CALIFORNIA INSTITUTE *of* TECHNOLOGY

One Hundred Fifteenth Annual Commencement

June 12, 2009

Cover: Caltech's commencement ceremony,
by Joseph Stoddard.

This program is produced by Caltech Public Relations.
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CALIFORNIA INSTITUTE *of* TECHNOLOGY

One Hundred Fifteenth
Annual Commencement

Friday Morning at Ten O'Clock
June Twelfth, Two Thousand Nine

IN HIS DIARY ENTRY of September 1, 1891, Pasadena philanthropist Amos Throop wrote, "Planted potatoes, cleaned a water pipe, husked the corn . . . In afternoon, saw Mr. Wooster and rented his block for five years . . . and hope I have made no mistake." Were he here today, Throop could rest assured in his decision. For the building of which he wrote, the Wooster Block, was rented for the purpose of establishing Throop University—the forerunner of Caltech.

In November of that year, Throop University opened its doors to 31 students and a six-member faculty. Could anyone have imagined then that the school would become a world center for science and engineering research and education? Perhaps . . . for in the first year, the board of trustees began to reconsider the mission of the school. In 1892, they decided to emphasize industrial training, and in 1893, reflecting this new focus, renamed the school Throop Polytechnic Institute.

Throop might have remained just a good local school had it not been for the arrival in Pasadena of George Ellery Hale. A faculty member at the University of Chicago and a noted astronomer, Hale settled here in 1903. From that time until his death in 1938, he made significant contributions to Pasadena and Southern California: he established the Mount Wilson Observatory, raised funds for Palomar Observatory and its 200-inch telescope, participated in the creation of the Huntington Library and Art Gallery, helped design the Civic Center in downtown Pasadena, and—perhaps his single greatest achievement—set the

course for the development of Throop into the California Institute of Technology, a school he envisioned as a scientific institution of the highest rank.

In 1913, Hale convinced Arthur Amos Noyes, professor of chemistry and former president of the Massachusetts Institute of Technology, to join him in Pasadena. With the arrival in 1917 of Robert Andrews Millikan, professor of physics at the University of Chicago, Hale had assembled the founders of the new institution. The world center of scientific and engineering research and education he had imagined soon took shape under a new name, the California Institute of Technology, administered by Millikan and enriched with the scientific talents of Noyes and his faculty colleagues.

And amazing things indeed have happened at Caltech over the years. Theodore von Kármán developed the principles that made jet flight possible, Charles Richter published his logarithmic scale for measuring the magnitude of earthquakes, and astronomer Maarten Schmidt discovered the nature of quasars. Here Linus Pauling determined the nature of the chemical bond, Max Delbrück conducted the studies of bacterial viruses that led to a new branch of biology called molecular genetics, Murray Gell-Mann theorized that all particles are made up of quarks and anti-quarks, and Roger Sperry developed new insights into the implications of right-brain and left-brain functions. And not only did the faculty have great impact on the world. Caltech alumni such as Charles Townes developed the laser, Chester Carlson invented Xerography; David Ho did landmark work in creating an effective AIDs drug treatment; Gordon Moore founded a semiconductor industry. Many alumni have gone on to make substantial marks in the business world, such as Simon Ramo and Ben Rosen, while others have become astronauts, university presidents, government leaders, and even authors, directors, and performance artists of note. Caltech's reach has certainly been wide and longlasting.

Caltech today has a 124-acre campus and operates eight off-campus astronomical, seismological, and marine biological facilities, and administers

NASA's Jet Propulsion Laboratory as well. At present, the Institute has an enrollment of some 2,100 students, more than half of whom are in graduate studies; about 290 professorial faculty members, including five Nobel laureates and three Crafoord laureates; and about 60 research faculty members. Today, Caltech will award 214 students the B.S. degree; 117 students the M.S. degree; 2 scholars the degree of Engineer; and 193 doctoral candidates the Ph.D. degree, for a total of 526 graduates—quite a leap from the one man and one woman who constituted the first collegiate graduating class of Throop Polytechnic Institute.

THESE TRIBAL RITES have a very long history. They go back to the ceremony of initiation for new university teachers in mediaeval Europe. It was then customary for students, after an appropriate apprenticeship to learning and the presentation of a thesis as their masterpiece, to be admitted to the Guild of Masters of Arts and granted the license to teach. In the ancient University of Bologna this right was granted by authority of the Pope and in the name of the Holy Trinity. We do not this day claim such high authority.

As in any other guild, whether craft or merchant, the master's status was crucial. In theory at least, it separated the men from the boys, the competent from the incompetent. On the way to his master's degree, a student might collect a bachelor's degree in recognition of the fact that he was half-trained, or partially equipped. The doctor's degree was somewhat different. Originally indistinguishable from the master's, the doctor's gradually emerged by a process of escalation into a super magisterial role—first of all in the higher faculties of theology, law, and medicine. It will come as no surprise that the lawyers had a particular and early yen for this special distinction.

These graduations and distinctions are reflected in the quaint and colorful niceties of academic dress.

Of particular interest is the cap or mortarboard. In the form of the biretta it was the peculiar sign of the master. Its use has now spread far beyond

that highly select group to school girls and choir boys and even to the nursery school. *Sic transit . . .*

The gown, of course, is the basic livery of the scholar, with its clear marks of rank and status—the pointed sleeves of the bachelor, the oblong sleeves of the master, the full sleeves and velvet trimmings of the doctor. The doctors, too, may depart from basic black and break out into many colors—Harvard crimson or Yale blue or the scarlet splash of Oxford.

Color is the very essence of the hood: color in the main body to identify the university; color perhaps in the binding to proclaim the subject of the degree—orange for engineering, gold for science, the baser copper for economics, white for arts and letters, green for medicine, purple for law, scarlet for theology, and so on. Size is a further variable, as the hoods tend to lengthen from the three feet of the bachelor to the four of the doctor. So the birds are known by their plumage.

With this color and symbolism, which is mediaeval though mutated, we stage our brief moment of pageantry, paying homage to that ancient community of scholars in whose shadow we stand, and acknowledging our debt to the university as one of the great institutional constructs of the Middle Ages. While looking back, however, we also celebrate the achievements of this present generation of students and look forward to the future of these our younger colleagues, whom we now welcome to our midst.

David C. Elliot (1917–2007)
Professor of History, Emeritus

STEVEN CHU is a distinguished experimental physicist and scientific administrator, a Nobel laureate, and now the 12th United States secretary of energy. As a member of President Obama's cabinet, Chu is devoted to the search for new solutions to energy challenges and to stopping global climate change through control of greenhouse-gas emissions and through research into advanced biofuels, artificial photosynthesis, and other forms of energy.

Born in St. Louis, Chu was raised in a family of highly accomplished academics. As he has said, "Education in my family was not merely emphasized. It was our raison d'être." But in his early years, he most enjoyed building plastic model airplanes and warships, creating devices with erector sets, and experimenting with homemade rockets. Unlike his older brother, who set their high school's record for the highest cumulative grade-point average, he approached schoolwork "as a chore rather than an intellectual adventure."

As a freshman at the University of Rochester, however, Chu found himself inspired by the work of Caltech physicist Richard Feynman. He soon decided to become a theoretical physicist, and so earned a B.A. degree in mathematics and a B.S. in physics. While pursuing graduate work at the University of California, Berkeley, the self-described "academic black sheep" of the family discovered a passion for experimental physics. After earning his Ph.D., Chu joined Bell Laboratories, where he later served as head of the Quantum Electronics Research Department. His research there focused on atomic physics, and his

development of techniques for cooling and trapping atoms using laser light won him the 1997 Nobel Prize in Physics.

In 1987, Chu joined the faculty of Stanford University, where he continued his work in the cooling and trapping of atoms, and also ventured into polymer physics and biology. At Stanford, he helped start Bio-X, a multidisciplinary initiative that brings together the physical and biological sciences with engineering and medicine.

In August 2004, Chu was appointed the director of the Lawrence Berkeley National Laboratory, an organization owned by the U.S. Department of Energy with 4,000 employees and a budget of about $650 million. Motivated by his interest in climate change, Chu encouraged related research in the area, and under his leadership the lab became a center of investigations into biofuels and solar-energy technologies.

On December 15, 2008, President Obama announced Chu's nomination as secretary of energy. "The future of our economy and national security is inextricably linked to one challenge: energy," said the president. "Steven has blazed new trails as a scientist, teacher, and administrator, and has recently led the Berkeley National Laboratory in pursuit of new alternative and renewable energies. He is uniquely suited to be our next secretary of energy as we make this pursuit a guiding purpose of the Department of Energy, as well as a national mission."

The United States Senate on January 20 unanimously confirmed Chu as secretary of energy. In this role he is charged with helping implement President Obama's ambitious agenda to invest in alternative and renewable energy, end the United States' dependence on foreign oil, address the global climate crisis, and create new jobs. The challenges of these programs may seem daunting, so it is fortunate that Chu will have the support of Department of Energy Under Secretary Steve Koonin, the former Caltech professor and provost who was confirmed by the Senate in May.

Academic Procession

Chief Marshal
Konstantinos P. Giapis, Ph.D.

Marshals
Scott E. Fraser, Ph.D.
Barbara C. Green, Ph.D.
John F. Hall, Ph.D.
Melany L. Hunt, Ph.D.
Richard M. Murray, Ph.D.
Zhen-Gang Wang, Ph.D.

Faculty Officers
Judith L. Campbell, Ph. D.
Fiona Cowie, Ph.D.
Richard M. Murray, Ph.D.

Marching Order

Candidates for the Degree of Bachelor of Science
Candidates for the Degree of Master of Science
Candidates for the Degree of Engineer
Candidates for the Degree of Doctor of Philosophy
Faculty Officers
The Faculty
The Chairs of the Divisions
The Deans
The Provost
The Trustees
The Commencement Speaker
The President
The Chairman of the Board of Trustees

PROGRAM

Organ Prelude	Leslie J. Deutsch, Ph.D.
PROCESSIONAL	The Caltech Convocations Brass and Percussion Ensemble *Allen R. Gross, D.M.A., Conductor*
PRESIDING	Kent Kresa *Chairman of the Board of Trustees* *California Institute of Technology*
COMMENCEMENT SPEAKER	Steven Chu, Ph.D. *United States Secretary of Energy*
CHORAL SELECTION "Ode to Joy" chorus (excerpt) from Symphony No. 9, fourth movement, by Ludwig van Beethoven	The Caltech Glee Clubs *L. Desiree LaVertu, M.M., Conductor*
CONFERRING OF DEGREES	Jean-Lou Chameau, Ph.D. *President* *California Institute of Technology*

PRESENTATION OF CANDIDATES FOR DEGREES

For the Degree of Bachelor of Science	John F. Hall, Ph.D. *Dean of Students*
For the Degree of Master of Science and the Degree of Engineer	Joseph E. Shepherd, Ph.D. *Dean of Graduate Studies*
For the Degree of Doctor of Philosophy	Dean Shepherd
Biology	Elliot M. Meyerowitz, Ph.D. *Division Chair*

Chemistry and Chemical Engineering	David A. Tirrell, Ph.D. *Division Chair*
Engineering and Applied Science	Ares J. Rosakis, Ph.D. *Division Chair*
Geological and Planetary Sciences	Kenneth A. Farley, Ph.D. *Division Chair*
Humanities and Social Sciences	Jonathan N. Katz, Ph.D. *Division Chair*
Physics, Mathematics and Astronomy	Andrew E. Lange, Ph.D. *Division Chair*
Announcement of Awards and Concluding Remarks	President Chameau
Alma Mater "Hail CIT" by Manton Barnes, BS '21 EE *(The audience may join in; lyrics are on page 57.)*	The Caltech Glee Clubs, The Caltech Convocations Brass and Percussion Ensemble, and Organ
Recessional	The Caltech Convocations Brass and Percussion Ensemble
Organ Postlude	Dr. Deutsch

Video footage of commencement may be viewed on the Caltech website at http://www.caltech.edu/commencement. The webcast is scheduled to begin after 3 p.m.

Bachelor of Science

Robin George Abraham* *Kottayam, Kerala, India* Applied and Computational Mathematics
Dvin Adalian *Alexandria, Virginia* Physics
Alexander A. Alemi* *West Bend, Wisconsin* Physics
Jessica Anne Arnold *New City, New York* Astrophysics and Planetary Science
Andrew Ascoli *Rocklin, California* Applied and Computational Mathematics and Economics
Yezdan Sher Hadi Badrakhan *Los Angeles, California* Biology
Karthik Balakrishnan* *Rolla, Missouri* Mechanical Engineering
Tania Banerji *West Linn, Oregon* Biology
Rebecca Ann Barter† *Poland Springs, Maine* Engineering and Applied Science (Computation and Neural Systems)
Christopher Beck* *New Canaan, Connecticut* Computer Science and Mathematics
Chris Behn* *Gardena, California* Physics
Yaear Ben Assa *Tel-Aviv, Israel* Physics
Juan Luis Benitez *Fallbrook, California* Mechanical Engineering
Helen Maria Bermudez *Pasadena, California* Biology
Ekta Bhojwani† *Dubai, United Arab Emirates* Chemical Engineering (Biomolecular)
Norbert M. Binkiewicz* *Scottsdale, Arizona* Physics and Business Economics and Management
Nathaniel Louis Borneman *Gaylordsville, Connecticut* Geology
Alexis James Bourel* *Paris, France* Applied and Computational Mathematics
Pradeep Bugga* *Arcadia, California* Chemistry
Jason M. Burt *Exton, Pennsylvania* Mechanical Engineering
Natasha Cayco Gajic* *Fremont, California* Applied and Computational Mathematics
Jason R. Cerundolo *Lexington, Massachusetts* Mechanical Engineering
Marissa Theresa Cevallos *Charleston, West Virginia* Astrophysics
Arthur Hsu Chen Chang* *Irvine, California* Electrical Engineering
Cliff Kwon-Fu Chang* *Wilmette, Illinois* Computer Science
Daniel S. Chao* *Taiwan (ROC)* Physics
Justin Gejune Chen *Bethesda, Maryland* Physics

* *Students whose names are followed by an asterisk are being graduated with honor in accordance with a vote of the faculty.*

† *Students whose names are followed by a dagger are close to completion and will receive diplomas when all graduation requirements are met.*

Bachelor of Science *continued*

Kevin Kuan-Wei Chen* *Irvine, California* Engineering and Applied Science (Aeronautics)
Stephen Si Cheng *Chico, California* Mechanical Engineering
Maria Irina Chiriac* *Bucharest, Romania* Chemistry
Rico Ngan Suen Chiu *San Jose, California* Applied Physics and Business Economics and Management
Lauren Elizabeth Chu* *Saratoga, California* Mechanical Engineering
Gabriel Adam Cohn* *Sammamish, Washington* Electrical Engineering
Michael Joseph Comstock II *Del Mar, California* Computer Science
Michael Aaron Conley* *San Geronimo, California* Computer Science
Bud B. Coulson* *Pittsburgh, Pennsylvania* Mathematics
Nathan Charles Crook* *Long Beach, California* Chemical Engineering (Biomolecular)
Daniel Francis Cullina†* *Chicago, Illinois* Electrical Engineering and Business Economics and Management
Matthew James Czubakowski *Bethel, Connecticut* Electrical Engineering
Matthew Michael Dellatorre *Bethesda, Maryland* Applied and Computational Mathematics
Christopher Joseph Dempsey *The Woodlands, Texas* Chemical Engineering (Biomolecular)
Phillip Thomas Deutsch *La Cañada, California* Computer Science
Arkya (Misha) Dhar* *Ann Arbor, Michigan* Engineering and Applied Science (Computation and Neural Systems)
Mary Dorman* *Chicago, Illinois* Mechanical Engineering
Sherwin Doroudi† *Mission Viejo, California* Mathematics and Economics
Andrea Rose Dubin* *Farmington Hills, Michigan* Chemistry and Philosophy
Evan Philip Dummit* *Shelburne, Vermont* Mathematics
Omer Durak *Gebze, Kocaeli, Turkey* Biology
Jeremy Michael Ehrhardt† *Trenton, New Jersey* Computer Science
Mark Eichenlaub *Kingsville, Maryland* Physics
Garrett Theodore Ervin* *San Diego, California* Mathematics and English
Sabeen Faridi *Karachi, Pakistan* Physics
Matthew Solomon Feldman* *Dallas, Texas* Mechanical Engineering
Panna Delora Felsen* *Encinitas, California* Electrical Engineering and Business Economics and Management
Micha N. Fireman* *Hollywood, Florida* Applied Physics
Erin Paul Flanagin* *Sammamish, Washington* Biology
Alexander Fogel* *Riverside, Illinois* Business Economics and Management
Nickolas Andrew Fortino* *North Andover, Massachusetts* Physics and Computer Science
Jian Yu Fung* *Diamond Bar, California* Applied Physics

Geoff Michael Galgon* *Swarthmore, Pennsylvania* Mathematics and Economics
Amit Arun Gandhi *Northridge, California* Mechanical Engineering
Calyani Ganesan *Pasadena, California* Biology
William Gibson* *Vancouver, British Columbia, Canada* Chemical Engineering (Biomolecular)
Aimee L. Gillespie *Clearfield, Utah* Geology
Marie Minh-Thu Giron *Los Angeles, California* Geology
Matthew James Glassman* *Yorba Linda, California* Chemical Engineering (Biomolecular)
Nicholas Scott Goeden *Manhattan Beach, California* Biology
Derek Goto* *Honolulu, Hawaii* Physics and Mathematics
Matthew Charles Grau* *Chantilly, Virginia* Physics
Maxwell Jacob Grazier G'Sell* *Saline, Michigan* Physics and Applied and Computational Mathematics
Abhi Gulati† *Bloomington, Illinois* Mathematics
John Joseph Hasier *Worth, Illinois* Physics
Travis David Haussler *Santa Cruz, California* Applied and Computational Mathematics and Business Economics and Management
Seth A. Hendrickson* *Bellevue, Washington* Computer Science
Zachary Higbee *Tampa, Florida* Mechanical Engineering and Business Economics and Management
Silas James Hilliard *Seattle, Washington* Engineering and Applied Science (Aeronautics)
Anna Maria Hiszpanski *Valencia, California* Chemical Engineering (Materials)
Cheng William Hong* *Republic of Singapore* Computer Science
Elizabeth Howe* *Saratoga, California* Mathematics
Ellen Hsu *Holmdel, New Jersey* Biology and English
Beijing Kara Huang* *Troy, Michigan* Chemical Engineering (Biomolecular)
Julie Yuk-Wah Huang* *Los Angeles, California* Geobiology
Alexander Chunhachatchawalkul Hudson† *Vancouver, Washington* Applied Physics
Michael Huynh* *Drexel Hill, Pennsylvania* Chemistry
Lozan M. Ivanov* *Sofia, Bulgaria* Mathematics and Economics
Sean Jezewski *Iowa City, Iowa* Applied and Computational Mathematics
Michelle Jiang *Rancho Palos Verdes, California* Computer Science and Business Economics Management
Eric C. Johlin* *Iowa City, Iowa* Mechanical Engineering
Georg Kaltenboeck *Auburn, Alabama* Chemical Engineering (Materials)
Christopher George Kawatsu *Northville, Michigan* Physics
Kristopher Mark Kazlowski* *Cedar Hill, Texas* Applied and Computational Mathematics
Aditya Khosla* *Patiala, India* Computer Science, Electrical Engineering, and Economics

Sungshik Kim* *Tallahassee, Florida* Chemical Engineering (Environmental)
Joseph Henry Schatz Koehler *Madison, Wisconsin* Mechanical Engineering
David William Koenitzer *Huntsville, Alabama* Physics
Andrew P. S. J. Kositsky* *Lummi Island, Washington* Mathematics
Kristen Kozak *Vashon, Washington* Biology
Nicholas Kramer *Leawood, Kentucky* Mechanical Engineering and Business Economics and Management
Andrew Krause *West Linn, Oregon* Engineering and Applied Science (Computation and Neural Systems)
Alex Anne Krikorian *Bellevue, Washington* Geobiology and English
Lea Dawn Kunesh *Oceanside, California* Mechanical Engineering
Jerry G. Kwong *Irvine, California* Biology
Andrew P. Lai* *Vancouver, Washington* Physics
Mason Man Gien Lai *Savannah, Georgia* Chemistry
Vibha Laljani* *Rajasthan, India* Computer Science
Ryan Lanman *Glen Ellyn, Illinois* Chemical Engineering (Materials)
Euiwoong Lee* *Seoul, Republic of Korea* Computer Science and Mathematics
Jinwoo Lee* *Seongnam, Republic of Korea* Biology
Lauren Lee *Glendale, California* Biology
Roger Lee* *Arcadia, California* Applied and Computational Mathematics and Economics
Tencia Lee* *Gaithersburg, Maryland* Applied and Computational Mathematics and Economics
John Ming Leichty* *Fresno, California* Mechanical Engineering
Daniel Leighton† *Livingston, New Jersey* Biology
Dana Jaya Levine* *Bonita, California* Chemistry
Li Song Li* *Maple Grove, Minnesota* Physics and Economics
Wei Li* *Columbus, Ohio* Engineering and Applied Science (Computation and Neural Systems)
Yingkun Li* *San Gabriel, California* Mathematics
Chen Yee Liaw* *Petaling Jaya, Malaysia* Biology and Business Economics and Management
David Hai Lin* *Haywood, California* Electrical Engineering
Han-Hsuan Lin* *Taipei, Taiwan (ROC)* Physics
Jack Jie Lin *Fargo, North Dakota* Chemical Engineering (Environmental)
Kelly C. Littlepage* *Centennial, Colorado* Applied and Computational Mathematics and Business Economics and Management and Control and Dynamical Systems (Minor)
Kyle Richard Littler† *Mission Viejo, California* Computer Science
Hongdau Peter Liu* *Diamond Bar, California* Biology
John Hsiao-Yung Liu* *Chandler, Arizona* Applied Physics
Daniel Lo* *Marlton, New Jersey* Electrical Engineering

Po-Ling Loh* *Madison, Wisconsin* Mathematics and English (Minor)
Ilya Loksha* *Washington, District of Columbia* Computer Science
Yike Lu *Murphy, Texas* Physics
Shuyi Ma* *Hawthorne, California* Chemical Engineering (Biomolecular)
Han Bin Man *Arcadia, California* Mechanical Engineering
Fedor Dmitrievich Manin* *Palo Alto, California* Mathematics
Radhika Marathe* *Pune, India* Electrical Engineering and Business Economics and Management
Sean Matthew Marney* *Sylmar, California* Computer Science
James Russell McClellan* *Keene, New Hampshire* Computer Science and Control and Dynamical Systems (Minor)
Daniel Michael McLaury *Norman, Oklahoma* Mathematics and English
Maximilian Merfeld* *Centennial, Colorado* Mechanical Engineering and Control and Dynamical Systems (Minor)
Jayson Dean Michilena Messenger† *Layton, Utah* Electrical Engineering
Deepak Mishra* *Shelby Township, Michigan* Chemical Engineering (Biomolecular)
Tommy Morphet *Colorado Springs, Colorado* Economics and Physics
Herschel Mukherjee* *Montclair, New Jersey* Chemistry
Philip Alejandro Muñoz *Beaverton, Oregon* Applied Physics
Jon Thomas Napolitano *Philadelphia, Pennsylvania* Computer Science
Caleb Enoch Ng† *Libertyville, Illinois* Chemistry
Duc-Huy Tran Nguyen* *Ho Chi Minh City, Vietnam* Chemical Engineering (Biomolecular)
Nam Nguyen* *Gardena, California* Mechanical Engineering
Vinh Thanh Nguyen† *Ho Chi Minh City, Vietnam* Mathematics
Kevin Alan Noertker* *Park City, Utah* Mechanical Engineering and History (Minor)
Manuel Ochoa *Pico Rivera, California* Electrical Engineering
Thomas Everell Oliver *Sacramento, California* Mechanical Engineering and Business Economics and Management
Caryn Alexandra Palatchi *Hamilton, Ohio* Physics
Yvonne Pao *West Covina, California* Biology
Soyoung Park* *Yong-in, Republic of Korea* Biology
James J. Paulos *Austin, Texas* Mechanical Engineering
Corinne Pender* *Annandale, Virginia* Biology
Chun Che Peng* *Fresh Meadows, New York* Mechanical Engineering and Business Economics and Management
Sierra Victoria Petersen* *Evanston, Illinois* Geochemistry
Ashley Elizabeth Potts* *Orinda, California* Astrophysics

Bachelor of Science *continued*

Arthur Benjamin Prindle IV* *East Palo Alto, California* Chemical Engineering (Biomolecular)
William Scott Raburn† *Concord, North Carolina* Physics
Noah Abdul Rahman *Solon, Ohio* Chemistry
Chaitanya Rastogi* *Paramus, New Jersey* Applied Physics and Business Economics and Management
Mahipal Raythattha *Lake Mary, Florida* Applied and Computational Mathematics
Rachel Reddick* *Richland, Washington* Physics
David Walter Renshaw* *Mechanicsburg, Pennsylvania* Mathematics
Maria Annichia Riolo *Ann Arbor, Michigan* Mathematics
Jessica Elizabeth Roberts *Fort Collins, Colorado* Planetary Science
David Kingsland Romney *Baltimore, Maryland* Chemistry
Alex Roper *Ann Arbor, Michigan* Computer Science
David Jacob Rosenman* *Dix Hills, New York* Biology
Daniel Walter Rowlands* *New Carrollton, Maryland* Chemistry and History (Minor)
Kausteya Roy† *Calcutta, India* Physics
Alan Shen-Jyr Rubink *Edinburg, Texas* Mathematics
Maritza Ruiz* *Miami, Florida* Mechanical Engineering
Peter J. Sadowski* *Everett, Washington* Computer Science
Brian Roland Sampson *Carlotta, California* Physics
Lauren Kay Savage *Arlington, Texas* Geology
Kee Scholten *Grapevine, Texas* Applied Physics
Marc Eugene Sells* *Eugene, Oregon* Mechanical Engineering
Han Seo* *Seoul, Republic of Korea* Physics and Business Economics and Management
Ilya Y. Shadrin* *Torrance, California* Biology
Susan Qi Shen* *Ames, Iowa* Biology and English
Joy Yue Sheng* *Cerritos, California* Chemical Engineering (Materials)
Sue J. Shiao* *Plano, Texas* Mechanical Engineering
Shafigh Shirinfar* *Los Angeles, California* Electrical Engineering
Anton Shuster† *Van Nuys, California* Computer Science
Suresh Sitaula* *Kathmandu, Nepal* Electrical Engineering
Mason Smith* *Gary, Indiana* Mathematics and Computer Science
Lori Christine Spalsbury *Estes Park, Colorado* Geophysics
Wilson Chia-hao Sung* *Pasadena, California* Chemical Engineering (Materials)
Ming Eric Tai* *Fremont, California* Physics
Daniel Raul Talancon* *La Habra, California* Mechanical Engineering
Meng Tan *Boxborough, Massachusetts* Computer Science
Abdul Ahad Tariq* *Fresno, California* Chemistry
Daniel Thai *Phoenix, Arizona* Electrical Engineering

Christina Vicky Theodoris* *Alpharetta, Georgia* Biology
Matthew Thill* *Arlington Heights, Illinois* Mathematics
Calvin Chong Kit Ting *San Mateo, California* Mechanical Engineering and Business Economics and Management
Kevin H. Tjho* *Freehold, New Jersey* Mechanical Engineering
Elizabeth Jane Trower *Poulsbo, Washington* Geology
Ila Kapur Varma* *Albuquerque, New Mexico* Mathematics
Harish Vasudevan* *Sugar Land, Texas* Biology
Alexandra Velian* *Bucharest, Romania* Chemistry
Natalie Dawn Vernia* *West Hills, California* Biology
Craig Stephen Vieregg *Wheaton, Illinois* Economics and Business Economics and Management
Tyler James Volkoff* *Kerman, California* Biology
Glenn Stephen Wagner* *Fairport, New York* Mechanical Engineering and Control and Dynamical Systems (Minor)
Esther S. Wang *Taipei, Taiwan (ROC)* Applied and Computational Mathematics
Geng Wang* *Grand Terrace, California* Electrical Engineering
Jackson Ho-Leung Wang* *Hong Kong (PRC)* Mechanical Engineering
Muzhou Wang* *Cincinnati, Ohio* Chemical Engineering (Materials)
Tina Wang* *Rochester, New York* Chemistry
Christopher Aaron Watson* *Lubbock, Texas* Applied Physics
William Austin Webb* *Custer City, Oklahoma* Computer Science
Joshua Matthew Weiner* *Andover, Massachusetts* Physics
Jesse Ralph West† *Coconut Creek, Florida* Computer Science
Dahvyd Aviel Wing *Apopka, Florida* Physics
Albert Wu* *Fremont, California* Mechanical Engineering
Haile (Robbie) Xiao *Pearland, Texas* Chemical Engineering (Biomolecular)
An-Tu Xie *Shanghai, People's Republic of China* Chemical Engineering (Materials)
Shuang Xie* *Jinan, People's Republic of China* Electrical Engineering
Shengbo Xu* *Chandler, Arizona* Electrical Engineering and Business Economics and Management
Benjamin Huei-Yah Yang* *Chandler, Arizona* Applied Physics
Yang Yang* *Los Angeles, California* Biology
Calvin Ga Yu *Jamaica, New York* Biology
Xi (Cecilia) Yu* *The Woodlands, Texas* Engineering and Applied Science (Environmental Science and Engineering)
Angela Zah *Holmdel, New Jersey* Biology and English
Yekaterina Yevgeniy Zak* *Redmond, Washington* Chemical Engineering (Environmental)

Sebastian B. Zhang *Simpsonville, South Carolina* Mechanical Engineering
Chengshan Zhou* *Ningbo, People's Republic of China* Electrical Engineering
Ilya Alexanrovich Zilberter† *Apex, North Carolina* Engineering and Applied Science
(Aeronautics)

The Caltech Alumni Fund is proud to recognize the 2009 Senior Class Gift of avocado trees for the campus. Special thanks go to senior class representatives who launched and led the gift drive and to Assistant Vice President of Student Affairs and Campus Life Tom Mannion for his continued support of student fund-raising efforts for the Alumni Fund.

Master of Science

Michael Douglas Adams *(Physics)* B.A., B.S., University of Rochester 2003.

Qi An *(Materials Science)* B.S., University of Science and Technology of China 2002; M.S., 2007.

Michael Evan Anderson *(Astrophysics)* B.S., The University of Michigan 2007.

Atsushi Baba *(Electrical Engineering)* B.E., Waseda University 2008.

Nicholas Ray Ballor *(Biochemistry and Molecular Biophysics)* B.S., Michigan Technological University 2005.

Joseph Brian Balta *(Geology)* B.S., Indiana University 2002.

Ning Bao *(Physics)* B.S. *(Physics and Political Science),* California Institute of Technology 2008.

John Bebawy *(Electrical Engineering)* B.S., The American University in Cairo 2005.

Jacob Louis Bitterman *(Chemistry)* B.A., Cornell University 2006.

Elizabeth Anne Bodine *(Electrical Engineering)* B.A., B.S., The University of Texas at Austin 2006.

Steven Michael Bowers *(Electrical Engineering)* B.S., University of California, San Diego 2007.

Yevgeniy L'vovich Buchko *(Bioengineering)* B.S., Georgia Institute of Technology 2006.

Che-Fung Chan *(Physics)* B.Sc., The Chinese University of Hong Kong 2003.

Alice Hee Chang *(Social Science)* B.A., Claremont McKenna College 2007.

Chun-Yang Chen *(Electrical Engineering)* B.S., National Taiwan University 2000; M.S., 2002.

Ming Hei Cheng *(Civil Engineering)* B.E., University of Hong Kong 2008.

Catherine S. Chou *(Electrical Engineering)* B.S., California Institute of Technology 2007.

Michael Isaac Cohen *(Physics)* B.Sc., University of Canterbury 2003.

Julia Theresa Cossé *(Aerospace Engineering)* B.S., University of Rochester 2008.

Jelena Culic-Viskota *(Chemical Engineering)* B.S., Polytechnic University 2007.

Vaclav Cvicek *(Physics)* A.B., Princeton University 2007.

Rahul Deb *(Electrical Engineering)* B.S., California Institute of Technology 2007.

Georgios Dogiamis *(Electrical Engineering)* Diploma, National Technical University of Athens 2007.

David Andrew Doll *(Physics)* B.S., University of North Carolina at Chapel Hill 2005.

Pelayo Domínguez Bohorquez *(Aerospace Engineering)* Industrial Engineer, Universidad de Sevilla 2008.

Evan Philip Dummit *(Mathematics)* B.S., California Institute of Technology 2009.

Lauren Ashley Edgar *(Geology)* B.A., Dartmouth College 2007.

Michael John Elzinga *(Mechanical Engineering)* A.B., B.S., Lafayette College 2007.

Craig Scott Ferguson *(Mechanical Engineering)* B.S. *(Computer Science and Mechanical Engineering),* Union College 2007.

Cary David Frydman *(Social Science)* B.A., Northwestern University 2006.

Vera Gluscevic *(Astrophysics)* B.Sc., University of Belgrade 2007.

Manuel Godoy *(Electrical Engineering)* B.S., California Institute of Technology 2008.

Alvaro Gonzalez Garcia *(Electrical Engineering)* Telecommunications Engineer, Universidad Politécnica de Valencia 2005; M.Sc., International Space University 2006.

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Amandine Hamel *(Aeronautics)* B.S., Ecole Polytechnique 2008.

Lisa Marie Hochrein *(Chemical Engineering)* B.S., University of California, Berkeley 2004.

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Meisam Honarvar Nazari *(Electrical Engineering)* B.Sc., University of Tehran 2006; M.S., M.A.Sc., University of Toronto 2008.

Nathaniel Quinn Honsowetz *(Environmental Science and Engineering)* B.S., Biola University 2007; B.S., University of Southern California 2007.

Chen Pin Ryan Huang *(Electrical Engineering)* B.S., California Institute of Technology 2007.

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Alexander Gerald Huth *(Computation and Neural Systems)* B.S., California Institute of Technology 2007.

Joyce Huynh *(Chemical Engineering)* B.S., University of California, Berkeley 2006.

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Master of Science *continued*

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Sarah Lillian Lansing *(Mechanical Engineering)* B.S., University of California, Santa Barbara 2008.

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Master of Science *continued*

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Yekaterina Sergeyevna Pavlova *(Applied and Computational Mathematics)* B.S., University of California, Irvine 2006.

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Kristin Eileen Phillips *(Geophysics)* B.S., University of California, San Diego 2006.

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Mayank Raj *(Electrical Engineering)* B.Tech., Indian Institute of Technology 2008.

Dominic Anthony Rizzo *(Computer Science)* S.B., Massachusetts Institute of Technology 2004.

Scott Nolan Roberts *(Materials Science)* B.S., Carnegie Mellon University 2007.

Christopher Sean Rogan *(Physics)* A.B., Princeton University 2006.

Rebecca Lynn Rought *(Aeronautics)* B.S., Syracuse University 2008.

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Surendra Nadh Somala *(Civil Engineering)* B.Tech., Indian Institute of Technology, Guwahati 2008.

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Master of Science *continued*

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Emily Lowell Warren *(Chemical Engineering)* B.S., Cornell University 2005; M.Phil., University of Cambridge 2006.
Robert Wells Whittlesey *(Aeronautics)* B.S. *(Aeronautical Engineering and Mechanical Engineering),* Illinois Institute of Technology 2008.
Aaron Samuel Wolf *(Planetary Science)* B.S. *(Earth Sciences and Physics),* University of California, Santa Cruz 2005.
Stephen Wu *(Civil Engineering)* B.S.E., B.S., The University of Michigan 2008.
Yong Yang *(Physics)* B.S., University of Science and Technology of China 2005.
Marian A. Zastawny *(Aeronautics)* B.S., Warsaw University of Technology 2008.
Xi Zhang *(Planetary Science)* B.S., Peking University 2007.
Yu Zhao *(Electrical Engineering)* B.S., Peking University 2008.
Hongchao Zhou *(Electrical Engineering)* B.S., Tsinghua University 2006; M.S., 2008.

Degree of Engineer

Amy Kar-Wei Beierholm *(Aeronautics)* B.Sc., University of British Colombia 1994; B.Eng., McGill University 2001; M.S., California Institute of Technology 2002.
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Doctor of Philosophy

DIVISION OF BIOLOGY

Meghan Sara Adams *(Biology)* B.S, University of California, Los Angeles 2000.
Thesis: Uncovering Molecular Properties of Neural Crest Cells.

Megan Jo Anderson *(Biochemistry and Molecular Biophysics)* B.A., B.S., University of California, San Diego 2003.
Thesis: Microfluidics-Based Strategies for Protein Crystallography.

Jessica Rose Escobedo *(Integrative Neurobiology)* B.A., Kenyon College 2000.
Thesis: Investigating Moral Events: Characterization and Structure of Autobiographical Moral Memories.

Sean Gordon *(Biochemistry and Molecular Biophysics)* B.S., University of Kansas 2001; M.Sc., Max Planck Research School for Molecular Biology 2003.
Thesis: Hormone and Gene Feedback during Development and Regeneration in *Arabidoposis thaliana*.

Jane Igor Khudyakov *(Biology)* B.S., University of North Carolina at Chapel Hill 2003.
Thesis: Role of Bmi-1 in Epigenetic Regulation during Early Neural Crest Development.

Joshua S. Klein *(Biochemistry and Molecular Biophysics)* A.A., College of Maine 2000; B.A., University of California, Berkeley 2002.
Thesis: Investigations in the Design and Characterization of HIV-1 Neutralizing Molecules.

Louisa M. Liberman *(Biology)* B.A., Mount Holyoke College 2002.
Thesis: Regulation of Neurogenic Ectoderm Specification in *Drosophila melanogaster*.

Andrew Medina-Marino *(Biology)* B.A., Swarthmore College 2000; M.S., California Institute of Technology 2003.
Thesis: Construction and Initial Characterization of the Densin Knockout Mouse.

Julien Muffat *(Cellular and Molecular Neurobiology)* D.E.A., Ecole Normale Supérieure 2001; Licence 1998; Maîtrise 1999.
Thesis: Role of Apolipoprotein D and Its Homologs, in Normal and Pathological Aging, in *Drosophila melanogaster*.

Elizabeth Ann Ottesen *(Biology)* B.A., Grinnell College 2002.
Thesis: The Biology and Community Structure of CO_2-Reducing Acetogens in the Termite Hindgut.

Alexa Mari Price-Whelan *(Biology)* B.A., Barnard College, Columbia University 2002.
Thesis: Physiology and Mechanisms of Pyocyanin Reduction in *Pseudomonas aeruginosa*.

When more than one field of study is listed, the first is the major, and the second and others are minors.

Adrian Edward Rice *(Biochemistry and Molecular Biophysics)* B.S., University of Washington 2001.
Thesis: Biophysical and Cell Biological Studies Characterizing the Vertebrate Iron Exporter Ferroportin.

Ted Olin Ririe *(Biology)* B.S., Brigham Young University 1999.
Thesis: A Multipartite Approach to Mapping the Gene Network Directing *Caenorhabditis elegans* Vulval Organogenesis.

Adeline Seah *(Biology)* B.S., University of California, Berkeley 2001.
Thesis: EGF, WNT & HOX Interactions during Patterning of *Caenorhabditis elegans* Equivalence Groups.

Celia Eenjing Shiau *(Biology)* B.S., University of California, Davis 2003.
Thesis: Formation of Cranial Sensory Ganglia: Role of Neural Crest-Placode Interactions, Slit-Robo, and Cadherins.

Amber L. Southwell *(Cellular and Molecular Neurobiology)* B.S. *(Biochemistry),* The University of Texas at Austin 1999; B.S. *(Molecular Biology),* 2001.
Thesis: Intrabodies as Theraputics for Huntington's Disease.

Devin Brent Tesar *(Biology)* B.A., B.S., University of Missouri-Columbia 2001.
Thesis: Investigations of the Mechanisms of Receptor-Mediated Immunoglobulin Transport in Mammals and Birds.

DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING

Akinleye C. Alabi *(Chemistry)* B.S., New York University 2004; B.E., Stevens Institute of Technology 2004.
Thesis: I. Synthesis and Proton Conductivity Studies of Mesostructured Organosilicates and Bitriazole-Polymer Composites. II. Targeted Nanoparticles for siRNA Delivery.

Benjamin D. Allen *(Chemistry)* B.A., Pomona College 2003.
Thesis: Development and Validation of Optimization Methods for the Design of Protein Sequences and Combinatorial Libraries.

Raymond Humphrey Archer *(Chemical Engineering)* B.E., B.Com., University of Canterbury 2003.
Thesis: Molecular Sieve Synthesis Using Imidazolium Structure Directing Agents.

Travis Scott Bayer *(Biochemistry and Molecular Biophysics)* B.S., The University of Texas at Austin 2003.
Thesis: Synthetic Regulation and Genetic Control of an Ecological Strategy.

Chase Lawrence Beisel *(Chemical Engineering and Biology)* B.S., Iowa State University 2004.
Thesis: Engineering Ligand Control of RNA Interference.

Doctor of Philosophy *continued*

Stephen Allen Chapman *(Chemical Engineering)* B.S., University of California, Berkeley 2001; M.S., California Institute of Technology 2004.
Thesis: Quantitative Performance and Tradeoffs in the MAP Kinase Signaling Module.

Wei-Chen Chen *(Chemistry and Physics)* B.S., National Tsinghua University 1998.
Thesis: Isotope Effects in Chemical Processes of Atmospheric Interest.

David Michael Chenoweth *(Chemistry)* B.S., Indiana University 1999.
Thesis: Synthesis and Structural Studies of Cyclic Py-Im Polyamides.

Justin Delgado Cohen *(Chemistry)* S.B., Massachusetts Institute of Technology 2003.
Thesis: Programming Protein Patterns on DNA Nanostructures with Pyrrole-Imidazole Polyamides.

Stephanie June Culler *(Chemistry)* B.S., University of California, San Diego 2003; M.S., California Institute of Technology 2005.
Thesis: Reprogramming Alternative Splicing Using *Cis*-Acting Intronic Control Elements.

Amy Lynn Eastwood *(Chemistry)* B.S., University of Virginia 2002.
Thesis: Investigating Structure-Function Relationships in Ion Channels Using Unnatural Amino Acids.

David C. Ebner *(Chemistry)* B.S., B.A., University of Saint Thomas 2002.
Thesis: Development and Applications of the Palladium-Catalyzed Enantioselective Oxidation of Secondary Alcohols.

Paul Richard Elowe *(Chemistry)* B.A., M.S., University of Pennsylvania 2003.
Thesis: The Selective Oligomerization of Ethylene Using Chromium Diphosphine Catalysts and the Synthesis and Reactivity of Group 7 Carbonyl Derivatives Relevant to Synthesis Gas Conversion.

Cristal Ivette Gama *(Biochemistry and Molecular Biophysics)* B.S., California State University, Los Angeles 2000.
Thesis: Understanding the Chemical Basis of Neuronal Development and Communication: I. The Role of Fucose α(1-2) Galactose Carbohydrates in Neuronal Growth. II. Structure-Function Analysis of Chondroitin Sulfate in the Brain.

Irina A. Gorodetskaya *(Chemistry)* S.B., Massachusetts Institute of Technology 2002.
Thesis: Nonlinear Polymeric Architectures via Olefin Metathesis.

Alon A. Gorodetsky *(Chemistry)* B.S., M.S., Cornell University 2003.
Thesis: Electrical Detection of DNA Binding Proteins.

Ariele Patrice Hanek *(Chemistry)* B.A., Bowdoin College 2003.
Thesis: Chemical-Scale Investigations of Cys-Loop Neurotransmitter Gated Ion Channels.

Doctor of Philosophy *continued*

Kristy Michelle Hawkins *(Chemical Engineering and Biology)* B.S., Texas A&M University 2002; M.S., California Institute of Technology 2005.
Thesis: Metabolic Engineering of *Saccharomyces cerevisiae* for the Production of Bensylisoquinoline Alkaloids.

Carey Frank Hsu *(Chemistry)* A.B., Harvard College 2001.
Thesis: Completion of a Programmable DNA-Binding Small Molecule Library.

Claire Sigrid Jacobs *(Chemistry)* B.Sc., The University of Chicago 2001.
Thesis: Structural Modifications to DNA-Binding Polyamides for Improved Biological Activity in Cell Culture.

Jennifer Rae Keeffe *(Biochemistry and Molecular Biophysics)* B.S., Western Washington University 2001.
Thesis: Engineering Cyanovirin-N for Enhanced Viral Neutralization.

Peter Michael Kekenes-Huskey *(Chemistry)* B.S., University of North Carolina at Asheville 2001.
Thesis: A Monte Carlo-based Torsion Construction Algorithm for Ligand Design.

Hyungjun Kim *(Chemistry and Physics)* B.S., Korea Advanced Institute of Science and Technology 2004.
Thesis: Multiscale and Multiphysics Computational Frameworks for Nano- and Bio-Systems.

Robert Randolph Knowles *(Chemistry)* B.S., College of William and Mary 2003.
Thesis: Asymmetric Organocatalysis in Complex Target Synthesis: Progress Towards the Total Synthesis of Diazonamide A.

Brian S. Leigh *(Chemistry)* B.S., Portland State University 2000; M.S., 2001.
Thesis: Electron Transfer through Organic and Biological Molecules.

Alexander Pei-den Lin *(Biochemistry and Molecular Biophysics)* B.S., California Institute of Technology 2003.
Thesis: Noninvasive Imaging of Carotid Arterial Strain Using Displacement Encoded MRI.

Bo-Lin Lin *(Chemistry)* B.S., University of Science and Technology of China 2003.
Thesis: A Combined Experimental and Computational Study of Ligand Effects on C-H Bond Activation by Palladium and Platinum Complexes.

James R. Maiolo III *(Chemistry and Computer Science)* B.A., Swarthmore College 2003.
Thesis: Photoelectrochemistry of Microstructured Silicon Materials for Solar Energy Applications.

Stacey Ann Maskarinec *(Chemistry)* B.S., The University of Chicago 2002.
Thesis: Engineering Protein-Based Biomaterials with Biological and Mechanical Cues to Direct Cellular Behavior.

John Charles McKeen *(Chemical Engineering)* B.S. *(Chemical Engineering and Electrical Engineering),* University of Minnesota–Twin Cities 2003; M.S., 2004.
Thesis: Proton and Ion Conductivity in Microporous Materials.

Doctor of Philosophy *continued*

Shane Michael Murphy *(Chemical Engineering)* B.S., University of Colorado at Boulder 2000.
Thesis: Analysis of the Chemical Composition of Atmospheric and Chamber Generated Aerosol Using Mass Spectrometry.

Heather Elizabeth Murrey *(Biochemistry and Molecular Biophysics)* B.A., M.S., Brandeis University 2000.
Thesis: Identification and Characterization of the Plasticity-Relevant Fucose-α(1-2) Galactose Glycoproteome from Mouse Brain.

Kimberly Marshall Papadantonakis *(Chemistry)* B.S., City University of New York—John Jay College 2002.
Thesis: Exploration of Physisorbed Monolayers for Molecular-Scale Surface Patterning.

Heidi Kathleen Privett *(Chemistry)* B.S., Centre College 2002.
Thesis: An Iterative Approach to *de novo* Computational Enzyme Design and the Successful Application to the Kemp Elimination.

James William Puckett *(Chemistry)* A.B., Harvard College 2003.
Thesis: Microarray and Genome-wide Sequencing Approaches to Characterizing DNA Binding Molecules.

Erik A. Rodriguez *(Chemistry)* B.S., California Institute of Technology 2002.
Thesis: *In Vivo* Incorporation of Multiple Unnatural Amino Acids.

Rosemary Dyane Rohde *(Chemistry)* B.S., University of California, Los Angeles 2003.
Thesis: Developing High-Affinity Protein Capture Agents and Nanotechnology-Based Platforms for *In vitro* Diagnostics.

Ian Ross McKay Shapiro *(Chemistry)* B.S., California Institute of Technology 2000.
Thesis: Observation of Single-Molecule Rotational Diffusion at Microsecond Timescale by Polarized Fluorescence Correlation Spectroscopy.

Bonnie Ann Sheriff *(Chemistry)* B.S., University of Kansas 2003.
Thesis: Silicon Nanowires and Silicon/Molecular Interfaces for Nanoscale Electronics.

Jennifer Lynn Stockdill *(Chemistry)* B.S., Virginia Polytechnic Institute and State University 2003.
Thesis: Forays into the Synthesis of Zoanthenol: Intriguing Patterns in Reactivity and Selectivity.

Ismet Çağler Tanrikulu *(Biochemistry and Molecular Biophysics)* B.A., Ohio Wesleyan University 2000.
Thesis: Discovery of Aminoacyl-tRNA Synthetase Mutants for the Incorporation of Non Canonical Amino Acids into Proteins.

Michael McCann Torrice *(Chemistry)* S.B., Massachusetts Institute of Technology 2002.
Thesis: Chemical-Scale Studies of the Nicotinic and Muscarinic Acetylcholine Receptors.

Doctor of Philosophy *continued*

Chad David Vecitis *(Chemistry)* B.S., The Johns Hopkins University 2001.
Thesis: Chemical Reactions at Aqueous Interfaces.

Ron Walker *(Chemistry)* B.S., Southern University A&M 2003.
Thesis: Functionalized Polymers from Ring-Opening Metathesis Polymerization through Monomer Design.

David Richard Weinberg *(Chemistry)* B.A., University of California, San Diego 2001.
Thesis: Investigations into the Requirements for Homogeneous Platinum- and Iridium-Catalyzed Oxidative C-H Bond Functionalization.

Matthew Thomas Whited *(Chemistry)* B.S., Davidson College 2004.
Thesis: Synthetic and Mechanistic Studies of Small-Molecule Activation at Low-Valent Iron, Cobalt, and Iridium Centers.

Heather L. Wiencko *(Chemistry)* B.S., Georgetown University 2002.
Thesis: Adrenergic Receptors: Model Systems for Investigation of GPCR Structure and Function.

Marc Dominic Woodka *(Chemical Engineering)* B.S., Rensselaer Polytechnic Institute 2003.
Thesis: Increased Classification Rates of Chemical Vapor Detectors Using Novel Sensor Types and Optimized Sensing Geometries.

Ke Xu *(Chemistry)* B.E., Dalian Maritime University 1999.
Thesis: Nonlinear Electrical Properties of One-Dimensional Nanostructures.

Ding-Shyue (Jerry) Yang *(Chemistry)* B.S., National Taiwan University 1997; M.S., 1999.
Thesis: Ultrafast Electron Crystallography: Principles and Applications.

DIVISION OF ENGINEERING AND APPLIED SCIENCE

James Richard Adleman *(Electrical Engineering)* B.S.E., Duke University 2000; M.S., California Institute of Technology 2004.
Thesis: Plasmonic Nanoparticles for Optofluidic Applications.

Motofumi Arii *(Electrical Engineering and Planetary Science)* B.E., Kyushu Institute of Technology 1995; M.E., 1997; M.S., California Institute of Technology 2005.
Thesis: Retrieval of Soil Moisture under Vegetation Using Polarimetric Radar.

Blake Waters Axelrod *(Applied Physics)* B.S., Haverford College 1999; M.S., California Institute of Technology 2005.
Thesis: Single Cell Pico Force Microscopy - A Novel Tool for High Resolution Measurement of Cell Forces.

Joseph Cheney Bardin *(Electrical Engineering)* B.S., University of California, Santa Barbara 2003; M.S., 2005.
Thesis: Silicon-Germanium Heterojunction Bipolar Transistors for Extremely Low-Noise Applications.

Doctor of Philosophy *continued*

Rajan Bhattacharyya *(Computation and Neural Systems)* B.S., University of California, Berkeley 2001.
Thesis: Egocentric Distance Encoding in the Posterior Parietal Cortex.

Julia Marie Badger Braman *(Mechanical Engineering and Planetary Science)* B.S., Purdue University 2003; M.S., California Institute of Technology 2005.
Thesis: Safety Verification and Failure Analysis of Goal-Based Hybrid Control Systems.

Signe Lauren Bray *(Computation and Neural Systems)* B.A.Sc., University of Waterloo 2003.
Thesis: Neural Mechanisms Underlying the Influence of Associative Learning on Valuation and Decision-Making in Humans.

Sarah Katherine Brenner *(Bioengineering)* B.S., M.S., Stanford University 2002.
Thesis: Engineering Synthetic Biofilm-Forming Microbial Consortia.

Agostino Capponi *(Computer Science and Applied and Computational Mathematics)* B.S., University of Rome "La Sapienza" 2001.
Thesis: Credit Risk and Nonlinear Filtering: Computational Aspects and Empirical Evidence.

Gwyneth Megan Card *(Bioengineering)* A.B., Harvard College 2001.
Thesis: Neural Control and Biomechanics of Flight Initiation in *Drosophila melanogaster*.

Moran Cerf *(Computation and Neural Systems)* B.Sc., Tel-Aviv University 2000; M.A., 2002.
Thesis: Competition and Attention in the Human Brain Eye-Tracking and Single-Neuron Recordings in Healthy Controls and Individuals with Neurological and Psychiatric Disorders.

Chun-Yang Chen *(Electrical Engineering and Applied and Computational Mathematics)* B.S., National Taiwan University 2000; M.S., 2002.
Thesis: Signal Processing Algorithms for MIMO Radar.

Po-Jui Chen *(Electrical Engineering)* B.S., National Taiwan University 2002; M.S., California Institute of Technology 2004.
Thesis: Implantable Wireless Intraocular Pressure Sensors.

Wei-Ting Chen *(Environmental Science and Engineering)* B.S., National Taiwan University 2001; M.S., California Institute of Technology 2004.
Thesis: I. Global Simulations of Interactions between Aerosols and Future Climate and II. Sensitivity of Multiangle Imaging to the Optical and Microphysical Properties of Biomass Burning Aerosols.

Yan Chen *(Bioengineering)* B.S., Tsinghua University 2002; M.S., California Institute of Technology 2007.
Thesis: Integration of Dye Lasers and Microfluidics for Biochemical Analysis.

Doctor of Philosophy *continued*

Sai Hung Cheung *(Civil Engineering)* B.E., Hong Kong University of Science and Technology 2001; M.S., 2003.
Thesis: Stochastic Analysis, Model and Reliability Updating of Complex Systems with Applications to Structural Dynamics.

Hsin-Ying Chiu *(Applied Physics)* B.S., National Tsing Hua University 2000; M.S., 2002; M.S., California Institute of Technology 2004.
Thesis: Thermal Properties and Nanoelectromechanical System Based on Carbon Nanotubes.

Daniel Chung *(Aeronautics)* B.E., University of Melbourne 2003.
Thesis: Numerical Simulation and Subgrid-scale Modeling of Mixing and Wall-Bounded Turbulent Flows.

Francesco Ciucci *(Mechanical Engineering)* Diplôme d'Ingénieur, École Centrale Paris 2001; Laurea in Ingegneria Aerospatiale, Politecnico Di Milano 2003; M.S., California Institute of Technology 2004.
Thesis: Continuum Modeling of Mixed Conductors: A Study of Ceria.

Vikram Vijay Deshpande *(Applied Physics)* B.Tech., M.Tech., Indian Institute of Technology, Bombay 2002; M.S., California Institute of Technology 2004.
Thesis: One-Dimensional Physics of Interacting Electrons and Phonons in Carbon Nanotubes.

Matthew J. Dicken *(Applied Physics)* B.S. *(Chemical Engineering and Physics),* University of California, San Diego 2003.
Thesis: Active Oxide Nanophotonics.

Jennifer Anne Dionne *(Applied Physics)* B.S., Washington University in Saint Louis 2003; M.S., California Institute of Technology 2005.
Thesis: Flatland Photonics: Circumventing Diffraction with Planar Plasmonic Architectures.

Jennifer Ann Franck *(Mechanical Engineering)* B.S., University of Virginia 2003.
Thesis: Large-Eddy Simulation of Flow Separation and Control on a Wall-Mounted Hump.

Hilary K. Glidden *(Computation and Neural Systems)* B.A., University of Cambridge 2003.
Thesis: Tracker Effector-Specific and Motor Planning Signals in Human Frontal and Parietal Cortices: Relevance for Goal-Directed Action and Neural Prosthetics.

Wei Hsin Gu *(Electrical Engineering and Mathematics)* B.S., National Tsing Hua University 1999; M.S., 2001; M.S., California Institute of Technology 2004.
Thesis: On Achievable Rate Regions for Source Coding Over Networks.

Feras Habbal *(Mechanical Engineering and Applied Physics)* B.S., The University of Texas at Austin 2003; M.S., California Institute of Technology 2004.
Thesis: The Optimal Transportation Meshfree Method for General Fluid Flows and Strongly Coupled Fluid-Structure Interaction Problems.

Benjamin Lee Hansen *(Materials Science and Mechanical Engineering)* B.S., Brigham Young University 2002; M.S., California Institute of Technology 2005.
Thesis: Modeling Metallic Single Crystal Plastic Hardening Through the Evolution of Dislocation Subgrain Structures.

Douglas C. Hofmann *(Materials Science)* A.A., A.S., Santa Rosa Junior College 2001; B.S., University of California, San Diego 2003; M.S., 2004.
Thesis: Designing Bulk Metallic Glass Matrix Composites with High Toughness and Tensile Ductility.

Nicolas Henry Hudson *(Mechanical Engineering and Control and Dynamical Systems)* B.E., University of Canterbury 2003; M.S., California Institute of Technology 2005.
Thesis: Inference in Hybrid Systems with Applications in Neural Prosthetics.

Thomas J. Johnson *(Applied Physics)* B.S., University of Oregon 2002; M.S., California Institute of Technology 2004.
Thesis: Silicon Microdisk Resonators for Nonlinear Optics and Dynamics.

Shankar Kalyanaraman *(Computer Science)* B.Tech., Indian Institute of Technology, Madras 2001; M.S., California Institute of Technology 2006.
Thesis: Limited Randomness in Games, and Computational Aspects of Revealed Preference.

Brendan Melville Kayes *(Applied Physics)* B.A., B.S., The University of Auckland 2001; B.S. (Honors), 2002; M.S., California Institute of Technology 2004.
Thesis: Radial pn Junction, Wire Array Solar Cells.

Alex Kelly *(Applied Mechanics)* B.M.E., University of Delaware 2001; M.S., California Institute of Technology 2002.
Thesis: A Constitutive Relation for Shape-Memory Alloys.

Mikhail N. Kislitsyn *(Materials Science)* B.S., Higher Chemical College of the Russian Academy of Sciences 2001; M.S., 2003; M.S., California Institute of Technology 2005.
Thesis: Materials Chemistry of Superprotonic Solid Acids.

Oleg B. Kogan *(Materials Science)* B.S., Case Western Reserve University 2001; M.S., California Institute of Technology 2004.
Thesis: Stochastic and Collective Properties of Nonlinear Oscillators.

Erin Crystal Koos *(Mechanical Engineering and Applied Physics)* B.S., Harvey Mudd College 2003; M.S., California Institute of Technology 2004.
Thesis: Rheological Measurements in Liquid-Solid Flows.

Richard Michael Jack Kramer *(Aeronautics)* B.S., University of Auckland 2004; M.S., California Institute of Technology 2005.
Thesis: Stable High-Order Finite-Difference Interface Schemes with Application to the Richtmyer-Meshkov Instability.

Sharlotte Lorraine Bolyard Kramer *(Aeronautics and Applied Physics)* B.S., University of Virginia 2004; M.S., California Institute of Technology 2005.
Thesis: Phase-Shifting Full-Field Interferometric Methods for In-Plane Tensorial Stress Determination for Fracture Studies.

Max G. Kresch *(Materials Science)* B.A., Pomona College 1999; M.S., California Institute of Technology 2004.
Thesis: Temperature Dependence of Phonons in Elemental Cubic Metals Studied by Inelastic Scattering of Neutrons and X-Rays.

Deepak Kumar *(Applied Physics)* B.Tech., Indian Institute of Technology, Bombay 2001; M.S., Texas A&M University 2003; M.S., California Institute of Technology 2004.
Thesis: Experimental Investigations of Magnetohydrodynamic Plasma Jets.

Gabriel A. Kwong *(Bioengineering)* B.S., University of California, Berkeley 2002.
Thesis: DNA Encoded Biotechnologies for Informative Cancer Diagnostics.

Peter Anthony Leong *(Applied Physics)* B.S., Columbia University 1999; M.S., California Institute of Technology 2004.
Thesis: Computational Challenges in High-Resolution Cryo-Electron Microscopy.

Bo Li *(Aeronautics)* B.E., Beijing University of Aeronautics and Astronautics 2001; M.E., 2003.
Thesis: The Optimal Transportation Method in Solid Mechanics.

John Jianzhong Li *(Applied Physics)* B.S., University of Science and Technology of China 1984; M.S., California Institute of Technology 2002.
Thesis: Study of Liquid Metals by Electrostatic Levitation.

Wen Li *(Electrical Engineering)* B.S., Tsinghua University 2001; M.S., 2003; M.S., California Institute of Technology 2004.
Thesis: Integrated Retinal Implants.

Zhiyi Li *(Applied and Computational Mathematics)* B.S., Peking University 2003.
Thesis: High-Order Solution of Elliptic Partial Differential Equations in Domains Containing Conical Singularities.

Yi Liu *(Mechanical Engineering)* B.E., Tsinghua University 2003.
Thesis: Three-dimensional Elastodynamic Modeling of Frictional Sliding with Application to Intersonic Transition.

Hsi-Wen Lo *(Electrical Engineering)* B.S., National Taiwan University 2003; M.S., California Institute of Technology 2004.
Thesis: Thin Film Silicon for Implantable Electronics.

Xiao Lu *(Aeronautics)* B.E., Tsinghua University 2003; M.S., California Institute of Technology 2004.
Thesis: Combined Experimental and Numerical Study of Spontaneous Dynamic Rupture on Frictional Interfaces.

Doctor of Philosophy *continued*

Leonard Joseph Lucas *(Mechanical Engineering)* B.S., Carnegie Mellon University 2004.
Thesis: Uncertainty Quantification Using Concentration-of-Measure Inequalities.

Matthew S. Lucas *(Materials Science)* B.S. *(Materials Science and Physics),* Carnegie Mellon University 2003; M.S., California Institute of Technology 2005.
Thesis: Cluster Expansion Applied to Inelastic Scattering Experiments.

Mark Edward Lyon *(Applied and Computational Mathematics)* B.S., Brigham Young University 2002; M.S., 2003.
Thesis: High-Order Unconditionally-Stable FC-AD PDE Solvers for General Domains.

Yuki Matsuda *(Materials Science)* B.A., Saitama University 1996; M.S., Hokkaido University 1998; M.S., California Institute of Technology 2004.
Thesis: Ab Initio Quantum Mechanical Studies in Electronic and Structural Properties of Carbon Nanotubes and Silicon Nanowires.

Christopher Paul Michael *(Applied Physics)* B.S., *(Materials Science and Physics),* University of Illinois at Urbana–Champaign 2003; M.Phil., University of Cambridge 2004; M.S., California Institute of Technology 2008.
Thesis: Optical Material Characterization Using Microdisk Cavities.

Marcus Quintana Mitchell *(Computation and Neural Systems)* A.B., Harvard College 1989.
Thesis: Dynamic Simulation and Control of Articulated Limbs.

Eric Paul Ostby *(Electrical Engineering)* B.S., University of Minnesota 2002; M.S., California Institute of Technology 2004.
Thesis: Photonic Whispering-Gallery Resonators in New Environments.

Jonathan Andrew Othmer *(Applied and Computational Mathematics)* B.A. *(Mathematics and Music),* Williams College 2002.
Thesis: Algorithms for Mapping Nucleic Acid Free Energy Landscapes.

Raviv Perahia *(Applied Physics)* B.A., B.S., Boston University 2003; M.S., California Institute of Technology 2005.
Thesis: Investigation and Application of Microscale Semiconductor Lasers and Cavities.

Poh Chieh Benny Poon *(Aeronautics)* A.B., B.S., University of Illinois at Urbana–Champaign 2004; M.S., California Institute of Technology 2005.
Thesis: A Critical Appraisal of Nanoindentation with Application to Elastic-Plastic Solids and Soft Materials.

Julián José Rímoli *(Aeronautics)* Ingeniero Aeronáutico, Universidad de la Plata 2001; M.S., California Institute of Technology 2005.
Thesis: A Computational Model for Intergranular Stress Corrosion Cracking.

Ling Shi *(Control and Dynamical Systems)* B.E., Hong Kong University of Science and Technology 2002.
Thesis: Resource Optimization for Networked Estimator with Guaranteed Estimation Quality.

Doctor of Philosophy *continued*

Ari Joshua Stern *(Applied and Computational Mathematics)* B.A., Columbia University 2001; M.A., 2002.
Thesis: Geometric Discretization of Lagrangian Mechanics and Field Theories.

Jin-Yoo Suh *(Materials Science)* B.S., Seoul National University 1995; M.S., 1997; M.S., California Institute of Technology 2005.
Thesis: Fracture Toughness Study on Bulk Metallic Glasses and Novel Joining Method Using Bulk Metallic Glass Solder.

Daniel Sutoyo *(Civil Engineering)* B.S., Harvey Mudd College 2004; M.S., California Institute of Technology 2005.
Thesis: Hysteretic Characteristics of Wood-Frame Structures Under Seismic Motions.

Tristan Scott Ursell *(Applied Physics)* B.S., Rensselaer Polytechnic Institute 2003; M.S., California Institute of Technology 2005.
Thesis: Stretching the Definition of a Lipid Bilayer: Elasticity's Role in Protein and Lipid Organization.

Guangxi Wang *(Electrical Engineering)* B.S., Lafayette College 2003; M.S., California Institute of Technology 2004.
Thesis: Compact Nonlinear Optical Devices in Silicon-Polymer Hybrid Material System.

Hua Wang *(Electrical Engineering)* B.S., Tsinghua University 2003.
Thesis: Precision Frequency and Phase Synthesis Techniques in Integrated Circuits for Biosensing, Communication and Radar.

Yu-Jiu Wang *(Electrical Engineering)* B.S., National Taiwan University 2001.
Thesis: Circuits and Systems for Wireless Concurrent Communication.

Casimir M. Wierzynski *(Computation and Neural Systems)* S.B., S.M., Massachusetts Institute of Technology 1992; B.A., University of Cambridge 1994.
Thesis: Prefrontal-Hippocampal Interactions.

Richard Alan Wildman, Jr. *(Environmental Science and Engineering)* B.S., Yale College 2001; M.S., California Institute of Technology 2005.
Thesis: Biogeochemical Implications of Changing Groundwater and Surface Water Hydrology at Lake Powell, Utah and Arizona, and the Merced River, California, USA.

Jigang Wu *(Electrical Engineering)* B.S., Tsinghua University 2001; M.S., 2004; M.S., California Institute of Technology 2005.
Thesis: Coherence Domain Optical Imaging Techniques.

Jing Yang *(Civil Engineering and Geophysics)* B.E., Tongji University 2001; M.S., California Institute of Technology 2003.
Thesis: Nonlinear Responses of High-Rise Buildings in Giant Subduction Earthquakes.

Doctor of Philosophy *continued*

Or Yogev *(Applied Mechanics and Applied and Computational Mathematics)* B.S., Technion – Israel Institute of Technology 2003; M.S., 2005.
Thesis: Computational Evolutionary Embryogeny.

Ling Zheng *(Mechanical Engineering and Applied Physics)* B.S., Tsinghua University 2003; M.S., California Institute of Technology 2005.
Thesis: Wrinkling of Dielectric Elastomer Membranes.

DIVISION OF GEOLOGICAL AND PLANETARY SCIENCES

Eun-seo Choi *(Geophysics)* B.S., Seoul National University 1999.
Thesis: Computational Approaches to Localized Deformation within the Lithosphere and for Crust-Mantle Interactions.

Nathan John Downey *(Geophysics)* B.S., University of Alberta 2001.
Thesis: Tectonic History of the Osbourn Spreading Center and Dynamic Subsidence of the Congo Basin.

Weifu Guo *(Geochemistry)* B.S., University of Science and Technology of China 2002.
Thesis: Carbonate Clumped Isotope Thermometry: Applications to Carbonaceous Chondrites and Effects of Kinetic Isotope Fractionation.

Xin Guo *(Planetary Science and Electrical Engineering)* B.S., Peking University 2003; M.S., California Institute of Technology 2005.
Thesis: Modeling Studies Related to Carbon Dioxide Phase Change on Mars.

Yoshihiro Kaneko *(Geophysics)* A.S., Foothill College 2002; B.S., University of California, Los Angeles 2003; M.S., California Institute of Technology 2005.
Thesis: Investigations of Earthquake Source Processes Based on Fault Models with Variable Friction Rheology.

Kevin Wayne Lewis *(Planetary Science and Geology)* B.S. *(Mathematics and Physics),* Tufts University 2003.
Thesis: The Rock Record of Mars: Structure, Sedimentology and Stratigraphy.

Ryan Petterson *(Geology)* B.S., University of California, Berkeley 2000; M.S., California Institute of Technology 2005.
Thesis: I. Glaciagenic and Related Strata of the Neoproterozoic Kingston Peak Formation in the Panamint Range, Death Valley Region, California. II. The Basal Ediacaran Noonday Formation, Eastern California, and Implications for Laurentian Equivalents III. Rifting of Southwest Laurentia During the Sturtian-Marinoan Interglacial: The Argenta Orogeny.

Darin Alan Ragozzine *(Planetary Science)* A.B., Harvard College 2004.
Thesis: Orbital Dynamics of Kuiper Belt Object Satellites, a Kuiper Belt Family, and Extra-Solar Planet Interiors.

Doctor of Philosophy *continued*

Colette Vanessa Salyk *(Planetary Science)* S.B., Massachusetts Institute of Technology 2003; M.S., California Institute of Technology 2005.
Thesis: Molecular Spectroscopy of Planet-Forming Regions in Circumstellar Disks.

Daoyuan Sun *(Geophysics)* B.S., University of Science and Technology of China 2000; M.S., 2003.
Thesis: Seismic Structure of the Lower Mantle.

Carl Harlan Tape *(Geophysics)* B.A., Carleton College 2001; M.Sc., University of Oxford 2004.
Thesis: Seismic Tomography of Southern California Using Adjoint Methods.

Charles Steven Verdel *(Geology)* B.S., Colorado School of Mines 1997; M.S., 2002.
Thesis: I. Cenozoic Geology of Iran: An Integrated Study of Extensional Tectonics and Related Vulcanism. II. Ediacaran Stratigraphy of the North American Cordillera: New Observations from Eastern California and Northern Utah.

Sloane John Wiktorowicz *(Planetary Science and Astronomy)* B.S., University of California, Santa Cruz 2003.
Thesis: Unambiguous Black Hole Mass from Polarimetry and Application to Hot Jupiters.

DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES

Michael R. Alton *(Social Science)* B.A., The University of Chicago 2004
Thesis: Continuous Double Auctions and Microstructure.

Serkan Küçükşenel *(Social Science)* B.A., B.S., Koc University 2002; M.A., Sabanci Universitesi 2004.
Thesis: Incentives and Institutions: Essays in Mechanism Design and Game Theory with Applications.

Morgan Hunt Llewellyn *(Social Science)* B.A., Hope College 2002.
Thesis: Rational Models of Political Behavior: The Effects of Opinion, Information, and Procedures.

Alan Daniel Miller *(Social Science)* B.A., University of California, Berkeley 1998; J.D., Northwestern University School of Law 2001; M.S., California Institute of Technology 2006.
Thesis: Essays on Law and Economics.

Noah Myung *(Social Science)* B.S., University of California, Los Angeles 2003.
Thesis: Organizational and Financial Economics.

Laura Elizabeth Panattoni *(Social Science)* B.S., Duke University 2000; M.S., California Institute of Technology 2005.
Thesis: On the Interaction Between Firm Level Variables, the CAPM Beta, and Stock Returns.

Doctor of Philosophy *continued*

David Thomas Young *(Social Science)* B.Sc., University of Canterbury 2001; M.S., California Institute of Technology 2005.
Thesis: Firm Behaviour in Markets with Capacity Constraints.

DIVISION OF PHYSICS, MATHEMATICS AND ASTRONOMY

Michael A. Armen *(Physics)* B.S., University of California, Berkeley 1999.
Thesis: Bifurcations in Single Atom Cavity QED.

Andrew David Beyer *(Physics)* B.S., The University of Texas at Austin 2002.
Thesis: Studies of the Low-Energy Quasiparticle Excitations in High-Temperature Superconducting Cuprates with Scanning Tunneling Spectroscopy and Magnetization Measurements.

Waheb Bishara *(Physics)* B.A., B.Sc., Technion – Israel Institute of Technology 2003.
Thesis: Non-Abelian Quantum Hall States and Fractional Statistics.

Michael Boyle *(Physics)* B.A., S.B., The University of Chicago 2002.
Thesis: Accurate Gravitational Waveforms from Binary Black-hole Systems.

Elina Brobeck *(Astrophysics)* S.B., Massachusetts Institute of Technology 2002.
Thesis: Measurement of Ultra-High Energy Cosmic Rays with CHICOS.

Patrick Brian Cameron *(Astrophysics)* B.A., Cornell University 2003.
Thesis: The Formation and Evolution of Neutron Stars: Astrometry, Timing, and Transients.

Stephen Bradley Cenko *(Physics)* A.B., Harvard College 2002.
Thesis: The Energetics and Environments of *Swift* Gamma-Ray Bursts.

Hsin Cynthia Chiang *(Physics)* B.S., University of Illinois at Urbana–Champaign 2002.
Thesis: Observation of Cosmic Microwave Background Polarization with BICEP.

Benjamin Forster Collins *(Physics)* B.A., Columbia University 2003.
Thesis: Understanding the Solar System with Numerical Simulations and Lévy Flights.

Elizabeth Wilcut Connolly *(Physics)* B.A., University of California, Berkeley 2000.
Thesis: Experiments with Toroidal Microresonators in Cavity QED.

Stuartt Allan Corder *(Astrophysics)* B.S., University of Kansas 2001.
Thesis: Optimizing Image Fidelity with Arrays.

Adrienne Lynn Erickcek *(Physics)* A.B. Princeton University 2003.
Thesis: The Consequences of Modifying Fundamental Cosmological Theories.

Kovid Goyal *(Physics)* B.S., St. Xavier's College 2003.
Thesis: Using Graph States for Quantum Computation and Communication.

Asa Sies Hopkins *(Physics)* B.S., Haverford College 2001; M.S., California Institute of Technology 2007.
Thesis: Reduced Order Models for Open Quantum Systems.

Doctor of Philosophy *continued*

Drew Garvin Keppel *(Physics)* B.S., University of Wisconsin–Madison 2004.
Thesis: Signatures and Dynamics of Compact Binary Coalescences and a Search in LIGO's S5 Data.

David Richard Law *(Astrophysics)* B.A., University of Virginia 2003.
Thesis: The Kiloparsec-Scale Structure and Kinematics of High-Redshift Star-Forming Galaxies.

Chao Li *(Physics)* B.S., University of Science and Technology of China 2004; M.S., California Institute of Technology 2008.
Thesis: Topics in Theoretical Astrophysics.

Ming-Shr Lin *(Physics, Business Economics and Management and Electrical Engineering)* B.S., National Taiwan University 2000.
Thesis: Applications of Combinatorial Analysis to the Calculation of the Partition Function of the Ising Model.

Karín Menéndez Delmestre *(Astrophysics)* B.S., McGill University 2002.
Thesis: The Luminous, the Massive and the Dusty: A Near- to Mid-Infrared Spectroscopic Study of Submillimeter Galaxies.

Russell Lowell Miller *(Physics)* B.S., The University of Michigan 2003.
Thesis: Characterization and Control of a Strongly-Coupled Atom-Cavity System.

Dmitry Pavlov *(Mathematics)* B.S., Moscow State University 2003.
Thesis: Structure-Preserving Discretization of Incompressible Fluids.

Timofei Piatenko *(Physics)* B.S., Cornell University 2002.
Thesis: Search for $B \rightarrow (p/w)\,\gamma$ Decays at BaBar.

Daniel Michael Pragel *(Mathematics)* B.S., University at Albany 2003; M.S., California Institute of Technology 2008.
Thesis: Embeddings of One-Factorizations of Hypergraphs and Decompositions of Partitions.

Paige Alicia Randall *(Physics and Applied and Computational Mathematics)* B.S., University of Washington 2002; M.S., *(Applied and Computational Mathematics and Physics),* California Institute of Technology 2008.
Thesis: Sparse Recovery via Convex Optimization.

Abhishek Saha *(Mathematics)* B.Math., Indian Statistical Institute 2004.
Thesis: On Critical Values of *L*-Functions for Holomorphic Forms on *GSp(4) X GL(2)*.

Hilke Elisabeth Schlichting *(Astrophysics)* B.A., M.Sc., University of Cambridge 2004; M.A., 2007.
Thesis: Understanding the Origin of Planetary Systems: Studying the Kuiper Belt and the Dynamics of Planet Formation.

Daniel Stark *(Astrophysics)* B.S., University of Wisconsin–Madison 2003.
Thesis: Observing Galaxy Formation in the First Two Billion Years.

Doctor of Philosophy *continued*

Sean Michael Tulin *(Physics)* B.A., The Johns Hopkins University 2003.
Thesis: Supersymmetry: From Baryogenesis at the Electroweak Phase Transition to Low-Energy Precision Experiments.

Gregory Lee Ver Steeg *(Physics)* B.S., Drake University 2003.
Thesis: Foundational Aspects of Nonlocality.

Mirjana Vuletić *(Mathematics)* B.S., University of Novi Sad 2000; M.S., 2003.
Thesis: The Pfaffian Schur Process.

Manwah Wong *(Mathematics)* B.A., Princeton University 2004.
Thesis: Orthogonal Polynomials, Paraorthogonal Polynomials, and Point Perturbation.

Dongping Zhuang *(Mathematics)* B.S., Peking University 2001; M.S., 2004.
Thesis: A Geometric Study of Commutator Subgroups.

Prizes and awards are listed only for those students receiving degrees in 2009, and include prizes and awards received by them in previous years.

MILTON AND FRANCIS CLAUSER DOCTORAL PRIZE

Awarded to the Ph.D. candidate whose research is judged to exhibit the greatest degree of originality as evidenced by its potential for opening up new avenues of human thought and endeavor as well as by the ingenuity with which it has been carried out.

Name of recipient to be announced at commencement.

FREDERIC W. HINRICHS, JR., MEMORIAL AWARD

Awarded to the seniors who, in the opinion of the undergraduate deans, have made the greatest undergraduate contribution to the welfare of the student body and whose qualities of leadership, character, and responsibility have been outstanding.

2009 Hongdau Peter Liu, Kevin Alan Noertker

MABEL BECKMAN PRIZE

Awarded to an undergraduate woman upon completion of her junior or senior year in recognition of demonstrated academic and personal excellence, contributions to the Institute community, and outstanding qualities of character and leadership.

2009 Po-Ling Loh

The prizes above are announced at the commencement ceremony.

ROSALIND W. ALCOTT MERIT SCHOLARSHIP, UPPER CLASS MERIT AWARD, CARNATION SCHOLARSHIP, AND JOHN STAUFFER MERIT SCHOLARSHIP

Each year Caltech awards these prizes for academic excellence to undergraduates. They are based solely on merit (selection is made on the basis of grades, faculty recommendations, and demonstrated research productivity) with no consideration given to need or any other nonacademic criteria.

2007

Matthew James Glassman
Po-Ling Loh

2008

Kevin Kuan-Wei Chen
Nickolas Andrew Fortino
Elizabeth Howe
Alexander Chunhachatchawalkul Hudson
Chen Yee Liaw
Daniel Lo
Po-Ling Loh
Radhika Marathe
Caleb Enoch Ng
Harish Vasudevan
Glenn Stephen Wagner
Muzhou Wang
Albert Wu

2009

Alexander A. Alemi
Daniel S. Chao
Gabriel Adam Cohn
Matthew James Glassman
Arthur Hsu Chen Chang
Kevin Kuan-Wei Chen
Nickolas Andrew Fortino
Cheng William Hong
Beijing Kara Huang
Alexander Chunhachatchawalkul Hudson
Sungshik Kim
Andrew P. S. J. Kositsky
Andrew P. Lai
Euiwoong Lee
John Ming Leichty
Chen Yee Liaw
Han-Hsuan Lin
John Hsiao-Yung Liu
Daniel Lo
Po-Ling Loh
Ilya Loksha
Fedor Dmitrievich Manin
Radhika Marathe
Deepak Mishra
Caleb Enoch Ng
Ashley Elizabeth Potts
Rachel Reddick
David Walter Renshaw
Ilya Y. Shadrin
Susan Qi Shen
Christina Vicky Theodoris
Harish Vasudevan
Glenn Stephen Wagner
Muzhou Wang
Albert Wu

AXLINE MERIT SCHOLARS

Awarded to selected freshmen whose record of personal and academic accomplishment is judged outstanding among incoming freshmen. These scholarships are renewable, contingent on academic performance.

2006	*Daniel S. Chao*	*Abhi Gulati*	*Caleb Enoch Ng*
	Kevin Kuan-Wei Chen	*Kristen Kozak*	*Corinne Pender*
	Maxwell Jacob Grazier G'Sell	*Po-Ling Loh*	*Mason Smith*

CHARLES D. BABCOCK AWARD

Awarded, by vote of the aeronautics faculty, to a graduate student whose achievements in teaching or other assistance to students have made a significant contribution to the aeronautics department.

2006 *Xiao Lu*
2007 *Ling Zheng*
2008 *Xiao Lu*
2009 *Emily Jayne McDowell*

ROBERT P. BALLES CALTECH MATHEMATICS SCHOLARS AWARD

Awarded to the mathematics major entering his or her senior year who has demonstrated the most outstanding performance in mathematics courses completed in the student's first three years at Caltech.

2008 *Po-Ling Loh*

WILLIAM F. BALLHAUS PRIZE

Awarded to aeronautics students for outstanding doctoral dissertations.

2009 *Daniel Chung*

ERIC TEMPLE BELL UNDERGRADUATE MATHEMATICS RESEARCH PRIZE

Awarded to one or more juniors or seniors for outstanding original research in mathematics.

2007 *David Walter Renshaw*

2009 *Ila Kapur Varma*

BHANSALI PRIZE IN COMPUTER SCIENCE

Awarded to an undergraduate student for outstanding research in computer science in the current academic year.

2008 *Fedor Dmitrievich Manin*

ROLF D. BUHLER MEMORIAL AWARD IN AERONAUTICS

Awarded to an aeronautics student for outstanding academic achievement in the Master's program.

2009 *Sebastian Liska*

FRITZ B. BURNS PRIZE IN GEOLOGY

Awarded to an undergraduate who has demonstrated both academic excellence and great promise of future contributions in the fields represented by the Division of Geological and Planetary Sciences.

2008 *Andrew P. S. J. Kositsky*

THE W. P. CAREY & CO., INC., PRIZE IN APPLIED MATHEMATICS

Awarded to a student receiving a Doctor of Philosophy degree for an outstanding doctoral dissertation in applied mathematics or pure mathematics.

2009 *Ari Joshua Stern*

BONNIE CASHIN PRIZE FOR IMAGINATIVE THINKING

Awarded each year to the entering freshman who has written the most imaginative essays in the Application for Freshman Admission.

2003 *Joseph Henry Schatz Koehler*

2006 *Albert Wu*

CENTENNIAL PRIZE FOR THE BEST THESIS IN MECHANICAL ENGINEERING

Awarded each year to a candidate for the degree of Doctor of Philosophy in mechanical engineering whose doctoral thesis is judged to be the most original and significant by a faculty committee appointed annually by the executive officer for mechanical engineering. The prize consists of a citation and a cash award of $1,000 and was established with gifts from alumni following the division's centennial celebration in 2007.

2009 *Julia Marie Badger Braman, Or Yogev*

RICHARD BRUCE CHAPMAN MEMORIAL AWARD

Awarded to a graduate student in hydrodynamics who has distinguished himself or herself in research in the Division of Engineering and Applied Science.

2009 *Daniel Chung*

DONALD S. CLARK MEMORIAL AWARD

Awarded to two juniors in recognition of service to the campus community and academic excellence. Preference is given to students in the Division of Engineering and Applied Science and to those in Chemical Engineering.

2008 *Vibha Laljani, Christopher Aaron Watson*

THE DONALD COLES PRIZE IN AERONAUTICS

Awarded to the graduating Ph.D. student in aeronautics whose thesis displays the best design of an experiment or the best design for a piece of experimental equipment.

2009 *Sharlotte Lorraine Bolyard Kramer*

DEANS' CUP AND CAMPUS LIFE AND MASTER'S AWARDS

Two awards, selected by the deans, the director of campus life, and the master of student houses, presented to undergraduates whose concern for their fellow students has been demonstrated by persistent efforts to improve the quality of undergraduate life and by effective communication with members of the faculty and administration.

2009 *Dvin Adalian, Ekta Bhojwani, Cliff Kwon-Fu Chang, Andrea Rose Dubin,* Campus Life

Zachary Higbee, Alexander Chunhachatchawalkul Hudson, Christopher Aaron Watson, Dean's Cup

DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN BIOTECHNOLOGY OR RELATED FIELDS

Awarded annually to a Ph.D. candidate for the best thesis, publication, or discovery in biotechnology or related fields at the Institute in the preceding 12 months. Winners are selected by the bioengineering faculty. This prize is made possible by a gift from Anna Kokkalis Demetriades and Sterge T. Demetriades, Eng '58.

2009 *Erik A. Rodriguez*

DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN NANOTECHNOLOGY OR RELATED FIELDS

Awarded annually to a Ph.D. candidate for the best thesis, publication, or discovery in nanotechnology or related fields at the Institute in the preceding 12 months. This prize is made possible by a gift from Anna Kokkalis Demetriades and Sterge T. Demetriades, Eng '58.

2009 *Ke Xu*

CONSTANTIN G. ECONOMOU MEMORIAL PRIZE

Awarded to a chemical engineering graduate student distinguished by outstanding research accomplishments and exemplary attitude while fulfilling candidacy requirements for the Ph.D. degree.

2006 *Chase Lawrence Beisel*

EVERHART DISTINGUISHED GRADUATE STUDENT LECTURER AWARD

Awarded to a graduate student who has demonstrated exemplary presentation ability and graduate research.

2009 *Gwyneth Megan Card, Adrienne Lynn Erickcek*

DORIS EVERHART SERVICE AWARD

Awarded annually to an undergraduate who has actively supported and willingly worked for organizations that enrich not only student life, but also the campus and/or community as a whole, and who has, in addition, exhibited care and concern for the welfare of students on a personal basis.

2008 *Hongdau Peter Liu*

2009 *Susan Qi Shen*

LAWRENCE L. AND AUDREY W. FERGUSON PRIZE

Awarded to the graduating Ph.D. candidate in biology who has produced the outstanding doctoral thesis for the past year.

2009 *Casimir M. Wierzynski*

RICHARD P. FEYNMAN PRIZE IN THEORETICAL PHYSICS

Awarded to a senior on the basis of excellence in theoretical physics.

2009 *Han-Hsuan Lin*

HAREN LEE FISHER MEMORIAL AWARD IN JUNIOR PHYSICS

Awarded to a junior physics major who demonstrates the greatest promise of future contributions in physics.

2008 *Rachel Reddick*

HENRY FORD II SCHOLAR AWARD

Awarded either to the engineering student with the best academic record at the end of the third year of undergraduate study, or to the engineering student with the best first-year record in the graduate program.

2008 *Kevin Kuan-Wei Chen*

JACK E. FROEHLICH MEMORIAL AWARD

Awarded to a junior in the upper 5 percent of his or her class who shows outstanding promise for a creative professional career.

2008 *Christina Vicky Theodoris*

GRADUATE DEANS' AWARD FOR OUTSTANDING COMMUNITY SERVICE

Awarded to a Ph.D. candidate who, throughout his or her graduate years at the Institute, has made great contributions to graduate life and whose qualities of leadership and responsibility have been outstanding.

2009 *Asa Sies Hopkins, Rosemary Dyane Rohde*

GEORGE W. AND BERNICE E. GREEN MEMORIAL PRIZE

Awarded to the undergraduate student who, in the opinion of the division chairs, has shown outstanding ability and achievement in creative scholarship.

2007 *Alexander A. Alemi*

2008 *Andrew P. S. J. Kositsky*

LUCY GUERNSEY SERVICE AWARD

Awarded to one or two students who have provided exceptional service to the Caltech Y and/or the community, are involved with service projects, have demonstrated leadership in community and volunteer service efforts, and who exemplify a spirit of service.

2007 *Abdul Ahad Tariq*

ARIE J. HAAGEN-SMIT MEMORIAL AWARD

Awarded to a sophomore or junior in biology or chemistry who has shown academic promise and who has made recognized contributions to Caltech.

2008 *Caleb Enoch Ng*

ALEXANDER P. AND ADELAIDE F. HIXON PRIZE FOR WRITING

Awarded annually in recognition of the best writing in freshman humanities courses.

2006 *David Walter Renshaw, first place*

Ilya Loksha, second place

HANS G. HORNUNG PRIZE

Awarded for the best oral Ph.D. defense presentation by a student advised by aerospace faculty. The decision is made by a committee of students who attend all thesis presentations for the year.

2009 *Sharlotte Lorraine Bolyard Kramer*

BIBI JENTOFT-NILSEN MEMORIAL AWARD

Awarded to an upperclass student who exhibits outstanding qualities of leadership and who actively contributes to the quality of student life at Caltech.

2009 *Angela Zah*

SCOTT RUSSELL JOHNSON PRIZE FOR EXCELLENCE IN GRADUATE STUDY IN MATHEMATICS

Awarded to continuing graduate students for excellence in one or more of the following: extraordinary progress in research, excellence in teaching, or excellent performance as a first-year graduate student.

2005 *Abhishek Saha*

2006 *Abhishek Saha, Mirjana Vuletić*

2008 *Dongping Zhuang*

SCOTT RUSSELL JOHNSON GRADUATE DISSERTATION PRIZE IN MATHEMATICS

Awarded for the best graduate dissertation in mathematics.

2009 *Abhishek Saha, Mirjana Vuletić*

SCOTT RUSSELL JOHNSON UNDERGRADUATE MATHEMATICS PRIZE

Awarded for the best graduating mathematics major. Special consideration is given to independent research done as a senior thesis or SURF project.

2009 *Po-Ling Loh*

KALAM PRIZE FOR AEROSPACE ENGINEERING

Awarded to a student in the aerospace engineering Master's program whose academic performance was exemplary and who shows high potential for future achievements at Caltech. This prize was made possible through the generosity of Dr. Abdul Kalam, the 11th president of India, himself an aerospace engineer.

2009 *Alejandro Lopez Ortega*

D. S. KOTHARI PRIZE IN PHYSICS

Awarded to a graduating senior in physics who has produced an outstanding research project during the year.

2009 *Ming Eric Tai*

MARGIE LAURITSEN LEIGHTON PRIZE

Awarded to one or two undergraduate women who are majoring in physics or astrophysics, and who have demonstrated academic excellence.

2007 *Rachel Reddick*

HARRY LEITER MEMORIAL MECHANICAL ENGINEERING PRIZE

Awarded to a candidate for the degree of Bachelor of Science in mechanical engineering who has demonstrated extraordinary creativity as judged by a faculty committee appointed each year by the executive officer for mechanical engineering. The prize consists of a citation and a cash award and was made possible by a gift from Dr. Symme Leiter.

2009 *Amit Arun Gandhi*

MARI PETERSON LIGOCKI ('81) MEMORIAL AWARD

Awarded to a student who has improved the quality of student life at Caltech through his or her personal character.

2008 *Po-Ling Loh*

DOROTHY B. AND HARRISON C. LINGLE SCHOLARSHIP

Awarded to an incoming freshman in recognition of interest in a career in science or engineering, outstanding academic record, demonstrated fair-mindedness, and unquestioned integrity. This prize is renewable, contingent on academic performance.

2006 *Caleb Enoch Ng*

THE HERBERT NEWBY McCOY AWARD

Awarded to chemistry doctoral students for outstanding contributions to the science of chemistry.

2009 *David Michael Chenoweth, Ding-Shyue (Jerry) Yang*

ROBERT L. NOLAND LEADERSHIP SCHOLARSHIP

Awarded to undergraduate students who exhibit qualities of outstanding leadership, which are most often expressed as personal actions that have helped other people and that have inspired others to fulfill their capabilities.

2008 *Marissa Theresa Cevallos, Abdul Ahad Tariq*

2009 *Anna Maria Hiszpanski, Vibha Laljani, Caleb Enoch Ng*

PRESIDENT'S SCHOLARS

Awarded to selected freshmen to promote the breadth and diversity of the Caltech undergraduate student body. The scholarships are renewable, contingent on academic performance.

2006

Yezdan Sher Hadi Badrakhan
Marissa Theresa Cevallos
Marie Minh-Thu Giron
Dana Jaya Levine
Sean Matthew Marney
Philip Alejandro Muñoz
Manuel Ochoa
Maritza Ruiz
Ila Kapur Varma
Tina Wang

HOWARD REYNOLDS MEMORIAL PRIZE IN GEOLOGY

Awarded to a sophomore or junior who demonstrates the potential to excel in the field of geology and who actively contributes to the quality of student life at Caltech.

2007 *Andrea Rose Dubin*

2008 *Sierra Victoria Petersen*

HERBERT J. RYSER MEMORIAL SCHOLARSHIPS

Awarded to undergraduate students for academic excellence, preferably in mathematics.

2007 *Elizabeth Howe*

2008

Evan Philip Dummit
Lozan M. Ivanov
Po-Ling Loh
David Walter Renshaw

ERNEST E. SECHLER MEMORIAL AWARD IN AERONAUTICS

Awarded to an aeronautics student who has made the most significant contribution to the teaching and research efforts of GALCIT (Graduate Aeronautical Laboratories of the California Institute of Technology). Preference is given to students working in structural mechanics.

2007 *Sharlotte Lorraine Bolyard Kramer*

DON SHEPARD AWARD

Awarded to students who would find it difficult, without additional financial help, to engage in extracurricular and cultural activities. The recipients are selected on the basis of their capacity to take advantage of and to profit from these activities rather than on the basis of their scholastic standing.

2006 *Julie Yuk-Wah Huang*
Abdul Ahad Tariq

2007 *Kevin Alan Noertker*
Rebecca Ann Barter

2008 *Ekta Bhojwani*
Calyani Ganesan
Hongdau Peter Liu
Po-Ling Loh
Philip Alejandro Muñoz
Angela Zah

HALLETT SMITH PRIZE

Established in 1997 to commemorate Professor Smith's long career as one of the 20th century's most distinguished Renaissance scholars. The cash prize is given annually by the literature faculty to the undergraduate student who writes the finest essay on Shakespeare.

2007 *Garrett Theodore Ervin*

JOHN STAGER STEMPLE MEMORIAL PRIZE IN PHYSICS

Awarded to a graduate student in physics for outstanding progress in research as demonstrated by an excellent performance on the oral Ph.D. candidacy examination.

2005 *Hsin Cynthia Chiang*

2008 *Adrienne Lynn Erickcek*

PAUL STUDENSKI MEMORIAL FUND PRIZE

A travel grant awarded to a Caltech undergraduate who would benefit from a period away from the academic community in order to obtain a better understanding of self and his or her plans for the future.

2006 *Herschel Mukherjee*

MORGAN WARD PRIZE

Awarded for the best problems and solutions in mathematics submitted by a freshman or sophomore.

2006 *Po-Ling Loh*

FREDRICK J. ZEIGLER MEMORIAL AWARD

Awarded to an outstanding sophomore or junior in pure or applied mathematics, for excellence in scholarship as demonstrated in class activities or in the preparation of an original paper or essay in any subject area.

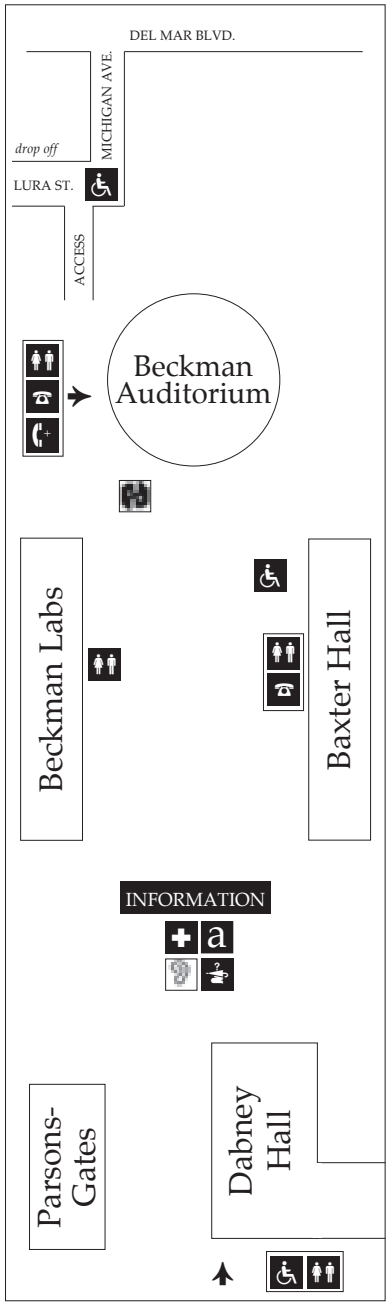
2007 *Po-Ling Loh*

Hail CIT

(Caltech Alma Mater)

by Manton Barnes, B.S. ’21 E.E.

In Southern California with grace and splendor bound,
Where the lofty mountain peaks look out to lands beyond,
Proudly stands our Alma Mater, glorious to see;
We raise our voices proudly, hailing, hailing thee.
Echoes ringing while we’re singing over land and sea,
The halls of fame resound thy name, noble CIT.



SERVICES FOR COMMENCEMENT GUESTS

PUBLIC TELEPHONES are available in Baxter Hall and Beckman Auditorium.

RESTROOMS are available in Baxter Hall, Beckman Labs, Dabney Hall, and Beckman Auditorium.

Information about the nearest location for FIRST AID SERVICES is available at the Information Center.

LOST AND FOUND items may be reported and/or claimed at the Information Center.

ATHENAEUM luncheon tickets will be on sale at the Information Center from 8 to 10 a.m.

SPECIAL SERVICES FOR PERSONS WITH DISABILITIES

ASSISTIVE LISTENING DEVICES are available at the Information Center. A driver's license or state-issued ID card is required.

LARGE-TYPE PROGRAMS (abridged) are available at the Information Center.

AMERICAN SIGN LANGUAGE (ASL) interpreters are stationed at the west front of the ceremony seating area.

PEOPLE WHO USE WHEELCHAIRS, and their guests, will find a special section near the east front of the ceremony seating area.

RESTROOMS ACCESSIBLE TO PEOPLE WHO USE WHEELCHAIRS are located on the first floor of Dabney Hall and of Baxter Hall.

AMPLIFIED TELEPHONE is available in Beckman Auditorium.