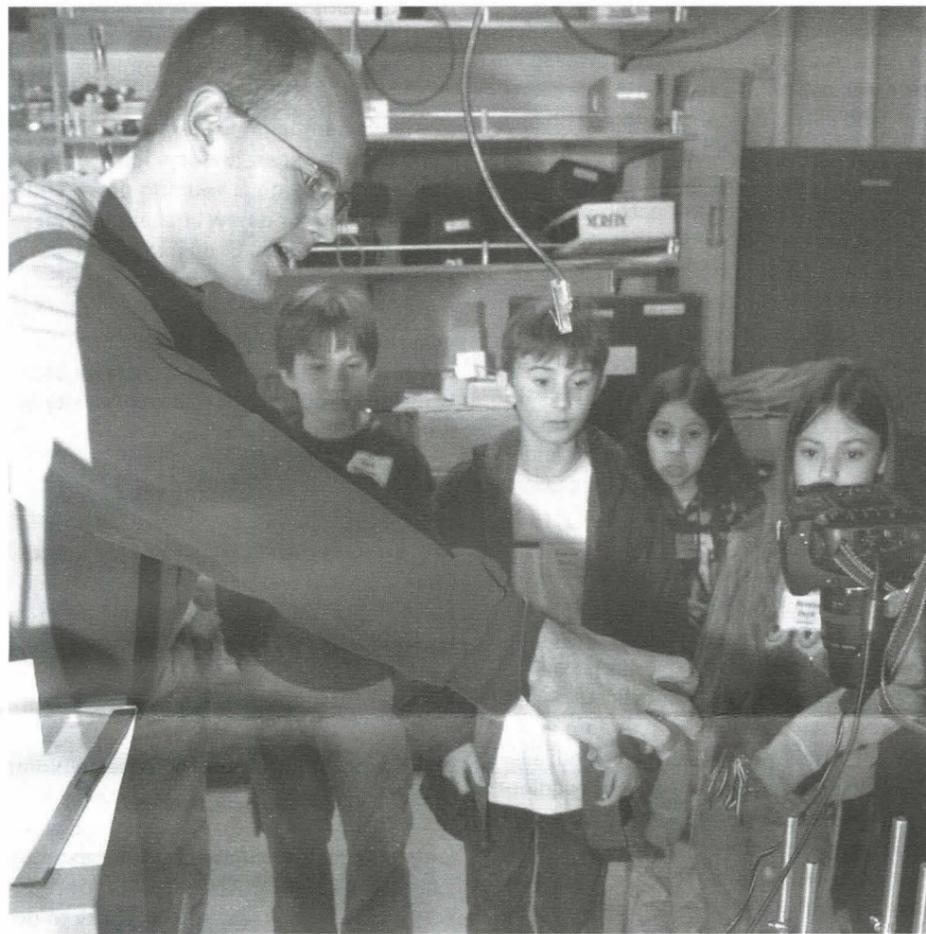


Caltech 336

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

The campus community biweekly
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All in a day's work



Graduate student Charles Nickerson shows young visitors some of the work that goes on in Julia Kornfield's polymer physics lab during Take Our Children to Work Day.

Having dozens of beetles crawl on your skin and up your arms might sound like a scene out of a horror flick. But at Caltech it's called a learning experience. And it's fun too, according to the kids who paid a visit to Throop Pond on their tour of Caltech.

They were among the roughly 70 children in grades 4 through 12 who attended Caltech's annual Take Our Children to Work Day. Made possible by dozens of campus volunteers, the event is designed to allow children to see the exciting things that go on at Caltech and to interest them in careers that are important to their future.

During morning tours, each group trekked to two labs or work sites that involved careers in fields from biology to graphic arts. Then the young visitors regrouped for pizza with parents and volunteers at the Beckman Institute courtyard. They went on to make their own ice cream, play soccer at Braun Athletic Center, and watch a high-definition movie, "The Deep" (an episode of *The Blue Planet: Seas of Life*), in Beckman Auditorium.

The Throop Pond beetles, ladybugs to be exact, were part of an ecology lesson in symbiosis. The lesson helped illustrate the give-and-take relationship that animals and plants of different species develop to survive. The orange bugs with the black polka dots are a popular form of natural pest control at Caltech because of their decidedly unladylike appetites.

Adults can eat up to 1,000 aphids in a day, and their larvae, no pushovers, can consume about half that amount, according to Delmy Emerson, associate director for buildings and grounds. That means an abundance of flowers for everyone to enjoy.

To make her point, Emerson produced a swarm of ladybugs taken from a container. They were released at a planter of roses near Millikan Library.

Also on hand at the pond was a campus cat named Mala, who was intent on fishing for mosquito fish. The fish eat mosquito larvae and are stocked to help control the campus mosquito population.

The group's seven girls and one boy also learned that earthworm tunnels help aerate the soil and distribute nutrients to root systems. Fallen leaves return nutrients to the soil and provide shelter for insects, in a process that sustains intricate food chains.

All in all, you might say the students saw a demonstration of how the Institute's populations of fish, turtles, and birds, small mammals like squirrels and raccoons, visiting egrets and skunks, and even campus cats help form the urban wilderness we call Pasadena.

Another group of girls and boys toured the polymer synthesis facilities of Julia Kornfield's lab, where graduate student Charles Nickerson showed off equipment that included "eyeball squishers and shakers" used in research

see *Children*, page 6

Seismic experiments provide new clues

In recent years, seismologists thought they were getting a handle on how an earthquake tends to rupture in a preferred direction along big strike-slip faults like the San Andreas. The direction of rupture has a profound influence on the distribution of ground shaking. But a new study could undermine their confidence a bit.

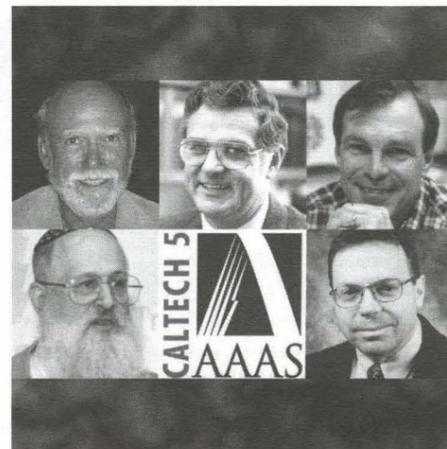
In the April 29 issue of the journal *Science*, researchers from Caltech and Harvard University discuss new laboratory experiments using dissimilar polymer plates to mimic Earth's crusts. The results show that the direction of rupture that controls the pattern of destruction is less predictable than recently thought.

These findings explain puzzling results from last year's Parkfield earthquake, in which a northwestward rupture occurred. A southeastward rupture had been predicted on the basis of the two past earthquakes in the area.

The phenomenon has to do with the basic ways rupture fronts are propagated along a boundary between two materials with different wave speeds.

In the experiment, von Kármán Professor of Aeronautics and Mechanical Engineering

see *Seismic*, page 6



Clockwise from top left: Barry Barish, William Bridges, Andrew Lange, David Tirrell, and Barry Simon.

Five elected to AAAS

Five Caltech faculty members are among this year's newly elected fellows of the American Academy of Arts and Sciences. They join 191 other Americans and 17 foreign honorees as the 225th class of fellows of the prestigious institution that was founded in 1780 by John Adams and other prominent Americans.

This year's new Caltech inductees are Barry Barish, the Linde Professor of Physics and director of the Laser Interferometer Gravitational-Wave Observatory (LIGO); William Bridges, the Braun Professor of Engineering, Emeritus; Andrew Lange, the Goldberger Professor of Physics; Barry Simon, the IBM Professor of Mathematics and Theoretical Physics; and David Tirrell, chair of the Division of Chemistry and Chemical Engineering and McCollum-Corcoran Professor and professor of chemistry and chemical engineering.

The five from Caltech join an illustrious list of fellows, both past and present. Other inductees in the 225th class include Supreme Court Chief Justice William Rehnquist, *Angels in America* author Tony Kushner, Academy Award-winning actor Sidney Poitier, former *NBC Nightly News* anchor Tom Brokaw, *Washington Post* CEO Donald Graham, and Pulitzer Prize-winning cartoonist Art Spiegelman. Past fellows have included George Washington, Benjamin Franklin, Ralph Waldo Emerson, Albert Einstein, and Winston Churchill.

According to the academy's president, Patricia Meyer Spacks, the fellows were chosen "through a highly competitive process that recognizes individuals who have made preeminent contributions to their disciplines and to society at large."

"Throughout its history, the Academy has convened the leading thinkers of the day, from diverse perspectives, to participate in projects and studies that advance the public good," said Executive Officer Leslie Berlowitz.

The academy is an independent policy research center that focuses on complex and emerging problems such as scientific issues, global security, social policy, the humanities and culture, and education.

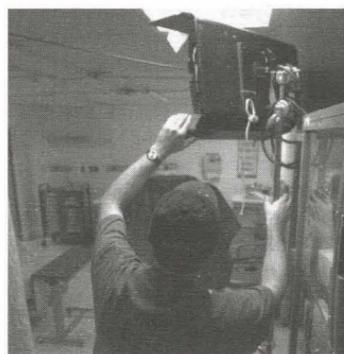
St. Luke's second act

Doctors and nurses no longer walk the halls of the former St. Luke Medical Center, but actors who play those roles remain in action.

As frequent sightings of trucks loading and unloading equipment in the parking lot attest, production companies routinely use the Pasadena architectural landmark for shoots. Caltech purchased the 1930s-era property from Tenet Healthcare in 2003 for future use in augmenting Caltech's research mission, and renamed it (CIT)².

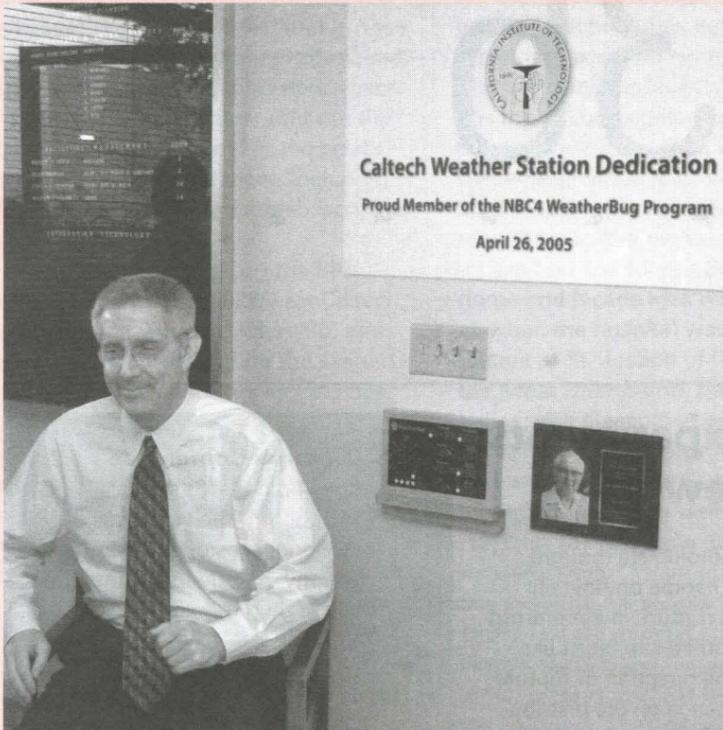
Since then about 70 productions have visited, including many commercials, television shows such as *Judging Amy* and *Cold Case*, and major motion pictures,

see *St. Luke's*, page 6



A crew member disassembles lights after the shooting of a hospital scene at (CIT)² for *Curb Your Enthusiasm*, the unscripted HBO comedy show.

NewsBriefs



Fritz Coleman, the chief weathercaster for KNBC-TV news, was on hand in the lobby of Physical Plant during the dedication of the weather station there to the memory of Ed Lewis, late Morgan Professor of Biology, Emeritus, at Caltech. Lewis served as a weather forecaster with the U.S. Army Air Forces during World War II.

Personals

Welcome to Caltech

April

Takao Aoki, visitor in physics; **Kathy Campbell**, administrative assistant, Seismo Lab; postdoctoral scholars **Wolfgang Einhaeuser-Treyer**, in biology, **Andrea Galeotti**, in the Social and Information Sciences Lab, **Herwig Just**, in biology, and **Harry Kleinschmidt**, in chemistry; **Maria Mansson**, visitor in chemistry; **Sorel Munoz-Jimenez**, server, Athenaeum; **Miriam Mwangi**, custodian, Physical Plant; **Stephen Prajna**, postdoctoral scholar in control and dynamical systems; **Ramon Ramirez**, roofer, Physical Plant; **Derrick Spears**, sous chef, Athenaeum; **Boris Springborn**, visitor in computer science; **Sam Waldman**, postdoctoral scholar in physics; **Brian Wicks**, senior applications developer, Administrative Technology Center.

Retirements

Sally Asmundson retired on April 30 after 24 years with Caltech. A former director of the Career Development Center in Student Affairs, she had been on disability leave.

Don Hart, a member of the licensing-services staff in the Office of Technology Transfer, retired on May 2 after 10 years at Caltech.

Honors and awards

Dining Services at Caltech has won two gold medals and a silver in the 2005 Loyal E. Horton Dining Awards contest. The gold medals came in the standard menu catering and multiple concepts/outlets categories, and the silver medal in the single stand-alone concept/outlet category. According to the event's organizers, 182 American universities entered this year. Caltech beat MIT, among others, in standard menu catering, and according to **Tom Mannion**, assistant vice president for campus life, that win alone will be sufficient to keep smiles on the faces of the dining staff for the coming year. Says Mannion, whose responsibilities include the campus food services, "We're always happy to beat the Other Institute of Technology in anything." And, in reference to another runner-up: "But also beating Harvard sends out the message that maybe you're just better off eating campus food in Pasadena than in Cambridge!" Meanwhile, **André Mallié**, director of dining services and executive chef at Caltech, notes that this is the third straight year that Caltech Dining Services has won at least one gold medal.

John Preskill, MacArthur Professor of Theoretical Physics, has been chosen as the 2005 Lawrence C. Biedenharn Lecturer at the University of Texas at Austin. He will give a series of lectures on quantum mechanics during the fall. A member of Caltech's faculty since 1983, when he joined the Institute as an associate professor, Preskill became professor in 1990 and was named MacArthur Professor in 2002. He received his AB from Princeton in 1975 and his PhD from Harvard in 1980. The Biedenharn Lectureship in Physics was established by Sarah Biedenharn in honor of her late husband's contributions to the field. A former adjunct professor in UT Austin's physics department, Biedenharn was noted for having carried out important research in quantum physics.

Caltech beats MIT in Internet chess match

The Caltech chess team defeated MIT's chess team in an eight-board chess match played online on the Internet Chess Club site. The April 24 match was the second of two between the two institutes.

In this year's match, MIT jumped off to an early lead by scoring two quick wins. But Caltech applied the pressure and kept it up in the six remaining games, earning four wins and two draws. Caltech won the match 5-3, just like it did two years ago when Caltech beat MIT 5-3 in a match of similar format.

The Caltech team consisted of players Patrick Hummel '06, Eugene Yanayt '06, Karl Yee (JPL), Howard Liu '06, Joshua Gutman '06, Edward Perepelitsky '07, Philipp Perepelitsky '08, and Zeb Rocklin '08. The MIT team they defeated is one of the toughest college teams in the country.

The Caltech chess team is composed of members of the Caltech Chess Club. Further information, including games from the Caltech-MIT match, can be found at www.its.caltech.edu/~citchess.

Call for judges

Caltech faculty and postdocs are encouraged to become judges for the 2005 California State Science Fair. Judges will decide the merits of the science projects created by students in grades 6 through 12. Judges should be practicing scientists and engineers with PhDs or equivalent degrees. Retirees from such positions are also encouraged to apply. The fair will take place at the California Science Center in Exposition Park on May 24 from 7 a.m. to 1:30 p.m. Breakfast and lunch will be provided. To learn how you can participate in this exciting event, visit www.usc.edu/CSSF/Judges.

Energy conservation begins with you

Harmick Marcarian and Bill Irwin

Yes, there is an energy crisis, and this time it is not just in California (remember the deregulation fiasco in 2001?). During the past three years, energy costs, as we are all aware, have skyrocketed. Natural-gas prices two years ago were about 45 cents per therm. Today they are closer to 75 cents per therm, and at these prices, Caltech might have had to pay over \$3 million more for natural gas this year.

Fortunately, a large portion of these increases has been avoided because of the measures taken to conserve energy and modernize our facilities. Because the best defense against rising energy costs is energy efficiency and conservation, Caltech's facilities management department for several years has been implementing energy-management projects. And the goals are to help ensure uninterrupted power to the campus; conserve energy in a safe manner; and shield the campus, if possible, from the cost volatilities currently being seen in gas and electric prices.

Some of the measures accomplished include the expansion of Caltech's cogeneration plant from 5 megawatts to 12 megawatts. This highly efficient system enables Caltech to avoid purchasing all of its electricity from the city of Pasadena, thereby avoiding significant electric cost increases. The new plant was recently awarded the Department of Energy and Environmental Protection Agency's Energy Star Award.

Inefficient lighting has been replaced with energy-efficient T-8 lamps in 15 academic research buildings; energy-saving equipment has been added to building mechanical systems; all exit signs have been converted from incandescent or fluorescent to LED signs; "phantom fluorescent tubes" have been reinstalled; air-conditioning run times in nonlab buildings have been reduced; a 60 kilowatt microturbine has been installed at the Administrative Technology Center; occupancy sensors have been installed in buildings; irrigation is monitored through an automatic control system; and an award-winning recycling program has reduced Caltech's waste stream by 40 percent.

As we brace for summer and even higher energy costs, we ask the campus community to follow some simple steps to help us control our energy consumption.

Computers: screen savers do not save energy, but giving your computer a nap does. Enable power-management features so that your computer monitor and hard drive will go into a low power (blank screen) or "sleep mode" when not actively in use. Keep all computer equipment off unless in use—especially at night and on weekends. Turn off your monitor when you go to lunch or to a meeting. Turn off monitors on servers. Enable power-management features on computer printers and/or turn them off when not actively printing.

When purchasing computers and peripherals, buy low-wattage equipment certified by the Energy Star program, and be sure to enable power-management features when setting up equipment.

Lighting: Turn off unused or unneeded lights (corridor and hallway lights and restroom lights can often be turned off). If you are the last out of a room, turn off the lights. Use natural lighting instead of electric lighting whenever possible. Try task lighting and reduce overhead lighting. If you have a desk lamp, make sure it uses a fluorescent bulb. Don't use table lamps unless illumination from the lamps is actually needed. Do not use halogen floor lamps in any campus building. These

see *Energy*, page 6



Adding Puntch to the Campaign

Robyn Puntch, a veteran higher-education fund-raiser, has joined the Institute as director of principal and major gifts. Filling a vacancy in Development and Alumni Relations, Puntch will oversee the Institute's effort to raise gifts of \$100,000 or more, supervising development officers who work on campus as well as in Chicago and New York.

She most recently served as director of development for the UCLA Medical Center and Clinics. Before that, Puntch directed development for UCLA's Schools of Law and Dentistry.

"I love campaign fund-raising," says Puntch, who began her new job March 14. "UCLA's campaign is winding down and I was looking for a new challenge." Her more than 20 years of development experience also include working for nonprofit service agencies and institutions in Kansas, including the Kansas Children's Service League. She earned a BA at Wichita State University and attended the University of Kansas School of Law.

Puntch came to campus just after Caltech celebrated passing the \$1 billion mark in its "There's Only One. Caltech" campaign to raise \$1.4 billion. "Right now there's a lot of momentum going. I think we are on a real high and people are interested in learning more about the campaign. Understandably, new construction projects and initiatives such as the Cahill Center for Astronomy and Astrophysics and the new information sciences building capture potential donors' imaginations.

"At the same time, we've got real challenges ahead," Puntch adds. "For example, we're focusing on raising money for the south student houses, and it's tricky to do that. Those houses already have names. We have to be more creative in making the case and make sure that alumni are aware that they can participate in the preservation of those amazing houses." Feelings of nostalgia may even inspire support, as alumni fondly remember their own days of living in the historic houses.

Other important pieces of the campaign are undergraduate financial aid and fellowships for graduate students as well as postdoctoral scholars. The campaign will also support named professorships, fund research efforts, and replenish Caltech's endowment.

Puntch also plans to expand the national donor prospect pool. "We'll be doing events across the country to introduce people to specific campaign priorities" in get-togethers ranging from small dinners in people's homes to lectures, she says.

The Caltech Associates—entrepreneurs, alumni philanthropists, faculty, and community leaders who provide financial support to the Institute—are highly involved in helping alumni and friends learn about Caltech. While most alumni live in California, the campaign wants to make a point of letting out-of-state residents know that they, too, play a critical role in the campaign's success. That message may best be conveyed through in-person contact, she says. "President Baltimore, division heads, and faculty members are all hitting the road."

May 9–15, 2005

M T W T F S S

Monday, May 9

Thesis Seminar

Beckman Institute auditorium, 10 a.m.—“Chemical Characterization and Charge Carrier Dynamics of Crystalline Silicon (III) Surfaces Modified with Surface-Bound Organic Functional Groups,” Lauren Webb, graduate student in chemistry, Caltech.

Thesis Seminar

Beckman Institute auditorium, 2 p.m.—“P450 BM3 Electrochemistry and Electrocatalysis,” Andrew Udit, graduate student in chemistry, Caltech.

Geological and Planetary Sciences Seminar

155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“The Biogeochemistry and Residual Mean Circulation of the Southern Ocean,” Takamitsu Ito, postdoctoral fellow, Joint Institute for the Study of the Atmosphere and Ocean, University of Washington.

High Energy Physics Seminar

469 Lauritsen, 4 p.m.—“Nonperturbative Approach to SU(2)/SU(3) Yang-Mills Thermodynamics and Some of Its Implications for Particle Physics and Cosmology,” Ralf Hofmann, University of Heidelberg and University of Frankfurt.

Inorganic-Electrochemistry Seminar

147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Raman Microscopy of Pigments: A Key Technique for the Scientific Investigation of Artwork,” Professor Robin J. H. Clark, Christopher Ingold Laboratories, University College London.

Tuesday, May 10

Caltech Library Systems Presents: Quick Review for Electronic Theses

Sherman Fairchild Library, multimedia conference room, noon to 1:30 p.m.—Caltech requires that theses be submitted in both paper and electronic versions. This presentation will offer a brief overview of techniques useful in the production and publication of electronic theses. The session will include tips on formatting, intellectual-property considerations, how to submit a thesis, and availability (who can see it and when) issues. No reservations are required.

Joint Biology/Beckman Institute Informal Seminar

Beckman Institute auditorium, 2 p.m.—“Personal Genomics and Synthetic Biology,” Dr. George Church, Harvard University School of Medicine.

Chemical Physics Seminar

147 Noyes, Sturdivant Lecture Hall, 2 p.m.—“Inorganic Nanotubes and Nanofluidic Transistors,” Peidong Yang, associate professor of chemistry, UC Berkeley.

Institute for Quantum Information Seminar

74 Jorgensen, 3 p.m.—Topic to be announced. David Fattal, department of physics, Stanford University.

Carnegie Observatories Colloquium Series

William T. Golden Auditorium, 813 Santa Barbara Street, 3:30 to 5 p.m.—“GCD+: Galactic Chemodynamics Code,” Daisuke Kawata, Observatories of the Carnegie Institution of Washington. Refreshments, 3:30 p.m.

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

25 Baxter, 4 p.m.—Topic to be announced. Matthias Dahm, visiting scholar, Kellogg School of Management, Northwestern University.

General Biology Seminar

119 Kerckhoff, 4 p.m.—“Wnt Signaling during Animal Development,” Professor Roel Nusse, department of developmental biology, Stanford University Medical Center, and Howard Hughes Medical Institute.

Wednesday, May 11

Thesis Seminar

Beckman Institute auditorium, 3 p.m.—“Analysis, Design, and Construction of Nucleic Acid Devices,” Robert Dirks, graduate student in chemistry, Caltech.

Environmental Science and Engineering Seminar

142 Keck, 3:40 to 5 p.m.—“Fe-NOM Interactions and the Photodegradation of Natural Organic Matter,” Professor Patricia Maurice, director, Center for Environmental Science and Technology, department of civil engineering and geological sciences, University of Notre Dame.

Astronomy Colloquium

155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“From Cores to Disks with Spitzer,” Neal Evans, professor of astronomy, University of Texas at Austin.

Neurobiology Seminar

24 Beckman Labs, 4 p.m.—“Taste Recognition in *Drosophila*,” Professor Kristin Scott, neurobiology, UC Berkeley.

Organic Chemistry Seminar

147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Facilitated Chemical Genetics Using Tagged Small Molecule Library,” Professor Young-Tae Chang, department of chemistry, New York University.

Social and Information Sciences Laboratory Seminar Series (SISL)/ Theory Workshop

25 Baxter, 4 p.m.—“Minimizing the Worst Slowdown: Off-Line and On-Line,” Professor Hervé Moulin, department of economics, Rice University.

Einstein Centennial Lecture

Beckman Auditorium, 8 p.m.—“Are There Really Atoms? What Einstein Showed Us in 1905,” Professor John D. Norton, chair of the department of history and philosophy of science, University of Pittsburgh.

Thursday, May 12

ESE & Society Discussion Group

151 Arms, Buwalda Room, 9 a.m.—Discussion groups are held on Thursday mornings from 9 to 10. Refreshments.

Thesis Seminar

151 Crellin, 11 a.m.—“Structure and Reaction Dynamics of Biomolecules in the Gas Phase,” Heather Cox, graduate student in chemistry, Caltech.

Biochemistry Seminar

147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Biological Sensing of NO and O₂: A Molecular Perspective on Specificity,” Professor Michael Marletta, department of chemistry, UC Berkeley.

Ulric B. and Evelyn L. Bray Seminar

25 Baxter, 4 p.m.—“Censored Regression Quantiles with Endogenous Regressors,” James Powell, professor of economics, UC Berkeley.

Chemical Engineering Seminar

106 Spalding Lab, Hartley Memorial Seminar Room, 4 p.m.—“Understanding Bistability in Complex Enzyme-Driven Reaction Networks,” Professor Martin Feinberg, department of chemical and biomolecular engineering, Ohio State University. Refreshments, 113 Spalding Lab, 3:30 p.m.

Geology Club Seminar

151 Arms, Buwalda Room, 4 p.m.—“Thermal State, Dynamics, and Tectonic Evolution of the Canadian Cordillera,” Stephane Mazzotti, Geological Survey of Canada.

Physics Research Conference

201 E. Bridge, 4 p.m.—“Systems Biology: Deciphering the Networks of Life,” Leroy Hood, president, Institute for Systems Biology, Seattle. Refreshments, 114 E. Bridge, 3:45 p.m.

Friday, May 13

Thesis Seminar

Beckman Institute auditorium, 10 a.m.—“Ultrafast Photoreduction of Nitric Oxide Synthase by Electron Tunneling Wires,” Wendy Belliston Bittner, graduate student in chemistry, Caltech.

Thesis Seminar

147 Noyes, Sturdivant Lecture Hall, 1 p.m.—“The Molecular Recognition of DNA by Novel Heterocycles,” Michael Marques, graduate student in chemistry, Caltech.

Inorganic-Organometallics Seminar

151 Crellin, 4 p.m.—“The Competitive Oxidation and Protonation of Aqueous Monomethylplatinum(III) Complexes: A Comparison of Oxidants,” David Weinberg, graduate student in chemistry, Caltech.

Kellogg Seminar

Lauritsen Library, 4 p.m.—“Lattice QCD with Domain-Wall Fermions,” Professor Maartin Golterman, physics and astronomy department, San Francisco State University.

William Bennett Munro Memorial Seminar

25 Baxter, 4 p.m.—“Slavery and the Missouri Crisis Revis'd,” Sean Wilentz, professor of history and director of the Program in American Studies, Princeton University.

May 16–22, 2005

M T W T F S S

Monday, May 16

Special High Energy Theory Seminar

469 Lauritsen, 2:30 p.m.—Topic to be announced. Laurent Baulieu, Laboratory of Theoretical and High Energy Physics (LPTHE), Paris.

Geological and Planetary Sciences Seminar

155 Arms, Robert Sharp Lecture Hall, 4 p.m.—"Characterization of Fault Structure Relevant to Earthquake Mechanics," Judith Chester, associate professor, geology and geophysics department, Texas A&M University, College Station.

High Energy Physics Seminar

469 Lauritsen, 4 p.m.—"Bumps and Bangs: Looking for Dark Matter in Our Galactic Neighborhood," Peter Fisher, professor of physics, MIT.

Tuesday, May 17

Caltech Library System Presents: Web of Knowledge

Sherman Fairchild Library, multimedia conference room, noon to 1:30 p.m.—The Web of Knowledge offers the extensive Web of Science database for science, engineering, humanities, and social science, plus Journal Citation Reports. This session will cover linking to full-text articles, navigating, exporting records, conducting searches, and more. Registration: <http://oliphant.library.caltech.edu/forms/cls-classes>.

Thesis Seminar

106 Spalding Lab, Hartley Memorial Seminar Room, 2 p.m.—"Targeted, Systemic Nonviral Delivery of Small Interfering RNA In Vivo," Jeremy Heidel, graduate student in chemical engineering, Caltech.

Institute for Quantum Information Seminar

74 Jorgensen, 3 p.m.—"A Theory of Quantum Gravity Based on Quantum Computation," Professor Seth Lloyd, department of mechanical engineering, MIT.

Thesis Seminar

151 Crellin, 3 p.m.—"DNA-Templated Dimerizations of Minor Groove-Binding Polyamides," Adam Poulin-Kerstien, graduate student in chemistry, Caltech.

Carnegie Observatories Colloquium Series

William T. Golden Auditorium, 813 Santa Barbara Street, 3:30 to 5 p.m.—"The Chemistry of Stars in Local Group Dwarf Galaxies," Kim Venn, associate professor, department of physics and astronomy, Macalester College. Refreshments, 3:30 p.m.

General Biology Seminar

119 Kerckhoff, 4 p.m.—"Fine Dining: A Role for cGMP Protein Kinase in Behavior," Professor Marla Sokolowski, medical genetics and microbiology department, University of Toronto.

Wednesday, May 18

Thesis Seminar

151 Crellin, 11 a.m.—"Investigations of Ion Channel Structure and Function: I. Studies of Nicotine Binding to the Acetylcholine Receptor. II. Development of Tools for Studying Learning and Memory with Unnatural Amino Acids," E. James Petersson, graduate student in chemistry, Caltech.

Kellogg Seminar

Lauritsen Library, 12:15 p.m.—"A Precision Measurement of G_E^p/G_M^p at BLAST," Chris Crawford, physics department, MIT.

Environmental Science and Engineering Seminar

142 Keck, 3:40 to 5 p.m.—"Bioremediation of Atomic Bomb Wastes: Adventures in the Near-Source Zone," associate professor Craig Criddle, civil and environmental engineering department, Stanford University.

Astronomy Colloquium

155 Arms, Robert Sharp Lecture Hall, 4 p.m.—"Extremely Metal-Poor Stars in the Galactic Halo: The Local High Redshift Universe," Judith Cohen, professor of astronomy, Caltech.

Beckman Lecture

22 Gates Annex, 4 p.m.—"Protein Glycosylation: Challenges and Opportunities," Professor Chi-Huey Wong, department of chemistry, Scripps Research Institute.

Materials Research Lecture

104 Watson, 4 p.m.—"Thermodynamically Tuned Low-Z Hydrides for High-Density Hydrogen Storage," Dr. John Vajo, HRL Laboratories.

Leakey Speaker Series on Human Origins

Beckman Auditorium, 8 p.m.—"Thirty Thousand Years of World Rock Art," Jean Clottes, former president and currently honorary president of the Société Préhistorique Française. Dr. Clottes is widely known for his work at the Chauvet Cave, the site of the oldest known European cave art. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Thursday, May 19

ESE & Society Discussion Group

151 Arms, Buwalda Room, 9 a.m.—Discussion groups are held on Thursday mornings from 9 to 10. Refreshments.

Thesis Seminar

151 Crellin, 10 a.m.—"Unnatural Amino Acid Incorporation to Rewrite Genetic Code and RNA-peptide Interactions," Xin Qi, graduate student in chemistry, Caltech.

Control and Dynamical Systems Seminar

125 Steele, 1:30 p.m.—"Terminal Motion of Sliding and Spinning Disks with Coulomb Friction," Professor Patrick Weidman, department of mechanical engineering, University of Colorado, Boulder.

Chemical Physics Seminar

153 Noyes, Sturdivant Lecture Hall, 2 p.m.—"Hyperpolarized Xenon and Krypton in NMR Spectroscopy and MR Imaging," Thomas Meersmann, assistant professor of chemistry, University of Colorado, Fort Collins.

Thesis Seminar

147 Noyes, Sturdivant Lecture Hall, 2 p.m.—"The Design and Development of Palladium-Catalyzed Aerobic Oxidative Transformations," Eric Ferreira, graduate student in chemistry, Caltech.

Biochemistry Seminar

147 Noyes, Sturdivant Lecture Hall, 4 p.m.—"Design and Selection of Metalloenzymes, from Novel Biocatalysts to Selective Biosensors," Professor Yi Lu, department of chemistry, University of Illinois at Urbana-Champaign, and Howard Hughes Medical Institute.

Chemical Engineering Seminar

106 Spalding Lab, Hartley Memorial Seminar Room, 4 p.m.—"Confinement Effects in Associating Bilayer Films: Continuous and Discrete Thinning Events, Segregation Instabilities, and 4-Fold Symmetry," Professor Sandra Troian, department of chemical engineering, Princeton University.

General Biology Seminar

119 Kerckhoff, 4 p.m.—"Illuminating the Cellular and Molecular Logics of Cortical Processing: A Molecular Genetics and Optical Imaging Approach," Dr. Kuan Hong Wang, the Picower Center for Learning and Memory, MIT.

Geology Club Seminar

151 Arms, Buwalda Room, 4 p.m.—Topic to be announced. Hagit Afek, Division of Geological and Planetary Sciences, Caltech.

Physics Research Conference

201 E. Bridge, 4 p.m.—"Bringing Hearing to the Deaf—Cochlear Implants: A Technical and Personal Account," Ian Shipsey, professor of physics, Purdue University. Refreshments, 114 E. Bridge, 3:45 p.m.

Von Karman Lecture Series

JPL, von Karman Auditorium, 7 p.m.—"Spirit and Opportunity: Field Geology on Mars," Dr. Joy Crisp, Mars Exploration Rover Project Scientist, JPL.

Friday, May 20

Annual Workshop on Advanced Networking

Fountain Ballroom, Pasadena Westin Hotel, 168 North Los Robles Avenue, 8 a.m. to 5 p.m.—Continental breakfast from 8 a.m. Buffet lunch at noon. Free for all participants. Reservations: hhein@caltech.edu by May 9. For further information and the day's schedule: <http://leecenter.caltech.edu/content/workshop05.html>.

High Energy Theory Seminar

469 Lauritsen, 11 a.m.—Topic to be announced. Eric Sharpe, department of physics, University of Utah.

Mathematics of Information Seminar

239 Moore, 3 to 4:30 p.m.—"Shape Restricted Estimation in the Search for Dark Matter," Michael Woodroffe, L. J. Savage Professor of Statistics and Mathematics, University of Michigan, Ann Arbor.

General Biology Seminar

119 Kerckhoff, 4 p.m.—"Novel Approaches to Growing Mangroves in the Mud Flats of Eritrea with the Potential of Relieving Regional Poverty and Hunger," Dr. Gordon Sato, Manzanar Project.

Inorganic-Organometallics Seminar

151 Crellin, 4 p.m.—"Selective Trimerization and Tetramerization of Ethylene Using Chromium Diphosphine Catalysts," Paul Elowe, graduate student in chemistry, Caltech.

Kellogg Seminar

Lauritsen Library, 4 p.m.—"Generalized Parton Distributions from Lattice QCD," Dr. Dru Renner, University of Arizona.

Von Karman Lecture Series

Pasadena City College, 1570 E. Colorado, the Vosloh Forum (south of Colorado on Bonnie), 4 p.m.—"Spirit and Opportunity: Field Geology on Mars," Dr. Joy Crisp, Mars Exploration Rover Project Scientist, JPL.

German Film Series

Baxter Lecture Hall, 7:30 p.m.—*The Harmonists* (aka *Comedian Harmonists*) (1997). This film tells the story of a famous German male sextet, five vocals and piano, known as the Comedian Harmonists. In German with English subtitles.

CampusEvents

Tuesday, May 10

Beginning Ballet Class

Braun Gym, multipurpose room, 3:30 p.m.—A free, introductory ballet class for women and men with no prior dance experience. No special clothing or shoes are required. The seven-week series of classes began on April 12.

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. Visit our website at www.its.caltech.edu/~aigp22.

Wednesday, May 11

Salsa Dance Classes

Winnett lounge, 7:30 p.m.—Free basic instruction starts at 7:30 p.m. If you already know the basics, come to the intermediate class at 8 p.m. Free practice starts at 9:30, and the advanced class takes place at 10. Classes started on April 13.

Thursday, May 12

My Left Breast

Caltech Women's Center, noon—In this film, Gerry Rogers bravely recounts her story of breast cancer survival to share with the world that life, indeed, can continue with full force and vigor.

Meeting of Caltech Democrats

Caltech Y lounge, 5:30 p.m.—The guest speaker will be Anthony Portantino, mayor of La Cañada Flintridge and a candidate for the 44th Assembly District seat in 2006.

Ethnic Visions Film Series: *Real Women Have Curves*

Baxter Lecture Hall, 7:30 p.m.—A free public screening of *Real Women Have Curves* (2002, 90 min.) Actress America Ferrera will be a special guest. Information: <http://events.caltech.edu/events/event-2267.html>.

Intermediate-Level Standard and Latin Dances

Winnett lounge, 8 p.m.—The first hour focuses on standard dances such as waltz, quickstep, Viennese waltz, tango, and foxtrot. Instruction in cha-cha, rumba, samba, and jive Latin-style dances begins at 9. Fee: \$25 for Caltech students; \$40 and permission of the instructors for others. The eight-week series started on March 31.

Beginning-Intermediate Hip-Hop

Braun Gym, multipurpose room, 9 p.m.—No special clothing or shoes are needed. Cost for Caltech students, \$25 for the series; for other Caltech community members, \$50 for the series. A trial class costs \$5 and \$8, respectively. This seven-week series began on April 14.

Friday, May 13

Space—Star Stuff. A School-Day Event

Beckman Auditorium, 10 a.m.—In this CineMuse high-definition film, Sam Neill takes us from the creation of the universe to the world we see around us today, exploring the origins of life on Earth and coming to the surprising conclusion that we may all be aliens. A discussion will follow the film. Designed for school groups in grades 3 to 12. Information: 395-6059.

Art Talk

070 Moore, 7:30 p.m.—Artist Dan Van Clapp will give a slideshow talk entitled "The Alchemy of Paint, Rust, and Dust." Van Clapp uses found materials for his pieces. Caltech artist in residence Michael McMillen will host the event. Information: <http://art.caltech.edu/events.htm>.

Hookslide in Concert

Ramo Auditorium, 8 p.m.—A vocal band based in San Francisco, Hookslide performs a high-energy mix of vocal percussion, booming bass, and screaming four-part harmony. This award-winning group has traveled throughout the nation and is currently riding the success of their recently released studio project, *Original Spin*. (See Public Events contact information on this page.)

Student Chamber Concert

Dabney Lounge, 8 p.m.—Caltech students will perform piano duets and music for small string and woodwind ensembles. Each program in the May chamber music series is different, with separate performers and repertoire. A reception will follow the concert.

Saturday, May 14

Skeptics Conference: Brain, Mind, and Consciousness

Beckman Auditorium, 8:45 a.m. to 9:30 p.m.—The annual conference of Southern California's Skeptics Society takes on the subject that Nobel Laureate Francis Crick has called "the greatest unsolved problem in biology." On-site registration begins at 7 a.m. Information: <http://www.skeptic.com/conf/schedule.html>.

JPL Open House

JPL, 9 a.m. to 5 p.m.—The open house will feature exhibits, displays, demonstrations, and presentations about the Laboratory's ongoing research and space exploration, and information about new technologies, solar system exploration and spacecraft communication, and more. There will be special hands-on activities designed just for kids. Food and beverages will be available. Admission and parking are free. No backpacks or ice chests are allowed.

Beginning-Intermediate Belly Dance

Braun Gym, multipurpose room, 12:25 p.m.—No experience or special shoes are needed. Cost for Caltech students, \$25 for the series; for other Caltech community members, \$50 for the series. A trial class costs \$5 and \$8, respectively. This seven-week series began on April 16.

Evening Under the Stars 3

Avery Courtyard, 6 p.m.—Join us for a spring evening under the stars at the annual fund-raiser for the Children's Center at Caltech. There will be cocktails, music, a silent auction, and dinner. Information and reservations: 395-6860 or charlene.roe@caltech.edu.

Caltech Folk Music Society Presents: *Old Blind Dogs*

Dabney Lounge, 8 p.m.—Old Blind Dogs performs the traditional music of Scotland. (See Public Events contact information on this page.)

Sunday, May 15

JPL Open House

See Saturday, May 14, for details.

Beginning-Level Standard and Latin Dances

Winnett lounge, 2 p.m.—The first hour focuses on standard dances such as waltz, quickstep, and Viennese waltz. Instruction in cha-cha, rumba, samba, and jive Latin-style dances begins at 3 p.m. Fee: \$25 for Caltech students; \$40 for others. The eight-week series began on April 3.

Caltech-Occidental Symphony Orchestra

Ramo Auditorium, 3:30 p.m.—The program will consist of works by Rossini, Mozart, and Tchaikovsky.

Caltech Women's Club Spring Family Potluck

Tournament Park, 4 p.m.—Meet other Caltech/JPL families and enjoy an evening of family fun. Plates, cups, utensils, and drinks will be provided. Just bring yourself, your family, and a potluck dish to share. Information: Nancy Hewett, 793-2535 or nancyhewett@earthlink.net.

Amnesty International Book Discussion Group

Vroman's Bookstore, 695 E. Colorado Boulevard, second floor, 6:30 p.m.—This month's book is *Dancing with Cuba*, a memoir of the Cuban revolution by the award-winning Mexican American journalist Alma Guillermoprieto. All are welcome. Sponsored by Caltech/Pasadena AI Group 22. Visit Group 22 at www.its.caltech.edu/~aigp22.

Monday, May 16

Outlook 2003 Level 1

120 ATC Building, 263 S. Chester, 1 to 5 p.m.—This session will cover the basics of e-mail, calendar sharing, organizing and sorting information, and more. Attendees will receive course materials for use at their own computer. This course will continue from 1 to 5 p.m. on May 17. Information and registration: http://cit.hr.caltech.edu/Education/course_descriptions.htm.

Bolero Dance Class

Winnett lounge, 7:30 p.m.—No partner or previous dance experience is required. Cost for Caltech students: \$40 for the series, \$6 per class; others, \$56 for the series, \$8 per class. Classes started March 28.

Tuesday, May 17

Getting the Best from Your Team

Brown Gym classroom, 8:30 a.m. to 12:30 p.m.—Find out how setting performance goals can reduce performance problems and generate exceptional performance from your staff. This module, for supervisors only, gives an overview of the performance management process and provides tools for establishing the right goals for your team. Registration: 395-8055 or diane.williams@caltech.edu.

Beginning Ballet Class

See Tuesday, May 10, for details.

Wednesday, May 18

Excel 2003 Level 1

120 ATC Building, 263 S. Chester, 8 a.m. to noon—Learn to create and use spreadsheets. Attendees will receive course materials for use at their own computer. This course will continue from 8 a.m. to noon on May 20. Information and registration: http://cit.hr.caltech.edu/Education/course_descriptions.htm.

Salsa Dance Classes

See Wednesday, May 11, for details.

Thursday, May 19

Reinventing Yourself

Brown Gym classroom, 8:30 a.m. to 12:30 p.m.—This class for supervisors and nonsupervisors will teach ways to redirect thinking, overcome negative behavior, and acquire skills necessary to achieve success. Registration: 395-8055 or diane.williams@caltech.edu.

Women and Diabetes

Caltech Women's Center, noon—Join Dr. Michael Bryer-Ash, director of the Gonda Diabetes Center, as he educates us on the causes, prevention, and treatments for diabetes in women. Open to the Caltech and JPL community only.

Ethnic Visions Film Series: *ABCD*

Baxter Lecture Hall, 7:30 p.m.—*ABCD* (1999, 105 min.). Director Krutin Patel will be the special guest at this free public screening. Information: <http://events.caltech.edu/events/event-2268.html>.

Intermediate-Level Standard and Latin Dances

See Thursday, May 12, for details.

Beginning-Intermediate Hip-Hop

See Thursday, May 12, for details.

Friday, May 20

Unveiling Feynman

Ramo Auditorium, 4 p.m.—On May 4, the United States Postal Service will issue a commemorative block of four stamps celebrating American scientists, including Nobel Laureate Richard Feynman. Caltech's celebratory event will begin at 4 p.m. with a screening of the classic documentary *The Pleasure of Finding Things Out*, followed by a 5 p.m. program featuring Caltech faculty members Tom Tombrello, Kip Thorne, David Politzer, and Steve Frautschi, as well as Michelle Feynman and Pasadena Postmaster Robert Mysel.

Caltech Glee Clubs Spring Concert

Dabney Lounge, 8 p.m.—The program for this concert has not yet been announced.

Saturday, May 21

Beginning-Intermediate Belly Dance

See Saturday, May 14, for details.

Caltech Glee Clubs Spring Concert

Dabney Lounge, 8 p.m.—The program for this concert has not yet been announced.

Sunday, May 22

Beginning-Level Standard and Latin Dances

See Sunday, May 15, for details.

Student Chamber Concert

Dabney Lounge, 3:30 p.m.—See Friday, May 13, for details.

Mondays

Lunchtime Pickup Ultimate Frisbee

Fox Stanton Track and Field, 12:15 p.m.—The Caltech Penultimate Frisbee players make up an informal recreational group that plays pickup games of Ultimate Frisbee at lunchtime on Mondays, Wednesdays, and Fridays. No experience is needed, and complete novices are welcome. Information: <http://mailman.its.caltech.edu/penultimate>.

Floorball Club

Brown Gymnasium, 9 p.m.—Caltech Floorball Club holds pickup floorball games on Mondays from 9 to 11 p.m. For more information, see our website at <http://floorball.caltech.edu>.

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). Sponsored by the Caltech Women's Club. Information: 584-0970 or kimdeman@yahoo.com.

CIT Knitters Group Meeting

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

Caltech Tai Chi Club

Winnett lounge, 7 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: 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. Sponsored by the Caltech Women's Club. Information: 793-2535 or nancyhewett@earthlink.net.

Lunchtime Pickup Ultimate Frisbee

Fox Stanton Track and Field, 12:15 p.m.—The Caltech Penultimate Frisbee players make up an informal recreational group that plays pickup games of Ultimate Frisbee at lunchtime on Mondays, Wednesdays, and Fridays. No experience is needed, and complete novices are welcome. Information: <http://mailman.its.caltech.edu/penultimate>.

Thursdays

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. Open on Thursdays only. No appointment is necessary. Information: 584-9773 or furnpool@caltech.edu.

Fridays

Lunchtime Pickup Ultimate Frisbee

Fox Stanton Track and Field, 12:15 p.m.—The Caltech Penultimate Frisbee players make up an informal recreational group that plays pickup games of Ultimate Frisbee at lunchtime on Mondays, Wednesdays, and Fridays. No experience is needed, and complete novices are welcome. Information: <http://mailman.its.caltech.edu/penultimate>.

Caltech Tai Chi Club

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

Caltech Chess Club

Page House dining room, 8 p.m.—Be you a master or novice, you will enjoy the chess club's weekly meetings. Information: www.its.caltech.edu/~citchess.

Public Events information and tickets

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

St. Luke's, from page 1

including *Meet the Fockers* and *The Ring Two*. An estimated 80 percent are hospital themed.

Million Dollar Baby, the 2005 Academy Awards Best Picture winner, used the intensive care unit, patient rooms, and hallways. The TV series *Without a Trace* used the operating room, corridors, radiology, the chapel, and third-floor space. Of course, Caltech doesn't rent out the place for bragging rights to the celebrities who have worked there, including Clint Eastwood, Scarlett Johansson, and Jack Nicholson.

The rental fees help pay the bills. Filming generated \$500,000 for Caltech during its first year of ownership, and will earn even more during the second year ending in July. "This income has been helpful in offsetting some of the cost associated with utilities, general maintenance, and upkeep on the 13-acre property," says Rick Canny, project manager with Caltech's Architectural and Engineering Services.

"The beauty of the space up there is that it can be transformed," says Denise Nelson Nash, Caltech's director of public events. "Currently it's unoccupied, so it gives great flexibility and latitude to the production companies." The site also offers a wealth of parking, which means trucks and personal vehicles stay off the surrounding residential streets.

Real to Reel, Caltech's location agency, pays attention to details that ensure good neighborhood relations, Nelson Nash says. "We are trying to be good neighbors regarding when and where the production trucks go in and out, hours of filming, and notifying neighbors of upcoming shoots."

The Office of Public Events reviews all scripts and treatments before contracts

are signed. "We don't want anything shot there that we wouldn't be proud of," Nelson Nash says.

The property appeals to location scouts, who are looking for well-maintained, empty buildings with large rooms and architectural flair, says Nick Arquette, director of acquisitions for Real to Reel. The company represents private properties in the Los Angeles area to the entertainment industry. Real to Reel takes a percentage of the fees, which run \$5,000-\$9,000 daily, with an average shoot running three to five days.

The main building's Spanish-style dome and facade look much the same as when the hospital was opened by the Sisters of St. Joseph of Orange. During the Great Depression, the San Gabriel Valley area blossomed as Americans came looking for warm weather and a new start in life, and St. Luke was one of the first hospitals to serve the area.

"That site is unique in L.A. County," Arquette says. "There are very few hospitals available for shoots that are from the 1930s and are in good condition. It feels like an old hospital." In-demand features, he says, include the large rooms, the hallways, the kitchen, and architectural details. In addition, the third floor features a "raw" room that can be turned into anything a set designer has in mind. After its days as a working hospital were over, St. Luke preserved enough furniture and hospital equipment to continue resembling a working hospital, which adds to its value to clients.

Real to Reel also handled film rentals for Tenet, which closed the hospital in May 2002 because of declining patient numbers and profitability. As for the future, "filming will continue at (CIT)² even as Caltech gradually occupies the site," Canny says.

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Energy, from page 2

lamps are very energy wasteful and may pose a safety risk. Turn off lights at sports fields, tracks, and courts when not in use.

Heating, ventilation, and air conditioning (HVAC): Dress appropriately to the season and keep thermostats set to achieve 68° to 70° Fahrenheit in the winter and 74° to 78° Fahrenheit for air-conditioned spaces in the summer. During the cool months, open blinds, drapes, and curtains to let the sun shine in. If there is no sunlight, close them to keep the heat in, especially at night. During the hot months, close blinds, drapes, and curtains to block direct sunlight. Use hot water sparingly. Keep windows and doors closed in heated and air-conditioned areas, and close vestibule doors if they are left propped open.

Regarding other electrical equipment, purchase only energy-efficient models, turn off all energy-consuming office and research equipment when not in use, such as copiers, refrigerators, environmental rooms, fume hoods, etc. Portable fans and heaters should not be used unless required for medical conditions or as a result of HVAC failures.

Report energy waste. Direct complaints about energy waste on campus, or suggestions for energy conservation, to Harmick Marcarian, the Institute's energy manager, at ext. 4299 or harmick.marcarian@caltech.edu.

Energy conservation is something we can (and indeed must) do together.

Irwin is the director of Facilities Management.

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Seismic, from page 1

Ares Rosakis and Smits Professor of Geophysics Hiroo Kanamori, both of Caltech; Professor James Rice of Harvard University; and Caltech grad student Kaiwen Xia, prepared polymer plates to mimic the effects of major strike-slip faults. These are faults in which two plates are rammed against each other by forces coming in at an angle, and which then spontaneously snap (or slide) to move sideways.

The team fixed two clear polymer plates made of two different materials so that force was applied to them at an acute angle relative to the "fault" between them. The researchers then set off a small plasma explosion with a wire running to the center of the plates (the "hypocenter"), causing the plates to quickly slide apart just as two tectonic plates would slide apart during an earthquake.

What's more, if the rupture fronts are super-shear, i.e., faster than the shear speed in the plates, they produce a shock-wave pattern that looks something like the Mach cone of a jet fighter breaking the sound barrier.

"Previously, it was generally thought that, if there is a velocity contrast, the rupture preferentially goes toward the direction of the slip in the low-velocity medium," says Kanamori. In other words, if the lower-velocity medium is the plate shifting to the west, then the preferred direction of rupture would typically be to the west.

"What we see, when the force is small and the angle is small, is that we simultaneously generate ruptures to the west and to the east, and that the rupture fronts in both sides go with sub-shear speed," Rosakis says. "But as the pressure increases substantially, the westward direction stays the same, but the other, eastward direction, becomes super-shear. This super-shear rupture speed is very close to the p-wave speed of the slower of the two materials."

The results also showed that, when the experiment is done at forces below those required for super-shear, the directionality of the rupture is unpredictable. Both waves are at sub-shear speed, but waves in either direction can be devastating.

This explains why the Parkfield earthquake last year ruptured in the direction opposite to that of past events. The experiment also strongly suggests that, if the earthquake had been sufficiently large, the super-shear waves would have traveled northwest, even though the preferred direction was southeast.

But the question remains whether super-shear is necessarily a bad thing, Kanamori says. "It's scientifically an interesting result, but I can't say what the exact implications are. It could also mean that earthquake ruptures are less predictable than ever," he adds.

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Children, from page 1

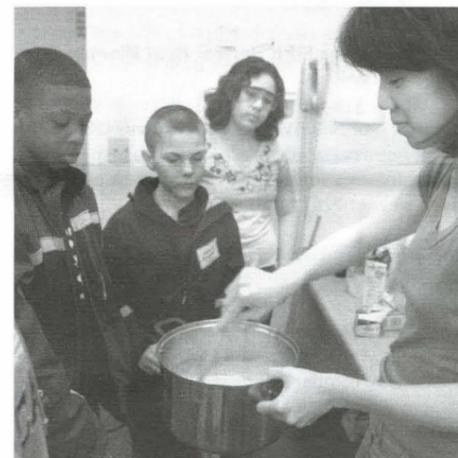
on creating synthetic lenses for the human eye. The lab's wide-ranging biological and industrial research includes developing new materials to help patients achieve perfect vision after cataract surgery.

Among the 10 sites that opened their doors on Take Our Children to Work Day was a lab where researchers explore the hippocampus, the part of the brain known to be crucial for memory in humans and other animals. Another lab planned a series of experiments designed to teach children the effects of temperature and pressure on everyday objects. Other kids visited the Seismological Lab's Earthquake Exhibit Center and Media Center, learned about fuel cells, made customized Caltech buttons in Graphic Resources, or assembled handcraft projects at the carpenter shop.

Right after lunch, the students learned firsthand that you don't necessarily need a lot of fancy equipment to turn a few raw ingredients into creamy vanilla ice cream.

CAPSI, the Caltech Precollege Science Initiative, showed them how they could make it using nothing more than a couple of plastic bags, milk, evaporated milk, sugar, vanilla extract, plenty of ice, and salt. Then came the fun part—after the children shook, rolled, and tossed their bag-inside-a-bag for several minutes, it became an "ice cream comet," to which they added sweet toppings meant to represent dust, rocky pieces, and carbon dioxide.

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Chemistry graduate student Connie Lu, who works in the Jonas Peters lab, demonstrates how to make ice cream using high-purity liquid nitrogen as a cooling agent.

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