



119th Annual Commencement  
CALIFORNIA INSTITUTE OF TECHNOLOGY

*June 14, 2013*



119th Annual Commencement  
CALIFORNIA INSTITUTE OF TECHNOLOGY

*Friday, June 14, 2013*  
*10:00 a.m.*

*“In life, leadership and learning are inextricably linked, and without advancements in both, a community and society cannot flourish.”*

*—Jean-Lou Chameau, Caltech President*

## LETTER FROM THE CHAIR AND THE PRESIDENT

Graduates, welcome to our celebration of you—the Caltech Class of 2013!

It is an honor and a privilege to join you and your family and friends as you commemorate the significant accomplishment your graduation represents. Your academic journey has undoubtedly been filled not only with lessons and challenges, but with growth and achievements. Today marks the beginning of a new journey—one in which you'll apply the knowledge and experience you've gained at Caltech to make a difference in academia, business, industry, government, and society as a whole.

You are among the world's most promising scientists, engineers, mathematicians, entrepreneurs, innovators, scholars, and leaders. You arrived at Caltech with big ideas and even bigger passions and goals. We hope that your time here has sharpened those ideas, nurtured those passions, and helped you achieve those goals. We also hope that you have built friendships, explored opportunities on campus and at the Jet Propulsion Laboratory, and embraced the lesson that innovation requires taking risks.

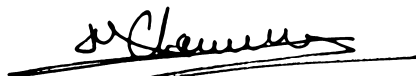
But even as you move on, we hope you will stay connected to Caltech. We encourage you to return often to campus or to become engaged in a local alumni chapter, so that Caltech students continue to benefit from all you have to share, just as you benefited from those who came before you. And, of course, we hope you will be a Caltech ambassador to further elevate the Institute's prominence in the world.

We join you in applauding your family members, your professors, the Caltech staff, your friends, and all the other generous champions—trustees, alumni, donors, Caltech Associates—who have supported your journey at Caltech. These are the people who have prepared you to carry the spirit of discovery and lifelong curiosity into the world, and they are no doubt as proud of you today as we are.

Congratulations, Class of 2013!



David Lee  
Chair, Board of Trustees



Jean-Lou Chameau  
President

## ABOUT CALTECH

More than a century ago, in November 1891, Throop University opened its doors to six faculty members and 31 students. Within a few years, astronomer George Ellery Hale, chemist Arthur Amos Noyes, and physicist Robert Andrews Millikan had come together to transform Throop into a world-class science and engineering research and education institution.

Since then, Caltech has grown to nearly 300 professorial faculty, more than 600 research scholars, over 1,200 graduate students, and almost 1,000 undergraduates—all of whom expand human knowledge and advance society through bold, collaborative explorations and creative, intensive scholarship in fundamental and applied sciences and engineering. Caltech scholars have accelerated life-changing discoveries and transformed the fields of energy, medicine, geoscience, and astrophysics. They have earned 32 Nobel Prizes, seven Crafoord Prizes, 13 National Medals of Technology, and 57 National Medals of Science.

The Institute operates internationally recognized facilities for advanced research on its campus and oversees a seismological laboratory, NASA's Jet Propulsion Laboratory, and an unparalleled network of astronomical observatories.

At Caltech, Theodore von Kármán developed principles that influenced modern jet flight, and played a key role in the founding of JPL; today, Caltech and JPL scientists such as John Grotzinger and Bethany Ehlmann are exploring Mars after successfully landing the newest rover, Curiosity, on the Red Planet.

Charles Richter created the first logarithmic scale for measuring the magnitude of earthquakes; Thomas Hanks and Hiroo Kanamori reinvented the scale to provide more accurate readings of large quakes, from a greater distance; and, today, K. Mani Chandu and R. Andreas Krause are working to adapt cell phones for use in earthquake forewarnings and detection.

Maarten Schmidt determined the nature of quasars; Mike Brown has discovered an object larger than Pluto beyond the outer solar system, demoting Pluto to dwarf-planet status.

Clair Patterson's research on lead pollution prompted controls in the automobile industry; today, faculty such as John Seinfeld, John Dabiri, Frances Arnold, and Sossina Haile are pioneering research into air quality and clean energy.

Linus Pauling determined the nature of the chemical bond; Max Delbrück helped inspire the creation of molecular genetics; and, today, David Baltimore is using gene therapy to aid in the fight against human HIV infections.

Caltech is a place where bold discoveries are possible—where visionary scholars advance the boundaries of knowledge. We celebrate today the 588 graduates who will receive 256 bachelor's degrees, 96 master's degrees, two engineer's degrees, and 236 Ph.D. degrees, and who will contribute to Caltech's impressive legacy and record of achievement around the world.



## ACADEMIC PROCESSION

### *Chief Marshal*

Konstantinos P. Giapis, Ph.D.

### *Marshals*

Geoffrey A. Blake, Ph.D.

John F. Brady, Ph.D.

Rod Kiewiet, Ph.D.

Richard M. Murray, Ph.D.

Joseph E. Shepherd, Ph.D.

David A. Tirrell, Ph.D.

### *Faculty Officers*

John O. Dabiri, Ph.D.

Kristine L. Haugen, 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 and Vice Provosts

The Vice Presidents

The Trustees

The Commencement Speaker

The President

The Chair of the Board of Trustees



## PROGRAM

ORGAN PRELUDE

Leslie J. Deutsch, Ph.D.

PROCESSIONAL

The Caltech Convocation Brass  
and Percussion Ensemble  
*William W. Bing, M.M., Conductor*

PRESIDING

David L. Lee, Ph.D.  
*Chair of the Board of Trustees  
California Institute of Technology*

COMMENCEMENT SPEAKER

Mary Sue Coleman  
*President, University of Michigan*

CHORAL SELECTION

“Ode to Joy” excerpts from  
Symphony No. 9  
by Ludwig van Beethoven;  
Arranged by Dr. Deutsch  
(*Translation on page 58*)

The Caltech Glee Club, the Caltech  
Convocation Brass and Percussion  
Ensemble, and Organ  
*Nancy Sulabian, M.M., Conductor*

CONFERRING OF DEGREES

Jean-Lou Chameau, Ph.D.  
*President  
California Institute of Technology*

PRESENTATION OF CANDIDATES FOR DEGREES

For the Degree of Bachelor of Science

D. Roderick Kiewiet, Ph.D.  
*Dean of Undergraduate Students*

For the Degree of Master of Science

Joseph E. Shepherd, Ph.D.  
*Dean of Graduate Studies*

For the Degree of Engineer

Joseph E. Shepherd, Ph.D.  
*Dean of Graduate Studies*

For the Degree of Doctor of Philosophy

|                                    |                                                      |
|------------------------------------|------------------------------------------------------|
| Biology                            | Raymond J. Deshaies<br><i>Professor of Biology</i>   |
| Chemistry and Chemical Engineering | Jacqueline K. Barton, Ph.D.<br><i>Division Chair</i> |
| Engineering and Applied Science    | Ares J. Rosakis, Ph.D.<br><i>Division Chair</i>      |
| Geological and Planetary Sciences  | Kenneth A. Farley, Ph.D.<br><i>Division Chair</i>    |
| Humanities and Social Sciences     | Jonathan N. Katz, Ph.D.<br><i>Division Chair</i>     |
| Physics, Mathematics and Astronomy | B. Thomas Soifer, Ph.D.<br><i>Division Chair</i>     |

ANNOUNCEMENT OF AWARDS AND  
CONCLUDING REMARKS

President Chameau

ALMA MATER  
“Hail CIT”

by Manton Barnes, B.S. '21  
*(The audience may join in;  
lyrics are on page 63)*

The Caltech Glee Club, the Caltech  
Convocation Brass and Percussion  
Ensemble, and Organ

RECESSIONAL

The Caltech Convocation Brass  
and Percussion Ensemble

ORGAN POSTLUDE

“The Throop Institute March,”  
composed by E. C. Kammermeyer  
in 1900 for the Throop Institute  
Guitar and Mandolin Society

Dr. Deutsch

*Live streaming of Caltech’s 2013 commencement ceremony will begin shortly before  
10 a.m. on Friday, June 14, at [www.caltech.edu](http://www.caltech.edu).*



## ABOUT THE SPEAKER

Mary Sue Coleman has served as the president of the University of Michigan (U-M) since August 2002. She is also a professor of biological chemistry in the Medical School and a professor of chemistry in the College of Literature, Science, and the Arts.

As president, Coleman has launched several major initiatives at U-M that are designed to have a positive impact on future generations of students, the intellectual life of the campus, and society at large. These include expanded academic partnerships with universities in China, Ghana, South Africa, and Brazil, and a groundbreaking collaboration between the university and Google that will enable the public to search the text of the university's 7-million-volume library, and will pave the way to universal access to and the preservation of recorded human knowledge.

She was one of six university presidents selected by President Obama to help launch the Advanced Manufacturing Partnership, a national effort bringing together industry, universities, and the federal government to revitalize American manufacturing through investment in and development of emerging technologies. In 2010, then U.S. commerce secretary Gary Locke named her cochair of the National Advisory Council on Innovation and Entrepreneurship. Coleman is regarded as a national spokesperson on the educational value of diverse perspectives in the classroom, and her extensive leadership positions in higher education have included membership on the National Collegiate Athletic Association Board of Directors and the Knight Commission on Intercollegiate Athletics.

As a biochemist, Coleman has built a distinguished career through her research on the immune system and malignancies. She is a member of the Institute of Medicine, and a Fellow of the American Association for the Advancement of Science and of the American Academy of Arts and Sciences. Coleman is also a nationally recognized expert on the consequences of being uninsured, both for individuals and society as a whole.

## CANDIDATES FOR DEGREES

### Bachelor of Science

Anish Agarwal\* *Republic of Singapore* Mechanical Engineering and Economics and Computer Science (Minor)

Shir Aharon\* *Princeton Junction, New Jersey* Applied and Computational Mathematics and Business Economics and Management

Lucia Minjung Ahn *Ithaca, New York* Computer Science

Avin Daniel Andrade\* *Pleasanton, California* Chemical Engineering (Environmental)

Mitchel Chinedu Arene\* *Jos Plateau, Nigeria* Electrical Engineering

Sarun Atiganyanun\* *Bangkok, Thailand* Applied Physics

Dori Bejleri\* *Wolcott, Connecticut* Mathematics

John Cain Blackwood\* *Rancho Palos Verdes, California* Chemical Engineering (Materials) and Business Economics and Management

Daniel Christopher Elevado Blado\* *Richmond, Texas* Applied and Computational Mathematics

Michelle Esther Bobrow\* *Great Neck, New York* Biology

Stephanie Claire Bohaczuk\* *Wyckoff, New Jersey* Biology

Carly Mariah Bond *Anchorage, Alaska* Chemical Engineering (Materials)

Ethan Rain Boroson\* *Tucson, Arizona* Mechanical Engineering

Reuben Joseph Britto\* *Redding, California* Chemical Engineering (Materials)

Nicholas Salpeter Buckley *Woodside, California* Engineering and Applied Science (Computation and Neural Systems)

Nina Budaeva\* *El Cerrito, California* Physics

Yi Elise Cai\* *Albany, California* Biology

Juan Diego Caporale *Chino, California* Mechanical Engineering

Juan Pablo Cardenas *Miami, Florida* Mechanical Engineering

Arjun Subramani Chandar\* *North Miami, Florida* Mechanical Engineering and Business Economics and Management

Sandhya Chandrasekaran\* *Fremont, California* Biology and Chemistry

Christine Haejung Chang\* *Pleasanton, California* Chemistry

Saptarshi Chaudhuri\* *Columbus, Ohio* Physics

Sinthunon Chavanaves\* *Bangkok, Thailand* Physics

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

† Students whose names are followed by a dagger are close to completion and will receive diplomas at the end of the academic year in which all graduation requirements are met.

## *Bachelor of Science continued*

Clare Chen\* *Pasadena, California* Mechanical Engineering  
Daniel Young Chen\* *Austin, Texas* Computer Science and Business Economics and Management  
Tao Tao Chen *Cupertino, California* Mathematics  
Victor Eric Chen\* *San Jose, California* Biology  
Benjamin J. Cherian *San Jose, California* Applied Physics  
Annie Fong Yu Chin\* *San Jose, California* Computer Science  
Eric Hyunseung Cho *Los Angeles, California* Computer Science  
Sung Bong Chun\* *Songnam, Republic of Korea* Physics and Mathematics  
Yejun Caleb Chun *Toledo, Ohio* Applied and Computational Mathematics  
Brandon Robert Comella† *Whitehouse Station, New Jersey* Physics  
Nadine Peyton Currie *DeLand, Florida* Chemistry  
Megan Rose Cutrofello\* *Evanston, Illinois* Mathematics and Economics  
Colleen Rebecca Delaney\* *Benicia, California* Physics and History (Minor)  
Breanna Denicola *Los Gatos, California* History  
Matthew Ross Diamond *Temecula, California* Geochemistry  
Race Everest Rial DiLoreto *University Place, Washington* Biology  
Gabriella Lora Dodd *Dallas, Texas* Mechanical Engineering  
Hanna Marie Dodd\* *Pasadena, California* Mechanical Engineering  
Jacinto Dominguez III *Vista, California* Mechanical Engineering  
Yishun Dong\* *Shanghai, People's Republic of China* Electrical Engineering and Applied and Computational Mathematics  
Shayan Doroudi\* *Mission Viejo, California* Computer Science  
Karen Marie Dowling\* *Ann Arbor, Michigan* Electrical Engineering  
Christopher Robert Dudiak\* *Atlanta, Georgia* Computer Science  
Mihail Eugen Dumitrescu *Bucharest, Romania* Computer Science  
Michael Wayne Edwards *Canyon Country, California* Computer Science  
Joshua Alexander Escribano-Fontanet\* *Apopka, Florida* Physics  
Steven Evergreen\* *Downey, California* Electrical Engineering  
Kelvin Fang\* *San Jose, California* Electrical Engineering  
Suzannah Alcyone Fraker\* *Washington, District of Columbia* Computer Science  
Mason Cecil Freedman *Falls Church, Virginia* Mechanical Engineering  
Matthew Kuenzli Fu\* *Herndon, Virginia* Mechanical Engineering  
Kimberly Keiko Furuya *Bloomington, Illinois* Engineering and Applied Science (Computation and Neural Systems)  
Prakriti Gaba\* *Las Vegas, Nevada* Biology and Business Economics and Management  
Meng Ge\* *Beijing, People's Republic of China* Applied and Computational Mathematics and Economics

## *Bachelor of Science continued*

- Marvin Ho-Yan Gee\* *Frederick, Maryland* Biology
- Alexandra Todorova Georgieva *Sofia, Bulgaria* Physics
- Vaishnavi Giridaran\* *Champaign, Illinois* Engineering and Applied Science (Computation and Neural Systems) and Bioengineering.
- Brent Justin Goldman *San Francisco, California* Computer Science and Business Economics and Management
- Eduardo Martín González† *Virginia Beach, Virginia* Computer Science
- Kevin Li Gu\* *Fresno, California* Chemical Engineering (Process Systems)
- Yuzhou Conan Gu\* *Changzhou, People's Republic of China* Applied and Computational Mathematics
- Kelly Mengyu Guan\* *Arcadia, California* Chemical Engineering (Materials)
- Matthew Patrick Harrigan\* *Essex, Connecticut* Chemistry
- Ying Qiao Hee\* *Republic of Singapore* Chemical Engineering (Process Systems) and Business Economics and Management
- Matthew Thomas Edwin Heydeman\* *Monterey, California* Physics
- Daniel William Hogan\* *Salt Lake City, Utah* Physics
- Nerissa Emmy Graetz Hoglen\* *Kalaheo, Hawaii* Engineering and Applied Science (Computation and Neural Systems) and English
- Kristen Marie Holtz\* *Tracy, California* Mechanical Engineering and Control and Dynamical Systems (Minor)
- Katherine Hooper† *Sunnyvale, California* Engineering and Applied Science (Computation and Neural Systems)
- Gladia Chork Hotan\* *Republic of Singapore* Physics
- Yang Hu\* *Richland, Washington* Biology
- Yifei Huang\* *Naperville, Illinois* Mechanical Engineering and Computer Science (Minor)
- Supriya Iyer *San Jose, California* Mechanical Engineering and Geological and Planetary Science (Minor)
- Megan Nora Jackson\* *Moraga, California* Chemistry
- Bryan Paul Jadot\* *Chapel Hill, North Carolina* Computer Science
- Anum Jang Sher *Islamabad, Pakistan* Mechanical Engineering and Business Economics and Management
- Ayooluwakunmi Oluwafemi Jeje\* *Ibadan, Nigeria* Mechanical Engineering
- Xinyao Ji\* *Jiangsu, People's Republic of China* Mathematics
- Zhengyang Jiang\* *Chengdu, People's Republic of China* Mathematics and Business and Economics and Management
- Raymond Christian Jimenez\* *Duarte, California* Electrical Engineering

## *Bachelor of Science continued*

Timothy Underwood Johnson *Torrance, California* Mathematics  
Samuel Stephen Jones *Rocky Mount, Virginia* Electrical Engineering  
Karolina Z. Kalbarczyk *Urbana, Illinois* Chemical Engineering (Biomolecular)  
Amol Deepak Kamat\* *Northville, Michigan* Biology  
Aroutin Khachaturian\* *Glendale, California* Electrical Engineering  
Rishi Das Khanna *Millwood, New York* Electrical Engineering  
Brian T. Kim\* *Northridge, California* Chemical Engineering (Biomolecular) and Political Science  
Caroline Haejin Kim† *Seongnam, Republic of Korea* Electrical Engineering  
Chang Sub Kim\* *Seoul, Republic of Korea* Physics  
Laura Kim\* *Atlanta, Georgia* Chemical Engineering (Materials)  
Seohyun Kim\* *Seoul, Republic of Korea* Chemistry  
Stacy Yeonchi Kim *Avondale, Arizona* Physics  
Roy Jeffrey Koczela *Shorewood, Wisconsin* Engineering and Applied Science  
Christopher Forrest Kolner\* *Moraga, California* Electrical Engineering  
Swadhruth Komanduri *Okemos, Michigan* Engineering and Applied Science (Computation and Neural Systems) and Business Economics and Management  
Philip L. Kong\* *Los Angeles, California* Biology  
Timea Kosztin\* *Columbia, Missouri* Mechanical Engineering and Business Economics and Management  
Jeffrey Adam Kowalski\* *Ewing, New Jersey* Chemical Engineering (Materials)  
Stephanie Ya-Wen Kwan *Rancho Palos Verdes, California* Biology and English (Minor)  
Sung Min Kwon† *Seoul, Republic of Korea* Chemical Engineering (Materials)  
Thomas Ginhay Kwong\* *Irvine, California* Mechanical Engineering  
Pawel Michal Latawiec\* *Cary, Illinois* Physics  
Kimberly Lutek Law\* *San Diego, California* Bioengineering  
Rebecca Jean Lawler\* *Portland, Oregon* Computer Science  
Tuan Anh Le\* *Warsaw, Poland* Computer Science  
Christina Colleen Lee† *Vancouver, Washington* Physics  
Eun Jee Lee\* *Seoul, Republic of Korea* Electrical Engineering  
Seoung Jun (Elijah) Lee\* *Incheon, Republic of Korea* Mechanical Engineering and Structural Mechanics (Minor)  
Jomya C. Lei\* *Brentwood, Tennessee* Electrical Engineering and Chemistry  
Cheng Ran Mathilda Li† *Wuhan, People's Republic of China* Computer Science  
Henry Li\* *San Jose, California* Computer Science and Business Economics and Management  
Nannan Li\* *Hefei, People's Republic of China* Chemical Engineering (Materials)  
Shuaili (Cici) Li\* *Fremont, California* Chemical Engineering (Materials)



## *Bachelor of Science continued*

Susan Elizabeth Liao *Princeton, New Jersey* Biology  
Ee Jane Lim *Kota Bharu, Malaysia* Chemical Engineering (Materials)  
Eric Liu *Warren, New Jersey* Chemical Engineering (Materials)  
Erik Jerry Liu *State College, Pennsylvania* Chemical Engineering (Biomolecular)  
Shiyi Liu *Guangdong, People's Republic of China* Physics  
Yuan Liu\* *Beijing, People's Republic of China* Applied and Computational Mathematics and Business  
Economics and Management  
Kevin Lo\* *San Diego, California* Computer Science  
Megan Lo\* *Austin, Texas* Chemical Engineering (Biomolecular)  
Cassandra Derrick Lochhaas\* *Newburyport, Massachusetts* Physics  
Tong Lu *San Ramon, California* Economics and Engineering and Applied Science (Computation  
and Neural Systems)  
Tsung-Ju Jeff Lu\* *San Jose, California* Electrical Engineering  
Marcus Aaron Lucas *Olympia, Washington* Mechanical Engineering  
Tuling Ma\* *East Brunswick, New Jersey* Computer Science  
Xiaoya Ma\* *Fayetteville, New York* Chemical Engineering (Materials)  
Timothy David MacDonald\* *Turlock, California* Mechanical Engineering and Aerospace  
Engineering (Minor)  
Vishnu Manoranjan\* *Pullman, Washington* Biology and Philosophy (Minor)  
Anastasiya Vadimovna Markovtsova *Foster City, California* Bioengineering  
Blaine Roger Matulevich\* *Kalispell, Montana* Mechanical Engineering and History  
Matthew Zoccoli Mayers\* *Franklin Lakes, New Jersey* Mathematics and Chemistry  
Naomi Aubrey McArthur *Omaha, Nebraska* Engineering and Applied Science (Computation and  
Neural Systems)  
Carson Kent McNeil *Salt Lake City, Utah* Engineering and Applied Science (Computation and  
Neural Systems) and Computer Science (Minor)  
Alan Joseph Menezes\* *Saratoga, California* Electrical Engineering  
Andrew Chengsi Meng\* *Baton Rouge, Louisiana* Physics and Chemistry  
Rocio Mercado *Wilmington, California* Chemistry  
Brian Merlob *Coral Springs, Florida* Political Science and Computer Science  
Timothy Meyer *Honolulu, Hawaii* Computer Science and Business Economics and Management  
Zeke Millikan\* *Minneapolis, Minnesota* Mechanical Engineering  
Jama Abdullahi Mohamed *Springfield, Virginia* Electrical Engineering  
Mahati Mokkarala\* *Budd Lake, New Jersey* Biology  
Rachel Stockton Moore *Aiken, South Carolina* Chemical Engineering (Materials)  
Melody Ann Morris\* *Bedford, Massachusetts* Chemical Engineering (Materials)

## *Bachelor of Science continued*

- Judy Mou\* *Temple City, California* Computer Science
- Alexander Telemachos Mouschovias\* *Urbana, Illinois* Applied Physics
- Collin Michael Murphy *Wasilla, Alaska* Computer Science and Business Economics and Management
- Jaime Rose Nagel\* *Neenab, Wisconsin* Mechanical Engineering
- Roshan Devan Nanu *Southlake, Texas* Physics
- Luis Alexander Navarro\* *Miami, Florida* Chemistry
- Ilya Nepomnyashchii\* *Carol Stream, Illinois* Computer Science and Mathematics
- Joshua Alexander Borwein Nevin *Hong Kong, People's Republic of China* Mathematics and Philosophy (Minor)
- Nina Zhixuan Ng-Quinn *Alta Loma, California* Biology
- HongAn Thuy Nguyen\* *Wyoming, Michigan* Mechanical Engineering
- Lan Huong Nguyen\* *Ha Noi, Vietnam* Applied and Computational Mathematics and Economics
- Brice Chedjou Nzeukou *Tucson, Arizona* Mechanical Engineering and Business Economics and Management
- Richard Hua O'Dowd\* *Santa Barbara, California* Computer Science
- John Jefferson Odell\* *Prince Frederick, Maryland* Mechanical Engineering
- Nicholas Charles Ogden *Carterville, Illinois* Electrical Engineering
- Steven Yukio Okai *Pearl City, Hawaii* Electrical Engineering
- Mia Rose Hubbard Oviatt *Woodinville, Washington* Biology
- Geunwook Paek\* *Seoul, Republic of Korea* Applied and Computational Mathematics and Economics
- Alison Dawn Parisian\* *Vacaville, California* Biology
- Sung Jin Park\* *San Jose, California* Chemical Engineering (Biomolecular)
- Priyam Patel *Irvine, California* Applied Physics
- Brian Daniel Penserini *Carmichael, California* Geology
- Christopher Adam Perez *Chicago, Illinois* Mathematics
- Ahalya Prabhakar *Alpharetta, Georgia* Mechanical Engineering
- Suyeon Pyo\* *Iksan, Republic of Korea* Chemical Engineering (Materials)
- Chenxi Qiu\* *Temecula, California* Bioengineering
- John Steven Rath *Eden Prairie, Minnesota* Mathematics
- Srihari V. Ravi\* *West Windsor, New Jersey* Computer Science
- Benjamin Razon\* *Maple Glen, Pennsylvania* Computer Science and Business Economics and Management
- Haoyang Ren *Cary, North Carolina* Computer Science
- Addison Rice *Sparta, New Jersey* Engineering and Applied Science (Environmental Science and Engineering) and Geological and Planetary Science (Minor)

## *Bachelor of Science continued*

Alexander David Rider\* *Monrovia, California* Physics  
Christian Daniel Rivas *Claremont, California* Business Economics and Management  
Joanna Renee Robaszewski *Arlington Heights, Illinois* Physics  
Andrew Carlos Rodriguez *Weston, Florida* Applied and Computational Mathematics  
Sebastián Rojas Mata\* *Escazú, Costa Rica* Mechanical Engineering  
Cipriano William Romero\* *Northbrook, Illinois* Electrical Engineering  
Errika Celine Romero *Houston, Texas* Chemical Engineering (Biomolecular)  
Tommaso Rosi *Fiorenzuola d'Arda, Italy* Applied and Computational Mathematics  
Alexander Manek Karl Runkel\* *Villingen-Schwenningen, Germany* Engineering and Applied  
Science (Computation and Neural Systems) and Economics  
Murtaza Saifee\* *Tarzana, California* Electrical Engineering  
Stephanie Rae Parlade Samson\* *Lomita, California* Chemical Engineering (Materials)  
Dev V. Sanghani\* *Rajkot, Gujarat, India* Computer Science  
Hunter James Sceats\* *Colorado Springs, Colorado* Applied Physics  
Stephen Joseph Schwee\* *Winter Springs, Florida* Mechanical Engineering and Business Economics  
and Management  
James Michael Scott\* *Rockford, Michigan* Physics  
Kijun Seo\* *Seoul, Republic of Korea* Computer Science  
Nihar Sharma *Noida, India* Computer Science  
Hong Sheng\* *Wuhan, People's Republic of China* Applied and Computational Mathematics  
Kevin Shi\* *Johnston, Iowa* Chemical Engineering (Biomolecular)  
Dong Woo Shin *Los Angeles, California* Chemistry and History  
Sang Ha Shin\* *Seoul, Republic of Korea* Mechanical Engineering  
Juan Pablo Sierra *El Segundo, California* Electrical Engineering  
Gregory Vahagn Simonian\* *Los Angeles, California* Astrophysics  
Nikita Sinha\* *San Ramon, California* Biology  
Seorim Song† *Arlington, Texas* Chemical Engineering (Materials)  
Daniel Enrique Sotolongo\* *Miami, Florida* Physics  
Andrew Chai Stanek *Fremont, California* Biology  
Jessica Tsu-Yun Su\* *Boca Raton, Florida* Computer Science  
Sabrina I-Chyi Sun\* *Arcadia, California* Chemical Engineering (Biomolecular)  
Dylan Joshua Sures *Northridge, California* Chemistry  
Mikhail Vladimir Sushkov\* *Cupertino, California* Computer Science  
Kevin Michael Sutherland\* *Modesto, California* Geology  
Wesley Staton Swank *Coraopolis, Pennsylvania* Mechanical Engineering  
Kelly K. Swanson\* *Naperville, Illinois* Physics

## *Bachelor of Science continued*

Alex Atsushi Takeda\* *Londrina, Brazil* Physics  
Katherine Anne Taylor *Washington, District of Columbia* Mechanical Engineering  
Thanchanok Teeraratkul\* *Bangkok, Thailand* Electrical Engineering  
Ryan Thorngren\* *Los Angeles, California* Mathematics  
Vicky Yuan Tian *Mukilteo, Washington* Mechanical Engineering and Business Economics and Management and Aerospace Engineering (Minor)  
Suk Sien Tie\*  *Bintulu, Sarawak, Malaysia* Astrophysics  
Mohit Tiwari\* *Yorktown Heights, New York* Physics and Mathematics  
Joshua Wayne Tollefson\* *Rosemount, Minnesota* Applied and Computational Mathematics and Planetary Science  
Mariya Ivanova Vasileva *Sofia, Bulgaria* Mechanical Engineering and Business Economics and Management  
Saraswathi Joy Venkatesh\* *Swarthmore, Pennsylvania* Mathematics  
Christine Grace Viveiros *Spokane, Washington* Mechanical Engineering  
Alex J-S Wang\* *Dallas, Texas* Chemical Engineering (Biomolecular)  
Jing Wang\* *Clarksville, Maryland* Physics and Computer Science  
Pan Qiyu Wang\* *Germantown, Maryland* Computer Science  
Tong Wang *Shenyang, People's Republic of China* Physics  
Yizhuo Wang\* *Kingsport, Tennessee* Computer Science  
Alexander Spence Wein\* *Palo Alto, California* Computer Science and Mathematics  
Jody C. Wen\* *Orange, California* Applied and Computational Mathematics  
Rebecca Ann Wernis\* *Chicago, Illinois* Physics  
Reginald George Wilcox III\* *Ottawa, Canada* Electrical Engineering and Business Economics and Management  
Sarah Marie Wittman *Milwaukee, Wisconsin* Computer Science  
Stephen Wayne Worlow *Spring, Texas* Mathematics and Computer Science  
Sarah Louise Wright *Strongsville, Ohio* Bioengineering  
Alexander Huang Wu\* *Yorba Linda, California* Applied and Computational Mathematics and Business Economics and Management  
Christine Elizabeth Wu *Pleasanton, California* Chemical Engineering (Biomolecular)  
Louie Robert Wu *Gainesville, Florida* Mathematics  
Xiaotong (Tony) Wu\* *Gainesville, Florida* Mechanical Engineering and Business Economics and Management  
Ying Xian\* *Fremont, California* Chemistry and English  
Catherine Bingchan Xie\* *Mountain View, California* Bioengineering and English (Minor)  
Yushu Joy Xie\* *Troy, Michigan* Chemical Engineering (Biomolecular)

## *Bachelor of Science continued*

Junxiao Xu\* *Troy, Michigan* Computer Science and Business Economics and Management  
Melissa Xu *Davis, California* Bioengineering  
Sibei Xu *San Diego, California* Bioengineering (Devices)  
Irene Chiyun Yang\* *Houston, Texas* Electrical Engineering  
Mimi Xuan Yang\* *Lexington, Kentucky* Electrical Engineering  
Ran Yang *Lake Oswego, Oregon* Biology  
Scott Michael Yantek\* *Olmsted Township, Ohio* Physics  
Alex Wayne Yeh *Westlake Village, California* Chemical Engineering (Biomolecular)  
Joshua Yoon\* *Columbia, Missouri* Physics  
Yeoil Yoon *Seoul, Republic of Korea* Mathematics  
Chia-Chen Yu\* *Kaohsiung, Taiwan (ROC)* Electrical Engineering  
Jenny Z. Yung *Ashburn, Virginia* Applied and Computational Mathematics  
Alexander Victor Zahn *Orange, California* Physics  
Eric B. Zhang\* *Sharon, Massachusetts* Applied and Computational Mathematics  
Rongxiao Zhang\* *Guangdong, People's Republic of China* Mechanical Engineering  
Vivian Zhang\* *Tucson, Arizona* Mechanical Engineering  
Shiyu Zhao\* *Zhejiang, People's Republic of China* Computer Science  
Zipeng Zhao\* *North Potomac, Maryland* Mechanical Engineering and Aerospace Engineering  
(Minor)  
Jennifer Haijin Zhu *Phoenix, Arizona* Chemical Engineering (Materials)  
Mario Victor Zubia\* *Guadalupe, California* Biology  
Andrew Joseph Zucker\* *Greeley, Colorado* Mathematics

## Master of Science

- Ryo Adachi (*Behavioral and Social Neuroscience*) B.E., The University of Tokyo 2009; M.S., 2011.
- Paul William Jacob Anzel (*Applied Physics*) B.A., B.S., Rice University 2009.
- Asma (*Electrical Engineering*) B.E., NED University of Engineering and Technology 2009.
- Sirio Belli (*Astrophysics*) Laurea Triennale, University of Bologna 2008; Laurea Magistrale, 2010.
- Rahul Brian Bhui (*Behavioral and Social Neuroscience*) B.A., The University of British Columbia 2010.
- Tobias Bischoff (*Environmental Science and Engineering*) Vordiplom, Philipps-Universität Marburg 2008; M.S., University of Cambridge 2011.
- Brock Douglas Bobbitt (*Mechanical Engineering*) B.S., University of Illinois at Urbana-Champaign 2011; B.S., Wheaton College 2011.
- Kristen Marie Boydston (*Physics*) B.Sc., McGill University 2010.
- Nicholas James Broten (*Social Science*) B.A., University of California, Berkeley 2008; M.Sc., London School of Economics 2009.
- Michael Ira Burd (*Electrical Engineering*) B.S., Rose-Hulman Institute of Technology 2008.
- Edward Scott Hafer Burns (*Mechanical Engineering*) B.S., Carnegie Mellon University 2011.
- Wuhan Desmond Cai (*Electrical Engineering*) B.S., Cornell University 2009.
- Kyle Ian Carlson (*Behavioral and Social Neuroscience*) B.A., The University of Memphis 2006.
- Remi Arthur Carmigniani (*Aeronautics*) Diplôme d'Ingénieur, École Polytechnique 2012.
- David Hamilton Case (*Geochemistry*) B.A., Washington University in St. Louis 2010.
- Matthew C. Chao (*Social Science*) B.A., Dartmouth College 2006.
- Lawrence Yong-uck Chung (*Mathematics*) B.S., Seoul National University 2008.
- Renata Christina Cummins (*Geobiology*) A.B., Harvard College 2011.
- Trevor Justin David (*Astrophysics*) A.B., Vassar College 2009.
- Mélanie Delapierre (*Space Engineering*) Diplôme d'Ingénieur, École Polytechnique 2012.
- Abel Bermie Roberto Dizon (*Civil Engineering*) B.S., University of California, Los Angeles 2011.
- Heather Ann Duckworth (*Space Engineering*) B.A., Columbia University 2011.
- Katharine Yan Fang (*Chemical Engineering*) B.A.Sc., The University of Toronto 2010.
- Masoud Farivar (*Electrical Engineering*) B.S., Sharif University of Technology 2009.
- Glenn Robert Garrett (*Materials Science*) B.S., Georgia Institute of Technology 2005.
- Paul Robert Gebhart (*Physics*) B.S., University of California, Irvine 2009.
- John Bernard Gorman (*Electrical Engineering*) B.S., California State University, Long Beach 2004.
- Andres Jared Goza (*Mechanical Engineering*) B.S., Rice University 2011.
- Vikash Gunreddy (*Electrical Engineering*) B.S., Virginia Polytechnic Institute and State University 2012.
- David Christopher Hall (*Electrical Engineering*) B.E., B.S., The University of Melbourne 2010.
- Jennifer Leigh Hamon (*Geology*) S.B., Massachusetts Institute of Technology 2010.
- Wentao Huang (*Electrical Engineering*) B.S., Nanjing University of Posts and Telecommunications 2008; M.S., Shanghai Jiao Tong University 2011.

## *Master of Science continued*

- Christopher George Janover (*Applied Mechanics*) B.E., M.E., The Cooper Union for the Advancement of Science and Art 2010.
- William Maxwell Jones (*Electrical Engineering*) B.S., California Institute of Technology 2010.
- Joshua Andrew Kammer (*Planetary Science*) B.A., Texas A&M University 2010.
- Melodie Minyu Kao (*Astrophysics*) S.B., Massachusetts Institute of Technology 2011.
- Scott Ian Kelber (*Physics*) B.A. (*Economics*), B.A. (*Physics*), The University of Chicago 2006.
- Aditya Shreyas Kher (*Applied Physics*) B.S., University of California, San Diego 2009.
- Jinho Kim (*Electrical Engineering*) B.S., Seoul National University 2005; M.S., 2007.
- Kun Woo Kim (*Applied Physics*) B.S., California Institute of Technology 2008.
- Ramya Korlakai Vinayak (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Madras 2011.
- Altemurcan Kahraman Kursunlu (*Space Engineering*) B.S., Bogazici University 2012.
- Carlos Daniel Laguna Juarez (*Space Engineering*) B.E., Universidad Panamericana 2012.
- Simon Lapointe (*Aeronautics*) B.S., Université Laval 2010; M.S., 2012.
- Jionghui Li (*Electrical Engineering*) B.E., Harbin Institute of Technology 2011.
- Zhao Li (*Electrical Engineering*) B.S., Beijing University of Posts and Telecommunications 2011.
- Rod Seung-Hwan Lim (*Biology*) B.S., University of California, San Diego 2008.
- Yunung Lin (*Geology*) B.A., National Taiwan University 2003; M.S., 2005.
- Maxwell Bernard Loewinger (*Chemistry*) B.A., Wesleyan University 2008; M.A., 2010.
- Frank Donald Maselli (*Civil Engineering*) B.E., M.E., Stevens Institute of Technology 2010.
- Jordan Eliot Maslov (*Electrical Engineering*) B.S., California Institute of Technology 2012.
- Lucas Rosendo Meza (*Mechanical Engineering*) B.S., University of California, Los Angeles 2011.
- Sergio Montero (*Social Science*) Licenciado en Economía, Centro de Investigación y Docencia Económicas 2011.
- Benjamin Tyler Montet (*Astrophysics*) B.A., B.S., The University of Illinois at Urbana-Champaign 2011.
- Abhiram Moturi (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Madras 2012.
- Judy Mou (*Computer Science*) B.S., California Institute of Technology 2013.
- Maxwell Robert Murialdo (*Materials Science*) B.S., Stanford University 2011.
- Neel Prashant Nadkarni (*Aeronautics*) B.Tech., Indian Institute of Technology, Gandhinagar 2012.
- Miki Nakajima (*Planetary Science*) B.A., Tokyo Institute of Technology 2007; M.S., 2009.
- Panagiotis Philippos Natsiavas (*Mechanical Engineering*) Diploma, Aristotle University of Thessaloniki 2012.
- Parham Noorzad (*Electrical Engineering*) B.S., University of Tehran 2012.
- Xiaoze Ou (*Electrical Engineering*) B.S., Zhejiang University 2011.
- Akshay Pai (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Madras 2012.

## *Master of Science continued*

- Shuo Pang (*Electrical Engineering*) B.S., Tsinghua University 2006; M.S., Texas A&M University 2008.
- Qiuyu Peng (*Electrical Engineering*) B.E., Shanghai Jiaotong University 2011.
- Nakul E. Reddy (*Bioengineering*) B.S., Georgia Institute of Technology 2006.
- Joseph Holda Rheinhardt (*Chemistry*) B.S., Indiana University 2010.
- Carolyn Mary Richmonds (*Chemical Engineering*) B.S., Case Western Reserve University 2010.
- Chris Roh (*Aeronautics*) B.S., Cornell University 2012.
- Alexander Charles Romero (*Biochemistry and Molecular Biophysics*) B.S., Duke University 2007.
- Kevin Thomas Rosenberg (*Space Engineering*) B.S. (*Aerospace Engineering*), B.S. (*Mechanical Engineering*), University of Florida 2012.
- Amir Hossein Safavi-Naeini (*Applied Physics*) B.A.Sc., University of Waterloo 2008.
- Theresa Ann Saxton-Fox (*Mechanical Engineering*) S.B., Massachusetts Institute of Technology 2012.
- Marc Serra Garcia (*Aeronautics*) B.Sc., M.Sc., Universitat Autònoma de Barcelona 2010.
- Matthew Reed Shaner (*Chemical Engineering*) B.S., University of California, Santa Barbara 2010.
- Amanda M. Shing (*Materials Science*) S.B., Massachusetts Institute of Technology 2008.
- Va Cheung Si (*Biology*) B.S., University of California, Los Angeles 2007.
- Gregory Stephen Smetana (*Aeronautics*) B.S., University of Wisconsin-Madison 2012.
- Jeffrey Owen Smith (*Chemistry*) B.S., Carnegie Mellon University 1998.
- Kevin Michael Sutherland (*Geochemistry*) B.S., California Institute of Technology 2013.
- Sean Pearson Symon (*Aeronautics*) B.A., B.S., University of Maryland, College Park 2012.
- Albert Z. Tan (*Electrical Engineering*) B.S. (*Electrical Engineering*), B.S. (*Political Science*), California Institute of Technology 2012.
- Zhihong Tan (*Environmental Science and Engineering*) B.S., Peking University 2009.
- Brian Jon Thompson (*Electrical Engineering*) B.S.E.E., Rose-Hulman Institute of Technology 2007.
- Zachary James Tobin (*Applied Physics*) B.S.E., Case Western Reserve University 2009.
- Elizabeth Trembath-Reichert (*Geobiology*) B.A., Barnard College 2008.
- Gerelt Tserenjigmid (*Social Science*) B.A., The University of Tokyo 2011.
- Jacqueline Rose Villadsen (*Astrophysics*) S.B., Massachusetts Institute of Technology 2009.
- Mu Wang (*Chemical Engineering*) B.E., McGill University 2007; M.E., 2008.
- Robert Christopher Wills (*Environmental Science and Engineering*) B.S., University of California, Berkeley 2011.
- Charlotte Ling Yang (*Computation and Neural Systems*) S.B., Massachusetts Institute of Technology 2011.
- Hang Yu (*Environmental Science and Engineering*) B.Sc., The University of British Columbia 2010.
- Fan Zhang (*Physics*) B.A., University of Cambridge 2004; M.Sc., 2005.
- Hao Zhang (*Environmental Science and Engineering*) B.S., Nankai University 2011.
- Qiaoxi Zhang (*Social Science*) B.S., University of Hong Kong 2011.
- Xiaoxiao Zhang (*Electrical Engineering*) B.S., Texas A&M University 2010.



## Engineer

Prakhar Mehrotra (*Aeronautics*) B.Tech., National Institute of Technology, Trichy 2007; M.S., California Institute of Technology 2008.

Rebecca Lynn Rought (*Aeronautics*) B.S., Syracuse University 2008; M.S., California Institute of Technology 2009.

## Doctor of Philosophy

### DIVISION OF BIOLOGY

Maja Bialecka-Fornal (*Biochemistry and Molecular Biophysics*) M.S., Jagiellonian University 2008.

Thesis: Single-Cell Analysis of the Physiology of Mechanosensation in Bacteria.

Danielle Vera Brown Bower (*Biology*) A.B., Harvard College 2005; M.S., University of Cambridge 2006.

Thesis: Chemical and Neural Regulation of Embryonic Branching Morphogenesis.

Julie YoungHee Cho (*Biology*) B.A., The Johns Hopkins University 2003.

Thesis: State-Dependent Modulation of Neuronal Circuits in *C. elegans* Sleep.

Marissa Morales Del Real (*Biology*) B.A., College of Notre Dame of Maryland 2006.

Thesis: Analysis of a Transcriptional Network Involving PU.1, Notch, and Gata3 in the Lymphomyeloid Lineage Decision during Early T-cell Development.

Adler R. Dillman (*Biology*) B.S., Brigham Young University 2006.

Thesis: Host Seeking and the Genomic Architecture of Parasitism among Entomopathogenic Nematodes.

Gilberto Hernandez (*Biology*) B.A., University of California, Los Angeles 1996; M.S., California Institute of Technology 2001.

Thesis: Building a Gene Regulatory Network in Adult Mouse Skeletal Muscle Following Nerve Injury: Transcriptome Characterization and New Model for Functional cis-Regulatory Analysis In Vivo.

Elaine Yih-Nien Hsiao (*Biology*) B.S., University of California, Los Angeles 2007.

Thesis: Brain, Gut and Immune Interactions in Autism Spectrum Disorder.

Na Hu (*Biology*) B.A., University of California, Berkeley 2008.

Thesis: Epigenetic Regulation in Neural Crest Development: Role of DNA Methyltransferases 3A and 3B.

Natalie J. Kolawa (*Biology*) B.A., University of California, Berkeley 2007.

Thesis: Proteomic Analysis of the Cdc48/Ubx Network Identifies a Role for Ubx2 in the Regulation of Lipid Biosynthesis.

Sung-Eun Melanie Lee (*Biology*) B.S., Harvey Mudd College 2004.

Thesis: Mechanism of Intestinal Colonization by Symbiotic Bacteria.

Janna C. Nawroth (*Biology*) B.S., Ruprecht-Karls-Universität Heidelberg 2004; M.S., 2007.

Thesis: Conceptual Framework and Physical Implementation of a Systematic Design Strategy for Tissue-Engineered Devices.

*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*

Anh H. Pham (*Biology*) B.S., University of California, Berkeley 2004; M.D., University of Southern California 2007.

Thesis: Tools for Assessing Mitochondrial Dynamics in Mouse Tissues and Neurodegenerative Models.

Abigail Green Saxena (*Biology*) B.S., University of Texas 2002.

Thesis: Sulfur-Cycling in Methane-Rich Ecosystems: Uncovering Microbial Processes and Novel Niches.

Maayan Schwarzkopf (*Biology*) B.S., Tel Aviv University 2004; M.S., 2006.

Thesis: Engineering Nucleic Acid Mechanisms for Regulation and Readout of Gene Expression: Conditional Dicer Substrate Formation and Sensitive Multiplexed Northern Blots.

Anna Shemorry (*Biology*) B.S., University of California, San Diego 2007.

Thesis: Studies of the N-End Rule Pathway in *Saccharomyces cerevisiae*.

Nicole Anne Tetreault (*Biology*) B.S., University of California, Davis 2002; M.S., University of California, Los Angeles 2006.

Thesis: Microglia in the Cerebral and Cerebellar Cortices in Individuals with Autism.

Ophelia S. Venturelli (*Biochemistry and Molecular Biophysics*) B.S., M.S., Stanford University 2007.

Thesis: Role of Feedback and Dynamics of a Gene Regulatory Network.

Jimmy Liu Zhao (*Biology*) A.A., Pasadena City College 2004; B.A., University of California, Berkeley 2006.

Thesis: Function of MicroRNA-146a and NF- $\kappa$ B in Physiologic and Pathologic Hematopoiesis.

## DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING

David Gregory Abrecht (*Chemical Engineering and Materials Science*) B.S. (*Chemical Engineering*), B.S. (*Paper Science and Engineering*), North Carolina State University 2007; M.S., California Institute of Technology 2011.

Thesis: Thermodynamic Properties of Organometallic Dihydrogen Complexes for Hydrogen Storage Applications.

Nathan Bruce Bennett (*Chemistry*) B.S., Brigham Young University 2008.

Thesis: Palladium-Catalyzed Asymmetric Allylic Alkylation: Insights, Application toward Cyclopentanoid and Cycloheptanoid Molecules, and the Total Synthesis of Several Daucane Sesquiterpenes.

Yashodhan Bhawe (*Chemical Engineering and Chemistry*) B.S., University of California at Berkeley 2008; M.S., California Institute of Technology 2010.

Thesis: I. Materials for Thermochemical Water Splitting II. Structure-Property Relations for the Zeolite Catalyzed Conversion of Methanol to Light Olefins.

## *Doctor of Philosophy continued*

Nicholas Boekelheide (*Chemistry*) B.S., Carleton College 2004.

Thesis: Quantum Simulation of Enzyme Catalysis.

Justin William Chartron (*Biochemistry and Molecular Biophysics*) B.S., University of California, San Diego 2006.

Thesis: The Structure of a Transmembrane Protein Sorting Complex.

Pedro de Souza Leão Coelho (*Chemistry*) M.Chem., Oxford University 2008.

Thesis: Olefin Cyclopropanation and Carbon-Hydrogen Amination via Carbene and Nitrene Transfers Catalyzed by Engineered Cytochrome P450 Enzymes.

Jill Suzanne Craven (*Chemical Engineering*) B.S., University of Arizona 2007; M.S., California Institute of Technology 2010.

Thesis: Studies of Ambient and Chamber Aerosol Composition Using the Aerosol Mass Spectrometer.

Christopher Scot Daeffler (*Chemistry*) B.S., Cornell University 2006.

Thesis: Ring-Opening Metathesis of Bulky Norbornene Monomers and the Radical-mediated Hydrophosphonation of Olefins.

Leopold Daniel d’Espaux (*Chemical Engineering and Biology*) B.S. Cornell University 2005; M.S., California Institute of Technology 2007.

Thesis: Synthetic Regulation of Eukaryotic Gene Expression by Noncoding RNA.

Nicole Danielle Bouley Ford (*Chemistry*) B.S., Trinity University 2007.

Thesis: Capturing Protein Dynamics with Time-resolved Luminescence Spectroscopy.

Alexander F. G. Goldberg (*Chemistry*) B.Sc., Queen’s University 2008.

Thesis: Synthetic Applications and Methodological Developments of Donor-Acceptor Cyclopropanes.

Han Han (*Chemical Engineering and Chemistry*) B.S., The University of Melbourne 2007.

Thesis: Development of Targeted, Polymeric Delivery Vehicles for Camptothecin and siRNA via Boronic Acid-Diol Complexation.

Lisa Marie Hochrein (*Chemical Engineering and Biology*) B.S., University of California, Berkeley 2004; M.S., California Institute of Technology 2009.

Thesis: Towards Conditional RNAi: Shape and Sequence Transduction with Small Conditional RNAs.

Nicholas Jeffrey Hoh (*Chemical Engineering*) B.S., Cornell University 2008.

Thesis: Effects of Particle Size Ratio on Single Particle Motion in Colloidal Dispersions.

Allen Yu Hong (*Chemistry*) B.S., University of California, Berkeley 2006.

Thesis: Development of a Novel Ring Contraction Strategy and Application to the Total Synthesis of Presilphiperfolanol Natural Products.

## *Doctor of Philosophy continued*

Kiwook Hwang (*Chemistry*) B.S., Seoul National University 2007.

Thesis: Biotechnologies for Cancer Diagnostics: Cell Sorting, Protein Analysis and Imaging of Cellular Metabolism.

Benjamin Keith Keitz (*Chemistry*) B.S., The University of Texas at Austin 2007.

Thesis: Selectivity in Ruthenium Catalyzed Olefin Metathesis: Applications and Origins.

Gretchen Eva Keller (*Chemistry*) A.A., Santa Barbara City College 2002; B.S., University of California, Santa Barbara 2005.

Thesis: Phototriggering Nitric Oxide Synthase from *Geobacillus stearothermophilus*.

Matthew James Kelley (*Chemistry*) B.S., John Carroll University 2004.

Thesis: Terahertz Time Domain Spectroscopy of Amino Acids and Sugars.

Chithra Krishnamurthy (*Chemistry*) B.S., University of California, Berkeley 2006.

Thesis: Developing Chemical Probes to Study Fucosylated Glycans.

Chethana Kulkarni (*Chemistry*) B.S., Stanford University 2006.

Thesis: Selective Functionalization of the Protein N-Terminus with N-Myristoyl Transferase in Bacteria.

Zuleikha Kurji (*Chemistry*) B.A., Cornell University 2003.

Thesis: Molecular Design of Side-Group Liquid Crystal Polymers: Understanding Their Interactions with Small-Molecule Liquid Crystal Solvent.

Benjamin Chun Yeung Li (*Chemistry*) B.A., Columbia University 2007.

Thesis: Synthesis and Biological Studies of DNA-binding Cyclic Py-Im Polyamides.

Walrati Limapichat (*Chemistry*) Sc.B., Brown University 2005.

Thesis: Probing the Roles of Receptor Structure, Drug-Receptor Interactions, and Receptor Crosstalk in Ligand-Gated Ion Channel Function.

Christine Lauren Loza (*Chemical Engineering and Environmental Science and Engineering*) B.S., University of Notre Dame 2008; M.S., California Institute of Technology 2010.

Thesis: Investigations of Secondary Organic Aerosol Formation in Laboratory Chambers.

Heather Catherine McCaig (*Chemistry*) B.S., Oregon State University 2004; M.S., California Institute of Technology 2007.

Thesis: Resonant Nanocantilever Chemical Vapor Sensors.

James Robert McKone (*Chemistry*) B.A., Saint Olaf College 2008.

Thesis: Earth-Abundant Materials for Solar Hydrogen Generation.

David Church Montgomery (*Chemistry*) B.S., University of California, Berkeley 2007.

Thesis: Improving the Biological Activity of Pyrrole-Imidazole Polyamides.

Matthew Michaels Moore (*Biochemistry and Molecular Biophysics*) B.S., University of California, San Diego 2006.

Thesis: Applications of Computational Protein Design to Red Fluorescent Proteins.

## *Doctor of Philosophy continued*

Natalie Bloom Muren (*Chemistry*) B.A., Willamette University 2006.

Thesis: DNA-mediated Charge Transport for Long-range Sensing and Protein Detection.

Arundhati Nag (*Chemistry*) B.S., University of Calcutta 2004; M.S., Indian Institute of Technology, Kanpur 2006.

Thesis: Developing Peptide Based Capture Agents for Diagnostics and Therapeutics.

Roger Rauhauser Nani (*Chemistry*) B.S., Boston College 2006.

Thesis: The Intramolecular Buchner Reaction of  $\alpha$ -Diazo- $\beta$ -Ketonitriles: Development and Application to the Total Synthesis of (+)-Salvileucalin B.

Hosea Martin Nelson (*Chemistry*) B.S., City College of San Francisco 2004.

Thesis: A Unified Synthetic Approach to the Transtaganolide and Basilolide Natural Products.

Thang Xuan Nguyen (*Chemistry*) B.S., University of California, Irvine 2007.

Thesis: A Study of Protein Targeting Reveals Insights into Mitigating Protein Aggregation.

Young In Oh (*Chemistry*) B.S., The University of Chicago 2006.

Thesis: Synthesis and Biological Activity of Anticoagulant Heparan Sulfate Glycopolymers.

Claude Joseph Rogers (*Chemistry*) B.S., University of California, Davis 2003.

Thesis: Discovery of New Roles for Chondroitin Sulfate in Neurotrophin Signaling and Retinotopic Development.

Elizabeth Anne Santori (*Chemistry*) B.S., The University of Chicago 2007.

Thesis: Si Microwire Array Photoanodes for Artificial Photosynthetic Devices.

Kuang Shen (*Chemistry*) B.S., University of Science and Technology of China 2007.

Thesis: Novel Roles of the SRP RNA in Co-Translational Protein Targeting.

Daniel Leif Migdow Suess (*Chemistry*) B.A., Williams College 2007.

Thesis: Reactions of Small Molecules Facilitated by Metal-Acceptor Interactions.

Christina Lei Ting (*Biochemistry and Molecular Biophysics*) B.S., The University of Texas at Austin 2007.

Thesis: A Novel Method for Studying Nucleated Pathways in Membranes: Development and Applications for Gene Delivery.

Frank Truong (*Chemical Engineering*) B.S., University of Houston 2006; M.S., California Institute of Technology 2008.

Thesis: Expanding Protein Sequence Space through Incorporation of Non-Canonical Amino Acids.

Matthew Martin Van Wingerden (*Chemistry*) B.S., University of Washington 2007.

Thesis: Improving the Efficiency of Ruthenium-Catalyzed Olefin Metathesis with Solid-Supported Catalysts, Microfluidic Reactors, and Novel X-type Ligands.

## *Doctor of Philosophy continued*

Emily Lowell Warren (*Chemical Engineering*) B.S., Cornell University 2005; M.Phil., University of Cambridge 2006; M.S., California Institute of Technology 2009.

Thesis: Silicon Microwire Arrays for Photoelectrochemical and Photovoltaic Applications.

Arif Wibowo (*Chemistry*) B.S., University of California, Berkeley 2006.

Thesis: Identification of Fucose a(1-2) Galactose Binding Proteins in the Mammalian Brain.

Devin Thomas Wiley (*Chemical Engineering*) B.S., University of Arizona 2007; M.S., California Institute of Technology 2011.

Thesis: Design of Nanoparticles that Cross the Blood-Brain Barrier by Receptor Mediated Transcytosis.

Heather R. Williamson (*Chemistry*) B.S., University of Alabama 2006.

Thesis: Engineering Multi Step Electron Tunneling Systems in Proteins.

Matthew Steven Winston (*Chemistry*) A.B., Harvard College 2007.

Thesis: Chemistry of PNP Bis(*phosphide*) Pincer Ligands -and- Palladium(II) Dimers as Robust, Versatile Precatalysts for Olefin Isomerization, Oligomerization, and Oxidation.

Bin Zhang (*Chemistry*) B.S., University of Science and Technology of China 2007.

Thesis: Sec-facilitated Protein Translocation and Membrane Integration.

## DIVISION OF ENGINEERING AND APPLIED SCIENCES

Ahmed Halid Akgiray (*Electrical Engineering*) B.S., Cornell University 2005; M.S., University of Illinois at Urbana-Champaign 2007.

Thesis: New Technologies Driving Decade-Bandwidth Radio Astronomy: Quad-ridged Flared Horn and Compound-Semiconductor LNAs.

Adrianus Indrat Aria (*Aeronautics*) B.S., Bandung Institute of Technology 2006; M.S., California Institute of Technology 2008.

Thesis: Control of Wettability of Carbon Nanotube Array by Reversible Dry Oxidation for Superhydrophobic Coating and Supercapacitor Applications.

Hesham Azizgolshani (*Bioengineering*) B.S., University of California, Los Angeles 2006.

Thesis: Tissue Engineering Active Biological Machines: Bio-Inspired Design, Directed Self-Assembly, and Characterization of Muscular Pumps Simulating the Embryonic Heart.

Jean-Loup Bourguignon (*Aeronautics*) Ingénieur Civil Physicien, Université de Liège 2007;

Ingénieur, Institut Supérieur de l'Aéronautique et de l'Espace 2007; M.S., California Institute of Technology 2008.

Thesis: Models of Turbulent Pipe Flow.

## *Doctor of Philosophy continued*

- Stanley P. Burgos (*Applied Physics*) B.S., California Institute of Technology 2008; M.S., 2012.  
Thesis: Coupled Plasmonic Systems and Devices: Applications in Visible Metamaterials, Nanophotonic Circuits, and CMOS Imaging.
- Andrea Censi (*Control and Dynamical Systems*) Laurea, Universita di Roma "La Sapienza" 2005; Laurea Specialistica 2007.  
Thesis: Bootstrapping Vehicles: A Formal Approach to Unsupervised Sensorimotor Learning Based on Invariance.
- Fiona Adriani Chandra (*Bioengineering*) B.S., University of California, Los Angeles 2005.  
Thesis: Limits and Tradeoffs in the Control of Autocatalytic Systems.
- Tong Chen (*Applied Physics*) B.S. (*Physics*), B.S. (*Statistics*), Peking University 2007; M.S., California Institute of Technology 2010.  
Thesis: Ultralow-Loss Silica Resonators and Waveguides on a Silicon Chip.
- Mulin Cheng (*Applied and Computational Mathematics*) B.S., Peking University 2002; M.S., 2005; M.S., California Institute of Technology 2008.  
Thesis: Adaptive Methods Exploring Intrinsic Sparse Structures of Stochastic Partial Differential Equations.
- Keenan Michael Crane (*Computer Science*) B.S., University of Illinois at Urbana-Champaign 2006; M.S., California Institute of Technology 2010.  
Thesis: Conformal Geometry Processing.
- Nadine L. Dabby (*Computation and Neural Systems*) B.A., University of California, Berkeley 2003.  
Thesis: Synthetic Molecular Machines for Active Self-Assembly: Prototype Algorithms, Designs, and Experimental Study.
- Jason Scott Damazo (*Aeronautics*) B.S., (*Mathematics*), B.S. (*Mechanical Engineering*), Walla Walla College 2007; M.S., California Institute of Technology 2008.  
Thesis: Planar Reflection of Gaseous Detonations.
- Davis Solomon Darvish (*Materials Science*) B.S., University of California, Berkeley 2006; M.S., California Institute of Technology 2008.  
Thesis:  $\text{Cu}_2\text{O}$  Substrates and Epitaxial  $\text{Cu}_2\text{O}/\text{ZnO}$  Thin Film Heterostructures for Solar Energy Conversion.
- Michael Gardner Decegle (*Applied Physics*) B.S., Dickinson College 2006; M.Phil., University of Queensland 2007; M.S., California Institute of Technology 2010.  
Thesis: Advanced Silicon Solar Cell Device Physics and Design.



## *Doctor of Philosophy continued*

- Michael deLorimier (*Computer Science*) B.S., University of California, Berkeley 2002; M.S., California Institute of Technology 2005.  
Thesis: GRAPh Parallel Actor Language: A Programming Language for Parallel Graph Algorithms.
- Theodoros Dikaliotis (*Electrical Engineering*) B.S., National Technical University of Athens 2004; M.S., California Institute of Technology 2006.  
Thesis: On Delay and Security in Network Coding.
- Julien Dubois (*Computation and Neural Systems*) M.S., Université Pierre et Marie Curie 2005.  
Thesis: Studying Conscious and Unconscious Vision with fMRI: the BOLD Promise.
- Tim Elling (*Applied and Computational Mathematics*) B.S., California Institute of Technology 2002.  
Thesis: GPU-Accelerated Fourier-Continuation Solvers and Physically Exact Computational Boundary Conditions for Wave Scattering Problems.
- Michael John Elzinga (*Mechanical Engineering*) A.B., B.S., Lafayette College 2007; M.S., California Institute of Technology 2009.  
Thesis: Flight Dynamics in *Drosophila* through a Dynamically-scaled Robotic Approach.
- Glenn Robert Garrett (*Materials Science*) B.S., Georgia Institute of Technology 2005; M.S., California Institute of Technology 2013.  
Thesis: Study of the Origins of Toughness in Amorphous Metals.
- Eleftherios E. Gdoutos (*Aeronautics*) B.S. (*Computer Science*), B.S. (*Mechanical Engineering*), Northwestern University 2009; M.S., California Institute of Technology 2010.  
Thesis: Thin Metastructures with Engineered Thermal Expansion.
- Ha Thanh Giang (*Mechanical Engineering*) B.S., Vietnam National University 2004; M.S., California Institute of Technology 2007.  
Thesis: Coupled Effects of Mechanics, Geometry, and Chemistry on Bio-membrane Behavior.
- Alex Gittens (*Applied and Computational Mathematics*) B.S., University of Houston 2006.  
Thesis: Topics in Randomized Numerical Linear Algebra.
- Ragavendran Gopalakrishnan (*Computer Science*) B.Tech., Indian Institute of Technology, Madras 2008; M.S., California Institute of Technology 2010.  
Thesis: Characterizing Distribution Rules for Cost Sharing Games.
- Gregory S. Griffin (*Computation and Neural Systems*) A.B., Princeton University 1992.  
Thesis: Learning and Using Taxonomies for Visual and Olfactory Classification.
- Paul Hebert (*Mechanical Engineering*) B.E., McGill University 2006; M.S., California Institute of Technology 2007.  
Thesis: Estimation and Inference for Grasping and Manipulation Tasks Using Vision and Kinesthetic Sensors.

## *Doctor of Philosophy continued*

- Jeffrey Thomas Hill (*Applied Physics*) B.A.Sc., University of Waterloo 2006; M.S., California Institute of Technology 2012.  
Thesis: Nonlinear Optics and Wavelength Translation via Cavity-Optomechanics.
- Meisam Honarvar Nazari (*Electrical Engineering*) B.Sc., University of Tehran 2006; M.S., M.A.Sc., University of Toronto 2008; M.S., California Institute of Technology 2009.  
Thesis: Electrical and Optical Interconnects for High-Performance Computing.
- Ting Hong (*Applied Physics*) B.S., Nanjing University 2002; M.S., Chinese Academy of Sciences 2005; M.S., California Institute of Technology 2007.  
Thesis: Brownian Thermal Noise in Interferometric Gravitational Wave Detectors and Single Photon Optomechanics.
- Ayako Ikeda (*Materials Science*) B.E., Kyoto University 1999; M.E., 2001.  
Thesis: Superprotonic Solid Acids: Thermochemistry, Structure, and Conductivity.
- Ian Jacobi (*Aeronautics*) S.B., Massachusetts Institute of Technology 2006; M.S., California Institute of Technology 2008.  
Thesis: Structure of the Turbulent Boundary Layer under Static and Dynamic Impulsive Roughness Perturbation.
- Min Seok Jang (*Applied Physics and Physics*) B.S., Korea Advanced Institute of Science and Technology 2006; M.S., California Institute of Technology 2010.  
Thesis: Plasmonics and Electron Optics in Graphene.
- Gwendolyn Brook Johnson (*Aeronautics*) S.B., Massachusetts Institute of Technology 2008; M.S., California Institute of Technology 2009.  
Thesis: Modeling, Simulation, and Design of Self-Assembling Space Systems: Accurate Collision Detection, Robust Time Integration, and Optimal Control.
- Justin Young-Hyun Kim (*Electrical Engineering*) B.S., Korea University 1999; M.S., 2001; M.S., California Institute of Technology 2007.  
Thesis: Parylene-C as a New Piezoelectric Material.
- Ka Wai Kwok (*Aeronautics*) B.S., Lehigh University 2007; M.S., California Institute of Technology 2009.  
Thesis: Mechanics of Viscoelastic Thin-Walled Structures.
- Andrew Jay Leenheer (*Materials Science*) B.S., Colorado School of Mines 2005; M.S., 2007.  
Thesis: Light to Electrons to Bonds: Imaging Water Splitting and Collecting Photoexcited Electrons.
- Andrea Beth Leonard (*Applied Mechanics*) B.S., Montana State University 2007; M.S., California Institute of Technology 2009.  
Thesis: Controlling Wave Propagation through Nonlinear Engineered Granular Systems.

## *Doctor of Philosophy continued*

- Derek Leong (*Electrical Engineering*) B.S., Carnegie Mellon University 2005; M.S., California Institute of Technology 2008.  
Thesis: On Erasure Coding for Distributed Storage and Streaming Communications.
- Jiang Li (*Applied Physics*) B.S., Peking University 2007; M.S., California Institute of Technology 2012.  
Thesis: Nonlinear Optics in Planar Silica-on-Silicon Disk Resonators.
- Na (*Lina*) Li (*Control and Dynamical Systems*) B.S., Zhejiang University 2007.  
Thesis: Distributed Optimization in Power Networks and General Multi-agent Systems.
- Minghong Lin (*Computer Science*) B.E., University of Science and Technology of China 2006; M.Phil., The Chinese University of Hong Kong 2008; M.S., California Institute of Technology 2011.  
Thesis: Algorithmic Challenges in Green Data Centers.
- Annie Hsin-Wen Liu (*Computer Science*) B.E., University of Washington 2007; M.S., California Institute of Technology 2010.  
Thesis: Sensor Networks for Geospatial Event Detection - Theory and Applications.
- Chih-Hao Liu (*Electrical Engineering*) B.S., National Tsing Hua University 2003; M.S., National Taiwan University 2005; M.S., California Institute of Technology 2011.  
Thesis: Transceiver Designs and Analysis for LTI, LTV and Broadcast Channels - New Matrix Decompositions and Majorization Theory.
- Loh Rui Yan, Matthew (*Electrical Engineering*) B.S., Lafayette College 2004; M.S., California Institute of Technology 2009.  
Thesis: Dense, Efficient Chip-to-Chip Communication at the Extremes of Computing.
- Alejandro Lopez Ortega (*Aeronautics*) Ingeniero Aeronáutico, Universidad de Sevilla 2008; M.S., California Institute of Technology 2009.  
Thesis: Simulation of Richtmyer-Meshkov Flows for Elastic-Plastic Solids in Planar and Converging Geometries Using an Eulerian Framework.
- Hareem Tariq Maune (*Applied Physics*) B.S., Florida Institute of Technology 2001; M.S., California Institute of Technology 2004.  
Thesis: Bandgap Tuning, Thermal Conductivity, and DNA Assisted Self-Assembly of Carbon Nanotubes.
- Michael B. McCoy (*Applied and Computational Mathematics*) B.S., The University of Texas at Austin 2007.  
Thesis: A Geometric Analysis of Convex Demixing.

## *Doctor of Philosophy continued*

- Nikil Mehta (*Computer Science*) Sc.B., Brown University 2003; M.S., California Institute of Technology 2006.  
Thesis: An Ultra-Low-Energy, Variation-Tolerant FPGA Architecture Using Component-Specific Mapping.
- Jonathan Michael Mihaly (*Aeronautics*) B.S., Syracuse University 2007; M.S., California Institute of Technology 2008.  
Thesis: Investigation of Hypervelocity Impact Phenomena Using Real-time Concurrent Diagnostics.
- Himanshu Mishra (*Materials Science*) B.Eng., Panjab University 2005; M.S., Purdue University 2007; M.S., California Institute of Technology 2010.  
Thesis: Proton Transfers at the Air-Water Interface.
- Robert Carlos Moeller (*Mechanical Engineering*) B.S., University of Southern California 1999; M.S., California Institute of Technology 2001.  
Thesis: Current Transport and Onset-Related Phenomena in an MPD Thruster Modified by Applied Magnetic Fields.
- Jorge Alberto Muñoz Jr. (*Materials Science*) B.S., The University of Texas at El Paso 2007; M.S., California Institute of Technology 2009.  
Thesis: Electronic Structure and Phonon Thermodynamics of Iron Alloys.
- Jacob K. Notbohm (*Mechanical Engineering*) B.S., University of Wisconsin-Madison 2007; M.S., California Institute of Technology 2009.  
Thesis: Dynamics of Cell-Matrix Mechanical Interactions in Three Dimensions.
- Clara O'Farrell (*Control and Dynamical Systems and Aeronautics*) B.E., Princeton University 2008.  
Thesis: A Dynamical Systems Analysis of Vortex Pinch-Off.
- Tae-Sik Oh (*Materials Science*) B.S., Seoul National University 2004; M.S., 2006; M.S., California Institute of Technology 2008.  
Thesis: Electrical, Electrochemical and Optical Characterization of Ceria Films.
- Niema Mohammed Pahlevan (*Bioengineering*) B.S., University of Tehran 2001; M.S., California State University, Northridge 2007.  
Thesis: A Systems Approach to Cardiovascular Health and Disease with a Focus on Aortic Wave Dynamics.
- Piya Pal (*Electrical Engineering*) B.Tech., Indian Institute of Technology, Kharagpur 2007; M.S., California Institute of Technology 2008.  
Thesis: New Directions in Sparse Sampling and Estimation for Underdetermined Systems.

## *Doctor of Philosophy continued*

- Shuo Pang (*Electrical Engineering*) B.S., Tsinghua University 2006; M.S., Texas A&M University 2008; M.S., California Institute of Technology 2013.  
Thesis: Fluorescence Optofluidic Microscopy and Fluorescence Microscopy Based on the Talbot Effect.
- Chatr Panithipongwut (*Materials Science*) B.S., Chulalongkorn University 2006; M.S., California Institute of Technology 2009.  
Thesis: Phase Behavior of Complex Superprotonic Solid Acids.
- Nicholaus J. Parziale (*Aeronautics*) B.S., State University of New York, Binghamton 2008; M.S., California Institute of Technology 2009.  
Thesis: Slender-Body Hypervelocity Boundary-Layer Instability.
- Bharat Prasad Penmecha (*Mechanical Engineering*) B.Tech., Indian Institute of Technology, Madras 2007; M.S., California Institute of Technology 2008.  
Thesis: Fracture of Materials Undergoing Solid-Solid Phase Transformation.
- Gregory Schoelerman Pomrehn (*Materials Science*) B.S., Harvey Mudd College 2004; M.S., California Institute of Technology 2010.  
Thesis: Phase Stability and Defect Behavior in Complex Thermoelectric Zinc-Antimonides.
- Jian Ren (*Electrical Engineering*) B.E., Tsinghua University 2001.  
Thesis: Endoscopic Optical Coherence Tomography: Design and Application.
- Andrew Walter Richards (*Mechanical Engineering*) B.S., Michigan Technological University 2005; M.S., 2007.  
Thesis: Interplay of Martensitic Phase Transformation and Plastic Slip in Polycrystals.
- Damon Stuart Russell (*Electrical Engineering*) B.S., University of California, Santa Barbara 1995.  
Thesis: Technology Advances for Radio Astronomy.
- Amir H. Safavi-Naeini (*Applied Physics*) B.A.Sc., University of Waterloo 2008.  
Thesis: Quantum Optomechanics with Silicon Nanostructures.
- Christos Theodoros Santis (*Electrical Engineering*) Diploma, National Technical University of Athens 2005; M.S., California Institute of Technology 2008.  
Thesis: High-Coherence Hybrid Si/III-V Semiconductor Lasers.
- Joseph Malcolm Schaeffer (*Computer Science*) B.S., California Institute of Technology 2003; M.S., 2012.  
Thesis: Stochastic Simulation of the Kinetics of Multiple Interacting DNA Strands.
- Jacob Benjamin Sendowski (*Electrical Engineering*) B.S., University of California, San Diego 2007; M.S., California Institute of Technology 2009.  
Thesis: On-chip Integrated Label-Free Optical Biosensing.

## *Doctor of Philosophy continued*

- Wendian Shi (*Electrical Engineering*) B.S., Peking University 2004; M.S., 2007; M.S., California Institute of Technology 2008.  
Thesis: Blood Cell Count On-a-Chip.
- Matthew Alexander Smith (*Bioengineering*) B.S., Oxford University 2008.  
Thesis: Non-Contiguous Protein Recombination.
- Somayeh Sojoudi (*Control and Dynamical Systems*) B.S., Shahed University 2005; M.S., Concordia University 2008.  
Thesis: Mathematical Study of Complex Networks: Brain, Internet, and Power Grid.
- Surendra Nadh Somala (*Civil Engineering*) B.Tech., Indian Institute of Technology, Guwahati 2008; M.S., California Institute of Technology 2009.  
Thesis: Source Imaging with Dense Sensor Networks: Inversions Based on Adjoint Methods.
- Nicholas P. Stadie (*Materials Science*) B.S., Arizona State University 2007; M.S., California Institute of Technology 2008.  
Thesis: Synthesis and Thermodynamic Studies of Physisorptive Energy Storage Materials.
- Jonathan Ben-Zion Sternberg (*Bioengineering*) B.S., University of California, Berkeley 2006.  
Thesis: Signal Transduction with Hybridization Chain Reactions.
- Peter Stobbe (*Applied and Computational Mathematics*) B.S., California Institute of Technology 1999.  
Thesis: Convex Analysis for Minimizing and Learning Submodular Set Functions.
- Ivan Michel Nicolas Szelengowicz (*Aeronautics*) Diplôme d'Ingénieur, École Polytechnique 2006; M.S., California Institute of Technology 2008.  
Thesis: Analysis and Optimization of Stress Wave Propagation in Two-Dimensional Granular Crystals with Defects.
- Sina Tootoonian (*Computation and Neural Systems*) B.A., B.S., The University of British Columbia 2006.  
Thesis: On the Analysis and Design of the Locust Olfactory System.
- Peter Trautman (*Control and Dynamical Systems*) B.S., Baylor University 2000.  
Thesis: Robot Navigation in Dense Crowds: Statistical Models and Experimental Studies of Human Robot Cooperation.
- Daniel B. Turner-Evans (*Applied Physics*) B.S., Yale University 2008.  
Thesis: Wire Array Photovoltaics.
- Aron Varga (*Materials Science*) M.S., University of Cambridge 2007; M.S., California Institute of Technology 2009.  
Thesis: Advancing Electrocatalysis for Solid Acid Fuel Cells.

## *Doctor of Philosophy continued*

Arseny Vasilyev (*Applied Physics*) B.S., University of California, Davis 2007.

Thesis: The Optoelectronic Swept-Frequency Laser and Its Application in Ranging, Three-dimensional Imaging, and Coherent Beam Combining of Chirped-seed Amplifiers.

Ying Min Wang (*Bioengineering*) B.S.E., Duke University 2006.

Thesis: Deep Tissue Fluorescence Imaging with Time-Reversed Light.

Zhiying Wang (*Electrical Engineering*) B.E., Tsinghua University 2007; M.S., California Institute of Technology 2009.

Thesis: Coding for Information Storage.

Peter Thomas Weir (*Computation and Neural Systems*) B.A., University of California, Berkeley 2004.

Thesis: Polarization-based Navigation in *Drosophila*.

Robert Wells Whittlesey (*Aeronautics*) B.S. (*Aeronautical Engineering*), B.S. (*Mechanical Engineering*), Illinois Institute of Technology 2008; M.S., California Institute of Technology 2009.

Thesis: Dynamics and Scaling of Self-Excited Passive Vortex Generators for Underwater Propulsion.

Sungwook Woo (*Bioengineering*) B.S., Pohang University of Science and Technology 2007; M.S., 2007.

Thesis: Beyond Watson and Crick: Programming the Self-Assembly and Reconfiguration of DNA Nanostructures Based on Stacking Interactions.

Indira Wu (*Bioengineering*) B.S., Columbia University 2006.

Thesis: Engineering Thermostable Fungal Cellobiohydrolases.

Huan Xu (*Mechanical Engineering*) S.B., Harvard College 2007; M.S., California Institute of Technology 2008.

Thesis: Design, Specification, and Synthesis of Aircraft Electric Power Systems Control Logic.

Guoan Zheng (*Electrical Engineering*) B.S., Zhejiang University 2007; M.S., California Institute of Technology 2008; M.S., California Institute of Technology 2008.

Thesis: Innovations in Imaging System Design: Gigapixel, Chip-Scale and Multi-Functional Microscopy.

Hongchao Zhou (*Electrical Engineering*) B.S., Tsinghua University 2006; M.S., 2008; M.S., California Institute of Technology 2009.

Thesis: Randomness and Noise in Information Systems.

## *Doctor of Philosophy continued*

### DIVISION OF GEOLOGICAL AND PLANETARY SCIENCES

Thomas J. Ader (*Geophysics*) M.S., Ecole Polytechnique 2007; M.S., Paul Sabatier University 2008; M.S., California Institute of Technology 2011.

Thesis: Earthquakes of the Nepal Himalaya: Towards a Physical Model of the Seismic Cycle.

Kristin Diane Bergmann (*Geology*) B.A., Carleton College 2004; M.S., California Institute of Technology 2011.

Thesis: Constraints on the Carbon Cycle and Climate during the Early Evolution of Animals.

Melanie Beth Channon (*Geochemistry*) B.S., Arizona State University 2007; M.S., California Institute of Technology 2010.

Thesis: Oxygen Isotopes and Volatiles in Martian Meteorites.

Steven Michael Chemtob (*Geochemistry*) B.A., Washington University 2006; M.S., California Institute of Technology 2008.

Thesis: The Origin and Evolution of Amorphous Silica Coatings on Young Hawaiian Basalts.

Yi-Chun Chen (*Environmental Science and Engineering*) B.S., National Taiwan University 2006.

Thesis: Aerosol-Cloud-Precipitation Interactions in Marine Stratocumulus Clouds.

Anne Elizabeth Dekas (*Geobiology*) A.B., Harvard College 2004.

Thesis: Diazotrophy in the Deep: An Analysis of the Distribution, Magnitude, Geochemical Controls, and Biological Mediators of Deep-Sea Benthic Nitrogen Fixation.

Lauren Ashley Edgar (*Geology*) B.A., Dartmouth College 2007; M.S., California Institute of Technology 2009.

Thesis: Identifying and Interpreting Stratification in Sedimentary Rocks on Mars: Insight from Rover and Orbital Observations and Terrestrial Field Analogs.

Emily A. Hamecher (*Geology*) B.A., Humboldt State University 2007; M.S., California Institute of Technology 2009.

Thesis: Studies of the Equation of State and Elasticity of Mantle Materials.

Xavier J. Levine (*Environmental Science and Engineering*) B.A., The University of Chicago 2006.

Thesis: Dynamics of Earth's Hadley Circulation.

King-Fai Li (*Environmental Science and Engineering*) B.S., The Chinese University of Hong Kong 2004; M.Phil., 2006.

Thesis: Atmospheric Trace Gases as Probes of Chemistry and Dynamics.

Yunung Nina Lin (*Geology*) B.A., National Taiwan University 2003; M.S., 2005; M.S., California Institute of Technology 2013.

Thesis: Using Space Geodesy to Constrain Variations in Seismogenic Behavior on Subduction Megathrusts.



## *Doctor of Philosophy continued*

- Michael Robert Line (*Planetary Science*) B.S., University of Wisconsin-Madison 2008; M.S., California Institute of Technology 2010.  
Thesis: Characterization of Exoplanet Atmospheres: Spectral Retrieval and Chemistry.
- Lingsen Meng (*Geophysics*) B.S., Nanjing University 2007; M.S., California Institute of Technology 2009.  
Thesis: Navigating Earthquake Physics with High-Resolution Array Back-Projection.
- Francisco Hernan Ortega Culaciati (*Geophysics and Computational Science and Engineering*) B.Sc., Universidad de Chile 2005; M.S., California Institute of Technology 2008.  
Thesis: Aseismic Deformation in Subduction Megathrusts: Central Andes and North-East Japan.
- Magdalena Rose Osburn (*Geobiology*) B.A., Washington University 2007; M.S., California Institute of Technology 2009.  
Thesis: Isotopic Proxies for Microbial and Environmental Change: Insights from Hydrogen Isotopes and the Ediacaran Khufai Formation.
- Belle Philibosian (*Geology*) B.S., California Institute of Technology 2005; M.S., University of Oregon 2007.  
Thesis: Characterization of Diverse Megathrust Fault Behavior Related to Seismic Supercycles, Mentawai Islands, Sumatra.
- Kristin Phillips-Alonge (*Geophysics*) B.S., University of California, San Diego 2006; M.S., California Institute of Technology 2009.  
Thesis: Structure of the Subduction System in Southern Peru from Seismic Array Data.
- Steven Michael Skinner (*Geology*) B.A., B.S., University of California, Los Angeles 2006.  
Thesis: Plate Tectonic Constraints on Flat Subduction and Paleomagnetic Constraints on Rifting.
- Claire Waller Thomas (*Geology*) B.S., Virginia Polytechnic Institute and State University 2008; M.S., California Institute of Technology 2011.  
Thesis: Liquid Silicate Equation of State: Using Shock Waves to Understand the Properties of the Deep Earth.
- Jeffrey Muir Thompson (*Geophysics and Civil Engineering*) B.S., University of Southern California 2008; M.S., California Institute of Technology 2010.  
Thesis: The Short-Timescale Behavior of Glacial Ice.
- Yu Wang (*Geology*) B.S., National Taiwan University 2001; M.S., 2002.  
Thesis: Earthquake Geology of Myanmar.
- June Ki Wicks (*Geochemistry*) B.S., California Institute of Technology 2008; M.S., California Institute of Technology 2010.  
Thesis: Sound Velocities and Equation of State of Iron-Rich ( $Mg, Fe$ )O.

## *Doctor of Philosophy continued*

Nneka Njeri Akosua Williams (*Geology and Geophysics*) A.B., M.A., Harvard College 2003.

Thesis: Defining the Relationship between Seismicity and Deformation at Regional and Local Scales.

Aaron S. Wolf (*Planetary Science*) B.S. (*Earth Sciences*), B.S. (*Physics*), University of California, Santa Cruz 2005; M.S., California Institute of Technology 2009.

Thesis: Probing the Thermodynamic Properties of Mantle Rocks in Solid and Liquid States.

Lindsay Diana Yee (*Environmental Science and Engineering*) B.S., University of California, Riverside 2008; M.S., California Institute of Technology 2010.

Thesis: Chemistry of Secondary Organic Aerosol Formation.

Xi Zhang (*Planetary Science*) B.S., Peking University 2007; M.S., California Institute of Technology 2009.

Thesis: Aerosols and Chemistry in the Planetary Atmospheres.

## DIVISION OF HUMANITIES AND SOCIAL SCIENCES

Dustin Beckett (*Social Science*) B.A., Claremont McKenna College 2004; M.S., California Institute of Technology 2008.

Thesis: An Economic Approach to Consumer Product Ratings.

Luke Anthony Boosey (*Social Science*) B.S., The University of Queensland 2005.

Thesis: Essays on Information, Competition, and Cooperation.

Benjamin Bushong (*Social Science*) B.S., University of Oregon 2007.

Thesis: Essays on Behavioral and Neuro-economics.

Mürüvvet Ilknur Büyükbayaci Hanay (*Social Science*) B.S., Bilkent University 2005; M.A., Sabanci University 2007.

Thesis: Essays on Contests, Coordination Games, and Matching.

Peter William Foley (*Social Science*) B.S., California Institute of Technology 2006; M.S., 2010.

Thesis: Four Essays on the Empirical Analysis of Political Ideology.

Yutaka Kayaba (*Social Science*) B.A., University of Tokyo 2002; M.A., 2007.

Thesis: Essays on Learning and Econometrics.

Emerson Cristian Melo Sanchez (*Social Science*) B.S., Universidad de Chile 2005; M.S., 2006.

Thesis: Essays on Economic Networks.

Guilherme Pereira De Freitas (*Social Science*) B.S., Universidade de Brasilia 2004; M.Sc., Instituto Nacional de Matemática Pura e Aplicada 2007.

Thesis: Essays on Mechanism Design.

Nilanjan Roy (*Social Science*) B.Sc., Presidency College, University of Calcutta 2006; M.S., Indian Statistical Institute 2008; M.S., California Institute of Technology 2010.

Thesis: Essays on Cooperation and Reciprocity.

## *Doctor of Philosophy continued*

Thomas Gorden Ruchti (*Social Science*) B.S., Ohio University 2008; M.S., California Institute of Technology 2010.

Thesis: Markets and Microstructure.

John Andrew Sinclair (*Social Science*) B.A., Claremont McKenna College 2008; M.S., California Institute of Technology 2010.

Thesis: Of Primary Importance: American Primary Elections 1945 - 2012.

## DIVISION OF PHYSICS, MATHEMATICS AND ASTRONOMY

Randol Wallace Aikin (*Physics*) B.A., University of Colorado, Boulder 2006.

Thesis: Testing Inflationary Cosmology with the BICEP1 and BICEP2 Experiments.

Daniel James Alton (*Physics*) B.Sc., University of Western Australia 2005; B.Sc., Australian National University 2006; M.S., California Institute of Technology 2012.

Thesis: Interacting Single Atoms with Nanophotonics for Chip-Integrated Quantum Networks.

Padraic James Bartlett (*Mathematics*) B.A., The University of Chicago 2008.

Thesis: Completing  $\mathbb{E}$ -dense Partial Latin Squares.

Peter Bernard Brooks (*Physics*) B.S., Stanford University 2007.

Thesis: Quantum Error Correction with Biased Noise.

Branimir Josip Ćaćić (*Mathematics*) B.Sc., University of Toronto 2007.

Thesis: On Reconstruction Theorems in Noncommutative Riemannian Geometry.

Sha Chang (*Mathematics*) B.S., Nanjing University 2007.

Thesis: Hele-Shaw Flow Near Cusp Singularities.

Nicole Gisela Czakon (*Physics*) B.S. Duke University 2004.

Thesis: Sunyaev-Zel'dovich Observations Using Large-Format Millimeter Arrays.

Kevin T. Engel (*Physics*) B.A., B.S.E., Case Western Reserve University 2007.

Thesis: Charged Pion Contribution to the Anomalous Magnetic Moment of the Muon.

Vera Gluščević (*Astrophysics*) B.Sc., University of Belgrade 2007; M.S., California Institute of Technology 2009.

Thesis: CMB as a Probe of New Physics and Old Times.

Jeongwan Haah (*Physics*) B.S., Seoul National University 2008.

Thesis: Lattice Quantum Codes and Exotic Topological Phases of Matter.

Kevin Peter Hickerson (*Physics*) B.S., California Institute of Technology 2002; M.S., 2011.

Thesis: The Physics of Ultracold Neutrons and Fierz Interference in Beta Decay.

Jingjing Huang (*Mathematics and Electrical Engineering*) B.A., Brandeis University 2007.

Thesis: Determinantal Hypersurface from a Geometric Perspective.

## *Doctor of Philosophy continued*

Shankar Iyer (*Physics*) A.B., Princeton University 2007; M.S., California Institute of Technology 2011.

Thesis: The Interplay of Localization and Interactions in Quantum Many-Body Systems.

Tucker Jones (*Astrophysics*) S.B., Massachusetts Institute of Technology 2007; M.S., California Institute of Technology 2009.

Thesis: Detailed Properties of High Redshift Galaxies.

Scott Ian Kelber (*Physics*) B.A. (*Economics*), B.A. (*Physics*), The University of Chicago 2006; M.S., California Institute of Technology 2013.

Thesis: Single-Particle Mass Spectrometry and Inertial Imaging with Nanomechanical Systems.

Isaac Hyun Kim (*Physics*) S.B., Massachusetts Institute of Technology 2007.

Thesis: Conditional Independence in Quantum Many-Body Systems.

David Benjamin Levitan (*Physics*) B.A., Cornell University 2006.

Thesis: Finding Needles in the Haystack: A Search for AM CVn Systems with the Palomar Transient Factory.

Xerxes F. López-Yglesias (*Physics*) B.S., University of California, Santa Barbara 2002; M.S., California Institute of Technology 2005.

Thesis: Physical Investigations of Small Particles: (I) Aerosol Particle Charging and Flux Enhancement and (II) Whispering Gallery Mode Sensing.

Chao Ma (*Physics*) B.S., Beijing Institute of Technology 2007; M.S., California Institute of Technology 2010.

Thesis: Single Cell Proteomics Microchip to Profile Immune Function, with Applications in Stem Cell Biology, Translational Disease Mechanism Study and Clinical Therapeutics Monitoring.

Walter Kennerth Max-Moerbeck Astudillo (*Astrophysics*) Lic. Cs. Astronomía, Lic. Cs. Ing. Eléctrica, Universidad de Chile 2004; Ing. Civil Eléctrica, 2005; M.S., California Institute of Technology 2008.

Thesis: The Relationship between the Radio and Gamma-Ray Emission of Blazars.

Andrew Burch Newman (*Astrophysics*) B.A., Washington University in St. Louis 2007; M.S., California Institute of Technology 2009.

Thesis: Dark Matter and the Assembly History of Massive Galaxies and Clusters.

Gregory H. Ogini (*Physics*) B.A., B.S., B.S.E.E., University of St. Thomas 2004.

Thesis: Measurement of Thermo-Optic Properties of Thin Film Dielectric Coatings.

Piti Ongmongkolkul (*Physics*) B.S., Carnegie Mellon University 2006.

Thesis: Measurement of Direct CP Asymmetry in  $b \rightarrow s\gamma$  via Sum of Exclusive B Meson Decays Using the BABAR Detector.

## *Doctor of Philosophy continued*

- Laura María Pérez Muñoz (*Astrophysics*) B.S., Universidad de Chile 2005; M.S., 2006; M.S., California Institute of Technology 2008.  
Thesis: Grain Growth in Protoplanetary Disks.
- Laura Rebecca Rynne Peskin (*Mathematics*) B.A., Columbia University 2008.  
Thesis: Ordinary Mod  $p$  Representations of the Metaplectic Cover of  $p$ -adic  $SL_2$ .
- Christopher S. Rogan (*Physics*) A.B., Princeton University 2006; M.S., California Institute of Technology 2009.  
Thesis: Searches for New Symmetries in  $pp$  Collisions with the Razor Kinematic Variables at  $\sqrt{s} = 7$  TeV.
- Gwen Charlena Rudie (*Astrophysics*) B.A., Dartmouth College 2007; M.S., California Institute of Technology 2009.  
Thesis: The Intergalactic and Circumgalactic Medium Surrounding Star-Forming Galaxies at Redshifts  $2 < Z < 3$ .
- Kevin Luke Setter (*Physics*) B.A., Swarthmore College 2002.  
Thesis: Topological Quantum Field Theory and the Geometric Langlands Correspondence.
- Paul Michael Skerritt (*Physics*) B.Sc., University College Dublin 1997; M.Sc., 1998; M.S., California Institute of Technology 2000.  
Thesis: Geometric Quantization and Foliation Reduction.
- Marcus Lawrence Teague (*Physics*) B.S., Texas A&M University 2003.  
Thesis: Scanning Tunneling Spectroscopic Studies on High-Temperature Superconductors and Dirac Materials.
- Kevin Kai-Wen Teh (*Mathematics*) B.A.Sc., University of Toronto 2007; M.Sc., 2008.  
Thesis: Dirac Spectra, Summation Formulae, and the Spectral Action.
- Vladlen Timciuc (*Physics*) B.S., Moscow Institute of Physics and Technology 2003; M.S., 2005; M.S., California Institute of Technology 2009.  
Thesis: Search for Heavy Neutral Resonances in the Dielectron Channel with the CMS Detector at the LHC.
- Hei Man Tsang (*Physics*) B.Sc., University of Hong Kong 2005; M.Phil., 2007.  
Thesis: Discovery of Non-Zero Neutrino Mixing Angle  $\theta_{13}$  Using Daya Bay Antineutrino Detectors.
- Chien-Yao Tseng (*Physics*) B.S., National Taiwan University 2004; M.S., 2005.  
Thesis: Deviation from Standard Inflationary Cosmology and the Problems in Ekpyrosis.
- Robin Daniel Tucker-Drob (*Mathematics*) B.S., Tulane University 2008.  
Thesis: Descriptive Set Theory and the Ergodic Theory of Countable Groups.

## *Doctor of Philosophy continued*

Michel van Garrel (*Mathematics*) B.S., Swiss Federal Institute of Technology 2006; M.S., 2008.

Thesis: Relative Mirror Symmetry and Ramifications of a Formula for Gromov-Witten Invariants.

Jan Veverka (*Physics*) Ing., Institute of Chemical Technology 2001; Dipl. Phys., Rheinisch-Westfälische Technische Hochschule Aachen 2005; M.S., California Institute of Technology 2009.

Thesis: Studies of Zgamma Production and Constraints on Anomalous Triple Gauge Couplings in pp Collisions at  $\sqrt{s} = 7$  TeV.

Christopher Wegg (*Physics*) M.S., University College London 2003.

Thesis: The Dynamics of White Dwarfs, Black Holes and Stellar Cusps.

Wong, Wing Hong Tony (*Mathematics*) B.S., The Chinese University of Hong Kong 2008; B.S., University of California, Berkeley 2008.

Thesis: Diagonal Forms, Linear Algebraic Methods and Ramsey-type Problems.

Huan Yang (*Physics*) B.S., California Institute of Technology 2007.

Thesis: Topics in Gravitational-Wave Science: Macroscopic Quantum Mechanics and Black Hole Physics.

Yong Yang (*Physics*) B.S., University of Science and Technology of China 2005; M.S., California Institute of Technology 2009.

Thesis: Search for a Standard Model Higgs Boson Decaying to Two Photons in CMS at the LHC.

Aaron Benjamin Zimmerman (*Physics*) B.S., The University of New Mexico 2008; M.S., California Institute of Technology 2012.

Thesis: Topics in Black Hole Perturbation Theory and the Visualization of Curved Spacetime.

## PRIZES AND AWARDS

*Prizes and awards are listed only for those students receiving degrees in 2013, and include prizes and awards received by them in previous years.*

### 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.

*2013 Avin Daniel Andrade, Juan Diego Caporale*

### 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.

*2013 Catherine Bingchan Xie*

### GEORGE W. HOUSNER AWARD

Formerly the Sigma Xi Award, awarded to a senior selected for an outstanding piece of original scientific research.

*2013 Andrew Joseph Zucker*

### MILTON AND FRANCIS CLAUSER DOCTORAL PRIZE

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

*Name of recipient to be announced at commencement.*

*The prizes above are announced at the commencement ceremony.*

### AXLINE MERIT SCHOLARSHIP

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

2007 *Jessica Tsu-Yun Su*

2008 *Jessica Tsu-Yun Su*

2010 *Jessica Tsu-Yun Su*

2011 *Jessica Tsu-Yun Su*

2012 *Jessica Tsu-Yun Su*

### ADVOCATING CHANGE TOGETHER (ACT) AWARD

The Caltech Y ACT Award allows students to learn about a global, national, or local issue by immersing themselves with activists working on a cause over the summer and then challenges them to educate others by creating and leading programs designed to raise awareness on campus the following year.

2012 *Amol Deepak Kamat*

### APOSTOL AWARD FOR EXCELLENCE IN TEACHING IN MATHEMATICS

Named in honor of Tom Apostol, who was a great teacher at Caltech for over 50 years, the award recognizes excellence in teaching by our graduate and undergraduate teaching assistants.

2010 *Wong, Wing Hong Tony*

2011 *Padraic James Bartlett, Kevin Kai-Wen Teh, Michel van Garrel*

2012 *Laura Rebecca Rynne Peskin*

2013 *Branimir Josip Čačić*

### 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.

2009 *Ian Jacobi*

2010 *Bharat Prasad Penmecha*



#### ROBERT P. BALLES CALTECH MATHEMATICS SCHOLARS AWARD

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

2012 *Ryan Thorngren*

#### WILLIAM F. BALLHAUS PRIZE

Awarded to aeronautics students for outstanding doctoral dissertations.

2013 *Adrianus Indrat Aria, Alejandro Lopez Ortega*

#### ERIC TEMPLE BELL UNDERGRADUATE MATHEMATICS RESEARCH PRIZE

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

2013 *Andrew Joseph Zucker*

#### BHANSALI PRIZE IN COMPUTER SCIENCE

Awarded to an undergraduate student for outstanding research in computer science in the current academic year. Awardees are selected by a committee of computer science faculty. (The award was established in 2001 by Vineer Bhansali (BS, MS 1987 Physics) in memory of his grandfather, Mag Raj Bhansali.)

2013 *Eun Jee Lee*

#### 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.

2010 *Haoyang Ren*

#### ROLF D. BUHLER MEMORIAL AWARD IN AERONAUTICS

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

2008 *Jean-Loup Bourguignon, Jason Scott Damazo*

2013 *Remi Arthur Carmigniani*

#### 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.

2012 *Kevin Michael Sutherland*

#### CALTECH ALUMNI ASSOCIATION SPIRIT AWARD

Commemorates extraordinary activities by Caltech undergraduate students, graduate students, and postdoctoral scholars who best exemplify the spirit, tradition, and values of Caltech. This Award is given only when the Association finds that exceptional activities have occurred which merit this special recognition.

2012 *Raymond Christian Jimenez, Rebecca Jean Lawler, Sebastián Rojas Mata, Ryan Thorngren*

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

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

2013 *Mulin Cheng, Michael B. McCoy*

#### CENTENNIAL PRIZE FOR THE BEST THESIS IN MECHANICAL AND CIVIL ENGINEERING

Awarded each year to a candidate for the degree of Doctor of Philosophy in applied mechanics, civil engineering, or mechanical engineering whose doctoral thesis is judged to be the most original and significant by a faculty committee appointed annually by the executive officer for mechanical and civil engineering. The prize consists of a citation and a cash award of \$1,000 and was established with gifts from alumni following the Mechanical Engineering Centennial Celebration in 2007.

2013 *Jacob K. Notbohm*

#### 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.

2013 *Ian Jacobi*

### DONALD S. CLARK MEMORIAL AWARD

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

2011 *Avin Daniel Andrade, Matthew Kuenzli Fu*

### 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.

2013 *Ian Jacobi, Robert Wells Whittlesey*

### DEANS' CUP AND STUDENT LIFE AND MASTER'S AWARDS

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

2012 *Kristen Marie Holtz, Deans' Cup*

2013 *Christopher Forrest Kolner, Deans' Cup*

*Supriya Iyer, Student Life and Master's*

*Stephanie Ya-Wen Kwan, Student Life and Master's*

*Alan Joseph Menezes, Student Life and Master's*

*Collin Michael Murphy, Student Life and Master's*

### DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN BIOTECHNOLOGY OR RELATED FIELDS

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

2011 *Fiona Adriani Chandra*

2013 *Pedro de Souza Leao Coelho*

#### DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN ENTREPRENEURSHIP OR RELATED FIELDS

Awarded annually for the best business plan or proposal, start-up, thesis, publication, discovery, or related efforts by student(s) in entrepreneurship or related fields at the Institute in the preceding 12 months. This prize is made possible by a gift from Anna Kokkalis Demetriades and Sterge T. Demetriades, Eng '58.

2013 *Guoan Zheng*

#### DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN ENVIRONMENTALLY BENIGN RENEWABLE ENERGY SOURCES OR RELATED FIELDS

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

2013 *James Robert McKone*

#### DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN NANOTECHNOLOGY OR RELATED FIELDS

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

2013 *Janna C. Nawroth*

#### 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.

2009 *Emily Lowell Warren*

2012 *Matthew Reed Shaner*

## EVERHART DISTINGUISHED GRADUATE STUDENT LECTURER AWARD

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

2012 *Keenan Michael Crane, Adler R. Dillman, Janna C. Nawroth*

2013 *Elaine Yi-Nien Hsiao, James Robert McKone, Piya Pal*

## 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.

2013 *Nikita Sinha*

## LAWRENCE L. AND AUDREY W. FERGUSON PRIZE

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

2013 *Adler R. Dillman*

## 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.

2012 *Judy Mou*

## 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.

2012 *Matthew Zoccoli Mayers*

#### GRADUATE DEANS' AWARD FOR OUTSTANDING COMMUNITY SERVICE

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

*2013 Jill Suzanne Craven, Daniel B. Turner-Evans*

#### GEORGE W. AND BERNICE E. GREEN MEMORIAL PRIZE

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

*2013 Megan Nora Jackson*

#### DAVID M. GRETHER PRIZE IN SOCIAL SCIENCE

Awarded to the undergraduate student who demonstrates outstanding performance and creativity in one of the social science options. Funded by Susan G. Davis in recognition of David M. Grether's contributions to econometrics and experimental economics and his service to the Division of the Humanities and Social Sciences, the prize is awarded annually by a committee of social science faculty and carries a cash award of \$500.

*2013 Tong Lu*

#### THE LUCY GUERNSEY SERVICE AWARD

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

*2013 Susan Elizabeth Liao, Eric B. Zhang*

#### 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.

*2012 Megan Nora Jackson*

#### ALEXANDER P. AND ADELAIDE F. HIXON PRIZE FOR WRITING

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

2011 *Michelle Esther Bobrow*

#### HANS G. HORNUNG PRIZE

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

2013 *Niema Mohammed Pahlevan*

#### 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.

2012 *Sebastián Rojas Mata*

2013 *Sarah Louise Wright*

#### SCOTT RUSSELL JOHNSON GRADUATE DISSERTATION PRIZE IN MATHEMATICS

Awarded for the best graduate dissertation in mathematics.

2013 *Laura Rebecca Rynne Peskin, Robin Daniel Tucker-Drob*

#### 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.

2010 *Padraic James Bartlett*

2012 *Robin Daniel Tucker-Drob*

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.

2013 *Ryan Thorngren*

SCOTT RUSSELL JOHNSON PRIZE FOR EXCELLENCE IN GRADUATE  
TEACHING IN MATHEMATICS

Awarded to continuing graduate students for excellence in teaching.

2012 *Wong, Wing Hong Tony*

KALAM PRIZE FOR AEROSPACE ENGINEERING

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

2009 *Alejandro Lopez Ortega*

2013 *Melanie Delapierre*

D. S. KOTHARI PRIZE IN PHYSICS

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

2013 *Rebecca Ann Wernis*

MARGIE LAURITSEN LEIGHTON PRIZE

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

2011 *Nina Budaeva*

THE LEMELSON-CALTECH STUDENT PRIZE

Awarded through an annual competition to a senior or graduate student who has created or improved a product or process, applied a technology in a new way, redesigned a system, or in other ways demonstrated remarkable inventiveness.

2011 *Guoan Zheng*



### LIBRARY FRIENDS' SENIOR THESIS PRIZE

This prize was established in 2010 to recognize a senior thesis that exemplifies scholarly research, including the effective use of library resources and other bibliographic materials. A \$1,200 cash award accompanies the citation. The senior thesis is an extensive, independent written work usually undertaken during a senior thesis course series. The University Librarian and the Friends of Caltech Libraries oversee the evaluation and nomination process and make recommendations to the Undergraduate Academic Standards and Honors Committee for final selection. At the discretion of the Friends of Caltech Libraries, more than one award, or none, may be made in any year.

2013 *Karolina Z. Kalbarczyk*

### MARI PETERSON LIGOCKI ('81) MEMORIAL AWARD

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

2013 *Vishnu Manoranjan*

### DOROTHY B. AND HARRISON C. LINGLE SCHOLARSHIP

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

2007 *Jessica Tsu-Yun Su*

2008 *Jessica Tsu-Yun Su*

2010 *Jessica Tsu-Yun Su*

2011 *Jessica Tsu-Yun Su*

2012 *Jessica Tsu-Yun Su*

#### MECHANICAL ENGINEERING AWARD

Awarded to a candidate for the degree of Bachelor of Science in mechanical engineering whose academic performance has demonstrated outstanding original thinking and creativity, as judged by a faculty committee appointed each year by the executive officer for mechanical engineering. The prize consists if a citation and a cash award

2013 *Matthew Kuenzli Fu, Anum Jang Sher*

#### GORDON MCCLURE MEMORIAL COMMUNICATIONS PRIZE

Awarded to undergraduate students for excellence in essay writing in three subjects: English, history, and philosophy.

2012 *Nerissa Emmy Graetz Hoglen, Blaine Roger Matulevich*

2013 *Shayan Doroudi, Vishnu Manoranjan*

#### THE HERBERT NEWBY MCCOY AWARD

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

2013 *Pedro de Souza Leao Coelho, Benjamin Keith Keitz, Kuang Shen, Bin Zhang*

#### JAMES MICHELIN SCHOLARSHIP

Given in memory of geologist James Michelin, who worked in the oil fields of Southern California in the 1930s and dreamed of returning to college at Caltech, this annual award recognizes undergraduate students for their contributions to the field of geology or geophysics.

2013 *Kevin Michael Sutherland*

#### 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.

2013 *Matthew Kuenzli Fu, Sebastián Rojas Mata, Mario Victor Zubia*

## PRESIDENT'S SCHOLARS

This scholarship, which is renewable contingent on academic performance, is awarded to selected freshmen to promote the breadth and diversity of the Caltech undergraduate student body.

2008 *Marcus Aaron Lucas*

## HERBERT J. RYSER MEMORIAL SCHOLARSHIPS

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

2012 *Ryan Thorngren, Saraswathi Joy Venkatesh, Andrew Joseph Zucker*

2013 *Zhengyang Jiang*

## SAN PIETRO TRAVEL PRIZE

Awarded to one or more sophomore, junior, or senior to fund an adventurous and challenging summer travel experience that expands the recipient's cultural horizons and knowledge of the world.

2011 *Mohit Tiwari*

2012 *Carly Mariah Bond, Catherine Bingchan Xie*

2013 *Chang Sub Kim, Melody Ann Morris, Geunwook Paek*

## 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.

2013 *Megan Nora Jackson, Matthew Zoccoli Mayers*

## 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.

2013 *Zeke Millikan*

#### 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.

2010 *Jonathan Michael Mihaly*

2011 *Jason Scott Damazo*

2012 *Prakhar Mehrotra*

2013 *Nicholaus Joseph Parziale*

#### RENUKA D. SHARMA AWARD

Awarded to a sophomore chemistry major for outstanding performance during his or her freshman year.

2011 *Megan Nora Jackson*

2012 *Seohyun Kim*

#### 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.

2009 *Geunwook Paek*

2010 *Blaine Roger Matulevich, Matthew Zoccoli Mayers*

2012 *Lucia Minjung Ahn, Timothy Meyer, HongAn Thuy Nguyen,  
Irene Chiyun Yang, Vivian Zhang*

### JOHN STAGER STEMPLER 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.

2009 *Christopher S. Rogan*

2011 *Piti Ongmongkolkul*

2012 *Kevin Thomas Engel, Jeongwan Haah*

### MORGAN WARD PRIZE

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

2008 *Gjergji Zaimi*

### CHARLES AND ELLEN WILTS PRIZE

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

2013 *Hongchao Zhou*

### FREDERICK J. ZEIGLER MEMORIAL AWARD

Awarded to an outstanding sophomore or junior in pure 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.

2011 *Matthew Zoccoli Mayers*

2012 *Geunwook Paek*

## THE MEANING OF ACADEMIC DRESS

The costumes of those in the academic procession have a specific symbolism that dates back to at least the 14th century. Academic institutions in the United States adopted a code of academic dress in 1895 that has been revised from time to time. The dress of institutions in other countries varies, and there is not a worldwide code, but the basic elements are present in all academic costumes.

Caltech's David Elliot (1917-2007), professor of history, emeritus, wrote the following about academic costumes:

"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. . . .

"With this color and symbolism, which is medieval 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."

## ODE TO JOY

*Text of Beethoven Ninth Symphony excerpt, after the poem “An die Freude (“To Joy”) by Johann Christoph Friedrich von Schiller (1759-1805)*

*Freude, schöner Götterfunken  
Tochter aus Elysium,  
Wir betreten feuertrunken,  
Himmlische, dein Heiligtum!  
Deine Zauber binden wieder  
Was die Mode streng geteilt;  
Alle Menschen werden Brüder,  
Wo dein sanfter Flügel weilt.*

Joy, beautiful spark of the gods  
Daughter of Elysium,  
We enter, drunk with fire,  
Heavenly one, your sanctuary!  
Your magic reunites  
What custom strictly divided.  
All men will become brothers,  
Where your gentle wing rests.

*Wem der große Wurf gelungen,  
Eines Freundes Freund zu sein;  
Wer ein holdes Weib errungen,  
Mische seinen Jubel ein!  
Ja, wer auch nur eine Seele  
Sein nennt auf dem Erdenrund!  
Und wer's nie gekonnt, der stehle  
Weinend sich aus diesem Bund!*

Whoever has had the great fortune  
To be a friend's friend,  
Whoever has married a beloved wife,  
Let him mix in his jubilation!  
Indeed, whoever can call even one soul  
His own on this round earth!  
And whoever was never able to, must creep  
Tearfully away from this band!

## **HAIL CIT**

*(Caltech alma mater)*

by Manton Barnes, B.S. '21

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.





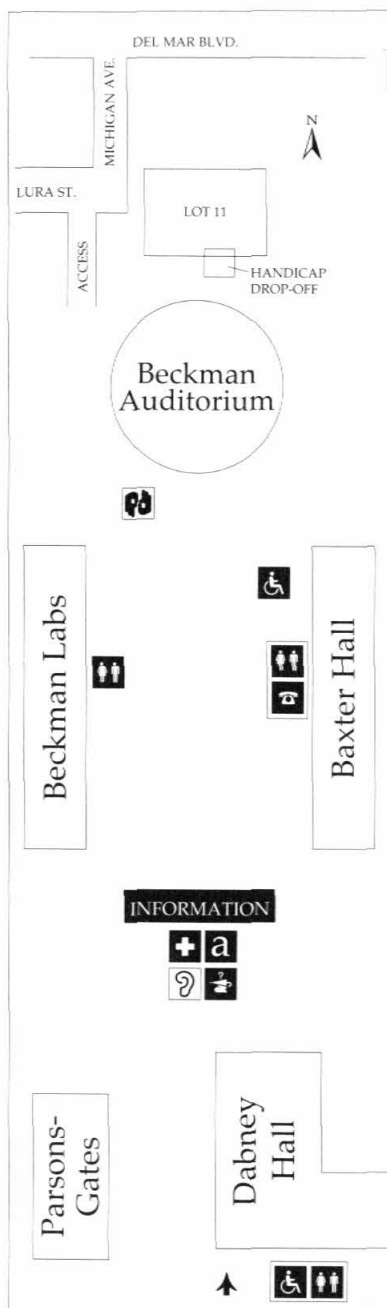
Congratulations to today's graduates. We welcome you to the family of Caltech alumni!

For more than 100 years, Caltech's alumni have gone forward from this day to make a positive impact in the world. We know this year's class will do the same, and that future Techers will be inspired by the achievements of the Class of 2013.

Your Caltech degree offers you a place among—and access to—one of the most accomplished alumni networks of any institution, with more than 22,000 graduates around the world. The Caltech Alumni Association, in partnership with Caltech, works to help you realize the full potential of that network, personally and professionally.

Graduates, your alumni community is proud of you. We encourage you to venture out to explore, invent, build, and innovate. Follow your passion, and in turn, make the world a better place.

Heather Dean, BS '00, MS '00  
President, Board of Directors  
Caltech Alumni Association  
[alumni.caltech.edu](http://alumni.caltech.edu)



## SERVICES FOR COMMENCEMENT GUESTS

-  PUBLIC TELEPHONES are available in Baxter Hall.
-  RESTROOMS are available in Baxter Hall, Beckman Labs, and Dabney Hall.
-  FIRST AID SERVICES are available at the information booth.
-  LOST AND FOUND items may be reported and/or claimed at the information booth.

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

## SPECIAL SERVICES FOR PERSONS WITH DISABILITIES

-  ASSISTIVE LISTENING DEVICES are available at the information booth. A driver's license or state-issued ID card is required.
-  LARGE-TYPE PROGRAMS (abridged) are available at the information booth.
-  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 floors of Dabney Hall and Baxter Hall.

*The passing of the torch  
symbolizes the spirit of research  
going from one hand to the next,  
from one generation to the next,  
from youth to maturity.*