

Caltech 336

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

The campus community biweekly
November 15, 2001, vol. 1, no. 17

Caltech Gothic



Irma Black, staff member in GPS, and Andy Ingersoll, professor of planetary science, made a striking Halloween pair as Grant Wood's famous dour farmers. Faculty, staff, and students also competed in the Caltech Bookstore's costume contest, won by staff member Michael Stutson of Campus Card Services.

RAINing all over the world

Barbara DiPalma

What do JPL space missions and the Chicago Stock Exchange have in common (other than a certain element of risk)? Well, for one thing, both have benefited from research done by Moore Professor of Computation and Neural Systems and Electrical Engineering Jehoshua (Shuki) Bruck and his colleagues.

Back in 1995, Bruck realized that the computer systems that ran spaceborne science missions were expensive because they had to be designed and built from scratch for each new mission. He began thinking about how to construct less-expensive systems using readily available, off-the-shelf components—PCs with commercial operating systems, for instance—that would be at least as reliable as the custom-designed variety.

The result was server-clustering software called RAIN—Reliable Array of Independent Nodes—whose prototype use on networked video servers in Bruck's lab proved it to be remarkably resilient to abuse. Individual computers could be unplugged and otherwise interfered with, yet the system would continue to operate. The secret was innovative algorithms developed by Bruck and his graduate students that allowed connections between servers to reroute, instantaneously

and undetectably, whenever a machine went down.

As the Internet grew and developed, and personal computers became tools for communication as well as for computation and data storage, Bruck saw that his server-clustering software had commercial applications. In 1998, he patented and licensed RAIN. Then, with three of his grad students, he launched a new company, Rainfinity (in which Caltech is an equity holder) to develop Rainwall, software that lets gateway servers—computers at the interface between an

see RAINing, page 6

Caltech, Schiff present science for students

On a recent October afternoon, just a day before the 2001 Mars Odyssey orbiter went into orbit around the red planet, Morrisroe Professor of Physics and former JPL director Ed Stone was in Beckman Institute auditorium fielding questions from 125 high schoolers about "Mars and the Search for Water."

Stone's talk was the inaugural lecture of the 27th Congressional District Science Scholar Forum, introduced by Caltech

see Students, page 6

Countering airline terrorism

Jesse (Jack) Beauchamp '64, Caltech's Ferkel Professor of Chemistry and a long-time private pilot, has utilized his combined expertise as a member of two federal commissions on airline safety and security. This interview with Caltech News editor Heidi Aspaturian, excerpted from vol. 35, no. 2/3, took place in the wake of the September 11 East Coast terrorist attacks.

What can you tell us about your involvement in the two airline security commissions?

The first was the National Research Council Committee on Aviation Security, which I chaired from 1993 to 1997. John Baldeschwieler [Johnson Professor and Professor of Chemistry Emeritus] had been the previous chair. Its mandate is to review the R&D programs at the FAA Technical Center. The center does a lot of work in developing, deploying, and testing new technology for passenger screening and explosives detection.

Then in 1996 when TWA 800 blew up over the Atlantic, the Clinton administration formed a commission on aviation safety and security chaired by Vice President Al Gore. Initially we focused most closely on security because it was thought that a terrorist bomb had destroyed TWA 800. Later, investigators determined that it had been an accident. But the report that we delivered to the president described the potential for terrorist attacks as a "national security issue," and made numerous proposals for security improvements.

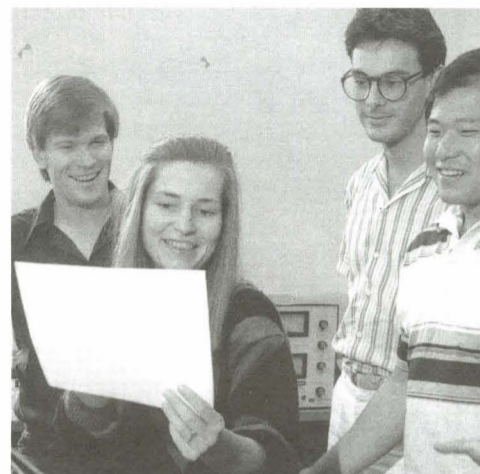
Hindsight is always 20/20, but I think that if those recommendations had been in place and operating on September 11, at least some of the hijackers might have been stopped.

What were the recommendations?

The most important to my mind was recommendation 3.19. [The full report text can be found online at www.fas.org/irp/threat/212fin~1.html.] It advocates a system of computer-automated passenger screening (CAPS), using information from readily available computerized databases to separate passengers into two security-risk categories—a large low-risk group, and a small high-risk group. The premise is that 98 percent or more of airline passengers rarely pose any cause for concern. They're frequent travelers. They can be found in several databases. Chances are that somebody using a false ID and planning to inflict harm is not going to appear to an automated profiling system in the same way.

We also recommended that the FBI, CIA, and ATF [Bureau of Alcohol, Tobacco and Firearms] expand their ongoing research into known and potential terrorists to develop a database to be used in passenger screening. I don't think that the intent of the recommendation was carried out. We now know that some of the September 11 hijackers had been identified as

see Beauchamp, page 6



Wold named new BI director

Caltech's Board of Trustees has approved the appointment of Professor of Biology Barbara Wold as the second director of the Beckman Institute. "Professor Wold was chosen to be the second leader of this unique Caltech institution after careful consideration of the pool of candidates," President David Baltimore and Provost Steve Koonin said in their announcement. "We look forward to working with her as she takes on this new responsibility."

Wold's new position will be to oversee the Beckman Institute's innovative research at the interface of biology and chemistry. Her laboratory works on the problems of embryo development and regeneration in vertebrates, focusing on the genetic regulatory circuitry that controls these events. Wold also is director of Caltech's L. K. Whittier Gene Expression Center and is active in national science policy on genomics. A senior advisor to the U. S. Department of Energy, she chairs the mammalian full-length cDNA Program, which aims to provide to researchers the full RNA sequence for every mouse and human gene.

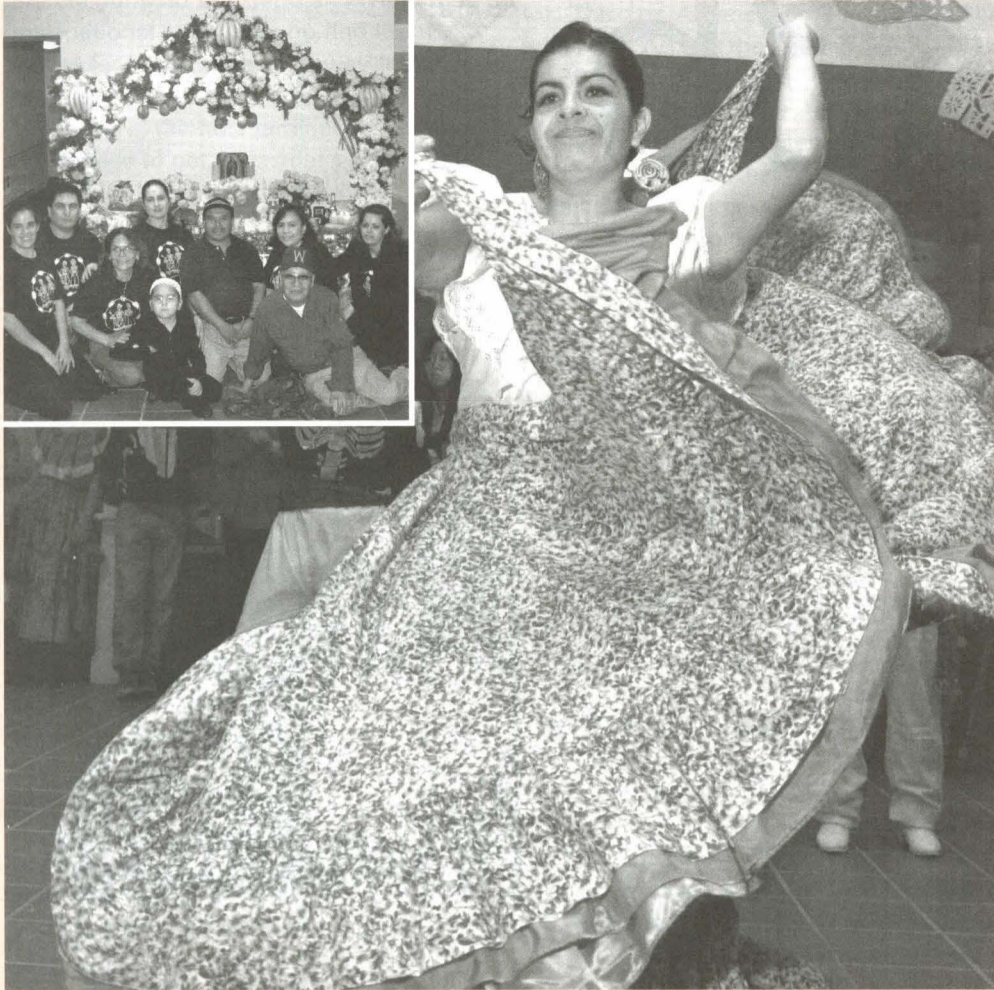
Baltimore and Koonin also expressed their thanks to Harry Gray, Beckman Professor of Chemistry and the institute's founding director, and wished him success as he hands over leadership to Wold. "Over the past 15 years, Professor Gray has built an exciting program of science and technology at the chemistry-biology interface," they said. "Caltech has profited greatly from his talents and energy in formulating and implementing the vision of the Beckman Institute."

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336 holiday schedule

Due to Thanksgiving, the next issue of Caltech 336, the last for fall term, will publish on December 6. We will resume our regular biweekly publication schedule on January 10. The 336 staff wishes everyone a joyous and safe holiday season.

NewsBriefs



Caltech recently observed Día de los Muertos, the Mexican celebration honoring the dead, in the Keck Student Services lobby. Family and friends (inset) gather at a traditional altar in memory of José and Maria Villegas, staff members in Physical Plant who died in an auto accident in August. Día de los Muertos was sponsored by Minority Student Affairs.

Personals

New positions

On September 19 **Walter Yuan**, a technical manager in the Humanities and Social Sciences, started at Caltech.

Joining Caltech on October 1 were **Rhoda Chang**, a senior auditor for Audit Services; **Mark Gonzales**, a precision machinist for Central Engineering Services; **Douglas Lies**, an associate scientist in geology; **John Meacham**, an associate engineer in Physics, Mathematics and Astronomy; and **Calum Torrie**, a research engineer with the Laser Interferometer Gravitational-Wave Observatory (LIGO) project.

Starting in biology on October 8 were **Myka Kairs**, an assistant lab technician; **John-Carl Olsen**, a research assistant II; and **Changjun Yu**, a senior research assistant.

Kimberly Klotz, an administrative aide in geology, started work on October 9.

Host **Charles Echols** joined Dining Services on October 12.

Starting at the Institute on October 15 were **Vikki Appel**, a data-center manager with the Seismo Lab; **Mark Gritten**, a financial information systems database analyst for Financial Services; **Myrtle Harris**, a payment services manager in Accounts Payable; **Kyle J. Keller**, a Web developer for the Space Infrared Telescope Facility (SIRTF); **Violeta Maldonado**, an administrative applications developer in the Administrative Technology Center; **Dianne Molina**, an assistant director of the Alumni Fund; **Jasvinder Nangiana**, a research aide A in biology; **Misty Richard**, a research aide in biology; **Vincent Studer**, an assistant scientist in applied physics; and **Michelle Yeater**, an administrative assistant in Faculty Housing.

Retirements

Sharon Beckenbach retired on October 1 after 28 years at Caltech. She was an administrative assistant in civil engineering and applied mechanics.

Patricia Bullard, a supervisor in chemistry, retired on September 1. She had worked at Caltech for 29 years.

Helen Carrier retired on September 1. A manager in electrical engineering, she had been at Caltech for 20 years.

Larry Dumas, JPL's deputy director, retired on October 1 after 39 years of service.

Hector Forero retired on November 1. A senior lab helper in biology, he had worked at Caltech for 11 years.

Louise Sartain, an administrative assistant in low-temperature physics, retired on October 1. She had worked at Caltech for 32 years.

Mary Torres, an assistant director of sponsored research, retired on September 1 after 36 years at Caltech.

Honors and awards

Philip Hoffman, professor of history and social science, has been selected along with coauthors Gilles Postel-Vinay and Jean-Laurent Rosenthal to receive the Economic History Association's Gyorgy Ranki Prize, which recognizes "the outstanding book on the economic history of Europe, published in 1999 and 2000." The award is for their book *Priceless Markets: The Political Economy of Credit in Paris, 1660–1870*. Postel-Vinay has been a visiting professor of history at Caltech, and Rosenthal received his PhD in social science from the Institute in 1988.

Matthew Jackson, professor of economics, is the first winner of the Social Choice and Welfare Prize, to be awarded by the Society for Social Choice and Welfare at its sixth annual international meeting, to be held at Caltech in July 2002. The prize is given "to honor young scholars of excellent accomplishment in the area of social choice theory and welfare economics."

Wolfgang Knauss, von Kármán Professor of Aeronautics and Applied Mechanics, has been selected by ASME International (The American Society of Mechanical Engineers) to receive its Warner T. Koiter Medal, to be presented during ASME's 2001 International Mechanical Engineering Congress and Exposition, November 11–16 in New York City. The award "recognizes the effective blending of theory and application of applied mechanics, and leadership in the international solid mechanics community."

James Woodward has been named the J. O. and Juliette Koepfli Professor of the Humanities; this title replaces that of professor of philosophy. The Koepfli chair is "awarded to distinguished teachers demonstrating a deep commitment to undergraduate students and their intellectual and cultural development." A philosopher of science, Woodward has been a member of Caltech's faculty since 1983, when he came to the Institute as a Mellon Postdoctoral Instructor. Woodward is also executive officer for the humanities.

Peter Wyllie, professor of geology, emeritus, has been awarded the Leopold von Buch Medal "in recognition of his scientific research on the petrology of crystalline rocks, and also for his service in publicizing the importance of geosciences for society." Wyllie received the medal, which is accompanied by honorary membership in the German Geological Society, at a ceremony on October 4, during the society's annual meeting in Kiel, Germany.

Hollywood exhibit at Historical Museum

Hollywood Comes to Pasadena, an exhibit chronicling the entertainment business in Pasadena from 1898 to the present, will run through January 6 at the Pasadena Historical Museum, 470 West Walnut Street (at Orange Grove). In appreciation of Caltech's continuing support, the museum is offering Caltech and JPL employees and their families special discounts with Institute ID: one free admission Wednesday through Friday, noon to 5 p.m.; two-for-one admissions on Saturday and Sunday, noon to 5 p.m.; and a 10 percent discount in the museum store Wednesday through Sunday. For more information, contact the museum at (626) 577-1660 or online at www.pasadenahistory.org.

Feds proclaim International Education Week

The U.S. Department of State and Department of Education have set November 11 to 17 as International Education Week 2001, encouraging schools, businesses, and communities worldwide to promote and celebrate the benefits of international education and exchange. In recognition, Caltech's International Student Programs office has joined with other campus organizations to present a number of events. For more information, visit the International Student Programs Web site at www.isp.caltech.edu/programs/intleduwk2001.html.

Thursday, November 15: Reception and film, *Nowhere to Hide* (Korean with English subtitles), 7:30 p.m., Beckman Institute courtyard and auditorium. Cosponsored by the Caltech Korean Graduate Student Association.

Friday, November 16: Photo exhibit, *Today's China: Culture, Achievement, and the Future*, 11:30 a.m. to 1:30 p.m., and concert, featuring Chinese classical musician Lilian Wang, noon to 1 p.m., Red Door Café patio. Cosponsored by the Caltech C and Caltech Y.

Diwali (Festival of Lights) celebration and film, *Pushpak*, 6 p.m., Beckman Institute courtyard and auditorium. Cosponsored by the Organization of Associated Students from the Indian Subcontinent.

Saturday, November 17: *The Silence* (Iranian with English subtitles), 7:30 p.m., Beckman Institute auditorium. Cosponsored by Friends of the Iranian Community at the California Institute of Technology.

Singing in the holiday season

It's that time of year again, when the Caltech music departments begin producing beautiful sounds to launch the holiday season. All events are free and open to the public.

On Sunday, December 2, at 3:30 p.m., the Caltech-Occidental Symphony Orchestra, conducted by Allen Gross, will present a concert in Ramo Auditorium. Caltech president David Baltimore will narrate a performance of *Lincoln Portrait*, Copland's 1942 tribute to Lincoln that was commissioned soon after the United States entered World War II.

The program will also include Schumann's Symphony no. 1 in B-flat Major (*Spring*) and Bruno Louchouart's *Time Pieces*. For more information, call the Caltech music program at ext. 3295. The concert will also be performed on Saturday, December 1, at 8 p.m. at Thorne Hall, Occidental College, with Occidental's president Ted Mitchell narrating *Lincoln Portrait*. For further information, please call Occidental College's music department at (323) 259-2785.

Gross said, "I had been thinking of doing *Lincoln Portrait* even before the September 11 attack, because I felt that its message was timeless in reminding us what government and leadership should be for this country. When the bombings occurred the piece became timely as well as timeless, and I'm delighted that both David Baltimore and Ted Mitchell will be available to deliver its message."

The Women's and Men's Glee Clubs and Chamber Singers will present their holiday concert, featuring music of the season, on Friday and Saturday, December 7 and 8, at 8 p.m. in Dabney Lounge. Under the direction of Don Caldwell, the combined glee clubs will perform early-20th-century composer Ottorino Respighi's *Lauda per la Nativita del Signore (Laud to the Nativity)*. Capitalizing on the presence of a native Italian speaker in the Men's Glee Club, the work will be performed in Italian, and the groups will be joined by three professional soloists, including Women's Glee Club director Desiree LaVertu.

"Respighi is best known for pastoral works such as *The Pines of Rome*, featured in Disney's *Fantasia 2000*," says Caldwell. "They abound with melody, highly original orchestration, and powerful climaxes. The *Laud* has moments of great beauty and a stirring 'Gloria in excelsis Deo' finale, and its instrumentation is mostly woodwinds."

In addition, the women's chorus will be singing holiday selections, including Victoria's Renaissance motet *O Magnum Mysterium*, Mendelssohn's *Veni, Domine*, and French carols. The men will perform Pinkham's *Christmas Cantata* and other seasonal music in French and Hebrew, and the Chamber Singers will perform a number of festive selections.

Last but not least, the glee clubs will hold their ever-popular *Messiah* sing-along on Friday, December 14, from noon to 1 p.m. in Dabney Lounge. Donald Caldwell, director of the men's chorus, will conduct, accompanied by Wendy Caldwell. As is traditional, Caldwell invites students or other guest artists who would like to audition for solos to contact him at ext. 6197 or dgc@caltech.edu, and welcomes all who would like to take part.

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<http://atcaltech.caltech.edu/calendar/>. To publish events online, register as an event planner on the @Caltech calendar. If unable to submit electronically, please call (626) 395-3630. For further information or a schedule of deadlines, call **(626) 395-3630**, fax (626) 449-2159, write *336 Calendar*, 1-71, California Institute of Technology, Pasadena, CA 91125, or e-mail debbieb@caltech.edu.

November 19–29, 2001

M T W T F S S

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

Monday, November 19

Aeronautics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 1 p.m.—“Modeling, Analysis, Simulations, and Computing (MASC) on Turbomachinery Aerodynamics,” Robert P. Nirschl, Pratt & Whitney. Information: www.galcit.caltech.edu/seminars.shtml.

Computation and Neural Systems Seminar
24 Beckman Labs, 4 p.m.—“Predictive Learning in Time-Continuous Systems: A Theoretical Approach Towards Classical Conditioning,” Professor Florentin Woergoetter, department of psychology, University of Stirling, Scotland.

General Biology Seminar
119 Kerckhoff, 4 p.m.—“Structural Analysis of the Hearing Organelle by Electron Tomography,” Manfred Auer, Skirball Institute for Biomolecular Medicine, NYU Medical Center.

Geology and Planetary Sciences Seminar
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“A Fault Friction Driven Model of Crustal Stress in the Los Angeles Region,” Brad Aagaard, U.S. Geological Survey. Information: www.gps.caltech.edu.

Inorganic-Electrochemistry Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Redox Reactions in Biofilms: Mechanisms and Consequences,” Dianne Newman, Clare Booth Luce Assistant Professor of Geobiology and Environmental Engineering Science, Caltech.

Applied and Computational Mathematics Colloquium
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 4:15 p.m.—“Fast Time Domain Integral Equation Solvers,” Eric Michielssen, associate professor of electrical and computer engineering, University of Illinois at Urbana-Champaign. Refreshments, 3:45 p.m.

Astronomy Tea Talk
106 Robinson, 4:15 p.m.—“The Nuclei of Nearby Galaxies with HST,” Gijs Verdoes, University of Leiden.

Tuesday, November 20

Caltech Library System Presents: Structure Searching Quick Review
Sherman Fairchild Library, multimedia conference room, noon to 1:30 p.m.—Learn to search chemical structures and reactions and display and print compound records. Information and registration: <http://library.caltech.edu/learning/form.htm>.

Ir/sub-mm/mm Sack Lunch
469 Lauritsen, 12:15 p.m.—“Overview of the Extragalactic Sub-mm Sources: Detection/Identification Success and Reliability,” Scott Chapman, senior postdoctoral scholar in astronomy, Caltech. Information: www.submm.caltech.edu/~motte/sacklunch.html.

Institute for Quantum Information Seminar
74 Jorgensen, 3 to 4:30 p.m.—Topic to be announced. Dorit Aharanov, Hebrew University.

Carnegie Observatories Colloquium Series
William T. Golden Auditorium, 813 Santa Barbara Street, 4 p.m.—“Formation of the Galactic Halo,” Jennifer Johnson, Carnegie Observatories. Refreshments, 3:30 p.m. Information: Bronagh Glaser, 304-0241 or bronagh@ociw.edu.

General Biology Seminar
119 Kerckhoff , 4 p.m.—“Regulation of Cell Fates and Gene Expression in the Immune System,” Harinder Singh, associate professor, Howard Hughes Medical Institute, University of Chicago.

William Bennett Munro Memorial Seminar
25 Baxter, 4 p.m.—“Cortical Reorganization of Visual and Language Functions after Early Auditory Deprivation,” Daphne Bavelier, assistant professor, Brain and Cognitive Sciences, Radiology, and the Center for Visual Science, University of Rochester. Refreshments.

Third Lee A. DuBridge Distinguished Lecture
Beckman Auditorium, 8 p.m.—“A Conversation with John Hume.” Corecipient of the 1998 Nobel Peace Prize for his peace efforts in Northern Ireland, John Hume will be interviewed by the *Boston Globe's* Kevin Cullen. Free admission, no tickets required. Doors open at 7:30 p.m. Information: (626) 395-4652 or (888) 222-5832.

Wednesday, November 21

Mathematical Physics Seminar
351 Sloan, noon—“Capacity of Noisy Quantum Channels,” Professor Mary Beth Ruskai, department of mathematics, University of Massachusetts, Lowell. Information: www.math.caltech.edu/events/mathphys.html.

Thursday, November 22

Thanksgiving holiday

Friday, November 23

Institute holiday

Monday, November 26

Aeronautics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 1 p.m.—GALCIT laboratory tours for first-year GALCIT graduate students. Information: www.galcit.caltech.edu/seminars.shtml.

Geology and Planetary Sciences Seminar
155 Arms, Robert Sharp Lecture Hall, 2 p.m.—“A Worm at One End and a Fool at the Other: Trace Fossils and the Early Evolution of Animals,” Sören Jensen, postdoctoral scholar, department of earth sciences, UC Riverside. Information: www.gps.caltech.edu/seminars/seminars_events.html.

Computation and Neural Systems Seminar
24 Beckman Labs, 4 p.m.—“Reverse Engineering the Visual System,” Simon Thorpe, CNRS Research Director, Centre de Recherche Cerveau et Cognition, Toulouse, France.

Astronomy Tea Talk
106 Robinson, 4:15 p.m.—Topic to be announced. Andrew Benson, postdoctoral scholar in astronomy, Caltech.

Tuesday, November 27

Caltech Library System Presents: Business Resources
Sherman Fairchild Library, multimedia conference room, noon to 1:30 p.m.—Learn business research strategies and methods for finding information on companies and industries. Information and registration: <http://library.caltech.edu/learning/form.htm>.

Institute for Quantum Information Seminar
74 Jorgensen, 3 to 4:30 p.m.—Topic to be announced. Andrew Ambainis, UC Berkeley.

Ulric B. and Evelyn L. Bray Seminar
25 Baxter, 4 p.m.—“The Rich and the Dead: Socioeconomic Status and Mortality in the U.S., 1850–60,” Joseph Ferrie, associate professor of economics and director of graduate studies, Northwestern University. Refreshments.

Carnegie Observatories Colloquium Series
William T. Golden Auditorium, 813 Santa Barbara Street, 4 p.m.—“Type II Supernovae as Distance Indicators,” Dr. Mario Hamuy, Carnegie Observatories. Refreshments, 3:30 p.m. Information: Bronagh Glaser, 304-0241 or bronagh@ociw.edu.

Chemical Physics Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Weakly Bound Complexes in OH Reactions and Their Impact on the Atmosphere,” Professor A. R. Ravishankara, department of chemistry and biochemistry, University of Colorado, Boulder.

Inaugural Thomas Wolff Memorial Lecture in Mathematics 2001
151 Sloan, 4:15 p.m.—“Sharp Fronts for Incompressible Fluids,” Charles Fefferman, Herbert E. Jones, Jr., Professor of Mathematics, and chair, department of mathematics, Princeton University.

Wednesday, November 28

Mathematical Physics Seminar
351 Sloan, noon—“Continuity of the Lyapunov Exponent For Quasiperiodic Operators,” Svetlana Zhitomirskaya, UC Irvine. Information: www.math.caltech.edu/events/mathphys.html.

Astronomy Colloquium
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“The Highest-Energy Gamma Rays from Gamma-Ray Bursts,” Brenda Dingus, associate professor of physics, University of Wisconsin–Madison. Information: <http://astro.caltech.edu/~jlc/colloquia.html>.

Environmental Science and Engineering Seminar
142 Keck, 4 p.m.—“Age, Carbon Content, and Climatic Sensitivity of the West Siberian Peatlands.” Laurence Smith, assistant professor, department of geography and department of earth and space sciences, UCLA. Refreshments, Keck lobby, 3:40 p.m. Information: www.esse.caltech.edu/seminars.html.

Frontiers in Science Seminar
Pierce College, 6201 Winnetka Avenue, Music Room 3400, Woodland Hills, 4 p.m.—“A Different View of the DNA Helix: A Conduit for Charge Transfer,” Jacqueline Barton, Arthur and Marian Hanisch Memorial Professor and professor of chemistry, Caltech. Presented jointly by Caltech and Pierce College. Free admission. Information: 395-6024 or (818) 703-0826.

Organic Chemistry Seminar
147 Noyes, Sturdivant Lecture Hall, 4 to 5:30 p.m.—“Exploring Chemical Diversity of Epoxyquinoid Natural Products,” Professor John A. Porco, department of chemistry, Boston University.

Wiersma Lecture
24 Beckman Labs, 4 p.m.—“Mechanisms and Applications of Gain Modulation in Neural Circuits,” Larry Abbott, professor of biology, Brandeis University.

Thursday, November 29

Joint Mechanical Engineering and Aeronautics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 3 p.m.—“The Viscoelastic Behavior of Particle-Reinforced Elastomers at Finite Strains,” Dr. Luis Dorfmann, Institute of Structural Engineering, Vienna. Refreshments after the seminar in Lees-Kubota foyer. Information: www.galcit.caltech.edu/seminars.shtml.

Constantin G. Economou Memorial Lecture in Chemical Engineering
106 Spalding Lab, Hartley Memorial Seminar Room, 4 p.m.—“The Physics of Stiff Polymers: From DNA to Kevlar,” Andrew Spakowitz, graduate student in chemical engineering, Caltech. Refreshments, 113 Spalding, 3:30 p.m. Information: www.cheme.caltech.edu/seminars/seminars.html.

Geology Club Seminar
151 Arms, Buwalda Room, 4 p.m.—“Isotopic Imaging of Presolar Organic Matter in Interplanetary Dust Particles,” Tori Hoehler, NASA. Refreshments, 3:45 p.m. Information: www.gps.caltech.edu/seminars/geoclub/.

Physics Research Conference
201 E. Bridge, 4 p.m.—“Disk Accretion onto Neutron Star: Boundary Layer and Ways To Distinguish Black Holes from Neutron stars,” Rashid Sunyaev, Max Planck Institute for Astrophysics, Garching. Refreshments, 108 East Bridge, 3:45 p.m. Information: www.pma.caltech.edu/~physcoll/PhysColl.html.

Thursday, November 29, continued on reverse...

November 29–December 9, 2001

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Inaugural Thomas Wolff Memorial Lecture in Mathematics 2001
151 Sloan, 4:15 p.m.—“Local Conformal Invariants,” Charles Fefferman, Herbert E. Jones, Jr., Professor of Mathematics, and chair, department of mathematics, Princeton University.

Special Fluid Mechanics Seminar: Klein Memorial Lecture
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 4:30 p.m.—“Design of the Blended-Wing-Body Subsonic Transport,” Professor Robert Liebeck, MIT/Boeing. Information: www.galcit.caltech.edu/Seminars/Fluids/CurrentFluids/index.html.

Von Karman Lecture Series
von Karman Auditorium, JPL, 7 p.m.—“The Hunt for Earth-like Planets,” Dr. Charles Beichman, chief scientist, NASA’s origins program, JPL. Admission is free. Information: www.jpl.nasa.gov/events/lectures.html.

Friday, November 30

Fluid Mechanics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 3 p.m.—Topic to be announced. Graham Candler, associate professor, department of aerospace engineering and mechanics, University of Minnesota, Twin Cities. Information: www.galcit.caltech.edu/Seminars/Fluids/CurrentFluids/index.html.

Ulric B. and Evelyn L. Bray Seminar
25 Baxter, 4 p.m.—“Learning and Strategic Complementarities,” Federico Echenique, assistant professor of economics, Torcuato Di Tella University, Argentina. Refreshments.

Computer Science 0.1 Seminar
Baxter Lecture Hall, 4 p.m.—“Interconnect: A Prime Example of the Intimate Relationship between the Physical World and Our Computing Landscape,” Andre DeHon, assistant professor of computer science, Caltech. Information: www.cco.caltech.edu/~koonin/cs.html.

Inorganic-Organometallics Seminar
151 Crellin, 4 p.m.—Topic to be announced. Matthias Pascaly, postdoctoral scholar in chemistry, Caltech.

Von Kármán Lecture Series
Pasadena City College, 1570 E. Colorado, the Forum (south of Colorado on Bonnie), 7 p.m.—“The Hunt for Earth-like Planets,” Dr. Charles Beichman, chief scientist, NASA’s Origins Program, JPL. Admission is free. Information: www.jpl.nasa.gov/events/lectures.html.

Monday, December 3

Thesis Seminar
106 Spalding Lab, Hartley Memorial Seminar Room, 11 a.m.—“Biologically Engineered Protein-Graft-Poly (Ethylene Glycol) Hydrogels: A Cell-Adhesive and Enzyme-Degradable Biosynthetic Material for Tissue Repair,” Sven Halstenberg, graduate student in chemical engineering, Caltech.

Aeronautics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 1 p.m.—“Spaceflight Safety,” Jeff Claxton, NASA Dryden Flight Research Center. Information: www.galcit.caltech.edu/seminars.shtml.

Inorganic-Electrochemistry Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Hydrogen Sensors and Hydrogen Actuated Switches from Arrays of Palladium Nanowires,” Professor Reginald M. Penner, associate professor, department of chemistry, UC Irvine.

Kliegel Lecture in Geology and Planetary Sciences
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“Razing Tibet: Uplift, Crustal Mush, and River Erosion of the Eastern Tibetan Plateau,” Professor Leigh H. Royden, department of earth, atmospheric, and planetary sciences, MIT. Information: www.gps.caltech.edu/seminars/seminars_events.html.

Applied and Computational Mathematics Colloquium
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 4:15 p.m.—“New Methods in Condensed-Matter Electronic Structure Theory,” Emily A. Carter, professor of chemistry, UCLA. Refreshments, 3:45 p.m.

Astronomy Tea Talk
106 Robinson, 4:15 p.m.—“Internal Dynamics of Dwarf Elliptical Galaxies,” Marla Geha, Lick Observatories.

Tuesday, December 4

Caltech Library System Presents: Copyright for Researchers in Academia
Sherman Fairchild Library, multimedia conference room, noon to 1:30 p.m.—Rights and responsibilities under copyright law will be discussed by Kimberly Douglas, director of the Sherman Fairchild Library, and attorney Peggy Luh, Caltech’s Office of the General Counsel. Information and registration: <http://library.caltech.edu/learning/form.htm>.

Carnegie Observatories Colloquium Series
William T. Golden Auditorium, 813 Santa Barbara Street, 4 p.m.—“The Atacama Large Millimeter Array: Imaging Cosmic Dawn,” Dr. Al Wootten, National Radio Astronomy Observatory. Refreshments, 3:30 p.m. Information: Bronagh Glaser, 304-0241 or bronagh@ociw.edu.

Inorganic-Electrochemistry Seminar
147 Noyes, Sturdivant Lecture Hall, 4 p.m.—“Nanostructured Dye Sensitization Solar Cells: Mechanism, Problems, Challenges,” Professor Helmut Tributsch, Hahn-Meitner Institute, Berlin.

Inaugural Thomas Wolff Memorial Lecture in Mathematics 2001
151 Sloan, 4:15 p.m.—“Domination of Pseudodifferential Operators,” Charles Fefferman, Herbert E. Jones, Jr., Professor of Mathematics, and chair, department of mathematics, Princeton University.

Wednesday, December 5

Mathematical Physics Seminar
351 Sloan, noon—“A Complete Description of the Spectral Measures of Hilbert-Schmidt Perturbations of the Free Jacobi Matrix,” Barry Simon, International Business Machines Professor of Mathematics and Theoretical Physics, Caltech. Information: www.math.caltech.edu/events/mathphys.html.

Astronomy Colloquium
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—“The First Sources of Light and the Reionization of the Universe,” Abraham Loeb, professor of astronomy, Harvard University. Information: <http://astro.caltech.edu/~jlc/colloquia.html>.

Environmental Science and Engineering Seminar
142 Keck, 4 p.m.—“Deciphering Structure-Function Relationships in Microbial Communities Using DNA Microarrays,” Professor Martin Polz, civil and environmental engineering department, MIT. Refreshments, Keck lobby, 3:40 p.m. Information: www.eso.caltech.edu/seminars.html.

NIMH Silvio Conte Research Center for Neuroscience Seminar
24 Beckman Labs, 4 p.m.—Topic to be announced. Professor John David Sweatt, division of neuroscience, Baylor College of Medicine.

Thursday, December 6

ME 72 Design Contest
Beckman Auditorium, 2 to 4 p.m.—Devices designed and built by teams of undergraduate students will compete against one another. Erik Antonsson, professor of mechanical engineering, Caltech, will preside; spectators are welcome. Admission is free. Information: <http://design.caltech.edu/Courses/ME72/>.

Constantin G. Economou Memorial Lecture in Chemical Engineering
106 Spalding Lab, Hartley Memorial Seminar Room, 4 p.m.—“Second Normal Stress Jump Instability in Non-Newtonian Fluids,” Ileana C. Carpen, graduate student in chemical engineering, Caltech. Refreshments, 113 Spalding Labs, 3:30 p.m. Information: www.cheme.caltech.edu/seminars/seminars.html.

General Biology Seminar
119 Kerckhoff, 4 p.m.—“The Expanding Roles of Cryoelectron Microscopy in Structural Biology,” Grant Jensen, Lawrence Berkeley National Laboratory.

Geology Club Seminar
151 Arms, Buwalda Room, 4 p.m.—“Isotopic Imaging of Presolar Organic Matter in Interplanetary Dust Particles,” Jerome Aleon, UCLA. Refreshments, 3:45 p.m. Information: www.gps.caltech.edu/seminars/geoclub/.

Physics Research Conference
201 E. Bridge, 4 p.m.—“Using Optical Tweezers to Study Biological Motors,” Professor Steven M. Block, department of applied physics and department of biological sciences, Stanford University. Refreshments, 108 East Bridge, 3:45 p.m. Information: www.pma.caltech.edu/~physcoll/PhysColl.html.

Science, Ethics, and Public Policy Seminar
25 Baxter, 4 p.m.—“The Pyramids and Prehistory: A Battle Royal in the Early Development of Scientific Archaeology,” David McGee, Sloan/Dibner Fellow, Dibner Institute for the History of Science and Technology, MIT. Refreshments. Information: www.hss.caltech.edu/ses/SEPP.html.

Inaugural Thomas Wolff Memorial Lecture in Mathematics 2001
151 Sloan, 4:15 p.m.—“Hedging of Options with Transaction Costs,” Charles Fefferman, Herbert E. Jones, Jr., Professor of Mathematics, and chair, department of mathematics, Princeton University.

Friday, December 7

Fluid Mechanics Seminar
101 Guggenheim Laboratory, Lees-Kubota Lecture Hall, 3 p.m.—“Shock Waves at Microscales,” Professor Martin Brouillette, department of mechanical engineering, Université de Sherbrooke. Information: www.galcit.caltech.edu/Seminars/Fluids/CurrentFluids/index.html.

Computer Science 0.1 Seminar
Baxter Lecture Hall, 4 p.m.—“Congestion Control for the Internet,” Steven Low, associate professor of computer science and electrical engineering, Caltech. Information: www.cco.caltech.edu/~koonin/cs.html.

Inorganic-Organometallics Seminar
151 Crellin, 4 p.m.—“Base Promoted C-H Activation Reactions of Platinum Complexes Supported by Amido Pincer Ligands,” Seth Harkins, graduate student in chemistry, Caltech.

LIGO Seminar
155 Arms, Robert Sharp Lecture Hall, 4 p.m.—Topic to be announced. Szabolcs Marka, postdoctoral scholar, LIGO Laboratory, Caltech.

Saturday, December 8

Caltech MIT Enterprise Forum
Baxter Lecture Hall, 7:45 a.m. to 12:30 p.m.—“How Entrepreneurs Succeed in Nanotechnology.” Speakers/panelists to be announced. Fee: \$40; \$10 for non-Caltech students with valid ID; free to Caltech students and faculty. Registration: 395-3916 or ircshare@caltech.edu. Information: www.entforum.caltech.edu.

CampusEvents

Monday, November 19

Baby Furniture and Household Equipment Pool

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

Ballroom Dance Club

Winnett lounge, 7:30 to 9 p.m.—American samba for beginners, taught by a professional instructor. This is the third of a five-week series on Monday evenings. If you missed the first two classes, come anyway; the figures will be reviewed. No partner is required. Fee: \$8 per lesson; \$6 for Caltech students. Refreshments. A half-hour practice period and general dancing will follow.

Ballroom Dance Mini Party

Winnett lounge, 9 to 11 p.m.—Open dancing; make requests or bring your own music. No partner is required. Refreshments.

Tuesday, November 20

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). Field trip. Information: (323) 550-8075 or jmph-p@pacbell.net.

The Caltech Tai Chi Club

Winnett lounge, 7 to 9 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Caltech Folk-Dancing Club

179 N. Vinedo Ave., Pasadena, 7:30 p.m. to midnight—Meets every Tuesday. Drop-ins are welcome. Donations accepted.

Beginners’ Hip-Hop Dance Class

Braun Gym, multipurpose room, 9 to 10:30 p.m.—Hip-hop classes, professionally taught, sponsored by the Caltech Dance Troupe. Fees for students, \$10 per term; for nonstudents, \$20 per term. Attendees must have a valid gym or student ID. To register, e-mail troupe@caltech.edu.

Wednesday, November 21

Baby Furniture and Household Equipment Pool

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

Ballroom Dance Club

Winnett lounge, 7:30 to 9 p.m.—American waltz for beginners, amateur-taught. This is the third of a five-week series; if you missed the first two lessons but know the basic figure, come anyway. No partner is required. \$1 per lesson; free for freshmen or those taking the class for PE credit. Refreshments and a half-hour practice period follow each class.

Thursday, November 22

Thanksgiving holiday

Friday, November 23

Institute holiday

The Caltech Tai Chi Club

Winnett lounge, 7 to 9 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Saturday, November 24

Men’s Basketball

vs. San Jose Christian, 3 p.m.

Monday, November 26

Baby Furniture and Household Equipment Pool

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

Ballroom Dance Club

Winnett lounge, 7:30 to 9 p.m.—American samba for beginners, taught by a professional instructor. This is the fourth of a five-week series on Monday evenings. If you missed the first three classes but know the basic step, come anyway. No partner is required. Fee: \$8 per lesson; \$6 for Caltech students. Refreshments. A half-hour practice period and general dancing will follow.

Ballroom Dance Mini Party

Winnett lounge, 9 to 11 p.m.—Open dancing; make requests or bring your own music. No partner is required. Refreshments.

Tuesday, November 27

Preschool Playgroup

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

The Caltech Tai Chi Club

Winnett lounge, 7 to 9 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Caltech Folk-Dancing Club

179 N. Vinedo Ave., Pasadena, 7:30 p.m. to midnight—Meets every Tuesday. Drop-ins are welcome. Donations accepted.

Beginners’ Hip-Hop Dance Class

Braun Gym, multipurpose room, 9 to 10:30 p.m.—Hip-hop classes, professionally taught, sponsored by the Caltech Dance Troupe. Fees for students, \$10 per term; for nonstudents, \$20 per term. Attendees must have a valid gym or student ID. To register, e-mail troupe@caltech.edu.

Wednesday, November 28

Baby Furniture and Household Equipment Pool

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

PowerPoint Glitches and Solutions

New Media Classroom, 363 S. Hill Avenue, in the building behind the Einstein Papers house, noon—Some common problems with using PowerPoint will be explained, along with tips for making presentations more manageable. New features that may be useful to users of PowerPoint will be demonstrated. Information: <http://twing.caltech.edu/demos>. Registration: 395-3420 or dmc@caltech.edu.

Swimming and Diving

at Whittier College, 4 p.m.

Ballroom Dance Club

Winnett lounge, 7:30 to 9 p.m.—American waltz for beginners, amateur-taught. This is the fourth of a five-week series; if you missed the first three lessons but know the basic figure, come anyway. No partner is required. \$1 per lesson; free for freshmen or those taking the class for PE credit. Refreshments and a half-hour practice period follow each class.

Thursday, November 29

Amnesty International Monthly Meeting

Caltech Y lounge, 7:30 to 9 p.m.—Meet to discuss plans for actions on human-rights abuses around the world. Help us plan future actions on Afghanistan, Tibet, the Campaign against Torture, and abolition of the death penalty. Refreshments.

Friday, November 30

The Caltech Tai Chi Club

Winnett lounge, 7 to 9 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Falun Gong: The Real Story

101 Kerckhoff, 7:30 to 9:30 p.m.—Through video documentaries and discussion, learn about what Falun Gong is and why it is persecuted in China. Information: www.its.caltech.edu/~falun.

Saturday, December 1

Swimming and Diving

at Chapman University, 11 a.m.

Ballet Classes

Braun Gym, multipurpose room, 1 to 4:30 p.m.—Free ballet classes sponsored by the Caltech Dance Troupe. No special clothing or shoes are required for the beginners’ class. Beginners meet from 1 to 2 p.m., the intermediate group from 2 to 3:30 p.m., and the advanced group from 3:30 to 4:30 p.m. All attendees must have a valid gym or student ID.

Women’s Basketball

vs. Simpson College, 1 p.m.

Shirley Jones

Beckman Auditorium, 8 p.m.—The first lady of American song presents her holiday show. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Sunday, December 2

Skeptics Society Lecture

Baxter Lecture Hall, 2 to 4:30 p.m.—“INFLUENCE! Turning Persuasion from an Art into a Science (with Commentary on the Making and Unmaking of Terrorist Zeal),” Robert Cialdini, professor of psychology, Arizona State University. Donation is \$8 for nonmembers, \$5 for members and non-Caltech students. Free to the Caltech/JPL community. Tickets and information: 794-3119 or skepticmag@aol.com. Book signing to follow the lecture.

Paco A. Lagerstrom Chamber Music Concerts

Beckman Auditorium, 3:30 p.m.—The Valencia Trio will perform pieces by Castelnuovo-Tedesco, Telemann, Britten, and Debussy. Tickets and information: 395-4652, 1 (888) 2CALTECH, or events@caltech.edu. Individuals with a disability: 395-4688 (voice) or 395-3700 (TDD). Visit Public Events at www.events.caltech.edu.

Monday, December 3

Baby Furniture and Household Equipment Pool

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

Ballroom Dance Club

Winnett lounge, 7:30 to 9 p.m.—American samba for beginners, taught by a professional instructor. This is the last of a five-week series. No partner is required. Fee: \$8 per lesson; \$6 for Caltech students. Refreshments. A half-hour practice period and general dancing will follow.

Ballroom Dance Mini Party

Winnett lounge, 9 to 11 p.m.—Open dancing; make requests or bring your own music. No partner is required. Refreshments.

Tuesday, December 4

Preschool Playgroup

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

Women in Science Lunch

Steele House (carriage house), noon—Professors Jackie Barton and Sossina Haile share their experiences about being women in science. Lunch will be provided. Space is limited; to sign up, e-mail Cynthia Collins at cynthiac@its.caltech.edu.

The Caltech Tai Chi Club

Winnett lounge, 7 to 9 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Caltech Folk-Dancing Club

179 N. Vinedo Ave., Pasadena, 7:30 p.m. to midnight—Meets every Tuesday. Drop-ins are welcome. Donations accepted.

Wednesday, December 5

Baby Furniture and Household Equipment Pool

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

Ballroom Dance Club

Winnett lounge, 7:30 to 9 p.m.—American waltz for beginners, amateur-taught. This is the last of a five-week series. No partner is required. \$1 per lesson; free for freshmen or those taking the class for PE credit. Refreshments and a half-hour practice period follow each class.

Thursday, December 6

Women’s Basketball

vs. Simpson College, 5 p.m.

Men’s Basketball

vs. LIFE Bible College, 7 p.m.

Friday, December 7

The Caltech Tai Chi Club

Winnett lounge, 7 to 9 p.m.—Meets Tuesdays and Fridays weekly. Sessions are free. Information: www.its.caltech.edu/~taichi/.

Women’s Basketball

Caltech Tournament, 8 p.m.

Saturday, December 8

Women’s Basketball

Caltech Tournament, noon.

Men’s Basketball

at Chapman University, 7:30 p.m.

Robotic battle set

The combatants whirr and buzz as they try to outmaneuver each other to move hockey pucks up a steep slope. Caltech’s 17th annual ME 72 Engineering Design contest will be held Thursday, December 6, at 2 p.m. in Beckman Auditorium. The competition, which is free and open to all spectators, pits undergraduate students against each other in designing the best machine to perform a task. For more information, visit <http://design.caltech.edu/Courses/ME72/>.

Thanksgiving hosts sought

In anticipation of the Thanksgiving holiday, members of the Caltech community are encouraged to extend an invitation to international students who find themselves far from home and away from their families.

In return, the host families will have the chance to get an insider's perspective of other cultures and learn what life is like in distant lands.

The call for Thanksgiving hosts is important, says Tara Tram, who is coordinating the program for Caltech's International Student Programs office.

"It's a good experience for the international students," she said. "It's nice for them to learn about what the culture is like here." The students, many for the first time, will get to participate in the thoroughly American tradition of conviviality and a sumptuous feast. It will provide a respite from their highly structured work and the attendant feelings of isolation, Tram said.

There are also benefits for the hosts, who will act in the spirit of Thanksgiving by sharing their prosperity with those in need. There are practical sides to volunteering as well.

"Sometimes they will host a student if they're going to visit the country and want to learn about it and the culture," Tram said. "Some of the hosts ask for a student from a specific field because they're having guests involved in that technology."

Tram said that there is a definite need for Thanksgiving Day hosts. In 1998, 21 students were invited to the homes of 13 families, who were distributed among Caltech and JPL staff, Pasadena Rotary Club members, and city of Pasadena administrators. The following year, 12 families welcomed 16 students, and in 2000, 11 families broke bread with 21 visiting scholars.

Besides providing their hospitality, the hosts may be asked to transport their guest to their homes and back to Caltech.

There are more than 500 international students from some 55 countries at Caltech. To become a host, volunteers may contact Tram at 395-6330 or write to taratram@caltech.edu.

Beauchamp, from page 1

having connections with terrorist organizations. If the profiling system had been in place, I think the airlines would have been alerted along the way to at least part of what was happening.

Why wasn't it widely implemented?

Bureaucratic inertia was certainly a factor. The *Los Angeles Times* reported that while the FAA and the airlines didn't oppose CAPS, their guidelines for implementing them were still mostly "in development" four years later, on September 11.

It's also the case that many older airports, both here and overseas, are not designed with a high level of security in mind. For example, in many airports it is difficult to separate passengers who have been cleared to board aircraft from other individuals.

Did the cost of the profiling system also slow down implementation?

The cost of a CAPS system is probably a fraction of the cost of equipment for explosives and weapon detection, in which the government has made a substantial investment. One of the commission's other recommendations was that the government purchase high-end X-ray computer tomography equipment that can scrutinize luggage specifically for explosives-type materials. And in fact, the government has since spent hundreds of millions of dollars buying this equipment.

But does it get used?

Up to now it's been used mostly on international flights, where it's required that both checked luggage and carry-ons be X-rayed. There's been no similar requirement for domestic flights, and a bomb in a suitcase could conceivably go undetected on a domestic flight.

In any case, the focus has been mostly on trying to keep explosives and weapons off planes, and it's now become clear that the challenge is much broader than that. People taking control of an aircraft and then using the aircraft itself as a weapon represents a major escalation of the game.

There's a debate under way in Congress about whether to federalize aspects of airline security that have mostly been subcontracted to private companies. Did the Gore Commission take a particular stand on oversight?

The prevailing view was that it probably doesn't matter so much who's handling airline security as long as they're doing a good job. Clearly this has not generally been the case. The people hired by these security firms get minimal training, wages, and benefits. The turnover is just enormous. This is a huge problem that needs to be addressed.

Part of our work on the commission involved looking at how security procedures are handled outside the United States. We took a close look at Israel, where passengers traveling on the national airline, El Al, are routinely scrutinized much more closely than they are anywhere else.

Highly trained professionals do these jobs, and not much gets by them.

Anyone who seems suspect has their baggage examined with sophisticated scanning equipment. They use chemical assays to test for explosives, and if they're still not satisfied, they will take items and disassemble them. I once watched them work on a very expensive-looking pair of in-line skates that had custom molded liners. They shoved a big syringe through the side of the skate and took out a sample of the gel inside because of the possibility that it could have been a plastic explosive.

But Israel has only a couple of major airports, and they handle only a fraction of the air traffic that we have. Providing that kind of hands-on scrutiny at every check point in this country would be impossible. That again is why computerized profiling was suggested.

Another part of the Israeli equation is that they have air marshals on all El Al flights. We certainly don't do that routinely here, although there is more talk about doing it now. I had an opportunity to visit the air-marshall training school. They have a commencement exercise in which graduates go through a simulated hijacking in a mock 747 cabin. The scenario involved a terrorist who had grabbed a passenger and was holding a weapon on him and trying to get into the flight-deck area. It was not unlike what actually happened in September. The graduate's role was to kill the terrorist.

Was he successful?

He passed, but not without criticism. When he jumped up to thwart the hijacking, he failed to look over his shoulder. So he was criticized because there might have been another party sneaking up on him. It was all pretty authentic.

Whether we'll see such things implemented here, I don't know. I hope not. We don't want to see this country become like a police state, and the more individuals you have carrying arms in an official capacity, the more it resembles one. Do we really want to put people carrying live ammunition on aircraft? Doing that on the scale we'd need to in this country seems to me to create more potential problems than it solves.

Given your own work in flight security, did the September 11 attacks take you by surprise?

Yes. I personally consider it a massive failure of intelligence. The intelligence agencies knew about some of these people, and the fact that they didn't give the airlines a heads-up points to a real system breakdown. I don't want to finger-point here—I worked with FBI and CIA people on the commissions, and they have a tough job. It's hard in this country because of the personal freedoms we all enjoy. But I do think that from now on, people who are regarded as security risks will be much more closely monitored. I certainly hope so.



Ed Stone and Adam Schiff

Students, from page 1

provost Steve Koonin and Congressman Adam Schiff. The quarterly lectures are designed for high school and junior college math and science students, giving them the chance to learn about science opportunities from the personalized view of Caltech researchers.

With slides and videotape from the most current missions, Stone explained NASA's ongoing exploration of Mars. The Odyssey orbiter is designed to make global observations of Mars to improve understanding of its climate and geologic history, including searching for water and evidence of life-sustaining environments. The mission will extend for more than one Martian year (two-and-a-half Earth years).

Elizabeth Krider, Caltech's assistant director of government and community relations and co-coordinator of the event, was impressed with the student audience. "The students had read about Odyssey beforehand, and they asked outstanding, very pertinent questions," she said.

All students who live or attend school within the 27th Congressional District have a special invitation to attend the lecture series, which is free and open to the public. Future topics will span physics, biology, chemistry, and math. For more information, contact Krider in Caltech's Government and Community Relations Office at ext. 8179 or ek@caltech.edu.

RAINing, from page 1

Internet—work cooperatively. Rainwall distributes network traffic evenly among firewall servers (one type of gateway server), thus reducing traffic bottlenecks and increasing the reliability of connections. A second product, Rainfront, also increases firewall availability, but adds Web server load balancing. Rainfinity's first customer, the Chicago Stock Exchange, has since been joined by many other clients—among them Andersen Consulting (now Accenture), Advanced Micro Devices, Home Shopping Network, and Dresdner Bank Group. The company now has more than 90 employees, and offices in San Jose, London, Munich, and Pasadena.