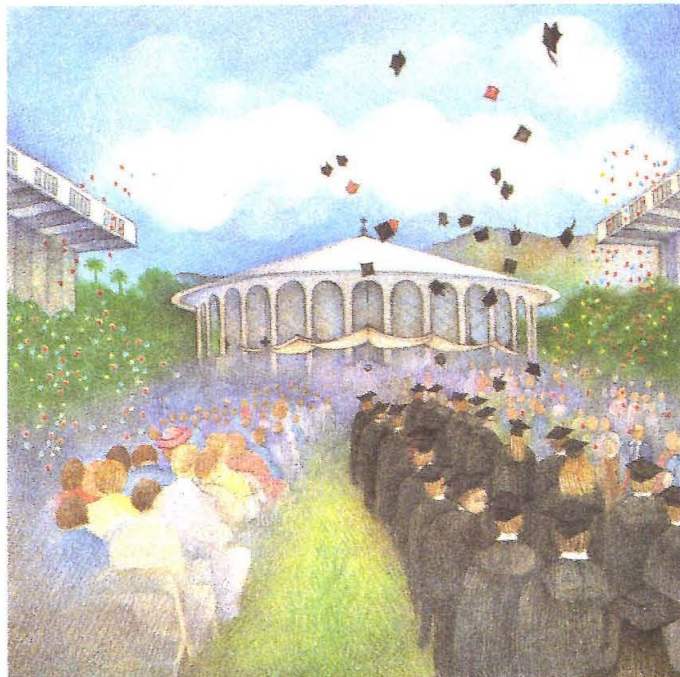


*One-Hundredth
Annual Commencement*

June 10, 1994



CALIFORNIA INSTITUTE
of TECHNOLOGY

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One-Hundredth
Annual
Commencement

FRIDAY MORNING AT TEN O'CLOCK
JUNE TENTH, NINETEEN NINETY-FOUR

About Caltech

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 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 now 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, and a faculty of about 275 professorial members and more than 370 research members, including three Nobel laureates and two Crafoord laureates. Today, Caltech will award 197 students the B.S. degree; 116 students the M.S. degree; 2 scholars the Engineer's degree; and 151 doctoral candidates the Ph.D. degree, for a total of 466 graduates—quite a leap from the one man and one woman who constituted the first collegiate graduating class of Throop University.

About the Speakers

In a departure from tradition, the Class of 1994 will hear from two speakers today, as the Institute celebrates its 100th commencement. Addressing the graduates will be Thomas E. Everhart, Caltech's president since 1987; and Ruben F. Mettler, a three-time Institute graduate and chair of the Institute's Board of Trustees from January 1984 through December 1993.

Thomas Everhart came to the Institute in 1987, after serving for three years as chancellor of the University of Illinois at Urbana-Champaign, six years as dean of the College of Engineering at Cornell, and 20 years on the electrical engineering and computer science faculty of UC Berkeley, where he made important contributions to the technology and development of scanning electron microscopy and the use of electron beams in semiconductor analysis. The honors he has received for his research and administrative achievements include election to the National Academy of Engineering and the Clark Kerr Award from the faculty senate at UC Berkeley, in recognition of his contributions to the advancement of higher education.

Ruben Mettler has been associated with Caltech since 1943, when he came to the Institute from Stanford to participate in the Navy's V-12 College Training Program. After earning his B.S., M.S., and Ph.D. degrees from Caltech, he embarked on a career in aerospace, ultimately becoming president and C.E.O., and later chairman and C.E.O., of TRW—positions he held for more than 20 years before retiring in 1988. A Caltech trustee since 1969, Mettler was elected Board chair in 1984, becoming chair emeritus in 1993. In 1966, he was among 23 alumni to receive the Institute's first Distinguished Alumni Award.



The Commencement Ceremony

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 supermagisterial 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, Judith R. Goodstein, Ph.D.

Marshals

Arden L. Albee, Ph.D.

Christopher E. Brennen, D.Phil.

Noel Robert Corngold, Ph.D.

Joel N. Franklin, Ph.D.

D. Roderick Kiewiet, Ph.D.

Ward Whaling, Ph.D.

David S. Wood, Ph.D.

Faculty Officers

John J. Hopfield, Ph.D.

Mary E. Lidstrom, 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 CHAPLAIN

COMMENCEMENT SPEAKER

THE PRESIDENT

THE CHAIR OF THE BOARD OF TRUSTEES

Program

ORGAN PRELUDE	Leslie J. Deutsch, Ph.D.
PROCESSIONAL	The Caltech Convocations Brass and Percussion Ensemble <i>William Bing, M.M., Conductor</i>
PRESIDING	Gordon E. Moore, Ph.D. <i>Chair of the Board of Trustees California Institute of Technology</i>
INVOCATION	Caty Konigsberg <i>Director, Caltech Hillel</i>
"ACCOMPLISHMENTS: PAST, PRESENT, FUTURE"	Thomas E. Everhart, Ph.D. <i>President California Institute of Technology</i>
CHORAL SELECTION	The Caltech Glee Clubs <i>Donald G. Caldwell, D.M.A., Conductor</i>
 "Hallelujah" from <i>Messiah</i> George Frederick Handel (The audience will please rise during the singing of the "Hallelujah" chorus.) 	
"LEADERS OF A PEACEFUL REVOLUTION"	Ruben F. Mettler, Ph.D. <i>Chair Emeritus of the Board of Trustees California Institute of Technology Retired Chairman and Chief Executive Officer TRW Inc.</i>
CONFERRING OF DEGREES	President Everhart

PRESENTATION OF CANDIDATES FOR DEGREES

For the Degree of Bachelor of Science D. Roderick Kiewiet, Ph.D.
Dean of Students

For the Degree of Master of Science Gary A. Lorden, Ph.D.
Vice President for Student Affairs

For the Degree of Engineer Arden L. Albee, Ph.D.
Dean of Graduate Studies

For the Degree of Doctor of Philosophy Dr. Albee

Biology John Abelson, Ph.D.
Division Chair

Chemistry and Chemical Engineering Fred C. Anson, Ph.D.
Division Chair

Engineering and Applied Science John H. Seinfeld, Ph.D.
Division Chair

Geological and Planetary Sciences David J. Stevenson, Ph.D.
Division Chair

Humanities and Social Sciences John O. Ledyard, Ph.D.
Division Chair

Physics, Mathematics and Astronomy Charles Peck, Ph.D.
Division Chair

ANNOUNCEMENT OF AWARDS AND

CONCLUDING REMARKS President Everhart

ALMA MATER The Caltech Glee Clubs,
The Caltech Convocations Brass and
Percussion Ensemble, and Organ
(*The audience may join in; lyrics are found on page 40.*)

BENEDICTION Ms. Konigsberg

RECESSIONAL The Caltech Convocations Brass
and Percussion Ensemble

ORGAN POSTLUDE Dr. Deutsch

Candidates for Degrees

BACHELOR OF SCIENCE

Ahmed Saeed Abbas *Vallejo, California* Engineering and Applied Science
Moeen Abedin* *El Paso, Texas* Biology
Prasanna Adhikari* *Kathmandu, Nepal* Electrical Engineering
Siddhartha Agarwal* *New Delhi, India* Engineering and Applied Science and Economics
Paul Edward Ainsworth *Medford, Oregon* Engineering and Applied Science
Sofia B. Akber* *Timonium, Maryland* Electrical Engineering
Ali Alagheband* *Vancouver, Canada* Engineering and Applied Science
Hussein Ali* *Karachi, Pakistan* Engineering and Applied Science
Michael Vadim Anshelevich* *Dallas, Texas* Mathematics
Matthew James Avalos *Wilmington, California* Physics
Jonathan E. Baker* *Brevard, North Carolina* Physics
Won B. Bang* *Eagle Rock, California* Engineering and Applied Science
Jeffrey Michael Barker* *St. Louis, Missouri* Engineering and Applied Science
Jessica Elizabeth Barnett *Santa Rosa, California* Social Science
Elizabeth Jean Barton* *East Windsor, New Jersey* Physics and Mathematics
Sarah Elizabeth Barwig *Milwaukee, Wisconsin* Geophysics
Troy James Bassett *Esko, Minnesota* Mathematics and Literature
Wendy Ann Belluomini* *San Jose, California* Engineering and Applied Science
Xavier Bengoechea *Reno, Nevada* Engineering and Applied Science
Scott Eric Bjerke *Hermiston, Oregon* Chemistry
Ned Barry Bowden* *Utrecht, The Netherlands* Chemistry
Michael Lee Brundage *Midwest City, Oklahoma* Mathematics
Ward Churchill Burrows *St. Thomas, Virgin Islands of the United States* Engineering and Applied Science
Gillian Nicole Bush *Stone Mountain, Georgia* Chemistry
Nina Madelyn Cardoza *Tiverton, Rhode Island* Engineering and Applied Science
Peter Alan Carlin* *Fairfax, Virginia* Engineering and Applied Science
Erica Leigh Wunderlich Carlson *Alpharetta, Georgia* Physics
Shaun David Carstairs* *Cathedral City, California* Biology
Chinley Leonard Chang* *San Jose, California* Engineering and Applied Science
Suneal Kumar Chaudhary *Morganville, New Jersey* Applied Mathematics and Engineering and Applied Science

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*

Terrence Y. Chay *Pittsburgh, Pennsylvania* Physics
Chang-Hwa (Mary) Chen* *Salt Lake City, Utah* Biology
Marcus Yen-Ta Chen* *Madison, Wisconsin* Biology
Yu Chen* *Beijing, China* Biology
Nicole Elaine Cherry *Hermiston, Oregon* Engineering and Applied Science
Wing Sze Cheung* *Torrance, California* Biology
Henry O. Choi* *Brooklyn, New York* Engineering and Applied Science
Michael Andrew Clemens *Salt Lake City, Utah* Engineering and Applied Science
Kathleen Therese Coughlin *Arlington Heights, Illinois* Physics
Uri Vaughan Cummings* *Sonoma, California* Electrical Engineering
Graham Ian Cummins *Pasadena, California* Chemistry
Darren Phi Bang Dang* *Santa Ana, California* Engineering and Applied Science
Alvin Julian Daniel* *Kuala Lumpur, Malaysia* Electrical Engineering
Matthew Derer *Arlington Heights, Illinois* Engineering and Applied Science and Literature
Daniel Dilling *Atherton, California* Engineering and Applied Science
Maciej Konrad Dudek* *Bychawa, Poland* Mathematics
Patrick Elazem *Bonn, Germany* Engineering and Applied Science
Bryce H. Elliott *Stafford, Texas* Engineering and Applied Science
Christine Carol Esau* *Oroville, California* Biology
Thomas Millar Fink* *Plattsburg, New York* Physics
Diana J. Finley *Chagrin Falls, Ohio* Engineering and Applied Science
Robert Taylor Fisher* *Northlake, Illinois* Physics
Hung Fai Fong* *Hong Kong, Hong Kong* Physics
Markos Evangelou Foniadakis *Psikhiko, Athens, Greece* Engineering and Applied Science
Steven Kenneth Fought* *Swarthmore, Pennsylvania* Engineering and Applied Science
Seiya Fukuda *Medford, New York* Biology
José de Jesús García *Escondido, California* Chemical Engineering
Joan Marie Gimbel *Elmhurst, Illinois* Engineering and Applied Science
Paul Jonathan Estalilla Go *Cebu City, Philippines* Electrical Engineering
Edray Herber Goins *Los Angeles, California* Mathematics and Physics
Michael Craig Goodey *Benton City, Washington* Electrical Engineering
Rebecca Erin Green *Madison, Wisconsin* Independent Studies Program
Charles Inmyong Grosjean* *Albany, California* Engineering and Applied Science
Robert Scott Halliday* *Oceanside, California* Engineering and Applied Science
Charles Ryan Halloran* *Summerville, South Carolina* Chemistry
Mark David Hammig* *Denver, Colorado* Engineering and Applied Science

BACHELOR OF SCIENCE — *Continued*

Linda Joy Hanely *Valley Springs, California* Chemistry
Jonah Alexander Harley* *Portugal Cove, Canada* Engineering and Applied Science
Michael Lee Harrison *Batesville, Arkansas* Mathematics
Kimberly Hatch *Pasadena, California* Biology and Literature
Aaron Roe Hawkins* *Kirtland, New Mexico* Applied Physics
Johann Francis Hornstein *Minot, North Dakota* Physics
Anthea Hanako Howell *Laguna Niguel, California* Engineering and Applied Science
Gregory Gershom Howes* *Hercules, California* Applied Physics
Wen Hsuan Hsieh* *Hong Kong, Hong Kong* Electrical Engineering
Julian Christopher Jamison* *Pacific Palisades, California* Mathematics
Tai Jing* *Xian City, People's Republic of China* Applied Mathematics and Electrical Engineering
Matthew Pool Johnson* *Sherborn, Massachusetts* Engineering and Applied Science
Miguel Rolando Jordan *La Cañada Flintridge, California* Engineering and Applied Science
Keerti Padmakar Joshi *Pune, India* Electrical Engineering
Kriten Jayant Joshi* *Albuquerque, New Mexico* Mathematics
Tadashi Kanamori* *Pasadena, California* Engineering and Applied Science
Miikka Matias Kangas *Atlanta, Georgia* Physics
Wurzel David Keir *Salt Lake City, Utah* Electrical Engineering
Gerard Sahag Ketefian* *Glendale, California* Engineering and Applied Science
Asif Khalak* *Kenmore, New York* Engineering and Applied Science
Frances Sanghei Kim* *Upland, California* Biology
Tara Leigh Kirby *Bartlett, Tennessee* Chemistry
Navinchandra B. Kiribamune* *Kandy, Sri Lanka* Engineering and Applied Science
Brian Christian Kjerulf *Stockton, California* Astronomy
Kevin Kraft *Portland, Oregon* Engineering and Applied Science
David Michael Krum *San Diego, California* Engineering and Applied Science
Brian Richard Landy* *St. Louis, Missouri* Astronomy
Lance Armstrong Larsh *Richmond, Virginia* Engineering and Applied Science
Kyrk Justin Lawyer *Parker, Colorado* Physics and Literature
Albert Lekuo Lee *Charlottesville, Virginia* Engineering and Applied Science
Albert Shu Yuan Lee* *Beverly Hills, California* Electrical Engineering and Economics
Hyong Chol Lee* *Chicago, Illinois* Physics
Jason T. Lee* *Diamond Bar, California* Biology
Vania Hyungjin Lee *Fountain Valley, California* Chemistry
Thomas King Hong Leung* *Hong Kong, Hong Kong* Electrical Engineering
Rex Gee Quan Lew *Piedmont, California* Biology

BACHELOR OF SCIENCE — *Continued*

Ivett Alejandra Leyva* *Torreon, Mexico* Engineering and Applied Science
Jonathan Xinling Liang* *Shanghai, People's Republic of China* Economics and Engineering and Applied Science
Michael Leaway Lin *Dhahran, Saudia Arabia* Biology
John Lindal* *Malibu, California* Electrical Engineering
Andrew Matthew Lines* *Seattle, Washington* Engineering and Applied Science
Daniel A. Lipofsky* *Rockledge, Florida* Engineering and Applied Science
Forrest Stuart Long *Los Altos, California* Chemistry
Linh Khanh Lu* *Monterey Park, California* Chemistry
Kim Everette Lombard* *Dracut, Massachusetts* Applied Mathematics
Andrew Hamilton Lundsten *Buffalo, Minnesota* Engineering and Applied Science
John Trung Kien Luong* *Seattle, Washington* Engineering and Applied Science
Cynthia Marie Machacek *Acton, Massachusetts* Planetary Science
Sacha Alexis Malin* *Burkittsville, Maryland* Biology
Rajit Manohar* *Bombay, India* Engineering and Applied Science
Near Moses Margalit* *South Pasadena, California* Applied Physics
Jeffrey Allyn Martin *West Lafayette, Indiana* Engineering and Applied Science
Stephen Owen Mast *Brentwood, Tennessee* Engineering and Applied Science
Kristin Lynn McAdams *Colorado Springs, Colorado* Physics
Brian P. McAllister *Cherry Hill, New Jersey* Physics
Chandler McDowell *Poquoson, Virginia* Physics
Jon Gibson McGill *Volant, Pennsylvania* Engineering and Applied Science
Dan Bergen Millward* *Missoula, Montana* Chemistry
Paul Silvio Mineiro *Las Vegas, Nevada* Physics
Kay Miyake *San Rafael, California* Applied Physics
Teru Miyake *San Rafael, California* Applied Physics
Lisa Joyce Moesker *St. Petersburg, Florida* Applied Physics
Roger Ethan Moore *Loveland, Colorado* Chemistry
William Jamison Lavar Moore *Gastonia, North Carolina* Physics
Dan Moraru* *Amity, Oregon* Astronomy
Michael Patrick Mulqueen* *Valrico, Florida* Chemical Engineering
Robert S. Muñoz *El Paso, Texas* Engineering and Applied Science
Edwin Nobuo Murakami *Los Angeles, California* Engineering and Applied Science
James Steven Murdoch *Brookfield, Illinois* Chemistry
Ryan Kwai Tim Likeke Naone* *Honolulu, Hawaii* Engineering and Applied Science
Johanna L. Neaderhouser* *Cincinnati, Ohio* Mathematics
Nhat Xuan Nguyen *San Diego, California* Engineering and Applied Science and Mathematics
Son Chu Thanh Nguyen *Portland, Oregon* Engineering and Applied Science

David Austin Nichols *Oakboro, North Carolina* Chemistry
 Seth Bradley Noble *Fort Lauderdale, Florida* Engineering and Applied Science
 Donald Jack North *Turlock, California* Engineering and Applied Science
 Michael Tracy Nygard* *Niceville, Florida* Engineering and Applied Science
 Michael Shawn Oder *Orange Park, Florida* Biology
 Gary Thomas Olsen* *Los Altos, California* Chemistry
 Lior Samuel Pachter *Washington Township, Ohio* Mathematics
 George Orson Papa* *Mesa, Arizona* Applied Physics and Economics
 John Paul Parks *Richmond, California* Engineering and Applied Science and Economics
 Jeffrey Brian Pasquino *Williamstown, New Jersey* Applied Physics
 James Mitchell Patton II *Gulfport, Mississippi* Engineering and Applied Science
 Sandee May Perez* *Modesto, California* Electrical Engineering
 David Morris Perlman *Seattle, Washington* Engineering and Applied Science
 Aaron Michael Petty *Elizabeth, Colorado* Biology
 Jed Walter Pitera *Allentown, Pennsylvania* Biology and Chemistry
 Sharif Mustafizur Rahman* *Dhaka, Bangladesh* Electrical Engineering
 Aron Walter Rempel *Abbotsford, Canada* Applied Physics
 Zhanqing Ren* *Beijing, China* Mathematics
 Tom Renner *Port Angeles, Washington* Engineering and Applied Science
 Stephen Jisoo Rhee* *Houston, Texas* Engineering and Applied Science
 Paul Wilhelm Karl Rothemund* *Laconia, New Hampshire* Biology and Engineering and Applied Science
 Douglas Edward Rowland *Allison Park, Pennsylvania* Physics
 Daniel Richard Rudisill *Julian, California* Engineering and Applied Science
 Kathryn Elizabeth Sackett* *Salt Lake City, Utah* Engineering and Applied Science
 James Charles Schaaf *Princeton, New Jersey* Physics
 Lawrence E. Schaufler* *San Diego, California* Biology and Chemistry
 Keith Allan Schneider *Washington, Missouri* Physics
 Russina Vassileva Sgoureira* *Sofia, Bulgaria* Applied Mathematics
 James A. Sherman *New Canaan, Connecticut* Applied Mathematics
 Karen Shih* *Northridge, California* Biology
 Benjamin Allan Smith *Chatham, New Jersey* Physics
 Steven Craig Smith, Jr.* *Mobile, Alabama* Engineering and Applied Science
 Amy Ellen Stern *Fair Lawn, New Jersey* Mathematics
 Michael Wen-Sen Su *Santa Clara, California* Applied Physics
 Derek Michael Surka* *Welland, Canada* Engineering and Applied Science
 Kevin Wing-Cheong Tang *Honolulu, Hawaii* Engineering and Applied Science

BACHELOR OF SCIENCE — *Continued*

Michael Lincoln Thomas *Richland, Washington* Physics
Quentin Brent Travis* *Ann Arbor, Michigan* Engineering and Applied Science
Jennifer Ellen Trittschuh *DeLand, Florida* Engineering and Applied Science
Theodore Louis Turocy* *Columbus, Ohio* Engineering and Applied Science and Economics
Robert Uglesich *Mayagüez, Puerto Rico* Applied Physics
Shreyas Shreenivas Vasanaawala* *Big Spring, Texas* Mathematics
Timothy Paul Wachholz *Ellsworth, Wisconsin* Engineering and Applied Science
Joshua Rama Walker* *Ketchum, Idaho* Engineering and Applied Science
Christopher Michael Ward* *Burbank, California* Electrical Engineering
Brett Alan Warneke* *St. Helens, Oregon* Electrical Engineering
Jiaperng Jennifer Wei* *Arcadia, California* Chemistry
Eric Leon Wernhoff* *Columbus, Nebraska* Engineering and Applied Science
Steven Michael Wilensky *Tinley Park, Illinois* Engineering and Applied Science
Michael Wong* *Sacramento, California* Chemical Engineering
Daniel Artemis Xystus *Azusa, California* Astronomy
Denise Keiko Yamagata *Kahului, Hawaii* Engineering and Applied Science
Berta Alberta Yezrielev *Kendall Park, New Jersey* Applied Mathematics and Engineering and Applied Science
Ruchirej Yongsunthon* *Bangkok, Thailand* Physics
Zu Xin Yu* *Shanghai, China* Electrical Engineering
William Zen (Phạm Gia Nguyễn-Sơn) *Anaheim, California* Biology
Maha Zewail* *Pasadena, California* Chemistry
Andrew A. Zug *Lancaster, Pennsylvania* Engineering and Applied Science

MASTER OF SCIENCE

- Xin An (*Electrical Engineering*) B.E., Tsinghua University 1991.
- David Alan Bachman (*Applied Physics*) B.S., University of California, Berkeley 1992.
- Eric Lee Bakke (*Applied Physics*) B.S., University of Wisconsin-Madison 1986.
- Georgios Barbastathis (*Electrical Engineering*) Diploma, National Technical University of Athens 1993.
- Yvette Valencia Baxter (*Chemical Engineering*) S.B., Massachusetts Institute of Technology 1991.
- Noel Lakshman Benedict (*Mechanical Engineering*) B.S., Lafayette College 1993.
- Dominic James Benford (*Physics*) B.A. (*Applied Mathematics*), B.A. (*Physics*), University of California, Berkely 1992.
- Andrey Yurevich Biyanov (*Mathematics*) B.Sc., Lomonosov Moscow State University 1991; M.Sc., 1991.
- Veronica Ruth Blackwell (*Environmental Engineering Science*) B.Eng., McGill University 1992.
- Vasken Bohossian (*Electrical Engineering*) B.Eng., McGill University 1993.
- Jean-Yves Bouguet (*Electrical Engineering*) Diplôme d'Ingénieur, École Supérieure d'Ingénieurs en Électrotechnique et Électronique 1994.
- Mark Adrian Brady (*Aeronautics*) B.S., University of California, San Diego 1993.
- Tyrome Yang Brown (*Electrical Engineering*) S.B., Massachusetts Institute of Technology 1990.
- Tracey Alexandra Burr (*Chemistry*) B.A., Wellesley College 1989.
- Zehra Kök Çataltepe (*Computer Science*) B.Sc., Bilkent University 1991.
- Chuan-cheng Cheng (*Electrical Engineering*) B.S., National Taiwan University 1991.
- Jung-Fu Cheng (*Electrical Engineering*) B.S., National Taiwan University 1991; M.S., 1993.
- Weng Ki Ching (*Aeronautics*) B.A., B.S., Boston University 1993.
- Patrick Yung-Shie Chuang (*Environmental Engineering Science*) B.Sc., University of Alberta 1992.
- Robert Dale Conner (*Materials Science*) B.S., California State Polytechnic University, Pomona 1989.
- Douglas Lippl Creutz (*Social Science*) A.B., Duke University 1992.
- David Wallace Croft (*Electrical Engineering*) B.S., United States Air Force Academy 1990.
- Richard Bruce Dandliker (*Materials Science*) B.S., Stanford University 1992.
- William Frederick Detlefs (*Physics*) S.B., Massachusetts Institute of Technology 1984; M.A., University of Maryland, College Park 1991.
- Bradley Scott Dooley (*Aeronautics*) B.S., Rice University 1993.
- Michael Nachshon Doran (*Applied Mathematics*) S.B. (*Materials Science*), S.B. (*Mathematics*), Massachusetts Institute of Technology 1991.
- Paul Jeffrey Drayton (*Chemical Engineering*) B.E., University of Canterbury 1990.
- David Aspinwall Evans (*Geology*) B.S., Yale University 1992.
- Neil Edward Fernandes (*Chemical Engineering*) B.E., University of Canterbury 1991.

MASTER OF SCIENCE — *Continued*

- Selena Mae Forman (*Environmental Engineering Science*) B.S., California Institute of Technology 1989; B.A., Reed College 1990.
- Annelise Gaarder (*Mechanical Engineering*) B.S., Rensselaer Polytechnic Institute 1992.
- Guanghua Gao (*Physics*) B.S., University of Science and Technology of China 1989.
- David Francis Geraghty (*Applied Physics*) B.S., California Institute of Technology 1991.
- Galen Gerald Gornowicz (*Aeronautics*) B.S.E., The University of Michigan 1993.
- Albert Frank Christian Haldemann (*Planetary Science*) Diplôme de Physicien, Université de Neuchâtel 1991.
- Anthony John Hall (*Civil Engineering*) B.S., The University of Illinois at Chicago 1993.
- Lewis Carl Hartless (*Aeronautics*) B.S., University of Virginia 1993.
- William Joseph Hartnett (*Social Science*) A.B., Washington University 1973; J.D., St. Louis University School of Law 1992; S.M., Massachusetts Institute of Technology 1993.
- Vassilios Hatzimanikatis (*Chemical Engineering*) Diploma, University of Patras 1991.
- Dylan H. Hixon (*Mechanical Engineering*) B.S., Yale University 1988.
- Iftikhar Huq (*Chemical Engineering*) B.Sc., University of Calgary 1991.
- Stephen Victor Hwan (*Electrical Engineering*) B.S., California Institute of Technology 1991.
- Ayhan İrfanoğlu (*Civil Engineering*) B.S., Middle East Technical University 1993.
- Michel Elie Jabbour (*Aeronautics*) Licence de Mécanique, Université Pierre et Marie Curie 1992; Maîtrise de Mécanique, 1993.
- Julian Christopher Jamison (*Mathematics*) B.S., California Institute of Technology 1994.
- David Song Jeon (*Aeronautics*) B.S., University of California, Berkeley 1993.
- Michael Jiro Kaneshige (*Mechanical Engineering*) B.S., University of Illinois at Urbana-Champaign 1993.
- William Mitchell Kelly (*Social Science*) M.A., University of Southern California 1991.
- Sven Hiralal Khatri (*Electrical Engineering*) B.S., University of Maryland, College Park 1992.
- Ahmet Kiraç (*Electrical Engineering*) B.S., Bilkent University 1993.
- Michael John Kleeman (*Environmental Engineering Science*) B.A.Sc., University of Waterloo 1993.
- Kenneth Koo (*Mechanical Engineering*) B.S., The University of Michigan 1993.
- Jacob Willem Kooi (*Electrical Engineering*) B.S., California Polytechnic State University, San Luis Obispo 1985.
- Robert Bumju Lee (*Applied Physics*) B.S., California Institute of Technology 1992.
- Wei Lin (*Electrical Engineering*) B.E., B.S., Tsinghua University 1991.
- Xianghong Lin (*Applied Physics*) B.S., University of Science and Technology of China 1988.
- Cheh-Ming Liu (*Electrical Engineering*) B.S., National Chiao-Tung University 1986; M.S., 1988.
- Wenshan Liu (*Applied Physics*) B.S., Fudan University 1992.

MASTER OF SCIENCE — Continued

- Min Lu (*Electrical Engineering*) B.S., Tsinghua University 1992.
- Kevin Erick Luster (*Computer Science*) B.S., California Institute of Technology 1991.
- Ryan Murrill Ezekiel Mackey (*Aeronautics*) B.A. (*Mathematics*), B.A. (*Physics*), University of California, Santa Cruz 1993.
- Daniel Maskit (*Computer Science*) B.A., Sarah Lawrence College 1988.
- Daniel Arthur McAdams (*Mechanical Engineering*) B.S., The University of Texas at Austin 1992.
- Christopher Andrew Mejia (*Control and Dynamical Systems*) S.B., Massachusetts Institute of Technology 1991.
- Hiroyuki Mori (*Biology*) B.A., University of California, Santa Cruz 1989.
- Mario Enrique Munich (*Electrical Engineering*) Ingeniero Electricista, Universidad Nacional de Rosario 1991.
- Laura Jeanne Nagel (*Materials Science*) B.S., Rice University 1991.
- Mohammad Naraghi Bagherpour (*Computation and Neural Systems*) B.A., Technological University of Aachen 1988; M.D., 1991.
- Seth Bradley Noble (*Computer Science*) B.S., California Institute of Technology 1994.
- Christopher Glenn Nolte (*Environmental Engineering Science*) B.S., Stanford University 1991.
- Gorm Nykreim (*Astronomy*) B.S., University of Washington 1988; M.S., California Institute of Technology 1990.
- Michael Ernster O'Brien (*Civil Engineering*) B.S., University of California, Irvine 1993.
- Randall Lee Owen (*Mechanical Engineering*) B.A., The University of Texas at Dallas 1985; M.S., Yale University 1987; M.Phil., 1988.
- Michael Edward Palmer (*Computer Science*) B.S., Yale College 1991.
- Rajesh Panchanathan (*Chemical Engineering*) B.Tech., Indian Institute of Technology, Madras 1990.
- Soren Pedersen (*Physics*) B.Sc., University College Cork 1990.
- Giang Trieu Phan (*Aeronautics*) B.S., Iowa State University 1993.
- Denis Joseph Phares (*Environmental Engineering Science*) B.S., Villanova University 1992.
- Jarmila Polet (*Geophysics*) Drs., Rijksuniversiteit Utrecht 1992.
- Cristian Mircea Radu (*Chemical Engineering*) B.S.E., Princeton University 1991.
- Gregory John Reynard (*Biology*) B.S., State University of New York at Buffalo 1989.
- Boaz Salik (*Electrical Engineering*) B.S., University of Arizona 1993.
- Kurt Schenk (*Electrical Engineering*) Diplom, Ingenieurschule Burgdorf 1989.
- Michael Joseph Scott (*Mechanical Engineering*) A.B., Harvard College 1986.
- Andrei Victorovitch Sherstyuk (*Computer Science*) B.S., Novosibirsk State University 1989.
- Douglas G. Shiels (*Aeronautics*) B.S., California Institute of Technology 1993.
- Carlos Bernard Shultz (*Mechanical Engineering*) B.S., University of Pennsylvania 1993.
- Dwight Douglas Shy (*Physics*) B.A., University of California, Berkeley 1989.
- Xubo Song (*Electrical Engineering*) B.E., Tsinghua University 1992.
- Colby Elizabeth Stanton (*Chemistry*) B.A., Wellesley College 1991.

MASTER OF SCIENCE — *Continued*

- David M. Stevens (*Mechanical Engineering*) B.S., California Institute of Technology 1990.
- Carrie Kim Stroud (*Chemistry*) B.S. (*Chemistry*), B.S. (*Mathematics*), The Ohio State University 1990.
- James Te Sun (*Chemistry*) B.S. (*Biology*), B.S. (*Chemistry*), University of California, Irvine 1991.
- Grant Douglas Swenson (*Aeronautics*) B.S., University of Southern California 1993.
- Richard Clark Teudt (*Aeronautics*) B.S., University of California, San Diego 1992.
- Anthony Domenick Toigo (*Planetary Science*) B.A., Cornell University 1992.
- Kiat Chai Tong (*Electrical Engineering*) B.S., University of California, Berkeley 1993.
- Ashok Burton Tripathi (*Mechanical Engineering*) B.S., Cornell University 1993.
- Stephen John Turner (*Applied Mathematics*) B.A., University of California, Santa Cruz 1991.
- Chris Thad Ulmer (*Electrical Engineering*) B.S., California Institute of Technology 1993.
- Pablo Umaña (*Chemical Engineering*) Licenciatura, Universidad de Costa Rica 1991.
- Norma Leticia Vega (*Electrical Engineering*) B.S., The University of Texas at Arlington 1992.
- Nat Vorayos (*Aeronautics*) B.E., Chiang Mai University 1992.
- Jennifer Wales Singleton (*Chemistry*) B.A., Amherst College 1990.
- Tricia Ann Waniewski (*Mechanical Engineering*) B.S., Pennsylvania State University 1993.
- Amy E. Warncke (*Aeronautics*) B.S., Michigan State University 1993.
- Linda Kay Weavers (*Environmental Engineering Science*) B.E., University of Minnesota 1992.
- Jason Robert Wilbur (*Mechanical Engineering*) B.S., The University of Iowa 1993.
- Michelle Anne Wild (*Civil Engineering*) B.E., University of Canterbury 1993.
- Richmond Andrew Wolf (*Geology*) A.B., Princeton University 1992.
- Alex Chor Yiu Wong (*Chemical Engineering*) B.S., University of California, Berkeley 1992.
- Adam Robert Woodbury (*Computer Science*) B.A., Columbia University 1991.
- Ren Wu (*Electrical Engineering*) B.A., Grinnell College 1993; B.S., California Institute of Technology 1993.
- Xing Yang (*Electrical Engineering*) B.S., Beijing University of Posts and Telecommunications 1991.
- Yevgeny Yurkovetsky (*Chemical Engineering*) Diploma, Odessa Technological Institute of Refrigeration Industry 1989.
- Yonghuang Zeng (*Electrical Engineering*) B.S., Zhejiang University 1989; M.S., 1992.

ENGINEER

- Mullahalli V. Srinivas (*Mechanical Engineering*) B.E., Bangalore University 1985; M.Sc., Indian Institute of Science 1989; M.S., California Institute of Technology 1992.
- Satoshi Sugawara (*Aeronautics*) B.Tech., Science University of Tokyo 1983; M.Tech., 1985.

DOCTOR OF PHILOSOPHY

DIVISION OF BIOLOGY

- Ronald Gary Benson (*Computation and Neural Systems*) B.A., B.S., University of Colorado 1986.
Thesis: Analog VLSI Supervised Learning System.
- Helen Marie Chamberlin (*Biology*) B.S., University of Utah 1988.
Thesis: Cell Fate Specification During *Caenorhabditis elegans* Male Tail Development.
- Dan Chen (*Biology*) M.D., Peking Union Medical College 1987.
Thesis: Molecular Mechanisms of Interleukin-2 Gene Inducibility: Developmental Control and Combinatorial Action of Transcription Factors.
- Ming-Ji Fann (*Neurobiology*) B.S., National Taiwan University 1984; M.S., National Yang-Ming Medical College 1988.
Thesis: Cytokine Control of Neuronal Phenotype.
- Russell James Hill (*Biology*) B.A., Haverford College 1986.
Thesis: The *Lin-3* Gene of the Nematode *C. elegans* Is the Vulval-Inducing Signal.
- Andrew Henry Huber (*Biology*) B.S., Cornell University 1989.
Thesis: A Biochemical and Structural Characterization of *Drosophila* Neuroglian.
- Junho Lee (*Biology*) B.S., Seoul National University 1986; M.S., 1989.
Thesis: Negative Regulators of a Growth Factor-Mediated Signaling Pathway in the Nematode *Caenorhabditis elegans*.
- William Mark Leiserson (*Biology*) A.B., Brown University 1980.
Thesis: Molecular Genetics of the *Drosophila eyes absent* Gene.
- Stefan I. McDonough (*Biology*) Sc.B., Brown University 1990; M.S., California Institute of Technology 1993.
Thesis: Pharmacology and Pore-Forming Domains of the Cystic Fibrosis Transmembrane Conductance Regulator.
- Bruno A. Olshausen (*Computation and Neural Systems*) B.S., Stanford University 1986; M.S., 1987.
Thesis: Neural Routing Circuits for Forming Invariant Representations of Visual Objects.
- Kevin William Plaxco (*Molecular Biology and Biochemistry*) B.S., University of California, Riverside 1986.
Thesis: Protein-DNA Interactions: Molecular Modeling of Structure and Energetics.
- Sylvie Adrienne Ryckebusch (*Computation and Neural Systems*) B.S., University of Maryland, College Park 1987.
Thesis: The Central Nervous Control of Walking in the Locust *Schistocerca americana*.

When more than one field of study is listed, in the Division of Biology it indicates a dual major; in other divisions the first is the major and the second and others are minors.

DOCTOR OF PHILOSOPHY — *Continued*

Shubha Tole (*Biology*) B.Sc., St. Xavier's College 1987; M.S., California Institute of Technology 1991.

Thesis: Surface Markers of Regionalization in the Vertebrate Nervous System.

Julia Ann Yang-Snyder (*Biology*) B.A., Bryn Mawr College 1983.

Thesis: Anatomical and Developmental Patterns of Interleukin-2 Gene Expression in the Mouse: Analysis of IL-2 Expressing Cells and Partial Characterization of Interactions Involved in Mediating IL-2 Gene Expression *In Vivo*.

Jian Zhu (*Cellular and Molecular Neurobiology*) B.S., Fudan University 1986; M.S., California Institute of Technology 1991.

Thesis: Identification and Characterization of a Novel Ca^{2+} -binding Protein in Avian Erythrocytes.

DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING

Peter Andrew Beal (*Chemistry*) B.S., University of North Dakota 1988.

Thesis: Recognition of Double Helical DNA by Purine Oligonucleotides via Triple Helix Formation.

Danilo Riguera Casimiro (*Chemistry*) B.S., University of the Philippines 1984; M.S., 1987.

Thesis: Electron Transfer in Ruthenium-Modified Recombinant Cytochromes and Myoglobins.

Ruizhen Chen (*Chemical Engineering and Biology*) B.S., East China University of Chemical Technology 1984; M.S., 1987.

Thesis: Metabolic and Energetic Studies of Recombinant *Escherichia coli* Strains: Applications of NMR Techniques.

Kevin Ronald Condroski (*Chemistry*) B.S., University of Wisconsin-Milwaukee 1987.

Thesis: Synthesis of (\pm)-7,8-Epoxy-4-basmen-6-one by a Transannular Cyclization Strategy.

Edward Bryan M. Coughlin III (*Chemistry*) B.A., Grinnell College 1988.

Thesis: Iso-Specific Ziegler-Natta Polymerization of α -Olefins with a Single-Component Organoyttrium Catalyst.

Nathaniel Solon Finney (*Chemistry*) B.S., University of Illinois at Urbana-Champaign 1988.

Thesis: Structural and Mechanistic Study of Monoalkyl Diazenes. Synthesis, Characterization, and Reactivity of 1,6-Didehydro[10]annulene.

Stewart L. Fisher (*Chemistry*) B.A., University of Vermont 1989.

Thesis: Unnatural Amino Acids in the Synthesis and Semisynthesis of Metalloprotein Motifs.

Shubhro Ghosh (*Chemical Engineering*) B.Tech., Indian Institute of Technology, Kanpur 1989; M.S., University of Notre Dame 1991.

Thesis: The Role of Various Geometrical Structures in Scalar Advection-Diffusion.

David Yee Gin (*Chemistry*) B.Sc., University of British Columbia 1989.

Thesis: A Convergent Synthetic Route to the Tunicamycin Antibiotics. Synthesis of (+)-Tunicamycin V.

DOCTOR OF PHILOSOPHY — *Continued*

Jack Yanchai Hwang (*Chemical Engineering*) B.S., University of California, Berkeley 1986.

Thesis: NMR of Dilute Sites in GaAs.

Simon Joshua Jacobs (*Chemistry*) A.B. (*Chemistry*), A.B. (*Mathematics*), Washington University 1987.

Thesis: One-Dimensional Models for Organic Magnetic Materials.

Dale Fredrick Johnson (*Chemistry*) B.S., North Carolina State University 1980; M.S., University of Central Florida 1984.

Thesis: Mechanistic and Kinetic Studies of the Surface Chemistry of Iridium and Ruthenium.

Patrick Charles Kearney (*Chemistry*) B.S., Carnegie Mellon University 1987.

Thesis: Studies of Organic Molecule Recognition by Synthetic Cyclophane Receptors in Aqueous Media.

Eric Paul Kelson (*Chemistry*) B.S., University of Utah 1988.

Thesis: The Electrocatalytic and Stoichiometric Oxidation Chemistry of Binuclear Ruthenium Complexes Incorporating the Anionic Tripod Ligand $\{(\eta^5\text{-C}_5\text{H}_5)\text{Co}[\text{P}(\text{OCH}_3)_2(=\text{O})]_3\}^-$.

Soojin Kim (*Chemical Engineering*) B.S., Cornell University 1988; M.S., California Institute of Technology 1990.

Thesis: Chemical Vapor Deposition of Permselective Oxide Membranes for Hydrogen Separation.

Wayne Edward Larson (*Chemistry*) B.A., Carleton College 1987.

Thesis: Synthesis, Structure, and Photophysics of Polypyridophenazine Transition-Metal Complexes.

Inho Lee (*Chemistry*) B.A., Swarthmore College 1985.

Thesis: Distinct Intron DNA Structures in Simian Virus 40 T-Antigen and Adenovirus 2 E1A Genes.

Thomas Mark McCleskey (*Chemistry*) B.S., Harvey Mudd College 1987.

Thesis: Design and Applications of Luminescent Inorganic Complexes.

Milan Mrksich (*Chemistry*) B.S., University of Illinois at Urbana-Champaign 1989.

Thesis: Design of Peptides for Sequence-Specific Recognition of the Minor Groove of DNA.

Richard Partain Muller (*Chemistry*) B.A., Rice University 1985.

Thesis: Development and Implementation of Ab Initio Methods for Application to Large Molecules.

Christine Marie Nelson (*Chemistry*) B.S., Trinity University 1988; M.S., California Institute of Technology 1989.

Thesis: Photodissociation and Reaction Dynamics of Chlorine-Containing Species Important in Stratospheric Ozone Chemistry.

Martha Gray Oakley (*Chemistry*) B.A. (*Chemistry*), Carleton College 1986; B.A. (*Biochemistry*), Oxford University 1988.

Thesis: Design, Synthesis and Characterization of Sequence-Specific DNA-Cleaving Metalloproteins.

DOCTOR OF PHILOSOPHY — *Continued*

- Kyoung Joon Oh (*Chemistry*) B.S., Seoul National University 1985; M.S., 1987.
Thesis: Exploration of New Drug Delivery Pathways: I. Mechanism of Folate Uptake in Cultured Human Cells. II. Role of Nuclear Localization Signal Peptides in the Delivery of Oligonucleotide into Reconstituted Nuclei.
- Jason Kendrick Perry (*Chemistry*) B.A., The Johns Hopkins University 1987; M.S., California Institute of Technology 1989.
Thesis: Alkane Activation by First, Second, and Third Row Transition Metal Ions: Organometallic Chemistry in the Gas Phase.
- Pedro José Pizarro (*Chemistry*) A.B., Harvard College 1987.
Thesis: Trapped Ion Magnetic Resonance: Concepts and Designs.
- Howard P. Pritchard (*Chemistry*) B.A., Rice University 1985.
Thesis: Application of the Schwinger Multichannel Method to Multichannel Studies of Electronically Inelastic Electron-Molecule Collisions.
- Roger Weihong Quan (*Chemistry*) B.S., The University of Michigan 1988.
Thesis: Oxo, Imido, and Borollide Complexes of Tantalum and Zirconium.
- Roopa Ramamoorthi (*Chemical Engineering and Biology*) B.Tech., Indian Institute of Technology, Bombay 1989; M.S., California Institute of Technology 1991.
Thesis: Genetics and Regulation of Pyrroloquinoline Quinone (PQQ) Biosynthesis in the Methylophilic Bacterium *Methylobacterium extorquens* AM1.
- Todd Alan Richmond (*Chemistry*) B.A., University of San Diego 1987.
Thesis: Structural Requirements for Catalysis: Studies on RTEM-1 β -lactamase.
- Scott Alan Ross (*Chemistry*) B.S., Iowa State University 1985.
Thesis: Insights into the Mechanism of Human Erythrocyte Hexose Transport: A Transferred NOE Study of Glucose Binding to GLUT1.
- Michael Tsapatsis (*Chemical Engineering*) Diploma, University of Patras 1988; M.S., California Institute of Technology 1991.
Thesis: Composite Inorganic Membranes for Gas Separations: Chemical Vapor Deposition of Hydrogen Permselective Oxide Membranes and Preparation of Supported Zeolite NaA Films.
- Kam To Wan (*Chemistry*) B.Sc., University of Hong Kong 1988; M.Phil., 1990.
Thesis: The Design and Synthesis of a True, Heterogeneous, Asymmetric Catalyst.
- Dean Michael Willberg (*Chemistry*) B.Sc., University of Alberta 1987.
Thesis: Picosecond Spectroscopy of van der Waals Clusters.
- Zhe Wu (*Chemistry*) B.S., University of Science and Technology of China 1987.
Thesis: Transition Metal Carbenes: Controlled Ring-Opening Metathesis Polymerizations and Metathetical Reactions with Acyclic Olefins.
- Deborah Sharon Wuttke (*Chemistry*) B.S., University of Rochester 1988.
Thesis: Preparation, Characterization and Intramolecular Electron-Transfer Studies of Ruthenium-Modified Cytochromes *c*.

DIVISION OF ENGINEERING AND APPLIED SCIENCES

Khalid Ahmed Bin Talal AlJuhany (*Aeronautics and Electrical Engineering*) B.S., The George Washington University 1987; M.S., California Institute of Technology 1989.
Thesis: Supersonic Film Cooling Including the Effect of Shock Wave Interaction.

Dimitrios Antsos (*Electrical Engineering*) B.S., California Institute of Technology 1990; M.S., 1991.

Thesis: Computer-Aided Modeling and Analysis of Passive Microwave and Millimeter-Wave High-Temperature Superconductor Circuits and Components.

Abhijit Bhattacharyya (*Mechanical Engineering*) B.Tech., Indian Institute of Technology, Kharagpur 1988; M.S., California Institute of Technology 1989.

Thesis: Internal Flows and Force Matrices in Axial Flow Inducers.

Milivoje Slobodan Brkovic (*Electrical Engineering*) B.S.E.E., University of Belgrade 1982; M.S.E.E., 1988; M.S., California Institute of Technology 1990.

Thesis: Switching Converters with Magnetic Amplifiers as Controllable Switches.

James Douglas Buntine (*Applied Mathematics*) B.E., B.Sc., University of Queensland 1986; M.Eng.Sc., 1988.

Thesis: Part I: Inviscid, Swirling Flows and Vortex Breakdown. Part II: A Numerical Investigation of the Lundgren Turbulence Model.

Gert Cauwenberghs (*Electrical Engineering*) Burgerlijk Werktuigkundig Electrotechnisch Ingenieur, Vrije Universiteit Brussel 1988; M.S., California Institute of Technology 1989.

Thesis: Analog VLSI Autonomous Systems for Learning and Optimization.

Bedri Çağ Çetin (*Electrical Engineering*) B.S., Bosphorus University 1988; M.S., California Institute of Technology 1990.

Thesis: TRUST: A New Global Optimization Methodology, Application to Artificial Neural Networks, and Analog VLSI Implementation.

I-Ming Chen (*Mechanical Engineering*) B.S., National Taiwan University 1986; M.S., California Institute of Technology 1989.

Thesis: Theory and Applications of Modular Reconfigurable Robotic Systems.

Andrew Joseph Conley (*Applied Mathematics*) B.S., Washington University 1987.

Thesis: New Plane Shear Flows.

Kevin Richard Curtis (*Electrical Engineering*) A.S., Antelope Valley College 1987; B.S., California Institute of Technology 1990; M.S., 1992.

Thesis: 3-D Photopolymer Disks for Correlation and Data Storage, and Cross-talk in Volume Holographic Memories.

Cong Nghiep Duong (*Applied Mechanics*) B.S., California State Polytechnic University, Pomona 1984; S.M., Massachusetts Institute of Technology 1986.

Thesis: A Nonlinear Thermoviscoelastic Stress and Fracture Analysis of an Adhesive Bond.

David Alan Edwards (*Applied Mathematics*) B.S., California Institute of Technology 1990.

Thesis: A Model for Nonlinear Diffusion in Polymers.

DOCTOR OF PHILOSOPHY — *Continued*

- AnnmariE Elderling (*Environmental Engineering Science and Economics*) B.E.,
The Cooper Union 1988; M.S., California Institute of Technology 1989.
Thesis: Alternative Models for Air Pollutant Effects on Visibility.
- Hinrich Eylers (*Environmental Engineering Science*) Diplom, Technische Universität
München 1990; M.S., California Institute of Technology 1991.
Thesis: Transport of Adsorbing Metal Ions Between Stream Water and Sediment Bed
in a Laboratory Flume.
- Zheng-Qiang Gao (*Materials Science*) B.S., Tsinghua University 1986; M.S., California
Institute of Technology 1990.
Thesis: The Kinetics of Ordering, Grain Growth and Chemical Segregation in
Nonequilibrium Fe_3X Alloys ($\text{X}=\text{Al}$, Si and Ge).
- Patrick Germain (*Aeronautics*) Bachelier en Ingenierie, École Polytechnique de
Montréal 1988; M.S., California Institute of Technology 1989.
Thesis: The Boundary Layer on a Sharp Cone in High-Enthalpy Flow.
- Niko George Glumac (*Mechanical Engineering and Chemistry*) B.S., University of
California, Santa Barbara 1989; M.S., California Institute of Technology 1990.
Thesis: Diamond Growth in Low Pressure Flames.
- Hayit Greenspan (*Electrical Engineering*) B.S., Technion - Israel Institute of
Technology 1986; M.S., 1989.
Thesis: Multi-Resolution Image Processing and Learning for Texture Recognition
and Image Enhancement.
- Annette C. Grot (*Electrical Engineering*) B.S., University of Delaware 1988; M.S.,
University of Pennsylvania 1990.
Thesis: Analog GaAs Optoelectronic Integrated Circuits for Large Scale Arrays.
- Jonathan Bruce Hacker (*Electrical Engineering*) B.A.Sc., University of British
Columbia 1986; M.S., California Institute of Technology 1990.
Thesis: Grid Mixers and Power Grid Oscillators.
- György Haller (*Applied Mechanics*) M.S., The Technical University of Budapest 1989.
Thesis: Multi-pulse Homoclinic Phenomena in Resonant Hamiltonian Systems.
- Imran Hashim (*Materials Science*) B.S., Cornell University 1989; M.S., California
Institute of Technology 1990.
Thesis: Microstructural and Magnetic Properties of Polycrystalline and Epitaxial
Permalloy ($\text{Ni}_{80}\text{Fe}_{20}$) Multilayered Thin Films.
- Mei-Jiau Huang (*Mechanical Engineering*) B.S., National Taiwan University 1989;
M.S., California Institute of Technology 1991.
Thesis: Theoretical and Computational Studies of Isotropic Homogeneous
Turbulence.
- Ted J. Hubbard (*Mechanical Engineering and Applied Physics*) B.Sc., Dalhousie
University 1987; Diploma in Engineering, 1987; B.E., Technical University of
Nova Scotia 1990.
Thesis: MEMS Design: The Geometry of Silicon Micromachining.

DOCTOR OF PHILOSOPHY — *Continued*

- Yan P. Kuhn de Chizelle (*Mechanical Engineering*) Ingénieur, École Polytechnique de Lausanne 1988; M.S., California Institute of Technology 1991.
Thesis: Hydrodynamics, Acoustics and Scaling of Traveling Bubble Cavitation.
- John Lambros (*Aeronautics and Materials Science*) B.Eng., Imperial College of Science and Technology of London 1988; M.S., California Institute of Technology 1989.
Thesis: Dynamic Decohesion of Bimaterial Interfaces.
- Jean-Marc Langlois (*Applied Physics*) B.Sc., University of Sherbrooke 1983; M.Sc., 1985; M.S., California Institute of Technology 1987.
Thesis: New Methods for Ab Initio Quantum Mechanical Calculations in Molecular and Crystalline Systems.
- Ming-Chieh Lee (*Electrical Engineering*) B.S., National Taiwan University 1988; M.S., California Institute of Technology 1991.
Thesis: Still and Moving Image Compression Systems Using Multiscale Techniques.
- Hsin-Yu Sidney Li (*Electrical Engineering*) B.S., National Chiao-Tung University 1984; M.S., 1986; M.S., California Institute of Technology 1990.
Thesis: Photorefractive 3-D Disks for Optical Data Storage and Artificial Neural Networks.
- Mo Li (*Applied Physics*) B.S., Central China Institute of Technology 1982; M.S., California Institute of Technology 1989.
Thesis: Crystal to Glass Transition and Its Relation to Melting.
- Cheng Liu (*Applied Mechanics and Materials Science*) B.S., Peking University 1984; M.S., 1986.
Thesis: Dynamic Fracture Problems Involving Highly Transient Crack Growth Histories: An Investigation of Dynamic Failure in Homogeneous and Bimaterial Systems.
- Wen-Shu Liu (*Materials Science*) B.S., National Tsing-Hua University 1987; M.S., California Institute of Technology 1990.
Thesis: Oxidation of GeSi and Applications.
- Igor Mezić (*Applied Mechanics*) Dipl. Ing., University of Rijeka 1990.
Thesis: On the Geometrical and Statistical Properties of Dynamical Systems: Theory and Applications.
- Namkyoo Park (*Applied Physics*) B.S., Seoul National University 1987; S.M., Brown University 1988.
Thesis: Application of Fiber Amplifiers to Fiber Lasers and Terahertz Spectroscopy.
- Atakan Peker (*Materials Science*) B.S., Bogazici University 1989.
Thesis: Formation and Characterization of Bulk Metallic Glasses.
- Yong Qiao (*Electrical Engineering*) B.S., Shanghai Jiao Tong University 1986; M.S.E.E., Northrop University 1988; M.S., California Institute of Technology 1990.
Thesis: Learning Dynamics of Photorefractive Neural Networks.
- Subrata Rakshit (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Bombay 1988; M.S., California Institute of Technology 1989.
Thesis: Analysis of Image Sequences Using Redundant Representations.

DOCTOR OF PHILOSOPHY — *Continued*

- Dan Raphaeli (*Electrical Engineering*) B.Sc., Ben Gurion University of the Negev 1987; M.S., California Institute of Technology 1992.
Thesis: Noncoherent Coded Modulation.
- Gamze Erten Salam (*Electrical Engineering*) B.S., Stanford University 1985; M.S. California Institute of Technology 1991.
Thesis: An Analog VLSI Architecture for Stereo Correspondence.
- Remy D. Sanouillet (*Computer Science*) Diplôme d'Ingénieur, École Nationale Supérieure des Arts et Métiers 1981; M.S., California Institute of Technology 1982.
Thesis: Computer Mediated Communication.
- Enrico Santi (*Electrical Engineering*) Laurea, Università degli Studi di Padova 1988; M.S., California Institute of Technology 1989.
Thesis: Magnetics and Control in Power Electronics: I. Modeling of Coupled Inductors. II. One-Cycle Control of Switching Converters.
- Thomas Schrans (*Electrical Engineering*) Ingenieur, State University of Ghent 1984; Ingenieur Zwakstroom, 1987; M.S., California Institute of Technology 1988.
Thesis: Part I: Longitudinal Static and Dynamic Effects in Semiconductor Lasers. Part II: Spectral Characteristics of Passively Mode-Locked Quantum Well Lasers.
- Jakov N. Seizovic (*Computer Science*) B.S.E.E., University of Belgrade 1986; M.S., California Institute of Technology 1988.
Thesis: The Architecture and Programming of a Fine-Grain Multicomputer.
- Angela Chao-Hsuan Shih (*Mechanical Engineering*) B.S., University of California, Los Angeles 1989; M.S., California Institute of Technology 1990.
Thesis: The Study of Taylor-Couette Flows with Superimposed Isothermal and Heated Axial Flows at High Taylor Numbers.
- Jung Hoon Shin (*Applied Physics*) B.A., Harvard College 1989.
Thesis: Defects in Amorphous Silicon: Dynamics and Role on Crystallization.
- Hideyuki Suzuki (*Materials Science*) B.S., University of Tokyo 1988; M.S., California Institute of Technology 1990.
Thesis: Scintillation Mechanisms of Cerium-Doped Rare Earth Oxyorthosilicates.
- Fang Dong Tan (*Electrical Engineering*) B.S., Jiangxi Polytechnic University 1979.
Thesis: Modeling and Control of Switching Converters: I. Unified Modeling and Measurement of Current-Programmed Converters. II. A Generic Averaged Model for Switches in Dc-to-Dc Converters.
- Guillaume Vendroux (*Aeronautics*) Diplôme d'Ingénieur, École Supérieure d'Ingénieurs de Marseille 1988; M.S., California Institute of Technology 1989.
Thesis: Scanning Tunneling Microscopy in Micromechanics Investigations.
- Jeffrey Lance Vollin (*Electrical Engineering*) B.S., California Institute of Technology 1982; M.S., University of California, Los Angeles 1984.
Thesis: Resonant Power Processing at a Fixed Frequency Using a Controllable Inductance.

DOCTOR OF PHILOSOPHY — *Continued*

- Harald Bernd von Sosen (*Applied Mathematics*) Sc.B., Brown University 1990.
Thesis: Part I: Folds and Bifurcations in the Solutions of Semi-Explicit Differential-Algebraic Equations. Part II: The Recursive Projection Method Applied to Differential-Algebraic Equations and Incompressible Fluid Mechanics.
- Andrew Bennett Wells (*Mechanical Engineering*) A.B., Dartmouth College 1989; M.S., California Institute of Technology 1990.
Thesis: Grammars for Engineering Design.
- Chihyung Wen (*Aeronautics*) B.S., National Taiwan University 1986; M.S., California Institute of Technology 1989.
Thesis: Hypervelocity Flow over Spheres.
- Gregory Thomas Willette (*Applied Physics*) A.B., Harvard College 1988; M.S., California Institute of Technology 1990.
Thesis: Stochastic Excitation of the Solar Oscillations by Turbulent Convection.
- Pascal Jean Yvon (*Applied Physics*) Diplôme d'Ingénieur, École Centrale des Arts et Manufactures Paris 1984; M.S., California Institute of Technology 1986.
Thesis: Metastable Phases in the Aluminum-Germanium Alloy System. Synthesis by Mechanical Alloying and Pressure Induced Transformations.
- Zheng Zeng (*Electrical Engineering*) B.E., Tsinghua University 1988; M.S., California Institute of Technology 1991.
Thesis: Recurrent Neural Networks for Grammatical Inference.
- Bin Zhao (*Applied Physics*) B.S., Tsinghua University 1985; M.S., California Institute of Technology 1988.
Thesis: Threshold and Dynamics in Semiconductor Quantum Well Lasers.

DIVISION OF GEOLOGICAL AND PLANETARY SCIENCES

- Donald J. Banfield (*Planetary Science and Applied Physics*) B.S., Cornell University 1987; M.S., California Institute of Technology 1990.
Thesis: A Dynamical History of the Inner Neptunian Satellites; and, Martian Weather: Viking Observations and M. O. Data Assimilation Techniques.
- Bruce Harold Betts (*Planetary Science and Geology*) B.S., Stanford University 1987; M.S., 1987; M.S., California Institute of Technology 1989.
Thesis: Thermal and Visible Studies of Mars Using Termoskan Data Set.
- Bryan Jay Butler (*Planetary Science and Computer Science*) B.S., Utah State University 1988; M.S., California Institute of Technology 1990.
Thesis: 3.5-cm Radar Investigation of Mars and Mercury: Planetological Implications.
- Laurinda Ann Chamberlin (*Geology*) A.B., University of California, Berkeley 1986; M.S., California Institute of Technology 1988.
Thesis: Pd-oxide Equilibration: A New Experimental Method for the Direct Determination of the Activities of Oxide Components in Melts and Minerals.
- Edward James Garnero (*Geophysics*) A.B., University of California, Berkeley 1985.
Thesis: Seismic Structure Above and Below the Core-Mantle Boundary.

DOCTOR OF PHILOSOPHY — *Continued*

- Laszlo P. Keszthelyi (*Geology and Planetary Science*) B.A., The University of Texas at Austin 1985; B.S., 1987; B.S., 1988; M.S., California Institute of Technology 1993.
Thesis: On the Thermal Budget of Pahoehoe Lava Flows.
- Stephen Sylvain Leroy (*Planetary Science and Physics*) B.A., Cornell University 1988; M.S., California Institute of Technology 1990.
Thesis: Convectively Generated Internal Gravity Waves in Venus's Middle Atmosphere: Momentum Transport and Radio Scintillations.
- Xiaodong Song (*Geophysics and Computer Science*) B.S., University of Science and Technology of China 1986; M.S., California Institute of Technology 1991.
Thesis: Structure of the Earth's Core and the Lowermost Mantle from Seismic PKP Waves.
- Paul James Tackley (*Geophysics*) B.A., Trinity College, Cambridge University 1987; M.S., California Institute of Technology 1991.
Thesis: Three-Dimensional Models of Mantle Convection: Influence of Phase Transitions and Temperature-Dependent Viscosity.
- Bradley Brett Woods (*Geophysics*) B.S.E., Princeton University 1985; M.S., California Institute of Technology 1988.
Thesis: Regional Surface Wave Magnitude and Moment Determination Methods Applied to Nuclear Explosions at the Nevada Test Site: Implications for Yield Estimation and Seismic Discrimination.

DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES

- Kay-Yut Chen (*Social Science*) B.S., California Institute of Technology 1989.
Thesis: The Strategic Behavior of Rational Novices.
- David Russell Schmidt (*Social Science*) B.A., Indiana University 1989.
Thesis: Equilibrium in Dynamic Economic Models.
- Kristin Erica Szakaly (*Social Science*) B.A., University of California, Berkeley 1989; M.S., California Institute of Technology 1991.
Thesis: The Political Economy of State Government Debt: An Analysis of Constitutional Limitations (1961-1990).

DIVISION OF PHYSICS, MATHEMATICS AND ASTRONOMY

- John Apostolakis (*Physics*) Ptychio, National and Kapodistrian University of Athens 1985; M.S., California Institute of Technology 1993.
Thesis: Asymptotic Scaling in the Two-Dimensional $O(3)$ Nonlinear Sigma Model: A Monte Carlo Study on Parallel Computers.
- John Eric Belz (*Physics*) A.B., University of California, Berkeley 1987.
Thesis: Two-Body Photodisintegration of the Deuteron at Intermediate Energy.
- Todd Andrew Brun (*Physics*) A.B., Harvard College 1989; M.S., California Institute of Technology 1991.
Thesis: Applications of the Decoherence Formalism.

DOCTOR OF PHILOSOPHY — *Continued*

- Carl Richard Brune (*Physics*) B.S., University of California, Santa Barbara 1988.
Thesis: The ${}^3\text{H}(\alpha, \gamma){}^7\text{Li}$ Reaction at Low Energies.
- Yi-Bin Cao (*Physics*) B.S., University of Science and Technology of China 1987.
Thesis: Vibrational Predissociation Spectroscopy of Mass-Selected Ionic Clusters.
- Bing-Qing Chen (*Physics*) B.S., University of Science and Technology of China 1987.
Thesis: Nuclear Hartree-Fock Calculations on Parallel Computers.
- Mark Chiaping Chen (*Physics*) B.Sc., Queen's University at Kingston 1989.
Thesis: Experiments in Neutrino Mass and Mixing: Part I: New Limits on Heavy Neutrino Emission in Nuclear Beta Decay. Part II: Fast Neutron Backgrounds for the San Onofre Neutrino Detector.
- Douglas Arthur Collins (*Physics*) B.A., Westmont College 1986; M.S., California Institute of Technology 1989.
Thesis: Growth and Characterization of Novel, III-V Semiconductor Heterostructures.
- Kaustuv Mukul Das (*Mathematics*) B.A., Vassar College 1989; M.S., California Institute of Technology 1991.
Thesis: Homotopy and Homology of p-Subgroup Complexes.
- Éanna Flanagan (*Physics*) B.Sc., University College Dublin 1987; M.Sc., 1988.
Thesis: Topics in General Relativity: The Hoop Conjecture, and Theoretical Aspects of Gravitational Wave Detection.
- Haiyan Gao (*Physics*) B.S., Tsinghua University 1988; M.S., California Institute of Technology 1991.
Thesis: Measurement of the Neutron Magnetic Form Factor from Inclusive Quasielastic Scattering of Polarized Electrons from Polarized ${}^3\text{He}$.
- William Adams Heindl (*Physics*) B.S., Case Western Reserve University 1987; M.S., California Institute of Technology 1990.
Thesis: Multiwavelength Observations of the Black Hole Candidate 1E 1740.7-2942.
- Thomas Herbig (*Astronomy and Physics*) B.S., The University of Michigan 1988.
Thesis: A Measurement of the Sunyaev-Zeldovich Effect in the Coma Cluster of Galaxies.
- Irwin Kenneth Horowitz (*Astronomy*) S.B. (*Earth, Atmospheric and Planetary Sciences*), S.B. (*Physics*), Massachusetts Institute of Technology 1986; M.S., California Institute of Technology 1992.
Thesis: Evolution of Emission Line Galaxies.
- Shaun Kevin Kirby (*Physics*) B.S.E., Princeton University 1989; M.S., California Institute of Technology 1991.
Thesis: Three-Dimensional Supercell Simulation of Novel Semiconductor Nanostructures.
- Lawrence Alexander Kolasa (*Mathematics*) B.A., The University of Michigan 1988.
Thesis: Oscillatory Integral Operators Related to Pointwise Convergence of Schrödinger Operators.

DOCTOR OF PHILOSOPHY — *Continued*

- Nataša Kovačević (*Mathematics*) B.S., University of Belgrade 1986; M.S., California Institute of Technology 1991.
Thesis: Möbius-like Groups of Homeomorphisms of the Circle.
- Eugenia Yi-Chih Kuo (*Physics*) B.S., The University of Sydney 1986.
Thesis: Dynamic States in Rotating Rayleigh-Bénard Convection Systems.
- David Richard Law (*Mathematics*) A.B., The University of Michigan 1982; S.M., Massachusetts Institute of Technology 1985.
Thesis: An Abstract Condensation Property.
- Clarence Lap Y. Lee (*Physics*) B.Sc., University of British Columbia 1984; M.S., California Institute of Technology 1987.
Thesis: Quantum Effective Field Theories in Heavy Quark Physics and Phase Transitions in Cosmology.
- Jeongwoo Lee (*Astronomy*) B.S., Seoul National University 1985; M.S., 1987.
Thesis: Study of Solar Microwave Radiation Using Multifrequency Data.
- Kai-Ming Lee (*Physics*) B.S., The University of Hong Kong 1988.
Thesis: Non-Abelian Discrete Gauge Theory.
- Alexander Abraham Lesin (*Mathematics*) M.S. (*Applied Mathematics*), M.S. (*Computer Science*), Moscow Institute of Gas and Oil 1987; M.S., California Institute of Technology 1991.
Thesis: On the Mumford-Tate Conjecture for Abelian Varieties with Reduction Conditions.
- Hoi-Kwong Lo (*Physics*) B.A., Trinity College, Cambridge University 1989; M.S., California Institute of Technology 1991.
Thesis: Exotic Phenomena in Non-Abelian Gauge Theories.
- Dragoljub Marković (*Physics*) B.S., University of Belgrade 1986.
Thesis: Black Holes in the Early Universe, in Compact Binaries, and as Energy Sources Inside Solar-Type Stars.
- José Navarro (*Astronomy*) B.Sc., Stanford University 1988.
Thesis: A Wide Bandwidth Pulsar Timing Machine.
- Thomas Germano O'Neill (*Physics*) A.B., University of California, Berkeley 1986; M.S., California Institute of Technology 1989.
Thesis: Search for Color Transparency in $A(e,e'p)$ at High Momentum Transfer.
- Brian K. Rasnow (*Physics*) B.S., California Polytechnic State University, San Luis Obispo 1984; M.S., California Institute of Technology 1986.
Thesis: The Electric Field of a Weakly Electric Fish.
- Joshua Roth (*Astronomy*) B.A., University of California, Berkeley 1984; M.S., California Institute of Technology 1991.
Thesis: Constraints upon the Cosmological Density Parameter from Tully-Fisher Observations of IRAS Galaxies.
- Sankar Sitaraman (*Mathematics*) B.Sc., R. K. M. Vivekananda College, University of Madras 1987; M.Sc., Indian Institute of Technology, Madras 1989.
Thesis: Arithmetic of Cyclotomic Fields and Fermat-Type Equations.

DOCTOR OF PHILOSOPHY — *Continued*

Piljin Yi (*Physics*) B.S., Seoul National University 1987; M.S., California Institute of Technology 1990.

Thesis: On Quantum Fluctuations and Black Holes.

Kenneth Harbour Young (*Astronomy*) B.A., Carleton College 1980.

Thesis: Submillimeter and Infrared Studies of Mass Lost by Asymptotic Giant Branch Stars.

Prizes and Awards

THE 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 senior who, in the opinion of the undergraduate Deans, has made the greatest undergraduate contribution to the welfare of the student body and whose qualities of leadership, character, and responsibility have been outstanding.

Michael Lee Brundage

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.

Joan Marie Gimbel

THE WILLIAM F. BALLHAUS PRIZE

Awarded to aeronautics students for outstanding doctoral dissertations.

John Lambros

ERIC TEMPLE BELL UNDERGRADUATE MATHEMATICS RESEARCH PRIZE

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

Julian Christopher Jamison

ROLF BUHLER AWARD

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

Bradley Scott Dooley

Prizes and awards are listed only for those students awarded degrees in 1994, and include prizes and awards received by them in previous years.

PRIZES AND AWARDS — *Continued*

FRITZ B. BURNS PRIZE IN GEOLOGY

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

1991 *Cynthia Marie Machacek*

CALTECH PRIZE SCHOLARSHIPS AND CARNATION SCHOLARSHIPS

Each year Caltech awards these prizes for academic excellence. 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. Listed below are graduating seniors who have been recipients of these prizes.

Siddhartha Agarwal
Michael Vadim Anshelevich
Jonathan E. Baker
Elizabeth Jean Barton
Ned Barry Bowden
Peter Alan Carlin
Marcus Yen-Ta Chen
Wing Sze Cheung
Henry O. Choi
Alvin Julian Daniel
Thomas Millar Fink
Robert Taylor Fisher
Hung Fai Fong
Mark David Hammig
Wen Hsuan Hsieh
Julian Christopher Jamison
Tai Jing

Kriten Jayant Joshi
Asif Khalak
Brian Richard Landy
Albert Shu Yuan Lee
Thomas King Hong Leung
Jonathan Xinling Liang
John Lindal
Andrew Matthew Lines
Rajit Manohar
Dan Moraru
Gary Thomas Olsen
Lior Samuel Pachter
Zhanqing Ren
Russina Vassileva Sgourev
Derek Michael Surka
Shreyas Shreenivas Vasanawala
Jiaperng Jennifer Wei

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 math.

Alexander Abraham Lesin

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.

Hinrich Eylers

Yan P. Kuhn de Chizelle

PRIZES AND AWARDS — *Continued*

DONALD S. CLARK MEMORIAL AWARDS

May be 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.

1993 *Won B. Bang*

Derek Michael Surka

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.

1993 *Edray Herber Goins, Deans' Cup*

1994 *Jennifer Ellen Trittschuh, Director of Residence Life and Master's Award*

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.

Helen Marie Chamberlin

HAREN LEE FISHER MEMORIAL AWARD IN JUNIOR PHYSICS

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

1993 *Thomas Millar Fink*

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.

1993 *Albert Shu Yuan Lee*

JACK E. FROELICH MEMORIAL AWARD

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

1993 *Jonathan Xinling Liang*

PRIZES AND AWARDS — *Continued*

GRADUATE DEAN'S 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.

David Alan Edwards

GEORGE W. 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.

1993 Thomas Millar Fink

1994 Robert Taylor Fisher

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.

1993 Gary Thomas Olsen

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.

Moeen Abedin

ARTUR MAGER PRIZE IN ENGINEERING

Awarded to a senior in engineering who has shown excellence in scholarship and the promise of an outstanding professional career.

Albert Shu Yuan Lee

THE HERBERT NEWBY MCCOY AWARD

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

1992 Deborah Sharon Wuttke

1994 David Yee Gin

MARY A. EARL MCKINNEY PRIZE IN LITERATURE

The purpose of this prize is to cultivate proficiency in writing. It may be awarded for essays submitted in connection with regular literature classes or awarded on the basis of a special essay contest.

1993 Kevin Kraft

1994 Derek Michael Surka

PRIZES AND AWARDS — *Continued*

MILLIKAN SCHOLARSHIP

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

1989 *Ward Churchill Burrows*

Amy Ellen Stern

1990 *Jonathan E. Baker*

Elizabeth Jean Barton

Michael Lee Brundage

Christine Carol Esau

Edray Herber Goins

Johann Francis Hornstein

Julian Christopher Jamison

Miikka Matias Kangas

Asif Khalak

Sacha Alexis Malin

Ryan Kwai Tim Likeke Naone

Johanna L. Neaderhouser

David Morris Perlman

Jed Walter Pitera

Paul Wilhelm Karl Rothemund

Keith Allan Schneider

Steven Craig Smith, Jr.

Shreyas Shreenivas Vasanawala

ROBERT L. NOLAND LEADERSHIP SCHOLARSHIP

Awarded to 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.

Rebecca Erin Green

THE RODMAN W. PAUL HISTORY PRIZE

Awarded to a graduating senior who has displayed unusual interest in and talent for history.

Edray Herber Goins

HERBERT J. RYSER MEMORIAL SCHOLARSHIPS

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

1992 *Shreyas Shreenivas Vasanawala*

Michael Vadim Anshelevich

1993 *Zhanqing Ren*

PRIZES AND AWARDS — *Continued*

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.

1993 *Ned Barry Bowden*

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.

1993 *John Lambros*

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.

1992 *Moeen Abedin*

Brian P. McAllister

Jed Walter Pitera

1993 *Michael Lee Brundage*

Michael Wong

SIGMA XI AWARD

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

Ned Barry Bowden

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.

1990 *Douglas Arthur Collins*

1993 *Mark Chiaping Chen*

PRIZES AND AWARDS — *Continued*

THE MORGAN WARD PRIZE

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

1991 *Edray Herber Goins*

1992 *Edray Herber Goins*

Troy James Bassett

CHARLES WILTS PRIZE

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

Enrico Santi

FREDERICK 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.

1992 *Russina Vassileva Sgourevva*

1993 *Michael Vadim Anshelevich*

CIT 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.*

