CALIFORNIA INSTITUTE *of* TECHNOLOGY

One Hundred and Ninth Annual Commencement

June 13, 2003

CALIFORNIA INSTITUTE *of* TECHNOLOGY

One Hundred and Ninth
Annual Commencement

Friday Morning at Ten O'Clock
June Thirteenth, Two Thousand Three

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.

Caltech today has a 124-acre campus and operates seven 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 2,000 students, more than half of whom are in graduate studies; 275 professorial faculty members, including four Nobel laureates and three Crafoord laureates; and more than 200 research faculty members. Today, Caltech will award 242 students the B.S. degree; 111 students the M.S. degree; and 137 doctoral candidates the Ph.D. degree, for a total of 490 graduates—quite a leap from the one man and one woman who constituted the first collegiate graduating class of Throop Polytechnic Institute.

Please note:
Video footage of commencement may be viewed on the Caltech website at http://www.caltech.edu/commencement/03/. Broadcast is scheduled to begin after 3:00 p.m.

THE INITIAL TAKEOFF and eventual direction of Harold Varmus's remarkable career did not follow the smooth upward trajectory that new college graduates usually envision for their own careers. Though he was the son of a doctor and had an interest in medicine, Varmus graduated from Amherst College as an English major, then went on to Harvard graduate school to study literature. When he realized that he wanted to study medicine after all, he applied to Harvard Medical School, where he was rejected twice. Accepted at Columbia's College of Physicians and Surgeons, he intended to become a psychiatrist, but was eventually drawn toward the study of the scientific basis of disease. At the age of 28, Varmus began working on the genetics of *E. coli* in a laboratory at the National Institutes of Health (NIH). Three years later, in 1970, he moved to UC San Francisco to work as a postdoctoral research fellow in a lab run by J. Michael Bishop. The research they did together greatly advanced the understanding, diagnosis, and treatment of cancer. In 1989, Bishop and Varmus were awarded the Nobel Prize in physiology or medicine for their discovery that normal human and animal cells contain genes capable of becoming cancer genes.

Receiving the prize provided Harold Varmus with a sense of broader responsibility toward science as a whole. He stepped into public life, serving on advisory panels and, in 1993, being named by then-President Bill Clinton as the director of the NIH. In that role—though he had never run a lab with more than 25 people in it—he found himself responsible for managing the largest medical

research entity in the world. He became a powerful and effective advocate in the halls of government for investing in basic science, and shaped the public's attitude about biomedical research as a public good. He initiated many changes at the NIH, attracted other distinguished scientists to its various institutes, and launched the addition of three major buildings.

After serving as its director for six years, Varmus left the NIH to become president and chief executive officer of Memorial Sloan-Kettering Cancer Center in New York City, in January 2000. Under his leadership, Memorial Sloan-Kettering has undertaken an expansion of its clinical infrastructure, adding space for programs in surgery, pathology, and pediatrics. Varmus has also enhanced the center's faculty and begun forging close ties with other scientific and medical institutions.

In addition to authoring over 300 scientific papers and four books, including an introduction to the genetic basis of cancer for a general audience, Varmus has been an advisor to the federal government, pharmaceutical and biotechnology firms, and many academic institutions. Recently, he has served on the World Health Organization's Commission on Macroeconomics and Health, advisory committees on electronic publishing, and planning groups for enhancing scientific activity in the developing world. He has been a member of the National Academy of Sciences since 1984 and of the Institute of Medicine since 1991.

Last year, Varmus was named a recipient of the 2001 National Medal of Science in recognition of his service at the helm of the NIH and his significant scientific accomplishments.

The arc of Harold Varmus's career has taken him from the humanities to pure research, then to scientific administration and advocacy. His journey—from college to today—demonstrates how an individual may, in rising to meet and to excel at the various challenges life presents, become one of the most influential leaders in science in the United States today.

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

Professor of History, Emeritus

ACADEMIC PROCESSION

Chief Marshal
Kim C. Border, Ph.D.

Marshals
Judith L. Campbell, Ph.D.
Barbara C. Green, Ph.D.
Christof Koch, Ph.D.
Niles A. Pierce, D. Phil.
Jean-Paul Revel, Ph.D.
Anneila I. Sargent, Ph.D.

Faculty Officers
Marianne Bronner-Fraser, Ph.D.
Melany L. Hunt, Ph.D.
David Wales, 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 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 *William W. Bing, M.M., Conductor*
PRESIDING	Benjamin M. Rosen *Chairman of the Board of Trustees* *California Institute of Technology*
COMMENCEMENT SPEAKER	Harold Varmus, M.D. *President and CEO, Memorial Sloan-Kettering Cancer Center*
CHORAL SELECTION	The Caltech Glee Clubs *Donald G. Caldwell, D.M.A., Conductor*
"Hallelujah," from *Messiah* George Frideric Handel	
CONFERRING OF DEGREES	David Baltimore, Ph.D. *President* *California Institute of Technology*

PRESENTATION OF CANDIDATES FOR DEGREES

For the Degree of Bachelor of Science	Jean-Paul Revel, Ph.D. *Dean of Students*
For the Degree of Master of Science	Margo Post Marshak, J.D. *Vice President for Student Affairs*
For the Degree of Doctor of Philosophy	Steven E. Koonin, Ph.D. *Provost*
Biology	Pamela Bjorkman, Ph.D. *Executive Officer for Biology*
Chemistry and Chemical Engineering	David A. Tirrell, Ph.D. *Division Chair*

Engineering and Applied Science	Richard M. Murray, Ph.D. *Division Chair*
Geological and Planetary Sciences	Edward M. Stolper, Ph.D. *Division Chair*
The Humanities and Social Sciences	Jean E. Ensminger, Ph.D. *Division Chair*
Physics, Mathematics and Astronomy	Thomas A. Tombrello, Ph.D. *Division Chair*

ANNOUNCEMENT OF AWARDS AND CONCLUDING REMARKS — President Baltimore

ALMA MATER — The Caltech Glee Clubs, The Caltech Convocations Brass and Percussion Ensemble, and Organ

"Hail CIT"
by Manton Barnes, BS '21 EE
(The audience may join in; lyrics are found on page 45.)

RECESSIONAL — The Caltech Convocations Brass and Percussion Ensemble

Organ Postlude — *Dr. Deutsch*

You are invited to attend a reception on the Athenaeum West Lawn following the program.

Bachelor of Science

Ajani Abdul-Khaliq *San Antonio, Texas* Independent Studies Program
Safia Calah Abidi *Elmhurst, Illinois* Social Science
Elisabeth Rose Adams* *El Cajon, California* Geophysics
Alexander Michiel Adriaanse *San Mateo, California* Engineering and Applied Science
Owen Peter Aftreth *Anchorage, Alaska* Biology
Minta Carol Akin *Micanopy, Florida* Chemistry
Michelle Kristin Allis* *Brea, California* Engineering and Applied Science (Aeronautics)
Mihail Amarie* *Suceaua, Romania* Physics
Eric Karl Anderson* *La Crescenta, California* Mechanical Engineering
Susan Rebecca Ayer *Lexington, Virginia* Mechanical Engineering
Sangeeta Bardhan* *Sewell, New Jersey* Biology
Mary Jean Beard *Wichita, Kansas* Engineering and Applied Science
Leon Marcel Bellan* *Pasadena, California* Physics
Mark Bilinski* *Oceanside, California* Mathematics and Chemistry and Economics
Jonathan C. Bird* *Malibu, California* Physics
Jeffrey Alan Blackburne *San Diego, California* Physics
Jason Kimball Blair* *Ridgecrest, California* Electrical Engineering
Michael John Boeddiker *San Jose, California* Electrical Engineering
Jeffrey Alan Bolz* *West Palm Beach, Florida* Engineering and Applied Science
Abelardo Bourbois *Mission, Texas* Applied and Computational Mathematics
Maria Jean Brumm *Iowa City, Iowa* Geophysics
James Ryan Burgess *Redmond, Washington* Engineering and Applied Science
Saskya Byerly* *Altadena, California* Mathematics
Oscar Jefferson Carlton IV *Hoover, Alabama* Engineering and Applied Science
Jennifer Caron *Homestead, Florida* Science, Ethics, and Society/History and Philosophy of Science
Audrey Beth Carstensen *Glenview, Illinois* Biology
Julie Cha* *Ramona, California* Chemical Engineering
James Zachary Chadick* *The Woodlands, Texas* Biology and Chemistry
Vivek Mahendra Chandran* *Chattanooga, Tennessee* Electrical and Computer Engineering
Alan C. Chang *Goodyear, Arizona* Electrical Engineering
James Chang *Fallbrook, California* Chemistry
Jonathan Chang* *Cerritos, California* Electrical and Computer Engineering
Laura Chasman* *Mendota Heights, Minnesota* Mathematics

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

Bachelor of Science *continued*

Jerry Szejay Chen* *Huntsville, Alabama* Electrical and Computer Engineering
Shang-Lin Eileen Chen* *Middletown, New Jersey* Engineering and Applied Science
Xuejing Chen* *Broken Arrow, Oklahoma* Electrical and Computer Engineering
Eugene Chun-Yu Cheung* *Freehold, New Jersey* Mechanical Engineering
Shay Chinn *Sacramento, California* Biology
Paul Jongjoon Choi* *Webster, New York* Chemistry
David Benson Chou* *Irvine, California* Applied and Computational Mathematics
Robert William Christy* *Doylestown, Pennsylvania* Engineering and Applied Science
Wee Kang Chua* *Singapore, Singapore* Physics
Helen Fei-Lun Chuang* *Cupertino, California* Chemical Engineering
Christopher Michael Cianci* *Gresham, Oregon* Electrical and Computer Engineering
Clinton Taylor Conley* *Santa Ana, California* Mathematics
Andrew Brondos Conner *Richmond, Virginia* Engineering and Applied Science
Cris James Cornell *Kingston, Illinois* Engineering and Applied Science (Aeronautics)
Kevin Patrick Edward Costello* *St. Charles, Illinois* Mathematics and Economics
Craig Earl Countryman* *Cottonwood, California* Chemistry
Christopher Evan Crabbe *Severna Park, Maryland* Engineering and Applied Science
Mian Dai* *Chengdu, China (People's Republic)* Engineering and Applied Science and Economics
Jonathan Allen Dama* *Howell, New Jersey* Electrical Engineering
Lusine Danakian* *Van Nuys, California* Biology
Lilli Mirjam Davis *Seattle, Washington* Engineering and Applied Science
Dann Own Dempsey *Pasadena, California* Engineering and Applied Science
Peter James Dennedy-Frank* *Santa Fe, New Mexico* Planetary Science
Serina Marie Diniega* *Aurora, Colorado* Mathematics
Timothy Ellsworth Dolch *Hudson, Ohio* Physics
Parsa Dormiani Tabatabaei *Auckland, New Zealand* Electrical Engineering
Erica Nicole Eber *New York, New York* Physics
Krista Anne Ehinger *Phoenix, Arizona* Engineering and Applied Science
Kimberly Dawn Eilert *Mesa, Arizona* Electrical Engineering
Luke Michael Ekkizogloy *Leesburg, Georgia* Electrical Engineering
Laura Marie Elliott *Paola, Kansas* Geology and Science, Ethics, and Society/History and Philosophy of Science
Omar Kamal El-Sheikh *San Jose, California* Electrical and Computer Engineering
Jose Manuel Escalada* *Nogales, Arizona* Chemistry
Daniel C. Fabrycky* *Arlington Heights, Illinois* Physics
Will Meierjurgen Farr* *Coos Bay, Oregon* Physics
Clayton Ray Featherstone* *Garland, Texas* Physics and Economics
William McLean Findley *Natchitoches, Louisiana* Engineering and Applied Science
Jonathan Bruce Foster* *Ellison Bay, Wisconsin* Astronomy

Justin Michael Fox* *Pottstown, Pennsylvania* Engineering and Applied Science (Aeronautics)
Jason D. Frantz *Berkeley, California* Engineering and Applied Science
Nathan Lai-Shuen Fung* *Salem, Connecticut* Geophysics
Ilya Fushman* *Silver Spring, Maryland* Physics
Cody W. Geary *Stockton, California* Chemistry
Clara Jane Graham *Sacramento, California* Engineering and Applied Science
Jane Cecilie Greenham *Pretoria, South Africa* Planetary Science
Julia Jennifer Greissl *Breitenstein, Germany* Astronomy
Martin Paul Grunthaner* *Glendale, California* Mechanical Engineering
Nicholas Damien Sun Wo Guise* *Centerville, Ohio* Physics
Karl Daniel Hammond *Rochester, Minnesota* Chemical Engineering
Si-Ping Han *Yorba Linda, California* Physics
James Michael Hansen *Silver Spring, Maryland* Mathematics
China An Hanson *Newport Beach, California* Biology
Jonathan Harel* *Clayton, California* Electrical and Computer Engineering
Steven Hamed Hassani* *Springfield, Virginia* Astronomy
Maki Hattori *Chicago, Illinois* Astronomy
Dax Arthur Herrera *Canyon Country, California* Engineering and Applied Science
Andrew Peter Homyk *Charlottesville, Virginia* Electrical Engineering
Matthew Robert Hughes* *Seattle, Washington* Mathematics and Engineering and Applied Science
Dana Aretia Ionita *Anaheim, California* Physics
Katharine S. Ip *Albany, New York* Engineering and Applied Science
Geoffrey Olof Irving* *Fairbanks, Alaska* Mathematics and Engineering and Applied Science
Derek T. Jackson *Niskayuna, New York* Mechanical Engineering
Jora Marcella Jacobi *Albuquerque, New Mexico* Electrical Engineering
Michael Brandon Jeffries *Houston, Texas* Mathematics and Engineering and Applied Science
Emily Grace Johnsen* *Fresno, California* Science, Ethics, and Society/History and Philosophy of Science
Tyler James Johnson *Downington, Pennsylvania* Physics
Bruce Payne Johnston *Manassas, Virginia* Mathematics
Glenn Evans Jones *Eugene, Oregon* Mathematics and Engineering and Applied Science
Matthew Alexander Jones* *Houston, Texas* Economics
Timothy Forest Jones* *Winston-Salem, North Carolina* Engineering and Applied Science
Ted Edward Jou *Potomac, Maryland* Applied and Computational Mathematics and Business Economics and Management
Tyler Robin Kakuda* *Stockton, California* Electrical Engineering
Justin C. Kao *Huntington Beach, California* Applied and Computational Mathematics
Kimberly Erin Kelsey* *Long Beach, California* Geology

Bachelor of Science *continued*

Chad Christopher Kessens *Blue Springs, Missouri* Mechanical Engineering
Basit Ahmed Khan* *Lahore, Pakistan* Engineering and Applied Science and Economics
Daniel Huibo Kim *Orlando, Florida* Biology
Hannah Kyungjoo Kim *Monterey Park, California* Biology
Randie H. Kim* *Los Angeles, California* Chemistry
Chad T. Kishimoto* *Honolulu, Hawaii* Physics
Elise Brigitte Kleeman *San Diego, California* Geology
Kelly Ann Klima *Taneytown, Maryland* Mechanical Engineering
Kevin Shan-Ching Ko* *College Station, Texas* Electrical and Computer Engineering
Joseph Clarence Koo* *Monterey Park, California* Electrical Engineering
Stephanie Ann Kovalchik* *Danville, California* Biology and Literature
Alastair Grandus Kusack *South Salem, New York* Engineering and Applied Science
Christina T. Lam* *Pleasanton, California* Electrical and Computer Engineering
Johnny Nguyen Lam *Monterey Park, California* Mechanical Engineering
Tin Yiu Lam* *Hong Kong, China* Chemistry
Benjamin N. Lee* *Fairfax, Virginia* Electrical and Computer Engineering
Jennifer Hanmei Lee *Arcadia, California* Applied Physics
Miguel Edmundo Lemus *Indian Wells, California* Biology
Cecile Lim *Glendale, California* Electrical and Computer Engineering and Literature
Yee Fun Lim* *Singapore, Singapore* Physics
Alexander Peter Lin *Morris Plains, New Jersey* Biology
Jonathan Gien-Wei Lin* *Austin, Texas* Physics
Janessa Marie Link *Houston, Texas* Geology
Robert Nils Lion *Menlo Park, California* Mechanical Engineering
Alexander R. Lippert *Fort Walton Beach, Florida* Chemistry
Caleb K. Lo* *El Cerrito, California* Electrical Engineering
Katherine Jean Mack *Long Beach, California* Physics
Siddarth Madhav* *Hyderabad, India* Engineering and Applied Science and Economics
Michael Randolph Maire* *Silver Spring, Maryland* Electrical and Computer Engineering
Kaisey Stephen Mandel* *Great Neck, New York* Physics
David Hayes Marcus *Boulder, Colorado* Applied and Computational Mathematics
Ross Joseph Massey* *Great Falls, Virginia* Chemistry
Benjamin Bryant Mathews* *Dallas, Texas* Physics
Matthew Stephen Mayernik *Lewistown, Montana* Engineering and Applied Science
Ryan David McDaniel *U.S. Military* Engineering and Applied Science (Aeronautics) and History
Isaac Thomas Miller* *Dayton, Ohio* Mechanical Engineering
Andrew Jesse Mills *Silver Spring, Maryland* Independent Studies Program
Vikram Mittal* *Amarillo, Texas* Engineering and Applied Science (Aeronautics)
David Christopher Moore* *Potomac, Maryland* Electrical Engineering

Bachelor of Science *continued*

Collin Gabriel Moshman* *Silver Spring, Maryland* Mathematics
Nora Jayne Mullaney *Junction, Texas* Engineering and Applied Science
Matthew Benjamin Myers *Apache, Oklahoma* Chemical Engineering
Anthony Robert Nannini* *Bolingbrook, Illinois* Electrical Engineering
Arjun Venkat Narayanan *Barrington, Illinois* Biology
Or Neeman* *Hadera, Israel* Mathematics
Matthew Oka Norman *Cardiff, California* Applied Physics
Brett Neil Olsen* *Springfield, Missouri* Chemistry
Elaine Ou* *San Gabriel, California* Electrical Engineering
Steve Taechun Paik* *Duarte, California* Physics
Nathan Abbott Paymer* *Orinda, California* Mathematics and Engineering and Applied Science
Julian Christopher Pellico* *Agoura Hills, California* Engineering and Applied Science
Kaloyan Minev Penev* *Stara Zagora, Bulgaria* Physics
Christian James Peressin *Wichita, Kansas* Engineering and Applied Science
Timothy Van Pfeiffer* *Carmel Valley, California* Biology
Jesse Ethan Pino* *New York, New York* Physics
Leonid Polovets* *San Jose, California* Engineering and Applied Science
Marc David Popkin-Paine* *Houston, Texas* Electrical and Computer Engineering
Mayanka Prasad *San Antonio, Texas* Engineering and Applied Science
James Pugh* *Boonville, California* Electrical and Computer Engineering
Joy Yuan Qiu* *Lake Arrowhead, California* Engineering and Applied Science
Rey Natividad Ramirez *South Pasadena, California* Biology
Bryan Christopher Rittmeyer *Westminster, Maryland* Engineering and Applied Science
Michael Rizk* *Niceville, Florida* Electrical and Computer Engineering
Juan Andres Rodriguez *Miami, Florida* Mechanical Engineering
Nitzan Channa Roth* *Boca Raton, Florida* Applied and Computational Mathematics
Mark Spencer Rudner* *Santa Ana, California* Chemistry
Colin Witter Rundel *Topanga, California* Biology
Dana Louise Sadava *Pasadena, California* Engineering and Applied Science and Literature
Julia Elizabeth Salas* *Los Angeles, California* Chemistry
Anthony James Michael Salter* *Woodinville, Washington* Biology
Jennifer Lynn Schurr *Rancho Cucamonga, California* Chemistry
Katherine Jeanne Scott* *Belle Mead, New Jersey* Mechanical Engineering
Isaac See* *Phoenix, Arizona* Mathematics and Biology
Joshua Wei-Daw Shao *Los Altos Hills, California* Engineering and Applied Science
Yogesh Jayaraman Sharma* *Bangalore, India* Electrical and Computer Engineering
Emilie Layla Sharp *San Rafael, California* Applied and Computational Mathematics
Mona Abdul-Azeez Sheikh* *Adliya, Bahrain* Engineering and Applied Science
Saken Sherkhanov* *Turkestan, Kazakhstan* Biology

Bachelor of Science *continued*

Jason Jihern Shih *Yorba Linda, California* Engineering and Applied Science
Eugene Lewis Short III* *Monterey, California* Engineering and Applied Science
Dylan Alexander Simon* *Campbell, California* Engineering and Applied Science
Svanhild Marie Simonson *St. Cloud, Minnesota* Electrical Engineering
Daniel Ryan Somen *Chicago, Illinois* Mechanical Engineering
Neha Soni* *Bombay, India* Engineering and Applied Science
Melissa Amelia Soriano *Burke, Virginia* Electrical and Computer Engineering and Business Economics and Management
Michael Dwayne Souder* *Fort Worth, Texas* Mechanical Engineering
Anthony Paul Sowinski *Socorro, New Mexico* Engineering and Applied Science
Ramanujan Srinivasan* *Winter Springs, Florida* Engineering and Applied Science
Elizabeth Lee Stameshkin *Lancaster, Pennsylvania* Biology
Martha-Helene Stapleton *San Pedro, California* Physics
Aaron Abraham Stern *Ligonier, Pennsylvania* Electrical and Computer Engineering
Linda Elisabeth Strubbe* *Yorktown Heights, New York* Astronomy
Michelle Holly Swann* *Warner Robins, Georgia* Geochemistry and Chemistry
Sean Siegfried Szeja *Lutz, Florida* Physics and Economics
Kaisa Elina-Maria Taipale *St. Paul, Minnesota* Mathematics
Eino-Ville Aleksi Talvala* *Cupertino, California* Electrical Engineering
Sindy Kam Yan Tang* *Hong Kong, China* Electrical Engineering
Sarah Lynn Teegarden* *Hemet, California* Biology
Christina Lee Telles *Arlington, Massachusetts* Biology and Literature
Rachel Neville Thessin* *Arlington, Virginia* Engineering and Applied Science
Paul Thienphrapa *Los Angeles, California* Electrical and Computer Engineering
Peter John Thomas* *Keller, Texas* Electrical Engineering
Sonia Crago Timberlake *Bellevue, Washington* Biology
Oana Tocoian *Oradea, Romania* Engineering and Applied Science
James Tsee-Kin Tong* *Missouri City, Texas* Electrical Engineering
Jonathan Edward Toomey *San Juan Capistrano, California* Engineering and Applied Science
Thomas Euel Trammell *Houston, Texas* Electrical Engineering
Joseph Christopher Tremoulet* *Lexington, Kentucky* Engineering and Applied Science
Panu Trivej* *Bangkok, Thailand* Physics
Kevin Yee-Bien Tse* *West Bloomfield, Michigan* Biology
Nora Na Tu* *Beltsville, Maryland* Biology
Ahmet Tura* *Ismir, Turkey* Electrical Engineering
Tasha Christine Vanesian *San Diego, California* Electrical and Computer Engineering
Virginia Panayotova Vassilevska* *San Ramon, California* Mathematics and Engineering and Applied Science
Anael Verdugo *San Diego, California* Mathematics

Bachelor of Science *continued*

Benjamin Charles Voss *Spring, Texas* Engineering and Applied Science
William R. Wajert II *Beaumont, Texas* Engineering and Applied Science
Jonathan Newton Wall* *Lake Oswego, Oregon* Engineering and Applied Science
Timothy Leung Wan *Mercer Island, Washington* Engineering and Applied Science
Brian C. Wang *La Habra, California* Geology
Jialan Wang *Changchun, China* Mathematics
Kevin Wang *Highland Heights, Ohio* Electrical Engineering
Yingbing Wang* *Chandler, Arizona* Chemical Engineering
Sarah Elizabeth Warren *Arlington, Virginia* Mechanical Engineering
Megha Weerakoon Watugala* *Colombo, Sri Lanka* Engineering and Applied Science and Economics
Jacob Richard West *Placentia, California* Physics
Emily Grace Wildanger *Los Altos, California* Applied Physics
Marcus Raymond Williams *Alpharetta, Georgia* Mechanical Engineering
Jason Cinge Wong *Millbrae, California* Mechanical Engineering
James B. Worcester *Winter Springs, Florida* Engineering and Applied Science
Nathan Noland Wozny* *Plano, Texas* Physics
Peter Chang Yi *Gilbert, Arizona* Engineering and Applied Science
Ada Cheuk Ying Yu* *Torrance, California* Engineering and Applied Science
Wingho Yu* *Wellington, Florida* Engineering and Applied Science
Yifan Frank Yu *Swampscott, Massachusetts* Applied Physics

Master of Science

Ehsan Afshari *(Electrical Engineering)* B.S., Sharif University of Technology 2001.

Chihoon Ahn *(Chemical Engineering)* B.S., Seoul National University 2001.

Cédric Robert Anen *(Electrical Engineering)* Licence Informatique, Université de Marne la Vallée 2000; Licence Mathématiques, Université Paris VI; Maîtrise Mathématique, 2001; Diplôme d'Ingénieur, École Supérieure d'Ingénieurs Électrotechnique et Électronique 2002.

Deniz Karapetian Armani *(Electrical Engineering)* B.S., University of Illinois at Urbana-Champaign 2000.

Meher Kiran Prakash Ayalasomayajula *(Applied Mechanics)* B.Tech., Indian Institute of Technology, Madras 2001.

Peter Babilo *(Materials Science)* B.S., University of California, Irvine 2001.

Roya Bahreini *(Environmental Science and Engineering)* B.S., University of Maryland 1999.

Vijayanthi Balaraman *(Electrical Engineering)* B.S., California Institute of Technology 2002.

Paul Edward Barclay (*Applied Physics*) B.A.Sc., University of British Columbia 2001.

Shabari Basu (*Planetary Science*) B.Sc., St. Stephen's College 2001.

Julie Suzanne Biteen (*Applied Physics*) A.B., Princeton University 2001.

Josh Daniel Black *(Chemical Engineering)* B.S., Rensselaer Polytechnic Institute 2000; M.S., 2001.

Mihai Bondarescu (*Physics*) Diploma de Licenta, West University Timisoara 2001; Diplom, Freie Universität Berlin 2001.

Matthew Gregory Borselli (*Applied Physics*) B.S. (*Physics and Mathematics*), University of Arizona 2001.

Michal Amaris Brown *(Materials Science)* B.S., Florida A&M University 2001.

Kate Marie Campbell (*Environmental Science and Engineering*) B.S., Georgetown University 2001.

John Oluseun Dabiri (*Aeronautics*) B.S.E. (*Mechanical Engineering and Aeronautics*), Princeton University 2001.

Lisa Dang *(Mechanical Engineering)* S.B., Massachusetts Institute of Technology 2001.

Deepshikha Datta (*Biochemistry and Molecular Biophysics*) B.Sc., University of Delhi 1996.

Árdís Elíasdóttir *(Physics)* B.S. *(Mathematics and Physics)*, University of Iceland 2001.

Mostafa Said El-Khamy (*Electrical Engineering*) B.S., Alexandria University 1999; M.Sc., 2001

Selene Farrell Eltgroth *(Geochemistry)* B.S., University of California, San Diego 1998.

Michael Steven Epstein *(Mechanical Engineering)* B.S., University of California, Los Angeles 2002.

James Richard Falsey *(Chemistry)* B.S., University of Arizona 2000.

Jeffrey Paul Fingler (*Applied Physics*) B.S., University of Manitoba 2001.

Michelle Diana Friedman (*Electrical Engineering*) B.S.E., Princeton University 2002.

Michael Jonathan Gale (*Aeronautics*) B.S., Cornell University 2002.

Master of Science *continued*

Jonathan Michael Galownia (*Chemical Engineering*) B.S., University of Illinois at Urbana-Champaign 2000.

Niki Chiyomi Galownia *(Chemical Engineering)* B.S., Case Western Reserve University 2001.

Suleyman Gokyigit *(Computer Science)* B.S., University of Toledo 1999.

Adam Andras Granicz *(Computer Science)* B.S., Missouri Southern State College 2000.

Isa Emin Hafalir (*Social Science*) B.S., Bilkent University 2001.

Fady Hajjar (*Aeronautics*) B.S., University of Illinois at Urbana-Champaign 2002.

Lin Han *(Applied Physics)* B.S., Jilin University 2001.

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Ron Kent Hockersmith *(Mechanical Engineering)* B.S.E., Arizona State University 2001.

Dean Marcu Holunga *(Chemical Engineering)* A.A., Ambassador University 1986; B.A., 1988; B.S., Rensselaer Polytechnic Institute 1999.

Tomonori Honda *(Mechanical Engineering)* B.S., University of California, Berkeley 2002.

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Yashar Kalani *(Biochemistry and Molecular Biophysics)* B.S., M.S., University of California, Los Angeles 2002.

Benjamin Bailey Kaufmann (*Materials Science*) B.S., University of California, Berkeley 2000.

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Theresa Hiromi Kidd (*Aeronautics*) B.S., University of Illinois at Urbana-Champaign 2002.

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Master of Science *continued*

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Master of Science *continued*

David Lawrence Shuster *(Geochemistry)* B.A., University of California, Berkeley 1996.
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Martín Javier Smith-Martinez (*Applied Physics*) B.S., Harvey Mudd College 2001.
Edwin Soedarmadji *(Electrical Engineering)* B.S., California Institute of Technology 1997.
Theresa Ann Spano (*Environmental Science and Engineering*) B.S., Hartwick College 2001.
Demetri Polychronis Spanos *(Mechanical Engineering)* B.A., B.S., Rice University 2002.
Sarah Jane Spessard *(Chemistry)* B.A., Gustavus Adolphus College 2000.
Geoffrey Daniel Staneff (*Materials Science*) B.S., University of Washington 1998.
Mihailo Stojnić (*Electrical Engineering*) Dipl. Ing., Belgrade School of Electrical Engineering 2001.
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Luke Andrzej Sweatlock (*Applied Physics*) B.S., Cornell University 2001.
Kunihiko Taira *(Mechanical Engineering)* B.S., University of Tennessee 2002.
Abhishek Tiwari (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Kanpur 2001.
Paul Gerhard Updike (*Electrical Engineering*) B.S., California Institute of Technology 2002.
Anand Vadehra *(Chemistry)* B.S., State University of New York at Stony Brook 2000.
Christopher Thomas Veazey *(Materials Science)* B.S., Pacific University 2001.
Rafael Verduzco *(Chemical Engineering)* B.S., Rice University 2001.
Saurabh Vyawahare (*Applied Physics*) B.Tech., Indian Institute of Technology, Madras 2001.
Robert Joseph Walters (*Applied Physics*) B.S., Harvey Mudd College 2001.
Feiyu Wang (*Electrical Engineering*) B.A., B.S., Lafayette College 2001.
Yajuan Wang *(Environmental Science and Engineering)* B.S., Tsinghua University 1999.
Jennifer Elisabeth Witman *(Chemical Engineering)* B.S. *(Chemistry and Chemical Engineering),* Purdue University 2001.
Michael Glenn Wrighton *(Computer Science)* B.S., Washington University 2000.
Peng Xu *(Materials Science)* B.S., Tsinghua University 1998; M.S., 2000.
Jing Yang *(Civil Engineering)* B.E., Tongji University 2001.
Chengzhong Zhang *(Chemical Engineering)* B.E., Tsinghua University 2001.

Doctor of Philosophy

DIVISION OF BIOLOGY

Yến Kim Buì *(Biology)* B.A., Pomona College 1996; M.S., California Institute of Technology 1999.
Thesis: Genetic Analysis of LET-23 Mediated IP_3 Signaling in *Caenorhabditis elegans.*

Bruce Seymour Burkemper *(Biology)* B.A., University of Vermont 1989.
Thesis: Biochemical Characterization of *Drosophila* Receptor Tyrosine Phosphatases.

Grace C. Chang (*Computation and Neural Systems*) B.S., Stanford University 1992; M.S., 1994.
Thesis: Neural Representation of Surface Ordering in Visual Areas V1, V2 and MT.

Deepshikha Datta *(Biochemistry and Molecular Biophysics)* B.Sc., University of Delhi 1996.
Thesis: Protein-Ligand Interactions: Docking, Design and Conformation Change.

Andrew Josef Ewald *(Biochemistry and Molecular Biophysics)* B.S., Haverford College 1997.
Thesis: The Molecular Control of Cell Movements during Early Vertebrate Development.

Martha Kirouac *(Biology)* B.S., Union College 1996; M.S., California Institute of Technology 2000.
Thesis: *cis*-Regulatory Control of Three Cell Fate-Specific Genes in Vulval Organogenesis of *C. elegans* and *C. briggsae*.

Chunhui Mo *(Biochemistry and Molecular Biophysics)* B.S., Peking University 1994.
Thesis: Synaptic Learning Rules for Local Synaptic Interactions: Theory and Application to Direction Selectivity.

Cindy María Quezada *(Biochemistry and Molecular Biophysics)* B.S., University of California, Davis 1995.
Thesis: Histidine Phosphorylation in Bacterial Chemotaxis.

Carlo Joseph Quiñónez *(Biology)* B.S., San Diego State University 1997; M.S., California Institute of Technology 1999.
Thesis: Theory and Design of Relaxometric Probes.

Christopher Ashby Voigt *(Biochemistry and Molecular Biophysics)* B.S.E., University of Michigan 1998.
Thesis: Computationally Optimizing the Directed Evolution of Proteins.

Qiao Zhou *(Biology)* B.S., Qingdao Ocean University 1993; M.S., Boston University 1997.
Thesis: Glial Cell Development in the Vertebrate Central Nervous System.

DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING

Ravinder Abrol *(Chemistry)* B.S., Hans Raj College 1993; M.S., Indian Institute of Technology, Kanpur 1995.
Thesis: Theory of Electronically Nonadiabatic Quantum Reaction Dynamics.

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

Doctor of Philosophy *continued*

Lily Joy Ackerman *(Chemistry)* B.S., Illinois State University 1999.
Thesis: Ancillary Ligand Effects in Niobocene Olefin Hydride Complexes and Hydrocarbon Oxidation by Palladium(II) Complexes.

Daniel Ephraim Austin *(Chemistry)* B.S., Brigham Young University 1998.
Thesis: Impact-Ionization Mass Spectrometry of Cosmic Dust.

Christopher W. Bielawski *(Chemistry)* B.S., University of Illinois at Urbana-Champaign 1997.
Thesis: Tailoring Polymer Synthesis with Designer Ruthenium Catalysts.

Elizabeth Marshall Boon *(Chemistry)* A.B., Kenyon College 1997.
Thesis: Electrochemical Sensors Based on DNA-Mediated Charge Transport Chemistry.

Gabriel Shaw Brandt *(Chemistry)* B.A., Reed College 1992.
Thesis: Site-Specific Incorporation of Synthetic Amino Acids into Functioning Ion Channels.

Shawn M. Briglin *(Chemistry)* B.A., B.S., University of Rochester 1997.
Thesis: Spatial, Temporal, and Chemical Aspects of Vapor Detection Using Conductive Composite Chemically Sensitive Resistors.

Arnab Kumar Chatterjee *(Chemistry)* B.A., Northwestern University 1997.
Thesis: Investigations into the Selectivity of Olefin Cross-Metathesis Using Ruthenium Alkylidene Catalysts: Electronic and Steric Matching of Substrates.

Timothy Casey Cheng *(Chemistry)* B.S., University of Toronto 1996.
Thesis: Investigations into the Enzymology and Biotechnology of the Hyperthermophilic Carboxypeptidase (PfuCP) from the Archaeon *Pyrococcus furiosus*.

Lance Eric Christensen *(Chemistry)* B.S., University of Chicago 1996.
Thesis: Laboratory Studies of Atmospherically Important Gas-Phase Peroxy Radical Reactions.

Alexander Robert Dunn *(Chemistry)* B.S., California Institute of Technology 1998.
Thesis: Sensitizer-linked Substrates as Probes of Heme Enzyme Structure and Catalysis.

Shachi S. Gosavi *(Chemistry)* M.S., Indian Institute of Technology, Bombay 1995.
Thesis: Electron Transfer at Metal Surfaces.

Jason Knowles Holt *(Chemical Engineering)* B.S., University of California, Irvine 1997; M.S., California Institute of Technology 1999.
Thesis: Hot-Wire Chemical Vapor Deposition of Silicon and Silicon Nitride for Photovoltaics: Experiments, Simulations, and Applications.

John Michael Joern *(Chemical Engineering)* B.S., Rensselaer Polytechnic Institute 1998.
Thesis: Engineering Dioxygenases by Laboratory Evolution: A Comparison of Evolutionary Search Strategies.

Agnes Juang *(Chemistry)* B.S., University of California, Santa Barbara 1997.
Thesis: Effects of Surface Modification on Charge-Carrier Dynamics at Semiconductor Interfaces.

Doctor of Philosophy *continued*

Ryan Roy Julian *(Chemistry)* B.S., University of Utah 1999.
Thesis: Molecular Recognition of Biomolecules in the Gas Phase.

David Randall Kent IV *(Chemistry)* B.A., Texas A&M University 1999.
Thesis: New Quantum Monte Carlo Algorithms to Efficiently Utilize Massively Parallel Computers.

Garett Michael Leskowitz *(Chemistry)* S.B., Massachusetts Institute of Technology 1988.
Thesis: Force-Detected Nuclear Magnetic Resonance Independent of Field Gradients.

Lintong Li *(Chemistry)* B.S., Beijing Medical University 1994; M.S., Institute of Chemistry, Chinese Academy of Sciences 1997.
Thesis: The Tethered Agonist Approach to Mapping Ion-Channel Proteins - Toward a Structural Model for the Agonist-Binding Site of the Nicotinic Acetylcholine Receptor.

Shuwei Li *(Chemistry)* B.S., Peking University 1994; M.S., Boston University 1997.
Thesis: In Vitro Selection of mRNA-Display Libraries Containing Unnatural Amino Acids.

Julia G. Lyubovitsky *(Chemistry)* B.S., New York University 1997.
Thesis: Mapping the *Cytochrome C* Folding Landscape.

Joshua Ahab Maurer *(Chemistry)* B.A., M.A., Clark University 1995.
Thesis: I. Structure-Function Analysis of the Mechanosensitive Channel of Large Conductance. II. Design of Novel Magnetic Materials using Crystal Engineering.

Alexandre Edouard Meier *(Chemistry)* Diplôme d'Ingénieur, École Polytechnique Fédérale de Lausanne 1996.
Thesis: Gallium and Chromium Corroles.

Jeremiah Edward Miller *(Chemistry)* B.Sc., University of Wisconsin-Madison 1998.
Thesis: Radical Formation and Electron Transfer in Biological Molecules.

John Philip Morgan *(Chemistry)* B.S., Haverford College 1997.
Thesis: Ruthenium-Based Olefin Metathesis Catalysts Coordinated with *N*-Heterocyclic Carbene Ligands: Synthesis and Applications.

Athanasios Nenes *(Chemical Engineering)* Diploma, National Technical University of Athens 1993; M.S., University of Miami 1997.
Thesis: Toward an Understanding of the Indirect Climatic Effect of Aerosols.

Victor Clay Rucker *(Chemistry)* B.S., Southeastern Louisiana University 1995; B.S., Tulane University 1998.
Thesis: Detection of DNA by Sequence Specific Fluorescent Polyamides.

Lianhong Sun *(Chemistry)* B.S., Inner Mongolia University 1994; M.S., Dalian Institute of Chemical Physics 1997.
Thesis: Engineering Galactose Oxidase to Increase Expression Level in *E. coli*, Enhance Thermostability and Introduce Novel Activities.

Doctor of Philosophy *continued*

Todd Addison Thorsen *(Biochemistry and Molecular Biophysics)* B.S., University of California, San Diego 1992; M.Ph., University of California, Berkeley 1997.
Thesis: Microfluidic Technologies for High-Throughput Screening Applications.

Christopher Ryan Treadway *(Chemistry)* B.S., University of Illinois at Urbana-Champaign 1996.
Thesis: Spectroscopic Characterization of DNA-Mediated Charge Transfer.

Tina Maria Trnka *(Chemistry)* B.A., Columbia University 1997.
Thesis: Catalysts for Olefin Metathesis: Ruthenium Alkylidene Complexes with Phosphine and N-Heterocyclic Carbene Ligands.

Jian Wang *(Chemical Engineering)* B.S., University of Science and Technology of China 1996; M.S., California Institute of Technology 1998.
Thesis: Instrument Development and Characterization of Atmospheric Aerosol Physical Properties through Airborne Measurement.

William Amine Wehbi *(Chemistry)* B.S., University of Arizona 1997.
Thesis: Amino Acid Radicals in Rhenium-Modified Copper Proteins.

Deqiang Zhang *(Chemistry and Computer Science)* B.S., University of Science and Technology of China 1993; M.S., Chinese Academy of Science 1996.
Thesis: Structure-Based Design of Mutant Proteins: I. Molecular Docking Studies of Amino Acid Binding to Wild-Type Aminoacyl-tRNA Synthetases. II. Structure-Based Design of Mutant Aminoacyl-tRNA Synthetases for Non-Natural Amino Acid Incorporation.

DIVISION OF ENGINEERING AND APPLIED SCIENCE

William B.G. Agassounon *(Electrical Engineering)* Diplôme d'Ingénieur, École Supérieure d'Ingénieurs en Électrotechnique et Électronique 1999; M.S., California Institute of Technology 1999.
Thesis: Modeling Artificial, Mobile Swarm Systems.

Marco Arienti *(Aeronautics and Applied and Computational Mathematics)* M.S., Politecnico di Milano 1994; M.S., California Institute of Technology 1998.
Thesis: A Numerical and Analytical Study of Detonation Diffraction.

Joanna Maria Austin *(Aeronautics and Applied Mathematics)* B.E., B.S., University of Queensland 1996; M.S., California Institute of Technology 1998.
Thesis: The Role of Instability in Gaseous Detonation.

Prakash Viththal Bhave *(Environmental Science and Engineering)* B.S., University of California, Berkeley 1998; M.S., California Institute of Technology 1999.
Thesis: Air Pollution at the Single-Particle Level: Integrating Atmospheric Measurements with Mathematical Models.

Doctor of Philosophy *continued*

Vanessa Sabrina Camelo *(Civil Engineering)* B.S., California Polytechnic State University, San Luis Obispo 1996; M.S., California Institute of Technology 1999.
Thesis: Dynamic Characteristics of Woodframe Buildings.

Xavier Cartoixà Soler *(Applied Physics)* Licenciat en Fisica, Universitat Autonoma de Barcelona 1996; M.S., California Institute of Technology 1999.
Thesis: Theoretical Methods for Spintronics in Semiconductors with Applications.

Chun Tung Cheung *(Electrical Engineering)* B.E., The University of Hong Kong 1997; M.S., California Institute of Technology 1998.
Thesis: Waveguide Packaging of Quasi-Optical Grid Amplifiers.

Calum Ronald Inneas Chisholm *(Materials Science)* B.S., Yale University 1995; M.S., California Institute of Technology 2001.
Thesis: Superprotonic Phase Transitions in Solid Acids: Parameters Affecting the Presence and Stability of Superprotonic Transitions in the MH_nXO_4 Family of Compounds (X=S,Se,P,As; M=Li,Na,K,NH_4,Rb,Cs).

Razvan C. Fetecau *(Applied and Computational Mathematics)* B.S., University "Al. I. Cuza" 1997; M.S., The University of Bucharest 1998.
Thesis: Variational Methods for Nonsmooth Mechanics.

Massimo Franceschetti *(Electrical Engineering)* Laurea, Università di Napoli Federico II 1997; M.S., California Institute of Technology 1999.
Thesis: Wireless Networks, from Collective Behavior to the Physics of Propagation.

Martha Anne Gallivan *(Mechanical Engineering and Control and Dynamical Systems)* B.S., University of Illinois at Urbana-Champaign 1996; M.S., California Institute of Technology 1997.
Thesis: Modeling and Control of Epitaxial Thin Film Growth.

Jason Allan Graetz *(Materials Science)* B.A., Occidental College 1998; M.S., California Institute of Technology 2000.
Thesis: Electronic Environments and Electrochemical Properties in Lithium Storage Materials.

Andrei Yakovlevich Greenberg *(Applied and Computational Mathematics)* M.S., Moscow State University 1997.
Thesis: Chebyshev Spectral Method for Singular Moving Boundary Problems with Application to Finance.

Eitan Grinspun *(Computer Science)* B.S., University of Toronto 1997; M.S., California Institute of Technology 2000.
Thesis: The Basis Refinement Method.

Andrew C. Guyader *(Civil Engineering)* B.S., California Polytechnic State University, San Luis Obispo 1997; M.S., California Institute of Technology 1998.
Thesis: A Statistical Approach to Equivalent Linearization with Application to Performance-Based Engineering.

Doctor of Philosophy *continued*

Jay C. Hanan *(Materials Science)* B.S. (*Chemistry and Engineering Physics*), Oklahoma Christian University 1997; M.S., California Institute of Technology 1999.
Thesis: Damage Evolution in Uniaxial SiC Fiber Reinforced Ti Matrix Composites.

Anil Nirmal Hirani (*Computer Science and Control and Dynamical Systems and Mathematics*) M.Sc., Birla Institute of Technology and Science 1986; M.S., Stanford University 1988; M.S., California Institute of Technology 2000.
Thesis: Discrete Exterior Calculus.

Elizabeth Anne Howard *(Applied and Computational Mathematics)* B.S., Kansas State University 1990.
Thesis: A Front Tracking Method for Modelling Thermal Growth.

Patrick Hung *(Mechanical Engineering)* B.A.Sc., University of Waterloo 1997; M.S., California Institute of Technology 1998.
Thesis: Algorithms for Reaction Mechanism Reduction and Numerical Simulation of Detonations Initiated by Projectiles.

E. McKay Hyde *(Applied and Computational Mathematics)* B.A., University of Utah 1997.
Thesis: Fast, High-Order Methods for Scattering by Inhomogeneous Media.

Gustavo Joseph *(Mechanical Engineering)* Ing., Universidad Nacional Autonoma de Mexico 1997; M.S., California Institute of Technology 1998.
Thesis: Collisional Dynamics of Macroscopic Particles in a Viscous Fluid.

Jason Christopher Kastner *(Applied and Computational Mathematics)* B.S., California Polytechnic State University, San Luis Obispo 1992; M.S., 1997.
Thesis: Modeling a *Hox* Gene Network Stochastic Simulation with Experimental Perturbation.

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Thesis: Graph-based Codes and Iterative Decoding.

Marisol Koslowski *(Aeronautics and Materials Science)* Licenciado en Ciencias Fisica, Universidad de Buenos Aires 1997; M.S., California Institute of Technology 1999.
Thesis: A Phase-Field Model of Dislocations in Ductile Single Crystals.

Sanjay Kumar *(Aeronautics and Applied and Computational Mathematics)* B.Tech., Indian Institute of Technology, Kanpur 1994; M.Tech.,1996.
Thesis: An Experimental Investigation of Richtmyer-Meshkov Instability.

Hyon-Jee Lee *(Materials Science)* B.S., Korea Advanced Institute of Science and Technology 1996; M.S., 1998.
Thesis: Molecular Dynamics Studies of Metallic Glasses.

Francois Lekien *(Control and Dynamical Systems)* Ingenieur, Université Libre de Bruxelles 1999.
Thesis: Time-Dependent Dynamical Systems and Geophysical Flows.

Doctor of Philosophy *continued*

Guillaume Lessard *(Electrical Engineering)* B.Sc.A., Université Laval 1996; M.S., California Institute of Technology 1998.
Thesis: Apertureless Near-Field Optical Microscopy for Fluorescence Imaging.

Fok-Yan Thomas Leung *(Environmental Science and Engineering)* B.S., Queen's University 1997; M.S., California Institute of Technology 1998.
Thesis: Elucidation of the Origins of Stratospheric Sulfate Aerosols by Isotopic Methods.

Adrián José Lew *(Aeronautics and Applied and Computational Mathematics)* Nuclear Engineer, Instituto Balseiro 1998; M.S., California Institute of Technology 1999.
Thesis: Variational Time Integrators in Computational Solid Mechanics.

Marko Lončar *(Electrical Engineering)* B.S.E.E., University of Belgrade 1997; M.S., California Institute of Technology 1998.
Thesis: Nanophotonic Devices Based On Planar Photonic Crystals.

Stefan Alexander Maier *(Applied Physics)* Vordiplom, Technische Universität München 1998; M.S., California Institute of Technology 2000.
Thesis: Guiding of Electromagnetic Energy in Subwavelength Periodic Metal Structures.

Richard James Mason *(Mechanical Engineering)* A.B., Harvard College 1992.
Thesis: Fluid Locomotion and Trajectory Planning for Shape-Changing Robots.

Konstantin Matveev *(Mechanical Engineering)* B.S., Moscow Institute of Physics and Technology 1994; M.S., 1996.
Thesis: Thermoacoustic Instabilities in the Rijke Tube: Experiments and Modeling.

Sean Patrick Mauch *(Applied and Computational Mathematics)* B.S., California Institute of Technology 1996.
Thesis: Efficient Algorithms for Solving Static Hamilton-Jacobi Equations.

Ellis Fan-Chuin Meng *(Electrical Engineering)* B.S., California Institute of Technology 1997; M.S., 1998.
Thesis: MEMS Technology and Devices for a Micro Fluid Dosing System.

Mark Bradley Milam *(Control and Dynamical Systems)* S.B., Massachusetts Institute of Technology 1988; M.S., California Institute of Technology 1991.
Thesis: Real-Time Optimal Trajectory Generation for Constrained Dynamical Systems.

Shayan Mookherjea *(Electrical Engineering and Physics)* B.S., California Institute of Technology 1999; S.M., Massachusetts Institute of Technology 2000.
Thesis: Coupled-resonator Optical Waveguides and Multiplexed Solitons.

Matthew A. Morgan *(Electrical Engineering)* B.S., University of Virginia 1999; M.S., California Institute of Technology 2001.
Thesis: Millimeter-Wave MMICs and Applications.

Doctor of Philosophy *continued*

Georgios Panotopoulos *(Electrical Engineering and Social Science)* Diploma, National Technical University of Athens 1997; M.S., California Institute of Technology 1998.
Thesis: Holographic Information Systems.

Tait Sherman Pottebaum *(Aeronautics and Planetary Science)* B.S., University of Southern California 1998; M.S., California Institute of Technology 1999.
Thesis: The Relationship between Near-wake Structure and Heat Transfer for an Oscillating Circular Cylinder in Cross-flow.

Edward J. Preisler *(Applied Physics)* B.S., University of California, San Diego 1998.
Thesis: Investigation of Novel Semiconductor Heterostructure Systems: I. Cerium Oxide/Silicon Heterostructures. II. 6.1 Å Semiconductor-Based Avalanche Photodiodes.

James Edward Radford *(Mechanical Engineering)* B.S., California Institute of Technology 1993; M.S., 1993.
Thesis: Symmetry, Reduction and Swimming in a Perfect Fluid.

Deborah Hannah Santamore *(Applied Physics)* B.S., North Carolina State University 1995; M.S., University of Maryland, College Park 1997.
Thesis: Quantum Transport and Dynamics of Phonons in Mesoscopic Systems.

Yang Song *(Electrical Engineering)* B.Eng., Tsinghua University 1993; M.S., 1996; M.S., California Institute of Technology 1998.
Thesis: A Probabilistic Approach to Human Motion Detection and Labeling.

Pururav Thoutireddy *(Aeronautics and Applied and Computational Mathematics)* B.Tech., Kakatiya University 1991; M.E., Indian Institute of Science, Bangalore 1997.
Thesis: Variational Arbitrary Lagrangian-Eulerian Method.

Patricio Antonio Vela *(Control and Dynamical Systems)* B.S., California Institute of Technology 1998.
Thesis: Averaging and Control of Nonlinear Systems.

Xiaoou Wang *(Mechanical Engineering and Computer Science)* B.E., Tsinghua University 1994; M.S., California Institute of Technology 1998.
Thesis: Set Mapping in the Method of Imprecision.

Zoë Justine Wood *(Computer Science)* B.S., University of California, Santa Cruz 1997; M.S., California Institute of Technology 2000.
Thesis: Computational Topology Algorithms for Discrete 2-manifolds.

Hui Wu *(Electrical Engineering)* B.E., Tsinghua University 1996; M.S., 1998; M.S., California Institute of Technology 2001.
Thesis: Signal Generation and Processing in High-Frequency/High-Speed Silicon-Based Integrated Circuits.

Yunping Yang *(Electrical Engineering)* B.S.; B.E., Tsinghua University 1991; M.S., Tsinghua University 1997; M.S., California Institute of Technology 1998.
Thesis: Holographic Recording and Dynamic Range Improvement in Lithium Niobate Crystals.

Doctor of Philosophy *continued*

Qian Zhao *(Electrical Engineering)* B.S., Tsinghua University 1998; M.S., California Institute of Technology 1999.
Thesis: Network Source Coding: Theory and Code Design for Broadcast and Multiple Access Networks.

DIVISION OF GEOLOGICAL AND PLANETARY SCIENCES

Joseph A. Akins *(Geology)* B.S., University of Connecticut 1997; M.S., California Institute of Technology 1999.
Thesis: Dynamic Compression of Minerals in the MgO-FeO-SiO_2 System.

Shane Byrne *(Planetary Science and Astronomy)* M.Sc., University of Wales 1998; M.S., California Institute of Technology 2001.
Thesis: History and Current Processes of the Martian Polar Layered Deposits.

Lori K. Fenton *(Planetary Science and Electrical Engineering)* B.S., University of Maryland, College Park 1996.
Thesis: Aeolian Processes on Mars: Atmospheric Modeling and GIS Analysis.

Elizabeth Ann Johnson *(Geochemistry)* B.A., Rice University 1997; M.S., California Institute of Technology 1999.
Thesis: Hydrogen in Nominally Anhydrous Crustal Minerals.

Zhiming Kuang *(Planetary Science and Applied Computation)* B.S., Peking University 1996.
Thesis: I. Remote Spectroscopic Measurements of Atmospheric HDO/H_2O and Column CO_2. II. Interannual Variations of the Earth's Reflectance.

Benjamin F. Lane *(Planetary Science and Astronomy)* B.S., California Institute of Technology 1997.
Thesis: High-Precision Infra-Red Stellar Interferometry.

Jing Liu *(Geology)* B.S., Nanjing University 1991; M.S., Institute of Geology, State Seismological Bureau 1994; M.S., California Institute of Technology 1999.
Thesis: Part I. Slip Behavior of the San Andreas Fault Through Several Earthquake Cycles. Part II. A Structural Interpretation of the Aftershock "Cloud" of the 1992 M_w 7.3 Landers Earthquake.

Shengnian Luo *(Geophysics)* B.S., University of Science and Technology of China 1994; M.S., California Institute of Technology 2001.
Thesis: I. The Heterogeneities at the Core-Mantle and Inner-Core Boundaries from PKP Phases. II. The Static and Dynamic Behavior of Silica at High Pressures.

Danny Hilman Natawidjaja *(Geology)* B.Sc., Bandung Institute of Technology 1984; M.S., University of Auckland 1992; M.S., California Institute of Technology 1998.
Thesis: Neotectonics of the Sumatran Fault and Paleogeodesy of the Sumatran Subduction Zone.

Doctor of Philosophy *continued*

Matthew Earl Pritchard *(Geophysics and Planetary Science)* B.A., University of Chicago 1997; M.S., California Institute of Technology 2000.
Thesis: Recent Crustal Deformation in West-Central South America.

Benjamin Paul Weiss *(Planetary Science and Geology)* B.A., Amherst College 1995; M.S., California Institute of Technology 2001.
Thesis: Martian Paleomagnetism with the SQUID Microscope.

DIVISION OF HUMANITIES AND SOCIAL SCIENCES

Serena Guarnaschelli *(Social Science)* Laurea, Bocconi University 1996; M.S., California Institute of Technology 1999.
Thesis: Essays on Uncertainty: An Axiomatization and Economic Applications.

Christopher S. Hoag *(Social Science)* B.A., Amherst College 1998.
Thesis: Three Episodes in Nineteenth Century United States Banking and Finance.

Ben Klemens *(Social Science)* B.A., University of Chicago 1996; M.S., California Institute of Technology 2001.
Thesis: Information Aggregation, with Application to Monotone Ordering, Advocacy, and Conviviality.

Elizabeth Maggie Penn *(Social Science)* B.A., University of California, Berkeley 1999; M.S., California Institute of Technology 2001.
Thesis: Cooperation and Social Choice: How Foresight Can Induce Fairness.

Catherine H. Wilson *(Social Science)* B.A., University of Pennsylvania 1993; M.S., California Institute of Technology 1999.
Thesis: Political Information, Institutions and Citizen Participation in American Politics.

Kathryn Marie Zeiler *(Social Science)* B.Sc., Indiana University 1991; M.Sc., Golden State University 1995; J.D., University of Southern California Law School 1999; M.S., California Institute of Technology 2000.
Thesis: Medical Malpractice and Contract Disclosure: A Study of the Effects of Legal Rules on Behavior in Health Care Markets.

DIVISION OF PHYSICS, MATHEMATICS AND ASTRONOMY

Joseph R. Buck, Jr. *(Physics)* B.S., Pennsylvania State University 1996.
Thesis: Cavity QED in Microsphere and Fabry-Perot Cavities.

John Kenneth Cartwright *(Astronomy)* B.S., Indiana University 1994; S.M., Massachusetts Institute of Technology 1995.
Thesis: Polarization Observations with the Cosmic Background Imager.

Adam M. Chandler *(Physics)* A.B., College of the Holy Cross 1992.
Thesis: Pulsar Searches: From Radio to Gamma-Rays.

Doctor of Philosophy *continued*

Yanbei Chen *(Physics)* B.S., Peking University 1999.
Thesis: Topics of LIGO Physics: Quantum Noise in Advanced Interferometers and Template Banks for Compact-Binary Inspirals.

Kenneth B. Cooper *(Physics)* A.B., Harvard College 1997.
Thesis: New Phases of Two-Dimensional Electrons in Excited Landau Levels.

Peter James Dukes *(Mathematics)* B.S., University of Victoria 1997; M.S., University of Toronto 1998.
Thesis: Convex Cone Conditions on the Structure of Designs.

Chu-Chen Fu *(Physics)* B.A., Northwestern University 1993; M.S., California Institute of Technology 1998.
Thesis: Spin-polarized Quasiparticle Transport in Cuprate Superconductors.

Darrell Harrington *(Physics)* B.S. (*Physics*), University of Saskatchewan 1992; B.S. (*Mathematics*), 1993.
Thesis: Physics and Applications of Nanoelectromechanical Systems (NEMS).

Michael David Hartl *(Physics)* A.B., Harvard College 1996; M.S., California Institute of Technology 1999.
Thesis: Dynamics of Spinning Compact Binaries in General Relativity.

Peter Byungho Lee *(Physics)* B.S., University of California, Berkeley 1998; M.S., California Institute of Technology 2000.
Thesis: D-Branes in Anti-de-Sitter Space.

Yuk Tung Liu *(Physics)* B.S., The Chinese University of Hong Kong 1995; M.Phil., 1997.
Thesis: Dynamical Stability of Nascent Neutron Stars.

Theresa Wan-Zhen Lynn *(Physics)* A.B., Harvard-Radcliffe College 1995; M.S., California Institute of Technology 1999.
Thesis: Measurement and Control of Individual Quanta in Cavity QED.

Yajun Mei *(Mathematics and Electrical Engineering)* B.S., Peking University 1996.
Thesis: Asymptotically Optimal Methods for Sequential Change-Point Detection.

Jongwon Park *(Physics)* B.S., Seoul National University 1996.
Thesis: String/Gauge Duality and Penrose Limit.

Tina Pavlin *(Physics)* A.B., Princeton University 1997; M.S., California Institute of Technology 2000.
Thesis: Hyperpolarized Gas Polarimetry and Imaging at Low Magnetic Field.

Patricia Marie Purdue *(Physics)* A.B., M.A., Bryn Mawr College 1995.
Thesis: Topics in LIGO-Related Physics: Interferometric Speed Meters and Tidal Work.

Shanti Raja Rao *(Physics)* B.S., University of Washington 1997.
Thesis: Mirror Thermal Noise in Interferometric Gravitational Wave Detectors.

Marcus Christian Runyan *(Physics)* B.A., University of California, Berkeley 1994.
Thesis: A Search for Galaxy Clusters Using the Sunyaev-Zel'dovich Effect.

Doctor of Philosophy *continued*

Alice Eve Shapley *(Astronomy)* A.B., Harvard-Radcliffe College 1997.
Thesis: Detailed Astrophysical Properties of Lyman Break Galaxies.

Federico Maximiliano Spedalieri *(Physics)* Licenciado en Ciencias, University of Buenos Aires 1994.
Thesis: Characterizing Entanglement in Quantum Information.

Werner Man-Li Sun *(Physics)* A.B., Harvard College 1994.
Thesis: Observation of $B \longrightarrow K_s^0\pi^+\pi^-$ and $B \longrightarrow K^*(892)^{\pm}\pi^{\mp}$ and Measurement of the Charge Asymmetry in $B \longrightarrow K^*(892)^{\pm}\pi^{\mp}$.

Lei Xia *(Physics)* B.S., Peking University 1996.
Thesis: Search for Scalar Leptons at LEP with the L3 Detector.

Andrej Zlatoš *(Mathematics)* M.S., Comenius University 1999.
Thesis: Sum Rules and the Szegö Condition for Jacobi Matrices.

PRIZES AND AWARDS

Prizes and awards are listed only for those students receiving degrees in 2003, 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.

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.

2003 Ted Edward Jou, Martha-Helene Stapleton

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.

2003 Mona Sheikh, Sindy Tang

ROSALIND W. ALCOTT MERIT SCHOLARSHIP, CALTECH PRIZE SCHOLARSHIP, 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.

2000 *Safia Abidi*

2001
Wee Kang Chua
Clinton Conley
Martin Grunthaner
Nicholas Guise
Geoffrey Irving
Basit Ahmed Khan
Nathan Wozny

2002
Mihail Amarie
Julie Cha
Eugene Cheung
Wee Kang Chua
Clinton Conley
Will Farr
Clayton Featherstone
Justin Fox
Ilya Fushman
Martin Grunthaner
Nicholas Guise
Geoffrey Irving
Basit Ahmed Khan
Christina Lam
Kaisey Mandel
Collin Moshman
Nathan Paymer
Mark Rudner
Neha Soni
Sindy Tang
Virginia Vassilevska
Jialan Wang
Yingbing Wang
Nathan Wozny

2003
Mark Bilinski
Julie Cha
Paul Choi
Wee Kang Chua
Helen Fei-Lun Chuang
Clinton Conley
Will Farr
Justin Fox
Martin Grunthaner
Nicholas Guise
Geoffrey Irving
Basit Ahmed Khan
Tin Yiu Lam
Christina Lam
Jonathan Lin
Michael Maire
David Moore
Collin Moshman
Or Neeman
Nathan Paymer
Kaloyan Penev
Jesse Pino
Michael Rizk
Mark Rudner
Mona Sheikh
Neha Soni
Sindy Tang
Joseph Tremoulet
Nora Tu
Virginia Vassilevska
Jialan Wang
Yingbing Wang

AXLINE AND PRESIDENT'S SCHOLARS

Awarded to selected freshmen whose record of personal and academic accomplishment is judged outstanding among incoming freshmen.

1998 *Tyler Johnson, Emilio Castaño Graff*

1999

Leon Marcel Bellan
Abelardo Bourbois
Maria Jean Brumm
Saskya Byerly
Xuejing Chen
Paul Choi
Nathan Lai-Shuen Fung
Nicholas Guise
Matthew Robert Hughes
Ted Edward Jou
Miguel Edmundo Lemus
Katherine Jean Mack
Michael Maire
Benjamin Mathews
David Moore
Jesse Pino
Nitzan Channa Roth
Julia Elizabeth Salas
Katherine Jeanne Scott
Isaac See
Eugene Lewis Short III
Melissa Amelia Soriano
Martha-Helene Stapleton
Linda Elisabeth Strubbe
Sarah Lynn Teegarden
Rachel Neville Thessin

2000 *Jonathan Lin, Jialan Wang*

2002

Ajani Abdul-Khaliq
Leon Marcel Bellan
Abelardo Bourbois
Saskya Byerly
Xuejing Chen
Paul Choi
Kevin Costello
Nathan Lai-Shuen Fung
Nicholas Guise
Matthew Robert Hughes
Tyler Johnson
Ted Edward Jou
Miguel Edmundo Lemus
Jonathan Lin
Katherine Jean Mack
Michael Maire
Benjamin Mathews
David Moore
Jesse Pino
Nitzan Channa Roth
Julia Elizabeth Salas
Isaac See
Eugene Lewis Short III
Melissa Amelia Soriano
Martha-Helene Stapleton
Linda Elisabeth Strubbe
Sarah Lynn Teegarden
Rachel Neville Thessin
Jialan Wang

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.

2002 *Sanjay Kumar, Tait Pottebaum*

WILLIAM F. BALLHAUS PRIZE
Awarded to aeronautics students for outstanding doctoral dissertations.

2003 *Adrián José Lew*

BECKMAN SCHOLARS
Awarded to two sophomore students in the Divisions of Biology and Chemistry and Chemical Engineering on the basis of academic achievement and research potential. Award winners collaborate with a faculty mentor during two summers and the intervening academic year. This award is funded by a grant from the Arnold and Mabel Beckman Foundation.

2001 *Sangeeta Bardhan, Craig Countryman*

BHANSALI PRIZE IN COMPUTER SCIENCE
Awarded to an undergraduate student for outstanding research in computer science in the current academic year.

2003 *Jeffrey Alan Bolz*

RICHARD G. BREWER PRIZE IN PHYSICS
Awarded to the freshman with the most interesting solutions to the Physics 11 "hurdles," in recognition of demonstrated intellectual promise and creativity at the very beginning of his or her Caltech education.

2000 *Benjamin Mathews*

ROLF D. BUHLER MEMORIAL AWARD IN AERONAUTICS
Awarded to an aeronautics student for outstanding academic achievement in the Master's program.

2003 *Subash Sukumara Pillai*

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.

2002 *Kimberly Erin Kelsey*

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

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

2003 *Razvan Fetecau, E. McKay Hyde*

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. The award may be shared if there is more than one deserving student in a particular year.

1999 *Kelly Ann Klima*

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.

2003 *Joanna Austin*

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.

2003 *Tait Pottebaum*

DEANS' CUP AND DIRECTOR OF RESIDENCE LIFE
AND MASTER'S AWARD

Two awards, selected by the deans, the director of residence 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.

2003 *James Pugh, Dana Louise Sadava, and Jonathan Edward Toomey, Residence Life*
Vikram Mittal, Dean's Cup

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.

2002 *Hyunjoo Lee*

EVERHART DISTINGUISHED GRADUATE STUDENT LECTURER AWARD

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

2001 *Christopher Voigt*
2002 *Benjamin Weiss*
2003 *Eitan Grinspun*

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. The award was established in 1999 by Martin and Sally Ridge in honor of Doris Everhart.

2003 *Joy Yuan Qiu*

LAWRENCE L. AND AUDREY W. FERGUSON PRIZE
Awarded to the graduating Ph.D. candidate in biology who has produced the outstanding Ph.D. thesis for the past year.

2003 *Qiao Zhou*

HAREN LEE FISHER MEMORIAL AWARD IN JUNIOR PHYSICS
Awarded to a junior physics major who demonstrates the greatest promise of future contributions in physics.

2002 *Jesse Pino*

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.

2002 *Paul Choi*

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.

2003 *Craig Countryman*

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.

2002 *Martha-Helene Stapleton*

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.

2001 *Peter Dukes*
2002 *Andrej Zlatos*

SCOTT RUSSELL JOHNSON GRADUATE DISSERTATION PRIZE IN MATHEMATICS

Awarded for the best graduate dissertation in mathematics.

2002 *Peter Dukes*

2003 *Andrej Zlatos*

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.

2003 *Geoffrey Irving*

D. S. KOTHARI PRIZE IN PHYSICS

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

2003 *Ilya Fushman*

MARGIE LAURITSEN LEIGHTON PRIZE

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

1999 *Safia Abidi*

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.

1999 *Kevin Costello*

THE HERBERT NEWBY McCOY AWARD

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

1999 *Garett Michael Leskowitz*

2002 *Arnab Kumar Chatterjee*

2003 *Elizabeth Marshall Boon, Alexander Robert Dunn, Ryan Roy Julian, Shuwei Li*

MARY A. EARL McKINNEY PRIZE IN LITERATURE
Awarded to undergraduate students for excellence in writing in three categories: poetry, prose fiction, and nonfiction essays.

2002 *Cecile Lim, Martha-Helene Stapleton*

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.

2003 *Abelardo Bourbois, Laura Elliott, Basit Ahmed Khan, Nathan Wozny*

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.

2002 *Laura Elliott*

HERBERT J. RYSER MEMORIAL SCHOLARSHIPS
Awarded to undergraduate students for academic excellence, preferably in mathematics.

2002 *Virginia Vassilevska, Kevin Costello*

RICHARD P. SCHUSTER MEMORIAL PRIZE
Awarded to one or more juniors or seniors in chemistry or chemical engineering on the basis of financial need and academic promise.

2002 *Julia Salas, Yingbing Wang*

ELEANOR SEARLE PRIZE IN LAW, POLITICS, AND INSTITUTIONS

The Eleanor Searle Prize was established in 1999 by friends and colleagues to honor Eleanor Searle. The prize is awarded annually to an undergraduate or graduate student whose work in history or the social sciences exemplifies Eleanor Searle's interests in the use of power, government, and law.

2001 *Jennifer Caron*
2002 *Kathryn Marie Zeiler*
2003 *Ryan McDaniel*

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.

1999 *Tyler Johnson*

2000 *Jennifer Caron, Janessa Marie Link*

2001 *James Zachary Chadick*
Craig Countryman
Laura Elliott

2002 *Peter Dennedy-Frank*
Elise Brigitte Kleeman
Janessa Marie Link
Yingbing Wang

SIGMA XI AWARD

Awarded to a senior selected for an outstanding piece of original scientific research.

2003 *Paul Choi*

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.

2002 *Dana Louise Sadava*

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.

2000 *Theresa Wan-Zhen Lynn*

FRANK TERUGGI MEMORIAL AWARD

Awarded to an undergraduate student who honors the spirit of Frank Teruggi's life through participation "in the areas of Latin American studies, radical politics, creative radio programming, and other activities aimed at improving the living conditions of the less fortunate."

2002 *Jennifer Caron*

CHARLES WILTS PRIZE

Awarded to a graduate student for outstanding independent research in electrical engineering leading to a Ph.D.

2003 *Massimo Franceschetti, Shayan Mookherjea*

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.

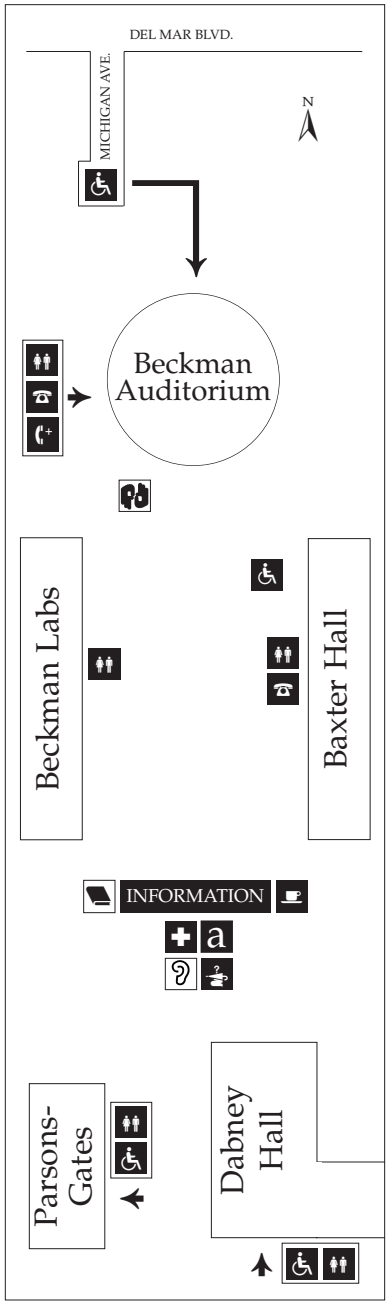
2001 *Geoffrey Irving*

Hail CIT

(Caltech Alma Mater)

by Manton Barnes, BS '21 EE

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, Parsons-Gates Hall of Administration, 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.

Complimentary COFFEE and PUNCH (beginning at 8:30 a.m.)

CALTECH BOOKSTORE sells souvenirs, film, and other items. ATHENAEUM luncheon tickets on sale 8 a.m.–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 in the Parsons-Gates Hall of Administration.

AMPLIFIED TELEPHONE is available in Beckman Auditorium.

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

This program is produced by the Public Relations Office.
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Contributors: Natalie Gilmore, Linda J. King