are the only ones of their kind in the world."

As a youth leader and director of educational outreach for Mountain Movers Youth Ministries, Dang has been responsible for a variety of classes, tutoring sessions, and programs for inner-city L.A. youth. He has also been a writing consultant at Caltech's Hixon Writing Center, a teaching assistant in applied physics, and an associate editor of *CURJ*, Caltech's undergraduate research journal, plus he is an accomplished classical pianist and jazz saxophonist.

Jewell, who received his BS in aeronautics and history, with honor, from Caltech last June, will attend Oxford University, England, next year as a Rhodes Scholar. Currently a grad student at the University of Michigan, he will spend two years working on a master's degree at Oxford. A specialist in scramjet engines, he plans to seek his PhD in aeronautics at either Caltech or Michigan after he returns to the United States.

The scholarship is "a great honor," Jewell says. "I hope to generally soak up the medieval atmosphere. I had a second major in medieval history at Caltech, so it will be pretty cool for me to study in England."

Jewell has been to Germany on a Caltech-sponsored trip. Other travels include a trip aboard NASA's infamous "vomit comet," the specially fitted jetliner used to prepare astronauts for the weightless conditions of space. At Caltech, he was involved in student government and played timpani for the Institute's concert band and symphony orchestra.

Hodas, who is working on his PhD in physics at Caltech, has been selected by the American Physical Society (APS) to receive its 2004 Leroy Apker Award for achievement in undergraduate physics. He comes to Caltech from Williams College, where he graduated this year with a bachelor's degree in physics with highest honors, and received the Howard P. Stabler Prize in Physics.

The Apker Award, which one recipient has declared "is like winning the Heisman Trophy for physics students," requires that finalists give a half-hour oral presentation—"a rigorous examination"—at APS headquarters.

Hodas's senior thesis was on "The stacked or freely jointed chain: a single-stranded stacking in nucleic acids." The APS also recognized his work toward creating a fast RNA binding algorithm and his multilane traffic simulation project.



# December 13, 2004–January 16, 2005

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## Monday, December 13

### Thesis Seminar

100 Broad Center, 1 p.m.—“Peptide Modulators of G Protein Signaling,” William Ja, graduate student in chemistry, Caltech.

## Tuesday, December 14

### Thesis Seminar

151 Crellin, 11 a.m.—“Photophysical Properties of Protonated Aromatic Hydrocarbons,” Vadym Kapinus, graduate student in chemistry, Caltech.

### Caltech Library System Presents: Chemical Structure Searching

Sherman Fairchild Library, multimedia conference room, noon to 1:30 p.m.—Learn to search with chemical structures (both drawn and with templates) for property data and chemical reactions in Beilstein, Gmelin, SciFinder Scholar, and the Combined Chemical Dictionary. Information: <http://library.caltech.edu/learning/default.htm>.

### Carnegie Observatories Colloquium Series

William T. Golden Auditorium, 813 Santa Barbara Street, 3:30 to 5 p.m.—“The Role of Starbursts in the Evolution of Galaxies,” Professor Betsy Barton, department of physics and astronomy, UC Irvine. Refreshments, 3:30 p.m.

### Ulric B. and Evelyn L. Bray Seminar in Political Economy

25 Baxter, 4 p.m.—“Political Equilibria and Smooth Elections,” Norman Schofield, Taussig Professor of Political Economy, Washington University in St. Louis.

### General Biology Seminar

119 Kerckhoff, 4 p.m.—“Regulation of Hematopoiesis by Cytokine Receptors and Micro RNAs,” Harvey Lodish, Whitehead Institute, MIT.

## Wednesday, December 15

### Thesis Seminar

106 Spalding Lab, Hartley Memorial Seminar Room, 1 p.m.—“Structure, Dynamics, and Properties of Artificial Protein Hydrogels Assembled Through Coiled-Coil Domains,” Wei Shen, graduate student in chemical engineering, Caltech.

## Thursday, December 16

### Caltech Library System Presents: Chemical Structure Searching

Sherman Fairchild Library, multimedia conference room, 2 to 3:30 p.m.—Learn to search with chemical structures (both drawn and with templates) for property data and chemical reactions in Beilstein, Gmelin, SciFinder Scholar, and the Combined Chemical Dictionary. Information: <http://library.caltech.edu/learning/default.htm>.

## Friday, December 24

### Christmas holiday

## Friday, December 31

### New Year's holiday

## Wednesday, January 5

### Environmental Science and Engineering Seminar

142 Keck, 3:40 to 5 p.m.—“The Role of Cell Surface Macromolecules on Bacterial Adhesion and Transport in Aquatic Environments,” Sharon Walker, assistant professor, chemical and environmental engineering, UC Riverside. Information: [www.ese.caltech.edu/seminars/index.html](http://www.ese.caltech.edu/seminars/index.html).

## Thursday, January 6

### DNA World Conference

Broad Center, Rock Seminar Room, 8 a.m. to 6 p.m.—“Engineering a DNA World” will explore the possibility of engineering sophisticated molecular systems in which all major functional roles are played by nucleic acids. Continues through January 8. Registration (by December 13): [www.cbcd.caltech.edu/dnaworld/index.html](http://www.cbcd.caltech.edu/dnaworld/index.html).

### Physics Research Conference

201 E. Bridge, 4 p.m.—“The Geography of Extra Dimensions,” Sergei Gukov, Clay Mathematics Institute Long-Term Prize Fellow, Harvard University. Refreshments, 114 E. Bridge, 3:45 p.m.

## Friday, January 7

### Inorganic-Organometallics Seminar

151 Crellin, 4 p.m.—“Development of Inorganic Sensors for Biological Applications,” Karn Sorasaene, postdoctoral scholar in chemistry, Caltech.

## Monday, January 10

### Geological and Planetary Sciences Seminar

155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“Submarine Bioalteration of Volcanic Glasses by Metal-Oxidizing Bacteria,” Alexis Templeton, NSF Postdoctoral Fellow, Marine Biology Research Division, Scripps Institution of Oceanography.

### High Energy Physics Seminar

469 Lauritsen, 4 p.m.—“The Strong CP Problem, Naturalness, and Extra Dimensions,” Matthew Schwartz, postdoctoral scholar, department of physics, UC Berkeley. Information: [www.theory.caltech.edu/people/carol/seminar.html](http://www.theory.caltech.edu/people/carol/seminar.html).

### Applied Mathematics Colloquium

101 Guggenheim Lab, Lees-Kubota Lecture Hall, 4:15 p.m.—Topic to be announced. Dr. Oleg Schilling, AX Division, Lawrence Livermore Laboratory.

## Tuesday, January 11

### Chemical Physics Seminar

147 Noyes, Sturdivant Lecture Hall, 2 p.m.—“From Three Dimensions to Two: Biology and Chemistry at Interfaces,” Professor Milan Mrksich, chemistry department, University of Chicago.

### Swift Lecture

22 Gates Annex, 4 p.m.—“Catalytic Reduction of Dinitrogen at Room Temperature at a Single Molybdenum Center,” Richard R. Schrock, Keyes Professor of Chemistry, MIT.

## Wednesday, January 12

### Control and Dynamical Systems Seminar

Location to be announced, 11 a.m.—“Piecewise-Holonomic Mechanics, Hybrid Dynamical Systems, and Escaping Cockroaches,” Professor Philip Holmes, department of mechanical and aerospace engineering, Princeton University. Check CDS website for location. Information: [www.cds.caltech.edu/research/seminars/seminar.cgi](http://www.cds.caltech.edu/research/seminars/seminar.cgi).

### Control and Dynamical Systems Seminar

Location to be announced, 1:30 p.m.—“The Response Dynamics of Neural Oscillator Populations,” Professor Jeff Moehlis, department of mechanical and environmental engineering, UC Santa Barbara. Check CDS website for location. Information: [www.cds.caltech.edu/research/seminars/seminar.cgi](http://www.cds.caltech.edu/research/seminars/seminar.cgi).

### Inorganic-Electrochemistry Seminar

153 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Recent Chemistry of High Oxidation State Molybdenum and Tungsten Complexes That Contain a Multiple Metal-Carbon Bond,” Richard R. Schrock, Keyes Professor of Chemistry, MIT.

## Thursday, January 13

### Biochemistry/Bioorganic Seminar

147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Mechanistic Enzymology of DNA Repair,” Professor Gregory L. Verdine, department of chemistry and chemical biology, Harvard.

### Chemical Engineering Seminar

106 Spalding Lab, Hartley Memorial Seminar Room, 4 p.m.—“New Biology with Simple Polymers,” Professor Dennis Discher, chemical and biomolecular engineering department, University of Pennsylvania. Refreshments, 113 Spalding Lab, 3:30 p.m. Information: [www.che.caltech.edu/calendar/seminars.html](http://www.che.caltech.edu/calendar/seminars.html).

### Physics Research Conference

201 E. Bridge, 4 p.m.—“Electrons in One Dimension: Spin-Charge Separation and Localization,” Amir Yacoby, professor of physics, Weizmann Institute of Science, Israel. Refreshments, 114 E. Bridge, 3:45 p.m.

## Friday, January 14

### Chemical Physics Seminar

147 Noyes, Sturdivant Lecture Hall, 4 p.m.—Topic to be announced. Professor Gerard Meijer, Fritz-Haber-Institut der Max-Planck-Gesellschaft.

### Inorganic-Organometallics Seminar

151 Crellin, 4 p.m.—“Anion Effects in Ziegler-Natta Polymerization,” Steven Baldwin, graduate student in chemistry, Caltech.

### German Language Film Series

Baxter Lecture Hall, 7:30 to 10 p.m.—*The Inheritors* (1984), Austria. Directed and cowritten by Walter Bannert. English subtitles.



# CampusEvents

## Tuesday, December 14

### **Making the Transition to Leadership for Supervisors and Nonsupervisors**

Brown Gym classroom, 8:30 a.m. to 12:30 p.m.—This course, designed for new and potential supervisors, focuses on basic management skills. Information and registration: 395-8055 or [diane.williams@caltech.edu](mailto:diane.williams@caltech.edu).

### **Amnesty International Letter Writing**

Athenaeum Rathskeller, 7:30 p.m.—Caltech/Pasadena AI Group 22 will host an informal meeting to write letters on human-rights abuses around the world. All are welcome. Refreshments. Information: (818) 354-4461 or [lkamp@lively.jpl.nasa.gov](mailto:lkamp@lively.jpl.nasa.gov). Visit our website at [www.its.caltech.edu/~aigp22](http://www.its.caltech.edu/~aigp22).

## Wednesday, December 15

### **Haven House Holiday Gift Collection**

Bring new, unwrapped gifts—nonviolent toys, and new clothing for the mothers—or checks made out to Haven House, to a collection box in one of the following locations by December 15: 184 Alles, 238 Baxter, 216 Beckman Behavioral Biology, 114 Broad Center, 157 Crellin, 271 S. Chester, 101 Keith Spaulding, 650 S. Wilson Ave. Cash gifts may be sent to S. Koceski, MC 216-76.

### **Asbestos Awareness Training**

118 Keith Spalding Building, 8:30 a.m.—This course is designed to enhance employee awareness of asbestos and its potential health hazards, as well as to provide guidelines for safely working around asbestos-containing materials. The Institute procedures for identifying and managing asbestos-containing building materials will also be discussed. Registration: 395-6727 or [safety.training@caltech.edu](mailto:safety.training@caltech.edu).

## Thursday, December 16

### **Caltech Baby Furniture and Household Equipment**

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 and JPL communities. No appointment is necessary. Information: 584-9773 or [furnpool@caltech.edu](mailto:furnpool@caltech.edu).

## Friday, December 17

### **Argentine Tango: All-Night Milonga**

Winnett lounge, 10:45 p.m. to 5 a.m.—Our all-night Argentine Tango dance party will follow a performance of Moti's "Love, Loss, Lust, and a Tango," an original dance production to be performed at Barnsdall Gallery Theatre. Free lessons will take place from 10:45 to 11:30 p.m. Cost: \$5 for students, \$7 for others. Refreshments. Fresh waffles will be served at 3 a.m. Information: [www.its.caltech.edu/~ballroom/events.html](http://www.its.caltech.edu/~ballroom/events.html). Information about the performance: <http://organictango.info/love.htm>.

## Sunday, December 19

### **Amnesty International Book Discussion Group**

187 S. Catalina Ave., unit 2, 6:30 p.m.—This month's book is *The Day the Leader Was Killed*, by Naguib Mahfouz. All are welcome. Sponsored by Caltech/Pasadena AI Group 22. Visit Group 22 at [www.its.caltech.edu/~aigp22](http://www.its.caltech.edu/~aigp22).

## Friday, December 24

### **Christmas holiday**

### **Credit Union Closure**

All branches of the Caltech Employees Federal Credit Union will be closed in observance of the Christmas holiday.

## Friday, December 31

### **New Year's holiday**

### **Credit Union Closure**

All branches of the Caltech Employees Federal Credit Union will be closed in observance of the New Year's holiday.

## Thursday, January 6

### **Caltech Baby Furniture and Household Equipment**

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## Sunday, January 9

### **Skeptics Society Lecture**

Baxter Lecture Hall, 2 p.m.—"Collapse! How Societies Choose to Fail or Succeed," Dr. Jared Diamond, professor of geography, UCLA. Donation is \$8 for nonmembers and non-Caltech students. Free to the Caltech/JPL community. Tickets and information: 794-3119 or [skepticsmag@aol.com](mailto:skepticsmag@aol.com). A book signing will follow the lecture.

## Tuesday, January 11

### **Amnesty International Letter Writing**

Athenaeum Rathskeller, 7:30 p.m.—Caltech/Pasadena AI Group 22 will host an informal meeting to write letters on human-rights abuses around the world. All are welcome. Refreshments. Information: (818) 354-4461 or [lkamp@lively.jpl.nasa.gov](mailto:lkamp@lively.jpl.nasa.gov). Visit our website at [www.its.caltech.edu/~aigp22](http://www.its.caltech.edu/~aigp22).

## Wednesday, January 12

### **Bloodborne Pathogens**

118 Keith Spalding Building, noon—This course, designed for individuals who are exposed to blood or other potentially infectious agents, presents information on preventing exposure to bloodborne pathogens, including hepatitis B and human immunodeficiency viruses. Requires registration; call 395-6727 or e-mail [safety.training@caltech.edu](mailto:safety.training@caltech.edu).

## Thursday, January 13

### **Techniques for Identifying and Correcting Mistakes in Written Communication**

Brown Gym classroom, 8:30 a.m. to 4 p.m.—This one-day program is designed for those whose job requires them to identify and correct errors in their writing or the writing of others. Emphasis will be placed on developing the ability to use proofreading techniques and marks; identify common typographical and character errors; and find and correct grammatical, punctuation, and spelling errors. Additional emphasis is placed on the finer points of proofreading and editing. Registration: 395-8055 or [diane.williams@caltech.edu](mailto:diane.williams@caltech.edu).

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## Sunday, January 16

### **Amnesty International Book Discussion Group**

Vroman's Bookstore, 695 E. Colorado Boulevard, second floor, 6:30 p.m.—This month's book has not yet been determined. All are welcome. Sponsored by Caltech/Pasadena AI Group 22. Visit Group 22 at [www.its.caltech.edu/~aigp22](http://www.its.caltech.edu/~aigp22).

## Public Events information and tickets

395-4652, 1 (888) 2CALTECH, or [events@caltech.edu](mailto:events@caltech.edu). Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at [www.events.caltech.edu](http://www.events.caltech.edu).

## Ongoing events

### Tuesdays

#### **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: 584-0970 or [kimdeman@yahoo.com](mailto:kimdeman@yahoo.com).

#### **CIT Knitters Group Meeting**

256 Mudd Laboratory, South, noon—All levels of knitters and related handcrafters are welcome. We make items for others and ourselves. Information: 395-6905.

#### **Caltech Shorinji Kempo Club**

Brown Gymnasium, 7 p.m.—Learn effective self-defense and martial arts. Sessions are free. No experience required. Wear comfortable clothing.

#### **Caltech Tai Chi Club**

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

### Wednesdays

#### **Wednesdays in the Park**

Tournament Park, 10 a.m. to noon—Every Wednesday there's conversation and coffee for parents and caregivers, and playtime and snacks for children. Stop by and make new friends from around the world. Information: 793-2535 or [nancyhewett@earthlink.net](mailto:nancyhewett@earthlink.net).

### Thursdays

#### **Caltech Shorinji Kempo Club**

Brown Gymnasium, 7 p.m.—Learn effective self-defense and martial arts. Sessions are free. No experience required. Wear comfortable clothing.

#### **Caltech Tai Chi Club**

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

### Sundays

#### **Caltech Shorinji Kempo**

Braun Athletic Center, aerobics room, 3:30 p.m.—Learn effective self-defense and martial arts. Sessions are free. No experience required. Wear comfortable clothing.



## Caltech 101

### Caltech's "prehistory"

One November day in 1891, 35 students walked through the doors of the Wooster Block (now part of Pasadena's Green Hotel) and attended the first classes of Throop University. Founded by Amos G. Throop, an aging Chicago politician and Universalist minister, Throop was the only area institution to offer industrial training to elementary-school- through college-aged boys and girls.

After a year, Throop's board of trustees began to reconsider the school's mission. They renamed it Throop Polytechnic Institute, moved it to new quarters, and expanded its program to encompass a grammar and high school, a teacher-training program, even a business school. Thanks to imaginative recruitment ploys—including Rose Parade floats and Mandolin and Guitar Club tours—the Institute by 1906 boasted 530 students, 23 of whom were working toward bachelor's degrees in the College of Science and Technology. The emergence of the modern Caltech, however, was still 15 years away.

*Adapted from "Caltech 101," a series that ran in the Pasadena Star-News. For more tidbits on Caltech's history, culture, current research, and more, visit <http://today.caltech.edu> and click on Caltech 101 at the lower right.*

## Wanted: feedback on community

What are your thoughts on the meaning of community here on campus? The diversity statement subcommittee, whose mission is to "initiate discussion and increase awareness about the value and meaning of diversity at Caltech," is inviting community members to give their input on a recently drafted statement of community for the Institute, as well as to discuss ways that these core values can be brought to life on campus.

The committee is looking to "capture the many different voices represented on campus" by holding focus groups during the month of January. Community members interested in participating may send an e-mail to [machang@caltech.edu](mailto:machang@caltech.edu) with their name, e-mail address, extension, and whether they are faculty, undergraduate, grad student, postdoc, or staff.

Also indicate any preference for a specialized focus group (those without a preference will be assigned to a general group): male undergraduate and graduate students; female undergraduate and graduate students; multicultural (African American, Latino, Native American, Pacific Islander); Asian American community; international community; lesbian, gay, bisexual, and transgender community; faculty; or staff. The deadline to respond is December 31.



## Share the love this season

Along with family gatherings, office parties, and merriment, the holidays also are a time to remember those who are less fortunate. As is traditional, the Institute has several opportunities for generous Teachers to lend a hand.

Friday, December 10, is the deadline to return Angel gifts to Human Resources. Affiliated with the Foothill Unity Center in Monrovia, the Angel program provides holiday gifts for low-income children in the San Gabriel Valley. Please bring unwrapped gifts in bags, with angels attached to the outside, to Human Resources, 399 South Holliston Avenue.

If you missed your chance to be an angel, the biology division is sponsoring a gift drive through Wednesday, December 15, for Haven House, a local shelter for battered women and children. Founded in 1964, Haven House provides a safe refuge from domestic violence, as well as counseling, follow-up support, and public education and advocacy.

Donations of new, unwrapped, nonviolent toys; new clothing for mothers; and checks or cash will help the shelter continue providing services. Gift drop boxes are located at 184 Alles, 238 Baxter, 216 Beckman Laboratories, 114 Broad Center, 157 Crellin, 263 South Chester Avenue (Financial Services), 101 Keith Spalding, and 650 South Wilson Avenue (Central Plant). Checks (made out to Haven House) or cash gifts may be sent to Sandra Koceski, MC 216-76, or brought to 216 Beckman Laboratories. For more information, e-mail [koceskis@its.caltech.edu](mailto:koceskis@its.caltech.edu) or call ext. 6806.

Finally, the 10,000 Books for Ethiopia drive, to help stock a new library in Addis Ababa, has been extended through Friday, December 17. Needed are used college-level textbooks (no novels, please) in science, leadership, management, psychology, business, social sciences, education, and engineering, as well as Pentium II or better computers. Drop books off at the Alumni House, 345 South Hill Avenue, or the Caltech Y, now located west of the Athenaeum tennis courts in building 62. Contact Jerry Houser at ext. 6747 or [jhouser@caltech.edu](mailto:jhouser@caltech.edu) with any questions.

## More card services online

Card Services has added more features to its new deposit and account management website. Caltech cardholders may now request replacements for expired, malfunctioning, or lost cards at [www.caltech-card.com](http://www.caltech-card.com). They may also pay online using SmartCash, personal account, or PTA, and have their cards sent to them via campus mail the same day. To encourage customers to use these new tools, Card Services has changed its hours from 9 a.m. to 1 p.m. Monday through Friday. Located in the Caltech Bookstore, the office can be reached at [cardoffice@caltech.edu](mailto:cardoffice@caltech.edu), ext. 6169, or [www.caltechcard.com](http://www.caltechcard.com).

## Grants fund a range of research

### Large grant, small-scale research

The Gordon and Betty Moore Foundation has awarded \$25.4 million to Caltech to establish the Nanoscale Systems Initiative (NSI). Part of a \$300 million commitment made in 2001, the grant will support a promising new research avenue—the creation of extremely tiny devices that will boost, and in some cases displace, today's state-of-the-art electronic systems.

According to Caltech professor of physics, applied physics, and bioengineering Michael Roukes, founding director of NSI, the funding significantly augments work already at the forefront of nanoscience. In January 2000, President Clinton visited Caltech to announce the launch of the National Nanotechnology Initiative, which has since led to an upsurge of research activity among major U.S. institutions. The Kavli Nanoscience Institute was founded at Caltech this year with a \$7.5 million grant.

Caltech's presence in nanoscience (the study of the function of devices measuring less than a billionth of a meter) and nanotechnology (the engineering of such devices) began with famed physicist Richard Feynman, who originated the concept. His 1959 lecture, "There's Plenty of Room at the Bottom," mapped out possibilities for extremely small devices, using quantum mechanics.

Caltech's two strong suits, Roukes says, are nanobiotechnology, which merges nanodevice engineering with the molecular and cellular machinery of living systems, and nanophotonics, which employs new materials technology and fabrication processes to develop novel nanodevices such as optically active waveguides and microlasers. The grant will assist with renovating and creating lab space, staffing, operations, and state-of-the-art equipment to allow Caltech to further its work in those areas.

### Size does matter—in reducing pollution

When it comes to reducing the harmful impacts of environmental pollution, size does matter . . . at least, that's the theory that Janet Hering and Richard Flagan, Caltech professors of environmental science and engineering, will be testing.

With a \$120,000 grant from the Camille and Henry Dreyfus Foundation's 2004 Postdoctoral Program in Environmental Chemistry, Hering and Flagan will recruit a postdoctoral scientist to help them examine strategies for reducing pollutants in aquatic ecosystems.

Elemental iron, Fe(0), also known as zero-valent iron, has been shown to effectively mitigate a wide range of environmental contaminants. Fe(0) can be delivered to the subsurface environment by the injection of Fe(0) nanoparticles. The study will compare particles in different size classes to determine whether nanoparticles show enhanced reactivity in reducing organic substrates based on their size when surface area effects are accounted for.

If nanoparticle size is found to increase effectiveness, the finding will significantly influence the use of Fe(0) materials in environmental remediation, as well as provide insight into the fundamental chemical properties of nanoparticles in these applications. Ultimately, the study seeks to help provide viable, cost-effective commercial technologies for remediating such contaminants as chlorinated solvents, nitrates, pesticides, chemical byproducts, and other industrial or inorganic contaminants.

### Observing the roiling earth

The 1960s theory of plate tectonics rocked geology's world by stating that the lithosphere—the first 60 miles or so of our planet—is divided into about a dozen rigid plates that crawl along at rates of a few centimeters each year. Although the theory explains the lithosphere's large-scale deformation over millions of years, says Caltech professor of geology Jean-Philippe Avouac, it doesn't account for the forces behind the plates' movement, nor later contradictory findings, e.g., that plates are not perfectly rigid after all.

Now, with a \$13,254,000 grant from the Gordon and Betty Moore Foundation, Caltech has established the Tectonic Observatory, which Avouac directs. Its goal is to provide new knowledge of the deformation of the earth's crust, whether over a span of tens of seconds (a typical earthquake length) or tens of millions of years.

Observatory scientists will study tectonic plate boundaries—where most earthquakes, volcanoes, and other major earth processes occur—in Taiwan, Sumatra, Central America, and North America to try to understand the cause of occasional sharp changes in plate speed and direction; the physical parameters controlling earthquake timing, location, and size; and other puzzles.

The grant will be used to acquire technologies for measuring deformation and imaging the earth's interior, including seismometers, space-based GPS, satellite images, and geochemical "fingerprinting" of rocks.



Construction is rolling along on the new underground parking garage, with a mountain of dirt waiting to be repacked around and atop the concrete walls. Located on California Boulevard adjacent to the Keith Spalding building, the 700-space structure will open for use in early 2005, crowned with a new athletic field.



**Bacher, from page 1**

of his career, serving as chair of Physics, Mathematics, and Astronomy from 1949 to 1962, and as Caltech provost from 1962 to 1969 and vice president and provost from 1969 to 1970. He became emeritus in 1976.

Institute Professor of Theoretical Physics, Emeritus, Robert Christy, who also worked on the Manhattan Project, said that next to Robert Andrews Millikan, Bacher was the person most important to the Institute's early reputation in physics and astronomy. "He was responsible for building Caltech physics after the war, and for making Caltech physics what it is today," Christy said.

Born August 31, 1905, in Ohio, Bacher earned his bachelor's degree from the University of Michigan in 1926 and his doctorate in 1930. He first came to Caltech in 1930 as a National Research Council Fellow, then held postdoctoral positions at MIT and the University of Michigan before joining the Columbia University faculty in 1934. Moving to Cornell University in 1935, he became a professor of physics and director of the Laboratory of Nuclear Studies; from 1940 to 1945, he was also affiliated with MIT's Radiation Laboratory and the Manhattan Project.

At Caltech, Bacher shaped the program in high-energy physics, then a burgeoning field, and was credited with bringing Richard Feynman and Murray Gell-Mann to campus. He also initiated the radio-astronomy program by creating the Owens Valley Radio Observatory, to this day one of the leading facilities of its kind.

Winner of the 1946 President's Medal for Merit, Bacher was a former president of the American Physical Society and of the International Union of Pure and Applied Physics. In addition, he was a U.S. delegate to the nuclear-test-ban negotiations in 1958, and a member of various committees for the State Department, Department of Defense, and National Academy of Sciences.

Bacher's wife of 64 years, Jean Dow Bacher, died in 1994. He is survived by a son, Andrew; a daughter, Martha Eaton; and two grandchildren.

**336 holiday breather**

This *Caltech 336* issue will be the last of the calendar year. We'll take a few weeks' break before the next issue, which publishes January 13. The 336 staff wishes everyone a safe and happy holiday season.

**Internet, from page 1**

search for the Higgs particles thought to be responsible for mass in the universe and for supersymmetry and other fundamentally new phenomena bearing on the nature of matter and space-time, in an energy range made accessible by the LHC for the first time.

While the SC2004 100+ Gbps demonstration required a major effort by the teams, their sponsors, and partnerships with major international research and education network organizations, it is expected that networking on this scale in support of the largest science projects (such as the LHC) will be commonplace within the next three to five years.

**Palomar, from page 1**

opens up a bold and exciting scientific future for the venerable 200-inch telescope, but also demonstrates the next step on a path toward future large telescopes such as the Thirty-Meter Telescope." Such next-generation instruments, he notes, will require similar sodium-laser adaptive optics.

Also on the Caltech team are Viswa Velur, Rich Goeden, Bob Weber, and Khanh Bui; the JPL Palomar team comprises leader Mitchell Troy, Gary Brack, Steve Guiwits, Dean Palmer, Jennifer Roberts, Fang Shi, Thang Trinh, Tuan Truong, and Kent Wallace. Professor Edward Kibblewhite, University of Chicago, built the project's laser, and Palomar's Andrew Pickles, Robert Thicksten, and Hal Petrie oversaw its installation, supported by Merle Sweet, John Henning, and Steve Einer. Funding comes from the Gordon and Betty Moore Foundation, the Oschin Family Foundation, and the National Science Foundation Center for Adaptive Optics.

**2005 Institute holidays**

Monday, January 17	Martin Luther King Day
Monday, February 21	President's Day
Monday, May 30	Memorial Day
Friday, July 1	Floating holiday
Monday, July 4	Independence Day
Monday, September 5	Labor Day
Thursday and Friday, November 24-25	Thanksgiving
Friday, December 23	Floating holiday
Monday, December 26	Christmas
Friday, December 30	Floating holiday



Caltech's groundskeepers recently won an honor for the general excellence of their work and landscaping from the Professional Grounds Management Society. About 77 acres of the campus are tended year-round by 30 workers. Milton Olander III, a grounds supervisor, holds the plaque, which will hang in the Campus Planning building.

**Grounds award, from page 1**

parking lots, and the ponds—a sizable 77 acres of the 126-acre campus.

"All the workers are dedicated and really enjoy working at Caltech, and this is reflected in the campus," says Milton Olander III, the grounds supervisor. He went to North Carolina in November to receive the plaque at the PGMS awards ceremony and to attend landscaping seminars.

Olander has been tilling the soil at Caltech for 22 years and remembers when Caltech last won the same honor.

"The last time we won was in 1985," he says, adding that the Institute received the further distinction of having a picture of Bechtel Mall on the cover of *Landscape Management Magazine*, the society's publication. The editors included an article on the general excellence of Caltech's grounds.

Like all successful professionals, the grounds workers make their job look easy, but the health and beauty of the campus foliage and trees is the result of year-round labor.

Every season brings with it a new set of tasks, and every species of grass, shrub, flower, and tree has its specific requirements, including feeding, trimming, and maintenance schedules, Emerson says. Then there are the challenges posed by visitors to the campus.

"One of our biggest challenges is the high number of campus events, such as Seminar Day and Commencement," she says. "We have to delay our irrigation schedules and make sure that everything is perfect. And we deal with student pranks, such as Ditch Day." That yearly event sees groups of exuberant underclass students traipsing across every corner of the campus, collecting clues left behind by ditching seniors.

Caltech is host to a surprising variety of plants in addition to those that add color to the courtyards and flowerbeds,

which are planted with seasonal flowers at least four times a year. The 3,300 campus trees include jacarandas with their clusters of lilac flowers; silk floss trees with their thorny trunks, pink blossoms, and large pods; cassia trees with their yellow bunches of blooms; tipuanas and their gold hibiscus-like flowers; and olive trees with their soft green leaves and dark fruit.

About 100 olive trees grow here, and they sometimes provide the groundskeepers with a thorny problem, as the oil from the trees' fruit can stain the concrete.

"We treat them to control the fruit with a suppressant, and people sometimes complain that we are working with chemicals," Emerson says. "But the chemicals that we use on campus are the most environmentally friendly. We are inspected monthly and submit reports to the state agricultural department."

Although measures are taken to control harmful pests, the campus is home to urban wildlife, she adds, including parrots that feast in the trees, an egret that returns to the ponds every year, opossums and raccoons, and an untold number of squirrels. A crow returns to a nest near Parsons-Gates every year to hatch her eggs and fledge the baby crows, she says. The ponds support turtles, fish, crayfish, and frogs.

The coming year will present the groundskeepers with the return of the north athletic field, a vast emerald expanse of turf that will cap the subterranean parking structure on California Boulevard.

"We are going to grow Bermuda grass on 16 inches of soil. We've got to make sure the irrigation is installed properly, and that it's got proper drainage," Emerson says. "It's on a major street and a lot of people will see if there's a brown spot."

As for the recent award, it will be displayed in a public place for all to see, Olander says.

"The plaque will hang in the lobby of the Campus Planning building, right next to the other one," he says.

**Caltech 336**  
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