

127th Annual Commencement  
CALIFORNIA INSTITUTE OF TECHNOLOGY

*Friday, June 11, 2021*  
*10 a.m.*

# PROGRAM

“CELEBRATION AROUND THE GLOBE” 2021 Graduates

WELCOME	Thomas F. Rosenbaum, Ph.D. <i>President</i> <i>Sonja and William Davidow Presidential Chair</i> <i>and Professor of Physics</i> <i>California Institute of Technology</i>
PRESIDING	David L. Lee, Ph.D. '74 <i>Chair of the Board of Trustees</i> <i>California Institute of Technology</i>
Keynote address	Norman R. Augustine <i>Retired Chairman and CEO</i> <i>Lockheed Martin Corporation</i>
ON RESILIENCE Words of wisdom for the graduates	Caltech Alumni ( <i>see page 5</i> )
CONFERRING OF DEGREES	President Rosenbaum
PRESENTATION OF CANDIDATES FOR DEGREES	
For the Degree of Bachelor of Science	Kevin M. Gilmartin, Ph.D. <i>Vice President for Student Affairs</i>
For the Degree of Master of Science	David C. Chan, Ph.D. <i>Dean of Graduate Studies</i>
For the Degree of Doctor of Philosophy	
Biology and Biological Engineering	Richard Murray, Ph.D. (B.S. '85) <i>Division Chair</i>
Chemistry and Chemical Engineering	Dennis A. Dougherty, Ph.D. <i>Division Chair</i>

Engineering and Applied Science	Guruswami Ravichandran, Ph.D. <i>Division Chair</i>
Geological and Planetary Sciences	John P. Grotzinger, Ph.D. <i>Division Chair</i>
Humanities and Social Sciences	Jean-Laurent Rosenthal, Ph.D. '88 <i>Division Chair</i>
Physics, Mathematics and Astronomy	Fiona A. Harrison, Ph.D. <i>Division Chair</i>

ANNOUNCEMENT OF AWARDS AND  
CONCLUDING REMARKS

President Rosenbaum

“CONGRATULATIONS TO THE  
2021 GRADUATES”

Friends of Caltech

MUSICAL SELECTION

“Fanfare” to <i>La Péri</i>	Paul Dukas
<i>Gaudeamus Igitur</i>	Traditional ( <i>lyrics on page 58</i> )
“Festive March” from <i>Tannhäuser</i>	Richard Wagner
“Coronation March” from <i>Le prophète</i>	Giacomo Meyerbeer
“Grand March” from <i>Aida</i>	Giuseppe Verdi
“Cortège de Bacchus” from <i>Sylvia</i>	Léo Delibes
<i>Hail CIT</i>	Manton Barnes (B.S. '21) arr. Raymond Burkhart ( <i>lyrics on page 59</i> )

*Music performed at the 2018 and 2019 commencement ceremonies by the Caltech Glee Club, Nancy Sulabian, M.M., conductor; and Convocation Brass, Percussion, and Organ Ensemble, Glenn D. Price, D.M.A., conductor; Leslie Deutsch (B.S. '76, M.S. '77, Ph.D. '81), organ soloist and arranger.*

*Streaming of Caltech's 2021 commencement ceremony will begin shortly before 10 a.m. on Friday, June 11, at [commencement.caltech.edu/watch](https://commencement.caltech.edu/watch).*

*Follow along with the day's events on Twitter, and Instagram. Share your photos and join the celebration by using #Caltech2021. (See page 60 for more information.)*

## ABOUT THE KEYNOTE SPEAKER

The 2021 commencement keynote speaker is Norman R. Augustine, a longtime leader in the aerospace industry. In the private sector, his career began with the Douglas Aircraft Company in 1958 and led him to Martin Marietta Corp., which he led when it merged with the Lockheed Corp. to form the aerospace and defense company Lockheed Martin.

In the public sphere, he has served as assistant secretary of the Army and undersecretary of the Army. Augustine has been president of the American Red Cross, chairman of the National Academy of Engineering, and a member of the President's Council of Advisors on Science and Technology. He has been awarded the National Medal of Technology and Innovation and the Department of Defense Civilian Distinguished Service Medal, which he has received five times.

He is the author of *Augustine's Laws*, a collection of humorous aphorisms relevant to business management; *Augustine's Travels*, a reflection on what it takes to be successful in business and life; and *The Way I See It*, a compilation of his photography. He also has co-authored *The Defense Revolution and Shakespeare in Charge*. An avid traveler, Augustine has visited 129 countries and has stood on both the North and South Poles.

## ON RESILIENCE

The work of Caltech students, scientists, and engineers resounds globally as well as personally. As the Institute prepares to welcome a new class into the extraordinary community of Caltech alumni, several members of this community offer advice, hard-won insight, and words of encouragement for Caltech's 2021 graduates to carry with them as they move on to face new challenges and opportunities.

### **Maryam Ali (B.S. '05)**

*Medical Writer, Medtronic Neurovascular*

### **Christopher Blaszcak-Boxe (M.S. '01, '02, Ph.D. '05)**

*Associate Research Professor, Department of Geosciences  
Associate, Earth & Environmental Science Institute +  
Institute for Computational & Data Sciences  
Co-Director, PSU EnvironMentors  
Penn State University*

### **Morgan L. Cable (Ph.D. '10)**

*Astrobiology and Ocean Worlds Group Supervisor  
NASA Jet Propulsion Laboratory*

### **Tara Gomez-Hampton (Ph.D. '11)**

*Associate Director of Medical Affairs  
Biosense Webster, Inc.*

### **Mason Smith (B.S. '09)**

*Software Developer  
TGS Management Company*



## ABOUT CALTECH

Caltech, founded in 1891, is a world-renowned science and engineering institute that marshals some of the world's brightest minds and most innovative tools to address fundamental scientific questions and pressing societal challenges.

A Caltech education is notable for its rigorous curriculum, close collaborations with faculty, and small class sizes. Caltech students work toward undergraduate and graduate degrees alongside their intellectual equals in an academic environment that emphasizes interdisciplinary teamwork, critical thinking, mutual support, and a deep understanding of core concepts and principles across fields.

Students graduate from Caltech prepared to become world leaders in science, engineering, academia, industry, and public service. Graduates are well trained in their ability to identify, analyze, and solve challenging problems within and across science and engineering disciplines, and are prepared to apply and communicate their expertise broadly throughout their professional careers.

An independent, privately supported institution, Caltech manages the Jet Propulsion Laboratory (JPL) for NASA. Together with JPL, Caltech is Pasadena's largest employer and a source of programs that benefit the entire region. Caltech also owns and operates the Seismological Laboratory, more than 50 research centers and institutes, and a global network of astronomical observatories, including the Palomar and W. M. Keck observatories. In addition, the Institute co-founded and co-manages the Laser Interferometer Gravitational-wave Observatory (LIGO).

Caltech's faculty, students, postdoctoral scholars, and staff produce transformative breakthroughs in fields ranging from quantum science and engineering to bioinformatics to energy and sustainability. Caltech faculty and alumni have earned national and international recognition, including 45 Nobel Prizes.

We celebrate today the 476 graduates who will earn 227 bachelor's degrees, 104 master's degrees, 145 doctoral degrees, and 50 graduates whose advanced degrees (12 master's and 38 doctoral) were awarded by the Board of Trustees in October 2020, all of whom will contribute to Caltech's impressive legacy and record of achievement around the world.

## CANDIDATES FOR DEGREES

### Bachelor of Science

Nayla Abney *Deptford, New Jersey* Chemical Engineering (Biomolecular)  
Kasey Adams *Onalaska, Wisconsin* Mechanical Engineering  
Sara Wren Adams *Wylie, Texas* Biology  
Ashima Agarwal *New Providence, New Jersey* Electrical Engineering  
Alessio Amaolo *Monte Hermoso, Argentina* Chemistry  
Cecelia Jane Andrews *Orinda, California* Biology  
Logan Apple *Winchester, Virginia* Computer Science  
Nicholas Ardavin *Gilbert, Arizona* Computer Science and Information and Data Sciences (Minor)  
Rahul Arun *Buffalo Grove, Illinois* Mechanical Engineering and Aerospace Engineering (Minor)  
Anthony Bao *Phoenix, Arizona* Physics  
Richard Bao *Phoenix, Arizona* Physics  
Rahil Bathwal *Mumbai, India* Computer Science and Business, Economics, and Management  
Brendan Berrigan *Darien, Connecticut* Mathematics  
Samuel Addison Blazes *Seattle, Washington* Computer Science  
Ali Boubezari *Santa Clara, California* Computer Science  
Cole Brabec *Olathe, Kansas* Electrical Engineering  
Liana Braun *Weston, Florida* Mechanical Engineering  
Jack Briones *Wake Forest, North Carolina* Computer Science  
Krystal Brodsky *Seattle, Washington* Chemistry and Biology (Minor)  
Krystin Brown *Lake Forest, California* Bioengineering and Business, Economics, and Management  
Michael Brown *New Orleans, Louisiana* Mechanical Engineering and Aerospace Engineering  
(Minor)  
Isabella Camplisson *Sydney, Australia* Computation and Neural Systems  
Cindy Cao *Torrance, California* Chemical Engineering (Biomolecular)  
Dominic Catanzaro *San Diego, California* Applied Physics  
Andrew Chan *Denver, Colorado* Geophysics and English  
Kristine Wing-yin Chelakkat *San Marino, California* Mechanical Engineering  
Eric Chen *Irmo, South Carolina* Computer Science and Information and Data Sciences (Minor)  
LC Chen *Renton, Washington* Computer Science

† *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*

- Lucy Haoyue Chen *Houston, Texas* Computer Science and Information and Data Sciences  
(Minor)
- Daniel Chica *Houston, Texas* Physics
- Pavan Chitta *Cupertino, California* Computer Science
- Jessica Choi *San Diego, California* Computer Science
- Nick Clausen *Clovis, California* Mechanical Engineering
- Joseph Como *Garden City, New York* Computer Science
- Robert Alexander Corado† *San Diego, California* Computer Science and Information and Data Sciences (Minor)
- Molly Ann Crotteau *Chicago, Illinois* Geochemistry and Environmental Science and Engineering  
(Minor)
- Irene Crowell *Fullerton, California* Computer Science and Control and Dynamical Systems  
(Minor)
- Steven Csaposs *Davis, California* Electrical Engineering
- Alexander Y. Cui *Toronto, Canada* Computer Science and Information and Data Sciences (Minor)
- Nicholas Currault *Paradise Valley, Arizona* Computer Science
- Richard Joseph Dargan *Albuquerque, New Mexico* Computer Science
- Gianfranco de Castro *Weston, Florida* Physics
- Daniel Delgado Cornejo *Encino, California* Physics
- Vidhya Meenakshi Dev *Erie, Colorado* Chemical Engineering (Materials)
- Kriti Devasenapathy *Princeton, New Jersey* Computer Science and Information and Data Sciences  
(Minor)
- Jeremiah Dibble *Venice Beach, California* Electrical Engineering and Business, Economics, and  
Management
- Marcus Dominguez-Kuhne *Redondo Beach, California* Computer Science
- Kaliden Drango *Lake Oswego, Oregon* Electrical Engineering and Business, Economics, and  
Management
- Kenny Duran *Bronx, New York* Physics and Computer Science (Minor)
- Sergio Escobar *Anchorage, Alaska* Physics and Mathematics
- Elisabeth Gallmeier *Oak Ridge, Tennessee* Chemistry and History (Minor)
- Thomas Donghyun Gallup *Houston, Texas* Biology
- Alexei Garcia *Salt Lake City, Utah* Mechanical Engineering and Aerospace Engineering (Minor)
- Dana Paige Gephart *Reno, Nevada* Chemistry
- Mahi Gokuli *Waukesha, Wisconsin* Materials Science
- Ruy Gonzalez Hermosillo *Weston, Florida* Computer Science

## *Bachelor of Science continued*

- Jethin S. Gowda *Orange, Connecticut* Applied and Computational Mathematics and Business, Economics, and Management
- Nora Gary Abdul Raheem Griffith *Santa Cruz, California* Biology
- Sirisha Gudavalli† *Lafayette, Colorado* Computation and Neural Systems
- Alex Guerra *Arlington Heights, Illinois* Computer Science and Mathematics
- Steve Guo *Pleasanton, California* Computer Science and Information and Data Sciences (Minor)
- Arushi Gupta *New York, New York* Mathematics and Computer Science (Minor)
- Eric Han *Pasadena, California* Computer Science and Information and Data Sciences (Minor)
- Ryan Han *Suwanee, Georgia* Computer Science
- John Heath *South Pasadena, California* Bioengineering and Information and Data Sciences (Minor)
- Andrew Hess *Fennimore, Wisconsin* Computer Science
- Andrew Quoc-Anh Ho *Palo Alto, California* Computer Science and Information and Data Sciences (Minor)
- Lofton Dillon Holder *New York City, New York* Information and Data Sciences
- Ankush Hommerich-Dutt *Hampton, Virginia* Computer Science and Business, Economics, and Management and Information and Data Sciences (Minor)
- Laura Hu *Bellevue, Washington* Computer Science and English
- Audrey Huang *Los Altos, California* Computer Science
- Christie Huang *Pasadena, California* Mechanical Engineering
- Yuehan Huang *Fuzhou, People's Republic of China* Chemical Engineering (Materials)
- Nerys Huffman *Broomfield, Colorado* Mechanical Engineering
- Calvin Joonsuk Huh *Fort Lee, New Jersey* Mechanical Engineering and Business, Economics, and Management
- Mike Iovine *Torrance, California* Computer Science and Information and Data Sciences (Minor)
- Tiffany Anne Jager *Dunkirk, New York* Computer Science
- Alex Janosi *Ann Arbor, Michigan* Computer Science and Business, Economics, and Management and Information and Data Sciences (Minor)
- Ethan Jaszewski *Denver, Colorado* Computer Science
- Maheck Jerez Terceros *Sammamish, Washington* Mechanical Engineering and Aerospace Engineering (Minor)
- Qixuan Jin *Rancho Mission Viejo, California* Computer Science
- James Martin Jusuf† *Scarsdale, New York* Physics
- Jaeyoung Kang *San Jose, California* Chemistry
- Ishani Karmarkar *San Jose, California* Applied and Computational Mathematics and Computer Science (Minor)

## *Bachelor of Science continued*

- Johanna Karras *Cupertino, California* Computer Science and Information and Data Sciences  
(Minor)
- Jake Berenson Ketchum *Redwood City, California* Mechanical Engineering
- Alveera Khan *San Jose, California* Computer Science
- Esther Soeun Kim *Cincinnati, Ohio* Chemistry
- June Kim *San Diego, California* Computer Science and Business, Economics, and Management and  
Information and Data Sciences (Minor)
- Matthew Minhyuk Kim *Irvine, California* Computer Science and Business, Economics, and  
Management
- Min Jae Kim *West Vancouver, Canada* Mechanical Engineering and Business, Economics, and  
Management
- Yu Jin Kim *Los Angeles, California* Mechanical Engineering
- Lily Kitagawa *Portage, Michigan* Biology and Computer Science (Minor)
- Katherine Knox *Lake Mary, Florida* Materials Science
- Nora Eliza Koe *New Hyde Park, New York* Electrical Engineering
- Adam Kogan *Clifton Park, New York* Electrical Engineering
- Ekaterina Korovina *Moscow, Russia* Computer Science
- Frank Howard Kou *Ellicott City, Maryland* Computer Science
- Sarah Kreider *River Forest, Illinois* Computer Science
- Anthony James Kukavica *Pasadena, California* Mathematics and Economics
- Sanjana Gowri Kulkarni *South Bend, Indiana* Bioengineering
- Vinayak Kumar *Milipitas, California* Mathematics and Computer Science
- Daniel D. Kyme *Mclean, Virginia* Computer Science
- Tye Pleiades Lamkin *St. Louis, Missouri* Planetary Science
- Alycia Lee *Lower Gwynedd, Pennsylvania* Computer Science and Business, Economics, and  
Management
- Regina Lee *Rancho Palos Verdes, California* Mechanical Engineering
- Su Min (Olivia) Lee *Seongnam-si, Republic of Korea* Applied and Computational Mathematics and  
Information and Data Sciences (Minor)
- Yelim Lee *Seoul, Republic of Korea* Biology
- Yongkyun Lee *Seoul, Republic of Korea* Computer Science and Business, Economics, and  
Management
- Lexy LeMar *Rochelle, Illinois* Chemical Engineering (Environmental)
- Amanda Sijiao Li *Westford, Massachusetts* Information and Data Sciences
- Michael Li *Bryn Mawr, Pennsylvania* Computer Science
- Erich Liang *Sammamish, Washington* Computer Science and Mathematics

## *Bachelor of Science continued*

- Xueer (Sherry) Liang *Foshan, People's Republic of China* Planetary Science and Business,  
Economics, and Management
- Rachel Lin *Moraga, California* Computer Science and Information and Data Sciences (Minor)
- Tony (Jianbang) Liu *Shanghai, People's Republic of China* Applied Physics
- Lauren Eleanor Liu *Los Altos, California* Computer Science
- Sarina Liu *Rolling Hills, California* Applied and Computational Mathematics and Information and  
Data Sciences (Minor)
- Alejandro Lopez *Pembroke Pines, Florida* Chemical Engineering (Biomolecular)
- Tegan Loveridge *San Jose, California* Physics
- Elaine Lowinger *North Miami, Florida* Mechanical Engineering
- Andrew S Lucas *San Gabriel, California* Chemical Engineering (Environmental)
- Samuel Michael Lushtak *Ross, California* Information and Data Sciences and Business,  
Economics, and Management
- Mohith Harish Manohara *Glendora, California* Electrical Engineering and Computer Science  
(Minor)
- Avery Marshall *Torrance, California* Physics
- Krystyna Maruszko *Redondo Beach, California* Biology and Chemistry (Minor)
- John (Jack) Maxfield *Durham, North Carolina* Computer Science and Mathematics
- Liana Noor Merk *Solana Beach, California* Bioengineering
- Rohan Mirchandani† *Pleasanton, California* Computer Science and Information and Data  
Sciences (Minor)
- Alessandra Mondello *Kinnelon, New Jersey* Chemical Engineering (Materials)
- Eric Anton Moreno *Albuquerque, New Mexico* Physics
- Spencer Morgenfeld *Palo Alto, California* Mechanical Engineering and Aerospace Engineering  
(Minor)
- Shiqiao Mu *Ridgefield, Connecticut* Applied and Computational Mathematics
- Shiva Mudide† *Acton, Massachusetts* Physics
- Izzy Muise *Cary, North Carolina* Chemistry and Planetary Science (Minor)
- Aru Mukherjea *Hong Kong, PRC* Mathematics
- Maya Alexandra Mutic *Creve Coeur, Missouri* Applied and Computational Mathematics
- Albert Nazeeri *Lebanon, Pennsylvania* Physics
- Daniel Neamati *Ann Arbor, Michigan* Mechanical Engineering and Planetary Science (Minor)
- Avery Jay Nielsen *Wilmington, Delaware* Physics and Geological and Planetary Sciences (Minor)
- Hale Obernolte *Big Bear Lake, California* Computer Science
- Ethan Ordentlich *San Jose, California* Computer Science
- Samuel Owen *Saint Charles, Missouri* Bioengineering and Computer Science

## *Bachelor of Science continued*

Mayank Pandey *Saratoga, California* Mathematics and Computer Science  
James Park† *Round Rock, Texas* Chemistry and Environmental Science and Engineering (Minor)  
Riley Matthew Patterson *Fort Worth, Texas* Computer Science  
Vivienne Alisha Patwardhan *San Jose, California* Electrical Engineering  
Tynesha L Pham† *Santa Ana, California* Computer Science  
Tara S. Porter *Buffalo, New York* Electrical Engineering  
Kenyon Prater *Santa Barbara, California* Computer Science  
Sarida Pratuangtham *River Forest, Illinois* Bioengineering and Computer Science (Minor)  
Zihao Qi *Rochester, New York* Physics  
Emma Qian *Ellicott City, Maryland* Computer Science  
Hongsen Qin *College Station, Texas* Computer Science and Information and Data Sciences (Minor)  
Brandon Quach *Honolulu, Hawaii* Computer Science  
Natalie Schoenborn Ramirez *Bakersfield, California* Computer Science  
Anirudh Rangaswamy *Dayton, Ohio* Computer Science and Business, Economics, and  
Management and Information and Data Sciences (Minor)  
Netra Ravishankar *Fremont, California* Computer Science and Business, Economics, and  
Management  
Malia T. Rebollo *Rocklin, California* Electrical Engineering  
XinYi Ren *Mabomet, Illinois* Mechanical Engineering  
Jacob Ressler–Craig *Atlanta, Georgia* Mathematics  
Paulina Ridland *Crestline, California* Mechanical Engineering  
Matthew Riker *Selkirk, New York* Computer Science and Business, Economics, and Management  
Kevin Rosa *Naperville, Illinois* Computer Science and Information and Data Sciences (Minor)  
Ari Jacob Rosner *Edgewater, Maryland* Mechanical Engineering and Business, Economics, and  
Management and Computer Science (Minor)  
Daniel Rostovtsev *Media, Pennsylvania* Mathematics  
Andrew B Rothstein *Potomac, Maryland* Physics and Aerospace Engineering (Minor)  
Ankita Roychoudhury *Madison, Connecticut* Bioengineering and Control and Dynamical Systems  
(Minor)  
Michael Klaus Rupprecht *Chicago, Illinois* Mathematics  
Caleb Sander *Lincoln, Massachusetts* Computer Science and Economics  
Julian Sanders *Keller, Texas* Electrical Engineering  
Neil Sanderson *Laguna Beach, California* Chemical Engineering (Biomolecular)  
Louis Santos *Teaneck, New Jersey* Computer Science  
Zhengyuan Shang *Beijing, People's Republic of China* Mathematics  
Aditi Shankar *Dayton, Ohio* Computer Science and Information and Data Sciences (Minor)

## *Bachelor of Science continued*

Varun Shanker *Midland, Michigan* Bioengineering  
Stephanie Shao *Temple City, California* Economics  
Tarini Singh *Lawrence, Kansas* Computer Science  
Whitney Walela Sloneker *Glenview, Illinois* Information and Data Sciences  
Noah Matthew Sock *St. Louis, Missouri* Computer Science and Information and Data Sciences  
(Minor)  
Maya Sharanya Srikanth *San Diego, California* Computer Science and Business, Economics, and  
Management  
Gokul Prem Srinivasaragavan *San Ramon, California* Astrophysics  
Alexandra Marie Stutt *Brooklyn, New York* Mechanical Engineering  
Lauren Grace Suezaki *San Ramon, California* Mechanical Engineering  
Haoyuan Sun *Mclean, Virginia* Mathematics and Computer Science  
Jessica Sun *York, Pennsylvania* Bioengineering and Business, Economics, and Management  
Rachel Sun *Tustin, California* Mechanical Engineering and Aerospace Engineering (Minor)  
Sharne Sun *Arcadia, California* Computer Science and Information and Data Sciences (Minor)  
Yuchen Tang *Chengdu, People's Republic of China* Physics  
Davis Tardif *Roswell, Georgia* Computer Science  
Emily M. Thierstein† *Mason, Ohio* Physics  
Charles F. Thut *Dover, New Hampshire* Information and Data Sciences  
Maquelle Tiffany *Long Beach, California* Mechanical Engineering and Computer Science (Minor)  
Kushal Tirumala *Saratoga, California* Mathematics and Computer Science  
Allyson Trussell *Mission Viejo, California* Geology  
Albert Tseng *Saratoga, California* Computer Science and Information and Data Sciences (Minor)  
Shu Fay Ung *Penang, Malaysia* Physics  
Vignesh Varadarajan *Fremont, California* Computer Science and Business, Economics, and  
Management  
Jamie Vinson *Kensington, Maryland* Mathematics and Economics and Chemistry (Minor)  
Jagath Vytheeswaran *Plano, Texas* Computer Science and Information and Data Sciences (Minor)  
James Douglas Walker III† *Grand Blanc, Michigan* Mechanical Engineering and Aerospace  
Engineering (Minor)  
Amy Wang *Colorado Springs, Colorado* Chemical Engineering (Process Systems)  
John Zhuo Wang *Louisville, Kentucky* Information and Data Sciences and Economics  
Pei (Betty) Wang *Cerritos, California* Computer Science  
Stella Wang *Greensboro, North Carolina* Physics  
Mitchell Watson *Windsor, Colorado* Mechanical Engineering

## *Bachelor of Science continued*

- James Wei *Chappaqua, New York* Computer Science and Information and Data Sciences (Minor)
- William Werst *Fort Collins, Colorado* Electrical Engineering
- Ryan White *San Antonio, Texas* Physics and Philosophy (Minor)
- Katie Kwan-Nga Wong *San Ramon, California* Biology and Environmental Science and Engineering (Minor)
- Gabriel Woolls *Bethesda, Maryland* Physics
- David Hanzhi Wu *College Station, Texas* Physics
- Sulan Wu *Rockville, Maryland* Bioengineering
- Yuanzhe Xie *Nanjing, People's Republic of China* Chemistry
- Michael Yao *Philadelphia, Pennsylvania* Applied Physics
- Dennis Joseph Yatunin *Brooklyn, New York* Physics and Computer Science
- Angelina Ye *Irvine, California* Computer Science
- Jessica Ye *Timonium, Maryland* Biology
- Akshay Yeluri *Edison, New Jersey* Computer Science and Biology (Minor) and Information and Data Sciences (Minor)
- Christine Huishan Yu *Fremont, California* Computer Science and Information and Data Sciences (Minor)
- Kevin Yu *Mason, Ohio* Applied and Computational Mathematics and Business, Economics, and Management and Information and Data Sciences (Minor)
- Qiyao (Vivian) Yu *Tianjin, People's Republic of China* Mathematics
- Shuyue Yu *Nanjing, People's Republic of China* Computer Science and Information and Data Sciences
- Matthew Zeitlin *Rye, New York* Computer Science and Business, Economics, and Management
- Albert Zhai *La Canada, California* Computer Science and Information and Data Sciences (Minor)
- Isabella Zhang *Vancouver, BC, Canada* Computer Science
- Manxuan Zhang *Toronto, Canada* Astrophysics
- Yantian (Tina) Zhang *Auckland, New Zealand* Physics
- David Zheng *Pasadena, California* Electrical Engineering
- Ruoyun Zheng *Cupertino, California* Computer Science and English (Minor)
- Andrew Zhou *Monona, Wisconsin* Chemistry and Biology (Minor)
- Angelica Zhou *Vaughan, Canada* Planetary Science
- Daniel Zhou *Saskatoon, Canada* Mathematics and Computer Science
- Shiyun Zhu *Vancouver, Canada* Computer Science and Biology (Minor)
- Zimo Zhu *Buffalo Grove, Illinois* Computer Science
- Alexander Zlokapa *Danville, California* Physics

## Master of Science

- Danica Jeannine Adams (*Planetary Science*) B.A., University of California, Berkeley 2018.  
Stephen Lowell Armstrong (*Materials Science*) B.S., The University of Texas at Austin 2017.  
Christopher James Balzer (*Chemical Engineering*) B.S.E., Arizona State University 2017; M.Phil., University of Cambridge 2019.  
Holly Ann Barnhart (*Geochemistry*) B.A., University of California, Berkeley 2018.  
Alexandra Rose Baumgart (*Mechanical Engineering*) B.S., University of Illinois at Urbana-Champaign 2019.  
Brent Roy Belland (*Physics*) S.B., Massachusetts Institute of Technology 2016.  
Jordan Tyrell Benjamin (*Environmental Science and Engineering*) S.B., Massachusetts Institute of Technology 2019.  
Benjamin Joseph Bernhard (*Space Engineering*) B.S., University of Notre Dame 2020.  
Sarah Blunt‡ (*Astrophysics*) Sc.B., Brown University 2017.  
David Brooking Bonan (*Environmental Science and Engineering*) B.S., University of Washington 2019.  
Alexander Jackson Buser (*Physics*) B.S., Georgia Institute of Technology 2018.  
Maria Noel Camarca (*Planetary Science*) B.S., Marymount University 2017.  
Ruizhi Cao (*Electrical Engineering*) B.E., Zhejiang University 2018.  
Sharon Yinting Chen (*Electrical Engineering*) B.S., Columbia University 2019.  
Xiaoqiao Chen‡ (*Computing and Mathematical Sciences*) B.S., Wuhan University 2018.  
Costa D Christopoulos (*Environmental Science and Engineering*) S.B., Massachusetts Institute of Technology 2017.  
Ryan Kazuo Cosner (*Mechanical Engineering*) B.S., University of California, Berkeley 2019.  
Heather Leigh Curtis (*Biology*) B.A., Hunter College of the City University of New York 2013.  
Emily Katherine de Jong (*Mechanical Engineering*) B.S.E., Princeton University 2019.  
Hannah Henning Dion-Kirschner (*Geobiology*) B.A., Northwestern University 2018.  
Lilian Aja Dove (*Environmental Science and Engineering*) S.B., Massachusetts Institute of Technology 2018.  
Danny Ebanks (*Social Science*) B.A., Princeton University 2015.  
Bryce Walker Edwards (*Materials Science*) B.S., University of Florida 2015.  
Marguerite Adrienne Epstein-Martin (*Planetary Science*) B.S., Yale University 2017.  
Bowen Gao (*Electrical Engineering*) B.A.Sc., University of Toronto 2019.  
Ramon Gao (*Applied Physics*) B.Sc., Swiss Federal Institute of Technology Zurich 2015; M.Sc., 2018.

‡ *Students whose names are followed by a double dagger had their degrees conferred after the previous year's commencement ceremony.*



## *Master of Science continued*

- Michael Grekrek-McKeon (*Planetary Science*) B.S., University of Maryland, College Park 2019.
- Zimu He (*Electrical Engineering*) B.S., University of California, San Diego 2019.
- Jinrui Hou (*Electrical Engineering*) B.Eng., Zhejiang University 2019.
- Wei Hou (*Mechanical Engineering*) B.S., University of California, Los Angeles 2019.
- Tzu-Chen Huang‡ (*Physics*) B.S., National Taiwan University 2016.
- Yujia Huang (*Electrical Engineering*) B.Eng., Zhejiang University 2017.
- Craig Edward Ives‡ (*Electrical Engineering*) B.S., University of California, San Diego 2017.
- Hiroki Kaifu (*Applied Physics*) B.S., University of California, San Diego 2016.
- Viraj Rajendra Karambelkar (*Astrophysics*) B.Tech., Indian Institute of Technology Bombay 2019.
- Armina Khakpour (*Electrical Engineering*) B.A.Sc., University of Toronto 2019.
- Polina Khapikova (*Environmental Science and Engineering*) B.S., University of California, Davis 2019.
- Kordag Mehmet Kilic (*Electrical Engineering*) B.S., Bilkent University 2018.
- Seong Shik (Steve) Kim (*Chemical Engineering*) B.S., Georgia Institute of Technology 2018.
- Seungkyeum Kim (*Chemical Engineering*) B.S., University of California, Los Angeles 2017.
- Taeho Kim (*Applied Mechanics*) B.S.E., University of Michigan, Ann Arbor 2018.
- Tobias Köhne (*Geophysics*) B.S., Technische Universität München 2016; M.S., The University of Texas at Austin 2018.
- Pranav Dhananjay Kulkarni (*Electrical Engineering*) B.Tech., Indian Institute of Technology Bombay 2019.
- Tianhao Le (*Environmental Science and Engineering*) B.S., Peking University 2016.
- Robert Whitson Learsch (*Materials Science*) S.B., Massachusetts Institute of Technology 2015.
- Seola Lee (*Mechanical Engineering*) B.S., University of Wisconsin-Madison 2019.
- Chen Li (*Physics*) B.S., Peking University 2017.
- Haoyu Li (*Geochemistry*) B.S., Nanjing University 2018.
- Yida Li (*Geophysics*) B.S., University of Science and Technology of China 2018.
- Zhihui Li (*Astrophysics*) B.S., Peking University 2018.
- Wei-Hsiang Lin (*Applied Physics*) B.S., Tamkang University 2006; M.S., National Chiao Tung University 2008.
- Shengduo Liu (*Applied Mechanics*) B.E., Tsinghua University 2019.
- Yang Liu (*Electrical Engineering*) B.E., Tsinghua University 2018.
- Yuan-Kai Liu (*Geophysics*) B.S., National Taiwan University 2015; M.Sc., King Abdullah University of Science and Technology 2018.
- Ignacio López Gómez (*Environmental Science and Engineering*) M.Sc., Institut Supérieur de l'Aéronautique et de l'Espace 2018.
- Chen-Hsuan Lu‡ (*Materials Science*) B.S., National Taiwan University 2018.

## *Master of Science continued*

- Tracy Lu (*Mechanical Engineering*) B.S., Duke University 2019.
- Heather Lauren Lukas (*Medical Engineering*) B.S., Cornell University 2019.
- Elena-Sorina Lupu (*Space Engineering*) B.S., Politehnica University of Bucharest 2015; M.Sc., Ecole Polytechnique Federale de Lausanne 2018.
- Theodore Kenneth Macioce (*Physics*) B.A., Columbia University 2015.
- Ren Thomas C. Marquez (*Geochemistry*) B.Sc., University of the Philippines Diliman 2014; M.Sc., 2017.
- Kelly E. McKenzie (*Materials Science*) B.S., University of Arkansas 2017.
- Sophie Eve Miller (*Chemical Engineering*) B.S., Stanford University 2015.
- Oren Simon Mizrahi (*Electrical Engineering*) B.S., Duke University 2019.
- Jacob Morrier (*Social Science*) B.Sc., Université du Québec à Montréal 2019.
- Daniel K. Mukasa (*Materials Science*) B.A., Oberlin College 2019.
- Sara Edinger Murphy (*Environmental Science and Engineering*) B.A., Pomona College 2018.
- Justin Anh-Khoa Nghiem (*Geology*) B.A., University of California, Berkeley 2019.
- Samir Vahdat Nooshabadi (*Electrical Engineering*) B.S., University of Michigan, Ann Arbor 2019.
- Evan Haze Nuñez (*Astrophysics*) A.S., El Camino College 2017; B.S., California State Polytechnic University, Pomona 2019.
- Stephanie O'Gara (*Mechanical Engineering*) B.S., Columbia University 2016.
- Yushu Pan (*Electrical Engineering*) B.Eng., Beijing Institute of Technology 2015; B.E., Peking University 2019.
- Henry Grant Peterson (*Environmental Science and Engineering*) B.S., University of California, Berkeley 2019.
- Kathryn Annette Plant† (*Astrophysics*) B.S., University of California, Santa Cruz 2016.
- Sergei Posnov (*Electrical Engineering*) B.S., Boston University 2019.
- Brandon Rasmussen (*Planetary Science*) B.S., University of Nevada, Reno 2017.
- Ojashvi Rautela (*Geophysics*) B.A., Macalester College 2019.
- Ryan Asa Rubenzahl (*Astrophysics*) B.S., University of Rochester 2018.
- Yashvi Sharma (*Astrophysics*) B.Tech., Indian Institute of Technology Bombay 2019.
- Cheng Shen‡ (*Electrical Engineering*) M.Phil., Harbin Institute of Technology 2018.
- Shaelyn Nicole Silverman (*Geobiology*) B.A., University of Colorado at Boulder 2017.
- Krittanon Sirorattanakul‡ (*Geophysics*) B.S., Lehigh University 2018.
- Michael Stramenga (*Space Engineering*) B.Eng., McMaster University 2020.
- Gregory Matthew Stroot (*Mechanical Engineering*) B.S., University of Illinois at Urbana-Champaign 2019.

## *Master of Science continued*

- Benjamin Thomas Strozewski (*Geophysics*) B.A., Washington University in St. Louis 2019.
- Siming Sun (*Electrical Engineering*) B.A.Sc., University of Toronto 2019.
- Yuchun Sun‡ (*Materials Science*) B.S., University of California, Berkeley 2018.
- Chris Tang (*Applied Physics*) B.S., Stanford University 2014.
- Xin Tong (*Medical Engineering*) B.S., Peking University 2019.
- Audrey Sujean Wang (*Electrical Engineering*) B.S., California Institute of Technology 2018.
- Christina Wenlu Wang (*Physics*) S.B., Massachusetts Institute of Technology 2018.
- Heming Wang (*Applied Physics*) B.S., Peking University 2016.
- Jiaqing Wang‡ (*Physics*) B.S., Fudan University 2016.
- Linghui Wang (*Applied Physics*) B.S., University of Illinois at Urbana-Champaign 2016.
- Ryan Xavier Ward (*Environmental Science and Engineering*) B.S., University of Florida 2019.
- Yibing Wei (*Electrical Engineering*) B.Eng., Beijing University of Posts and Telecommunications 2019.
- Ailec Wu (*Electrical Engineering*) B.S., University of Virginia 2019.
- Samantha Chloe Wu (*Astrophysics*) B.A., University of California, Berkeley 2018.
- Fengze Xie (*Electrical Engineering*) B.S., University of Illinois at Urbana-Champaign 2020.
- Tian Xie‡ (*Applied Physics*) B.S., Tsinghua University 2018.
- Charles Erding Xu (*Physics*) S.B., Massachusetts Institute of Technology 2015.
- Nitika Yadlapalli (*Astrophysics*) B.S., Rutgers, The State University of New Jersey 2018.
- Casey Amanda Yamamoto-Hillman (*Geology*) B.S., University of California, Los Angeles 2018.
- Arky Qin Yang (*Chemistry*) B.S., University of California, Berkeley 2016.
- Yan Yang (*Geophysics*) B.S., University of Science and Technology of China 2016; M.S., 2019.
- Matthew Xuhuai Yao (*Applied Mechanics*) B.A.Sc., University of Waterloo 2018; M.A.Sc., 2019.
- Yuhan Yao‡ (*Astrophysics*) B.S., Peking University 2018.
- Zixin Ye (*Electrical Engineering*) B.Eng., The University of Queensland 2019.
- Evan Chaoteh Yeh (*Electrical Engineering*) B.S., California Institute of Technology 2020.
- Zhiquan Yuan (*Applied Physics*) B.E., Tsinghua University 2018.
- Dominic Jeffrey Yurk (*Electrical Engineering*) B.S., California Institute of Technology 2017.
- Yang Zhang (*Applied Physics*) B.S., Harbin Institute of Technology 2018.
- Zhou Zhiling (*Electrical Engineering*) B.Eng., Zhejiang University 2019.
- Haoshuai Zhou (*Electrical Engineering*) B.E., East China Normal University 2019.
- Ziran Zhou (*Mechanical Engineering*) B.S., University of Illinois at Urbana-Champaign 2019.
- Zhuyun Zhuang (*Astrophysics*) B.S., Nanjing University 2019.

## Doctor of Philosophy

### DIVISION OF BIOLOGY AND BIOLOGICAL ENGINEERING

Mohamad Abedi (*Bioengineering*) B.S., University of California, Irvine 2014.

Thesis: Thermal Bioswitches for Non-invasive Control of Cellular Therapies.

Michael Altermatt (*Neurobiology*) B.S., Swiss Federal Institute of Technology Zurich 2014; M.S., 2015.

Thesis: Serotonergic Circuits: Role in Sleep and Enhanced Genetic Tools for Access and Optical Recording.

Michael Anaya (*Biology*) B.S., University of California, Riverside 2006.

Thesis: Modernization of Monoclonal Antibody Screening and Protein-Interaction Assays.

Dawna Paria Bagherian (*Bioengineering*) S.B., Massachusetts Institute of Technology 2014.

Thesis: Artificial Neural Networks for Nonlinear System Identification of Neuronal Microcircuits.

Abhik Kumar Banerjee (*Biology*) B.A., B.S., University of California, Los Angeles 2012.

Thesis: Diverse Roles of RNA-Protein Interactions: From Viral Antagonism to Mammalian Development.

Cynthia Mei-Ling Chai (*Neurobiology*) B.A., Mount Holyoke College 2014.

Thesis: Neurogenetic Analysis of *C. elegans* Developmental Decision-making.

Hui Chiu (*Biology*) B.S., National Taiwan University 2008; M.S., 2011.

Thesis: Neural Control of Male and Female Aggression in *Drosophila*.

Lucy Shin Chong (*Biology*) B.A., University of Pennsylvania 2014.

Thesis: Engineering and Delivery of Programmable Protein Circuits as Potential Therapeutic Devices.

William Chour (*Bioengineering*) A.B., Princeton University 2013.

Thesis: Molecular Technologies for Antigen-Based Immunity.

Alexander Armand Cohen (*Biochemistry and Molecular Biophysics*) B.S., University of California, Los Angeles 2014.

Thesis: Developing Multivalent Nanoparticle Vaccines Against Current and Future Viruses.

‡ *Students whose names are followed by a double dagger had their degrees conferred after the previous year's commencement ceremony.*

*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*

- Sarah Michelle Cohen (*Genetics*) B.A., Cornell University 2015.  
Thesis: Formation and Function of Ascarosides in the Nematodes *C. elegans* and *C. briggsae*.
- Shashank Gandhi (*Developmental Biology*) M.S., New York University 2015.  
Thesis: Molecular Mechanisms Underlying Cardiac Neural Crest Development in Avian Embryos.
- Xiawei Huang (*Biology*) B.S., Xiamen University 2014.  
Thesis: Molecular Function and Regulation of Aub Arginine Methylation in the piRNA Pathway.
- Jihyun Irizarry‡ (*Biology*) B.S., California State University, Los Angeles 2013.  
Thesis: Temporally Changing Roles of Morphogen Dorsal in the *Drosophila* Early Embryo.
- Anders Matthew Knight‡ (*Bioengineering*) B.S., University of Wisconsin-Madison 2014.  
Thesis: Expanding the Scope of Metalloprotein Families and Substrate Classes in New-to-Nature Reactions.
- Joseph Louis Marino (*Computation and Neural Systems*) B.S., University of Minnesota, Twin Cities 2014.  
Thesis: Learned Feedback & Feedforward Perception & Control.
- Reed Dillard McCardell (*Bioengineering*) B.S., University of California, Los Angeles 2013.  
Thesis: Genetic Circuits for the Control of Multi-Strain Bacterial Populations.
- James Michael Parkin (*Bioengineering*) B.S., University of Illinois at Urbana-Champaign 2014.  
Thesis: Signal Amplification in Synthetic Bacterial Communication.
- Elena Kim Perry (*Biology*) B.S., Yale University 2015.  
Thesis: Mechanisms and Consequences of Bacterial Resistance to Natural Antibiotics.
- Porfirio Quintero Cadena‡ (*Systems Biology*) B.S., Universidad Autónoma de Nuevo León 2014.  
Thesis: Mechanism and Scaling of Eukaryotic Transcription Activation.
- Tyler David Ross‡ (*Biology*) B.S., University of Virginia 2010.  
Thesis: Guiding Self-Organization in Active Matter with Spatiotemporal Boundary Conditions.
- Daniel P. Sawyer (*Bioengineering*) B.A., Bard College at Simon's Rock 2016; B.S., Columbia University 2016.  
Thesis: Enhanced Noninvasive Imaging of Acoustic Biomolecules.
- Yodai Takei (*Biology*) B.S., The University of Tokyo 2012; M.S., 2014.  
Thesis: Integrated Spatial Genomics Reveals Organizational Principles of Single-Cell Nuclear Architecture.
- Zeynep Turan (*Neurobiology*) B.S., Bucknell University 2007; M.S., Columbia University 2014.  
Thesis: Life Without Cortex: Subcortical Circuits in Naturalistic Behaviors.

## *Doctor of Philosophy continued*

Grigor Varuzhanyan‡ (*Biology*) B.S., California State Polytechnic University, Pomona 2013.

Thesis: Mitochondrial Dynamics and Mitophagy during Male Germline Development.

Ruohan Wang (*Biology*) B.S., University of Michigan, Ann Arbor 2014.

Thesis: Identification of New OPA1 Cleavage Site Reveals that Short Isoforms Regulate Mitochondrial Fusion.

Wan-Rong Wong (*Neurobiology*) B.S., National Taiwan University 2012; M.S., 2014.

Thesis: *C. elegans* Models of ASD-Associated Missense Variants.

## DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING

Hannah Marie Allen (*Chemistry*) B.A., Reed College 2014.

Thesis: Constraining the Formation and Fate of Hydroperoxides in the Remote Atmosphere.

Charles Haden Arnett‡ (*Chemistry*) B.S., Georgetown University 2015.

Thesis: Multimetallic Model Complexes of the Nitrogenase Active Site.

Jacob David Bagley (*Chemistry*) B.S., Brigham Young University 2016.

Thesis: Fabrication of Pristine and Doped Graphene Nanostripes and Their Application in Energy Storage.

Azhar Iqbal Carim (*Chemistry*) B.S., University of Michigan, Ann Arbor 2011.

Thesis: Growth Towards Light: Translation of Optical Inputs into Mesostuctured Outputs via Inorganic Phototropism.

Sophia Mohini Charan (*Chemical Engineering and Environmental Science and Engineering*) B.S., Yale University 2016.

Thesis: Secondary Organic Aerosol Formation from Volatile Chemical Products: Understanding Aerosol Yields and Dynamics.

Austin Ryan Dulaney (*Chemical Engineering*) B.S., The University of Texas at Austin 2016; M.S., California Institute of Technology 2018.

Thesis: Density Fluctuations and Machine Learning in Active Matter.

Chee-Huat Linus Eng (*Chemistry*) B.S., Binghamton University, State University of New York 2014.

Thesis: Plus Ultra: Genome-Wide Spatial Transcriptomics with RNA seqFISH+.

Rachel Rae Ford (*Chemistry*) B.S., University of Florida 2014.

Thesis: Controlling the Dynamics of Microstructure Formation in Mixed-Matrix Polymeric-Particle Membranes.

Phillip Laurence Helms (*Chemical Engineering*) B.S., University of Utah 2016.

Thesis: Tensor Networks for Nonequilibrium Statistical Mechanics.

## *Doctor of Philosophy continued*

- Carina I. Jette (*Chemistry*) B.S., University of California, Santa Barbara 2015.  
Thesis: Transition Metal-Catalyzed Enantioselective Functionalization of Nitrogen and Oxygen-Containing Heterocycles.
- Paul Andrew Kempler‡ (*Chemical Engineering*) B.E., Vanderbilt University 2015.  
Thesis: High-Aspect Ratio Structures in Light-Absorbers and Electrocatalysts for Solar Fuels Devices.
- Heidi Elizabeth Klumpe (*Chemical Engineering*) B.A., North Carolina State University 2013.  
Thesis: Context-Dependent, Combinatorial Logic of BMP Signaling.
- Weimeng "Stephanie" Kong‡ (*Chemical Engineering*) B.S., Harvey Mudd College 2015; M.S., California Institute of Technology 2018.  
Thesis: Nanometer-sized Aerosol Particles in the Atmosphere: Measurement, Analysis, and Impact.
- Benjamin Joseph Laccetti‡ (*Chemical Engineering*) B.A., Emory University 2013; B.S., Georgia Institute of Technology 2013; M.S., California Institute of Technology 2017.  
Thesis: Therapeutic Microparticles and Biolistic Drug-Delivery to the Cornea.
- Sebastian James Rice Lee (*Chemistry*) B.S., University of California, Santa Barbara 2015.  
Thesis: Combining High- and Low-Level Electronic Structure Theories for the Efficient Exploration of Potential Energy Surfaces.
- Kyra SoHyun Lee‡ (*Chemistry*) B.S., University of Illinois at Urbana-Champaign 2013.  
Thesis: The Electronic Nose: 2-D Material Vapor Sensors.
- Griffin John Mead (*Chemistry*) B.A., Occidental College 2014.  
Thesis: Chirped Pulse Microwave and Single-Shot Terahertz Spectroscopy Studies of Intermolecular Interactions.
- Joseph Peter Herman Messinger (*Chemistry*) B.A., Amherst College 2014.  
Thesis: Spectroscopy and Kinetics of Atmospheric and Astrochemical Radical Reactions.
- Aurapat (Fa) Ngamnithiporn (*Chemistry*) B.A., Carleton College 2015; M.S., California Institute of Technology 2019.  
Thesis: I. Development of Nickel- and Palladium-Catalyzed Asymmetric Allylic Alkylation Reactions. II. Enantioselective Syntheses of Tetrahydroisoquinoline-Based Natural Products and Unnatural Analogs.
- Paul Daniel Nuñez‡ (*Chemistry and Computer Science*) B.S., The University of Texas at Austin 2013.  
Thesis: Investigating Unexpected but Advantageous Integrated Systems for Solar Water Splitting.

## *Doctor of Philosophy continued*

- Maiko Obana (*Chemistry*) B.Eng., The University of Tokyo 2014.  
Thesis: Genetically Encoded 3,4-Ethylenedioxythiophene (EDOT) Functionality for Fabrication of Protein-Based Conductive Polymers.
- Roberta Poveciciute† (Chemical Engineering) S.B., Massachusetts Institute of Technology 2013.  
Thesis: Mucosal Landscape of the Gut: Development and Application of 3D Imaging Tools for Interrogation of Host-Microbe Mucosal Interface in Mice and Humans.
- Christopher Elias Reimann† (Chemistry) B.S., University of Southern California 2015.  
Thesis: Convergent Synthetic Strategies toward Heterodimeric Bisindole Alkaloids and Polyoxygenated Diterpenoids.
- Jieun Shin (*Chemistry*) B.S., Yonsei University 2015.  
Thesis: Investigating the Catalytic Mechanisms of Bio-degrading Copper Proteins: Multi-copper Oxidases (MCOs) and Lytic Polysaccharide Monooxygenases (LPMOs).
- Ethan David Simonoff (*Chemistry*) B.A., Northwestern University 2014.  
Thesis: Understanding Pattern Formation and Improving Fidelity in Phototropic Growth.
- Gautam Dutta Stroschio (*Chemistry*) B.S., The University of Chicago 2014; M.S., California Institute of Technology 2018.  
Thesis: Understanding the Electronic Structures of First-Row Transition Metal Complexes for Solar Energy Conversion and Catalysis.
- Chong Sun (*Chemistry*) B.S., Peking University 2015.  
Thesis: Finite Temperature Simulations of Strongly Correlated Systems.
- Stephanie Denise Threatt† (Biochemistry and Molecular Biophysics) B.A., Harvard University 2014.  
Thesis: In Vivo Activity of Rhodium Metalloinsertors and Exploration of Drug Delivery Systems.
- Jingzhou Wang (*Biochemistry and Molecular Biophysics*) B.S., University of California, Los Angeles 2016.  
Thesis: CDRxAb: Antibody Small-Molecule Conjugates with Computationally Designed Target-Binding Synergy.
- Zachary Wu (*Chemical Engineering*) B.S., Cornell University 2015; M.S., California Institute of Technology 2018.  
Thesis: Data-Driven Protein Engineering.
- Ellen Yan (*Chemistry*) B.Sc., University of Toronto 2015.  
Thesis: Experimental and Theoretical Investigation of a Reductant-Activated Methodology for Covalent Functionalization of 1T' Transition Metal Dichalcogenides MoS<sub>2</sub> and WS<sub>2</sub>.
- Weilai Yu (*Chemistry*) B.S., Wuhan University 2016.  
Thesis: Stability of Photo-Electrochemical Interface for Solar Fuels.



## *Doctor of Philosophy continued*

Dan Zhou (*Chemistry*) B.S., University of Science and Technology of China 2013.

Thesis: Mechanism of Action of a Therapeutic Peptide, Risuteganib, Suggests that Supporting Mitochondrial Function Underlies its Clinical Efficacy in Treating Leading Causes of Blindness.

Wen Zhou (*Biochemistry and Molecular Biophysics*) B.S., McGill University 2013.

Thesis: Single-Cell Analysis of Normal and Perturbed Early T-Cell Developmental Processes.

## DIVISION OF ENGINEERING AND APPLIED SCIENCE

Thomas Geoffrey Anderson‡ (*Applied and Computational Mathematics*) B.S., New Jersey Institute of Technology 2014.

Thesis: Hybrid Frequency-Time Analysis and Numerical Methods for Time-Dependent Wave Propagation.

Noriaki Arai (*Materials Science*) B.A., Keio University 2012.

Thesis: Freeze Casting of Ceramics: Pore Design from Solidification Principles.

Navid Azizan Ruhi (*Computing and Mathematical Sciences*) B.S., Sharif University of Technology 2013; M.S., University of Southern California 2015.

Thesis: Large-Scale Intelligent Systems: From Network Dynamics to Optimization Algorithms.

Guillaume Beardsell (*Mechanical Engineering*) B.Eng., Université Laval 2013; M.Sc., 2016.

Thesis: Numerical Investigation of Compressibility Effects in Reacting Subsonic Flows.

Pakpoom Buabthong (*Materials Science and Computer Science*) B.S., University of Illinois at Urbana-Champaign 2015; M.S., California Institute of Technology 2018.

Thesis: Stability and Protective Coatings of Semiconductor Electrodes for Solar Fuel Devices.

Karena Xin Cai (*Control and Dynamical Systems*) B.S., Princeton University 2015.

Thesis: Safe and Interpretable Autonomous Systems Design: Behavioral Contracts and Semantic-Based Perception.

Yalu Chen (*Materials Science*) B.S., Shanghai Jiao Tong University 2016.

Thesis: Computational Investigation of Nanoscale Electrocatalysts for Clean Energy Conversion.

Yikai Chen (*Mechanical Engineering*) B.Eng., Tongji University 2006; M.S., California Institute of Technology 2018.

Thesis: Numerical Simulation of Performance and Solar-to-Fuel Conversion Efficiency for Photoelectrochemical Devices.

## *Doctor of Philosophy continued*

- Richard Cheng (*Mechanical Engineering*) B.S.E., Princeton University 2015; M.S., California Institute of Technology 2017.  
Thesis: Assuring Safety under Uncertainty in Learning-Based Control Systems.
- Bryce Walker Edwards (*Materials Science*) B.S., University of Florida 2015.  
Thesis: Mechanical Investigations: Experimental Fracture Techniques and Frozen Small-Molecule Organics.
- Luizetta Vadimovna Elliott (*Medical Engineering*) B.S., The University of Chicago 2016; M.S., California Institute of Technology 2019.  
Thesis: Stimuli Responsive Micro-Architected Materials.
- Mohammadsadeh Faraji-Dana† (*Electrical Engineering*) M.A.Sc., University of Waterloo 2014; M.S., California Institute of Technology 2018.  
Thesis: From Metasurfaces to Compact Optical Metasystems.
- Seyed Mohammadreza Fatemi† (*Electrical Engineering*) B.S., K. N. Toosi University of Technology 2011; M.S., Sharif University of Technology 2013; M.S., California Institute of Technology 2016.  
Thesis: Active Flat Optics Wavefront Manipulation for Imaging, Ranging, and Sensing.
- Filippos Filippitzis (*Mechanical Engineering*) Diplom, University of Thessaly 2016; M.S., California Institute of Technology 2018.  
Thesis: Identification of Structural Damage, Ground Motion Response, and the Benefits of Dense Seismic Instrumentation.
- Matan Gal-Katziri† (*Electrical Engineering*) B.Sc., Ben-Gurion University of the Negev 2010; M.S., California Institute of Technology 2016.  
Thesis: Precision At Scale: System Design from Tiny Biosensors to Giant Arrays.
- Leah Morgan Ginsberg (*Mechanical Engineering*) B.S., Georgia Institute of Technology 2016; M.S., California Institute of Technology 2019.  
Thesis: Multiscale Mechanical Characterization of Subcellular Structures in Living Walled Cells.
- Sai Sharan Injeti (*Mechanical Engineering*) B.Tech., M.Tech., Indian Institute of Technology Madras 2016; M.S., California Institute of Technology 2018.  
Thesis: Multi-functional Metamaterials.
- Silken Michelle Jones (*Aeronautics*) B.S.E., Princeton University 2015; M.S., California Institute of Technology 2016.  
Thesis: Thermal Ignition by Vertical Cylinders.

## *Doctor of Philosophy continued*

- Akshay Joshi (*Aeronautics*) B.Tech., Indian Institute of Technology Madras 2017; M.S., California Institute of Technology 2018.  
Thesis: A Shock Compression Investigation of Failure-Waves and Phase-Transition in Soda-Lime Glass.
- Ghazaleh Kafaie Shirmanesh‡ (*Applied Physics*) B.S., Sharif University of Technology 2012; M.S., 2014; M.S., California Institute of Technology 2019.  
Thesis: Electro-optically Tunable Metasurfaces for a Comprehensive Control of Properties of Light.
- Konstantinos Karapiperis (*Applied Mechanics and Applied and Computational Mathematics*)  
Diplom, National Technical University of Athens 2012; M.S., University of California, Davis 2015; M.S., California Institute of Technology 2017.  
Thesis: Multiscale, Data-Driven and Nonlocal Modeling of Granular Materials.
- Kathleen Marie Kennedy (*Materials Science*) B.S., Columbia University 2016; M.S., California Institute of Technology 2018.  
Thesis: Renewable Energy Generation and Storage: From Microwires to Macro-Energy Systems.
- Aroutin Khachaturian (*Electrical Engineering*) B.S., California Institute of Technology 2013; M.S., 2014.  
Thesis: Large-Scale Photonics Integration: Data Communications to Optical Beamforming.
- Taeyong Kim‡ (*Applied Physics*) B.S., Yonsei University 2013; M.S., California Institute of Technology 2015.  
Thesis: Investigation of Transport Phenomena of Thermal Acoustic Excitations in Semi-Crystalline and Amorphous Materials using Transient Grating Spectroscopy.
- Deepan Kishore Kumar (*Electrical Engineering*) B.E., Birla Institute of Technology and Science, Pilani 2014; M.S., California Institute of Technology 2015.  
Thesis: Novel Light-Matter Interaction in Quasi-One-Dimensional Graphene Nanomaterials for Photonics.
- Tai-jung Kuo (*Materials Science*) B.S., National Tsing Hua University 2015.  
Thesis: Customized Porosity in Ceramic Composites via Freeze Casting.
- Danilo Smiljan Kusanovic (*Civil Engineering and Applied and Computational Mathematics and Computer Science*) M.S., Universidad Técnica Federico Santa María 2009; Licenciado, 2010; M.S., California Institute of Technology 2017.  
Thesis: Improving Reduced Order Models of Soil-Structure Interaction Using an Ensemble Kalman Inversion Finite Element Model Updating Framework.

## *Doctor of Philosophy continued*

- Hyoungnan Kwon (*Electrical Engineering*) B.S., Seoul National University 2016; M.S., California Institute of Technology 2018.  
Thesis: Dielectric Metasurfaces for Integrated Imaging Devices and Active Optical Elements.
- Anthony Herman Fu-Hao Kwong‡ (*Materials Science*) M.S., University of Southern California 2014.  
Thesis: Mechanical Properties of Small Scale Sputtered Metallic Glasses.
- Joel Michael Lawson (*Aeronautics*) B.E., B.S., The University of Auckland 2015; M.S., California Institute of Technology 2016.  
Thesis: Focused Laser Differential Interferometry.
- Victoria Jin-Young Lee (*Mechanical Engineering*) Sc.B., Brown University 2015; M.S., California Institute of Technology 2017.  
Thesis: Theoretical, Computational, and Experimental Characterization of Nematic Elastomers.
- Zachary Jordan Lee (*Electrical Engineering*) B.S., John Brown University 2016; M.S., California Institute of Technology 2018.  
Thesis: The Adaptive Charging Network Research Portal: Systems, Tools, and Algorithms.
- Wei-Hsiang Lin (*Applied Physics*) B.S., Tamkang University 2006; M.S., National Chiao Tung University 2008.  
Thesis: Synthesis of 2D Quantum Materials for Nanoelectronic and Nanophotonic Applications.
- Palma Alise den Nijs London‡ (*Computer Science*) B.S., University of Washington 2014; M.S., California Institute of Technology 2017.  
Thesis: Frameworks for High Dimensional Convex Optimization.
- Wen-loong Ma (*Mechanical Engineering*) B.S., China University of Petroleum (*East China*) 2011; M.S., Texas A&M University 2014.  
Thesis: From Bipedal to Quadrupedal Locomotion, Experimental Realization of Lyapunov Approaches.
- Riley John Murray (*Computing and Mathematical Sciences*) B.S., University of California, Berkeley 2016.  
Thesis: Applications of Convex Analysis to Signomial and Polynomial Nonnegativity Problems.
- Yashwanth Kumar Nakka (*Space Engineering*) B.S., Indian Institute of Space Science and Technology 2011; M.S., University of Illinois at Urbana-Champaign 2016; M.S., California Institute of Technology 2017.  
Thesis: Spacecraft Motion Planning and Control under Probabilistic Uncertainty for Coordinated Inspection and Safe Learning.

## *Doctor of Philosophy continued*

- Vinayak Narasimhan† (*Medical Engineering*) B.E., National University of Singapore 2012; M.S., California Institute of Technology 2017.  
Thesis: Bioinspired Nanostructures for Biomedical Applications.
- Kai Narita (*Materials Science*) B.Eng., Tokyo Institute of Technology 2014; M.Eng., 2016.  
Thesis: 3D Architected Battery Electrodes for Exploring Battery Kinetics from Nano to Millimeter.
- Ellen Rachel Novoseller (*Control and Dynamical Systems*) B.S., University of Southern California 2014.  
Thesis: Online Learning from Human Feedback with Applications to Exoskeleton Gait Optimization.
- Daniel Pastor (*Space Engineering*) Aeronautical Engineer, Universidad Politécnica de Madrid 2014; M.Sc., Cranfield University 2014; M.S., California Institute of Technology 2016.  
Thesis: Towards Learning Robotic Dynamics: Application to Multicopter Takeoff and Landing.
- Antonio Pedivellano (*Space Engineering*) Laurea, Università degli Studi di Palermo 2014; M.S., 2016; M.S., California Institute of Technology 2017.  
Thesis: Deployment Dynamics of Thin-Shell Space Structures.
- Tung Phan-Minh (*Mechanical Engineering and Computer Science*) A.S., Orange Coast College 2012; B.S., University of California, Berkeley 2014; M.S., California Institute of Technology 2017.  
Thesis: Contract-based Design: Theories and Applications.
- Ethan Marcus Pickering (*Mechanical Engineering*) B.S., M.S., Case Western Reserve University 2016; M.S., California Institute of Technology 2018.  
Thesis: Resolvent Modeling of Turbulent Jets.
- Jenna Reher (*Mechanical Engineering*) B.S., University of Nebraska, Lincoln 2013; M.S., California Institute of Technology 2018.  
Thesis: Dynamic Bipedal Locomotion: From Hybrid Zero Dynamics to Control Lyapunov Functions via Experimentally Realizable Methods.
- Xinying (Cindy) Ren (*Control and Dynamical Systems*) B.E., Tsinghua University 2015.  
Thesis: Principles for Designing Robust and Stable Synthetic Microbial Consortia.
- Becky Roh (*Civil Engineering and Geophysics*) B.S., Cornell University 2015; M.S., California Institute of Technology 2017.  
Thesis: Matching Waveform Envelopes for Earthquake Early Warning.
- Fabien Royer (*Space Engineering*) B.S., Institut Supérieur de l'Aéronautique et de l'Espace 2014; M.S., California Institute of Technology 2016.  
Thesis: Probing the Buckling of Thin Shell Space Structures.

## *Doctor of Philosophy continued*

- Joseph Ruan (*Mechanical Engineering*) B.S., Purdue University 2016; M.S., California Institute of Technology 2018.  
Thesis: Streamwise Homogeneous Turbulent Boundary Layers.
- Fariborz Salehi (*Electrical Engineering and Applied and Computational Mathematics*) B.S., Sharif University of Technology 2015; M.S., California Institute of Technology 2016.  
Thesis: Structured Signal Recovery from Nonlinear Measurements with Applications in Phase Retrieval and Linear Classification.
- Florian Tobias Schäfer (*Applied and Computational Mathematics*) B.Sc., University of Bonn 2013; M.Sc., 2015.  
Thesis: Inference, Computation, and Games.
- Shane Shayan Shahrestani (*Medical Engineering*) B.S., University of California, Los Angeles 2016; M.S., California Institute of Technology 2019.  
Thesis: Eddy Current Damping Stroke Sensor.
- Maysam Shamai (*Aeronautics*) B.S., University of California, Irvine 2015; M.S., California Institute of Technology 2016.  
Thesis: Complexity Reduction of Fluid-Structure Systems at Low Forcing Frequencies.
- Boqiang Shen (*Applied Physics*) B.S., Peking University 2015; M.S., California Institute of Technology 2018.  
Thesis: Applications and Integration of Optical Frequency Combs.
- Naijian Shen (*Aeronautics*) B.Sc., The University of Melbourne 2014; M.Sc., 2016; M.S., California Institute of Technology 2018.  
Thesis: Part I: The Equations of Plasma Physics and The Richtmyer-Meshkov Instability in Magnetohydrodynamics. Part II: Evolution of Perturbed Planar Shockwaves.
- Xichen Shi (*Space Engineering*) B.S., University of Illinois at Urbana-Champaign 2013.  
Thesis: Intelligent Control for Fixed-Wing eVTOL Aircraft.
- Jialin Song (*Computing and Mathematical Sciences*) B.S., University of Toronto 2015.  
Thesis: Learning to Optimize: from Theory to Practice.
- Yu Su (*Computing and Mathematical Sciences*) B.S., University of Illinois at Urbana-Champaign 2015; M.S., California Institute of Technology 2017.  
Thesis: Optimizing Cloud AI Platforms: Resource Allocation and Market Design.
- Ying Shi Teh (*Mechanical Engineering and Computational Science and Engineering*) B.Eng., National University of Singapore 2015; M.S., California Institute of Technology 2017.  
Thesis: Understanding Imperfections and Instabilities in Crystals via Physics-based and Data-driven Models.

*Doctor of Philosophy continued*

- Oguzhan Teke $\ddot{z}$  (*Electrical Engineering and Applied and Computational Mathematics*) B.S., Bilkent University 2012; M.S., 2014.  
Thesis: Signals on Networks: Random Asynchronous and Multirate Processing, and Uncertainty Principles.
- Simon Silvio Tödli (*Aeronautics*) B.S., Swiss Federal Institute of Technology Zurich 2013; M.Sc., 2015; M.S., California Institute of Technology 2016.  
Thesis: Control of Wall-Bounded Turbulence Through Closed-Loop Wall Transpiration.
- Heming Wang (*Applied Physics*) B.S., Peking University 2016.  
Thesis: Kerr Solitons and Brillouin Lasers in Optical Microresonators.
- Di Wu (*Medical Engineering*) B.A.Sc., University of Toronto 2014; M.S., California Institute of Technology 2016.  
Thesis: Biomolecular Tools for Noninvasive Imaging and Manipulation of Engineered Cells.
- Xiaobin Xiong (*Mechanical Engineering*) B.E., Tongji University 2013; M.S., Northwestern University 2015.  
Thesis: Reduced Order Model Inspired Robotic Bipedal Walking: A Step-to-step Dynamics Approximation Based Approach.
- Jian Xu $\ddot{z}$  (*Electrical Engineering*) B.E., Zhejiang University 2016.  
Thesis: Optical Light Manipulation and Imaging through Scattering Media.
- Erika Ye (*Applied Physics*) S.B., Massachusetts Institute of Technology 2014; M.E., 2015; M.S., California Institute of Technology 2017.  
Thesis: Reducing Computational Costs for Many-Body Physics Problems.
- Hikmet Yildiz (*Electrical Engineering*) B.S., Bilkent University 2015; M.S., California Institute of Technology 2016.  
Thesis: Linear Codes with Constrained Generator Matrices.
- Ke Yu (*Mechanical Engineering and Applied and Computational Mathematics*) B.S., Peking University 2015; M.S., California Institute of Technology 2016.  
Thesis: Multi-resolution Lattice Green's Function Method for High Reynolds Number External Flows.
- Haolu Zhang (*Mechanical Engineering*) B.S., University of Michigan, Ann Arbor 2016; M.S., California Institute of Technology 2018.  
Thesis: Microstructure-Enabled Plasticity in Nano-to-Microscale Materials.
- Zhewei Zhang (*Applied Physics*) B.A., Peking University 2015; M.S., California Institute of Technology 2018.  
Thesis: Hybrid Si/III-V Lasers for Next-generation Coherent Optical Communication.

*Doctor of Philosophy continued*

DIVISION OF GEOLOGICAL AND PLANETARY SCIENCES

- Elizabeth Bailey‡ (*Planetary Science*) S.B., Massachusetts Institute of Technology 2014.  
Thesis: Interior and Orbital Dynamics at the Innermost and Outermost Reaches of Planetary Systems.
- Joseph Anthony Biasi (*Geochemistry*) B.S., Indiana University Bloomington 2015; M.S., California Institute of Technology 2017.  
Thesis: Paleomagnetism and Geochemistry of Basalts in the North American Cordillera, Davis Strait, and Antarctica.
- Grayson Lee Chadwick‡ (*Geobiology*) B.S., California Institute of Technology 2011.  
Thesis: How to Beat Diffusion: Explorations of Energetics and Spatial Relationships in Microbial Ecosystems.
- Laura M. Chimiak (*Geochemistry*) B.A., Amherst College 2009; M.S., California Institute of Technology 2019.  
Thesis: Prebiotic Fingerprints.
- Siteng Fan (*Planetary Science*) B.S., Peking University 2015; M.S., California Institute of Technology 2017.  
Thesis: Planetary Atmospheres: Astrobiologically Relevant Icy Worlds and Earth as a Proxy Exoplanet.
- Alistair Thompson Hayden‡ (*Geology*) B.S., University of Michigan 2011; M.A., Boston University 2012; M.S., California Institute of Technology 2018.  
Thesis: Exhumed Fluvial Deposits: New Paleohydrological Tools Indicate Long-Duration Fluvial Activity on Early Mars.
- Daniel Lee Johnson (*Geochemistry*) A.B., Washington University in St. Louis 2014; M.S., California Institute of Technology 2017.  
Thesis: Sulfur Isotopic Insights into the Modern and Ancient Marine Sulfur Cycles.
- Valere Regis Westbrooke Lambert (*Geophysics and Mechanical Engineering*) B.S., California Institute of Technology 2014; M.S., 2017.  
Thesis: Constraining Earthquake Source Processes Through Physics-Based Modeling.
- Madeline Janine Lewis (*Geochemistry*) B.S., Indiana University Bloomington 2015; M.S., California Institute of Technology 2017.  
Thesis: Magmatic Differentiation in Arc and Mid-Ocean Ridge Settings.
- Usha Farey Lingappa (*Geobiology*) B.A., Hampshire College 2012.  
Thesis: Manganese Through Time and Other Stories Concerning Cyanobacteria and the World Around Them.



## *Doctor of Philosophy continued*

- Kyle Shuhert Metcalfe‡ (*Geobiology*) B.A., Pomona College 2014; M.S., California Institute of Technology 2018.  
Thesis: Symbiotic Diversity and Mineral-Associated Microbial Ecology in Marine Microbiomes.
- Sean William Alexander Mullin‡ (*Geobiology*) B.S., University of California, Berkeley 2011.  
Thesis: Spatial and Temporal Dynamics of Microorganisms Living Along Steep Energy Gradients and Implications for Ecology and Geologic Preservation in the Deep Biosphere.
- Alexandra Atlee Phillips (*Geochemistry*) B.A., University of California, Santa Barbara 2015; M.S., California Institute of Technology 2018.  
Thesis: Sulfur Cycling in the Water Columns of Lakes and Oceans.
- Kevin Patrick Roback (*Geology*) B.S., University of Michigan, Ann Arbor 2016; M.S., California Institute of Technology 2019.  
Thesis: Investigating Sand Transport and Landslides, and Implications for Past and Present Environments on Mars and Earth.
- Leah Sabbeth‡ (*Geology*) B.S., University of Rochester 2013; M.S., California Institute of Technology 2016.  
Thesis: Provenance, Structural Geology, and Sedimentation of the Miocene and Pliocene Californias.
- Samantha Trumbo (*Planetary Science*) B.A., Cornell University 2013; M.S., University of California, San Diego 2015; M.S., California Institute of Technology 2018.  
Thesis: Views of an Ocean World: The Signatures of Internal and External Processes on the Surface of Europa.
- Siwen Wang‡ (*Environmental Science and Engineering*) B.E., Tsinghua University 2011; M.E., 2014; M.S., California Institute of Technology 2017.  
Thesis: Photo- and Electro-Chemistry Methods for Waterborne Pathogen Treatment and Detection in Environmental Water.
- Xunyi Wu (*Environmental Science and Engineering*) B.S., University of California, Los Angeles 2015; M.S., California Institute of Technology 2017.  
Thesis: Novel, Rapid and Cost-effective Methods for Concentration, Detection and Monitoring of Waterborne Pathogens in Resource-Limited Settings.
- Hao Xie (*Geochemistry*) B.S., University of Science and Technology of China 2015; M.S., California Institute of Technology 2017.  
Thesis: Road to Equilibrium: Stable Isotope Distribution in Gaseous Alkanes and Thermal History of Geological Hydrocarbons.

## *Doctor of Philosophy continued*

### DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES

Anastasia Buyalskaya (*Social and Decision Neuroscience*) B.A., Hunter College of the City University of New York 2012; M.Sc., Imperial College London 2014.

Thesis: Investigating Drivers of Repeated Behaviors in Field Data.

Xiaomin Li (*Behavioral and Social Neuroscience and Computer Science*) B.E., Shanghai University of Finance and Economics 2013; M.A., New York University 2015; M.S., California Institute of Technology 2017.

Thesis: Attention, Strategies and the Human Mind.

### DIVISION OF PHYSICS, MATHEMATICS AND ASTRONOMY

Brent Roy Belland (*Physics*) S.B., Massachusetts Institute of Technology 2016.

Thesis: Modeling Focal Ratio Degradation, Its Implications for Upcoming Fiber Spectrographs, and the Dynamics of NGC 6822.

Christopher David Bochenek (*Astrophysics*) B.A., The University of Chicago 2016; M.S., California Institute of Technology 2018.

Thesis: The Progenitors of Fast Radio Bursts.

Kevin Brian Burdge (*Physics*) S.B., Massachusetts Institute of Technology 2015.

Thesis: Twinkle, Twinkle, Little Stars: Shedding Light on the Population of Galactic Gravitational Wave Sources.

Craig Russell Cahillane (*Physics*) B.S., University of Notre Dame 2014.

Thesis: Controlling and Calibrating Interferometric Gravitational Wave Detectors.

Swati Chaudhary (*Physics*) B.Sc., University of Delhi 2013; M.Sc., Indian Institute of Technology Kanpur 2015.

Thesis: Light Induced Dynamics in Quantum Matter.

Chien-Chang Chen (Physics) B.S., University of Illinois at Urbana-Champaign 2011; M.S., California Institute of Technology 2015.

Thesis: Investigation of the Physical Properties of Dirac Materials.

Hsiao-Yi Chen (*Physics*) B.S., National Taiwan University 2013.

Thesis: Exciton Dynamics Studies from First-Principles Calculations: Radiative Recombination, Exciton-Phonon Interactions, and Ultrafast Exciton Relaxation.

Pouria Dadras (*Physics*) M.S., Sharif University of Technology 2015.

Thesis: Black Holes and Entanglement Entropy.

## *Doctor of Philosophy continued*

- Kishalay De (*Astrophysics*) B.S., Indian Institute of Science 2016; M.S., California Institute of Technology 2018.  
Thesis: The Whisper and the Bang: Cosmic Fireworks in the Lives of Compact Binaries.
- Joshua Robert Frisch (*Mathematics*) S.B., Massachusetts Institute of Technology 2016.  
Thesis: Analogues of Amenability.
- Anna Yen Qin Ho† (*Astrophysics*) S.B., Massachusetts Institute of Technology 2014; M.S., California Institute of Technology 2017.  
Thesis: The Landscape of Relativistic Stellar Explosions.
- Juhyun Kim (*Mathematics*) B.S., Seoul National University 2016.  
Thesis: Annular Links with  $sl_2$ -Irreducible Annular Khovanov Homology.
- Nien-En Lee (*Physics*) B.S., National Taiwan University 2010; M.S., 2012.  
Thesis: Electron-Phonon Interactions and Charge Transport from First-Principles Calculations: Complex Crystals, Higher Order Coupling, and Steps Toward the Small Polaron Regime.
- Joshua Franklin Lieber (*Mathematics*) B.A., The University of Chicago 2014.  
Thesis: Études in Homotopical Thinking:  $F_1$ -Geometry, Concurrent Computing, and Motivic Measures.
- Junyu Liu (*Physics*) B.S., University of Science and Technology of China 2016; M.S., California Institute of Technology 2019.  
Thesis: Does Richard Feynman Dream of Electric Sheep? Topics on Quantum Field Theory, Quantum Computing, and Computer Science.
- Ivaylo Sashkov Madjarov (*Physics*) B.A., Cornell University 2016.  
Thesis: Entangling, Controlling, and Detecting Individual Strontium Atoms in Optical Tweezer Arrays.
- James Francis Mangan (*Physics*) B.A., Grinnell College 2015.  
Thesis: Effective Field Theory Topics in the Modern S-Matrix Program.
- Zachary Mark (*Physics*) B.A., Oberlin College 2014; M.S., California Institute of Technology 2019.  
Thesis: Gravitational Wave Signatures of Black Hole Physics.
- Muir James Morrison (*Physics*) B.S., University of Nevada, Reno 2012.  
Thesis: Statistical Mechanics of Problems in Transcription Regulation.
- Donal Brendan O’Sullivan‡ (*Astrophysics*) B.S., National University of Ireland, Maynooth 2013; M.S., California Institute of Technology 2015.  
Thesis: Mapping the Diffuse Universe: Integral Field Spectroscopy of Galaxy Environments.

## *Doctor of Philosophy continued*

- Aaron Benjamin Pearlman (*Physics*) B.S., University of Maryland, Baltimore County 2010; M.S., California Institute of Technology 2019.  
Thesis: Hunting for Radio Transients in the Local Universe and Pulsars Toward the Center of the Milky Way Galaxy.
- Frank R. Rice III‡ (*Physics*) B.A., Northwestern University 1977; M.S., Naval Postgraduate School 1986.  
Thesis: A Very Wide Bandwidth SIS Heterodyne Receiver Design for Millimeter and Submillimeter Astronomy.
- Brenden Carlisle Roberts (*Physics*) B.S., Clemson University 2014; M.S., California Institute of Technology 2017.  
Thesis: New Tensor Network Methods and Studies of Criticality in Low-Dimensional Quantum Systems.
- Angad Singh‡ (*Mathematics*) B.S., Purdue University 2014; M.S., California Institute of Technology 2018.  
Thesis: Mathematical Models of Trading.
- Lev Spodyneiko (*Physics*) B.S., Moscow Institute of Physics and Technology 2012; M.Sc., 2014.  
Thesis: Topological Invariants of Interacting Gapped Quantum Materials and Transport Phenomena.
- Yu Qing Tang (*Physics*) B.S., University of Waterloo 2015; M.S., California Institute of Technology 2020.  
Thesis: Quantum Information at High and Low Energies.
- YanJun Xu (*Physics*) B.S., University of Science and Technology of China 2015.  
Thesis: Probing the Inner Accretion Flow Properties Around Black Holes with X-ray Observations.
- Liyang Yang (*Mathematics*) B.S., Tsinghua University 2016.  
Thesis: A Coarse Jacquet-Zagier Trace Formula for  $GL(n)$  with Applications.
- Lingfei Yi (*Mathematics*) B.S., Peking University 2016.  
Thesis: Geometric Langlands for Hypergeometric Sheaves.
- Gene Ryan Yoo‡ (*Mathematics*) S.B., Massachusetts Institute of Technology 2015.  
Thesis: Learning Patterns with Kernels and Learning Kernels from Patterns.
- Minyoung You‡ (*Physics*) B.S., University of California, San Diego 2013.  
Thesis: Topological Phases of Matter: Classification, Stacking Law, and Relation to Topological Quantum Field Theory.

*Doctor of Philosophy continued*

Zhicai Zhang (*Physics*) B.S., Tsinghua University 2015; M.S., California Institute of Technology 2018.

Thesis: First Observation of the Production of Three Massive Vector Bosons and Search for Long-Lived Particles using Delayed Photons in pp Collisions at  $\sqrt{s} = 13$  TeV.

## PRIZES AND AWARDS

*Prizes and awards are listed only for those students participating in commencement this year, and include prizes and awards received by them in previous years.*

### MABEL BECKMAN PRIZE

Given in memory of Mabel Beckman's many years of commitment to Caltech's educational and research programs, this prize is awarded to an undergraduate woman (or women) who, upon completion of her junior or senior year at Caltech, has achieved academic excellence and demonstrated outstanding leadership skills, a commitment to personal excellence, good character, and a strong interest in the Caltech community.

*2021 Arushi Gupta, Isabella Camplisson*

### FREDERIC W. HINRICHS, JR., MEMORIAL AWARD

This award, established by the Board of Trustees, is in memory of Frederick W. Hinrichs, Jr., who served for more than 20 years as dean and professor at Caltech. In remembrance of his honor, courage, and kindness, the annual award is given to the senior (or seniors) who, throughout their undergraduate years, made the greatest contribution to the student body and whose qualities of character, leadership, and responsibility have been outstanding. At the discretion of the dean, more than one award may be made in any year.

*2021 Varun Shanker*

### GEORGE W. HOUSNER PRIZE FOR ACADEMIC EXCELLENCE AND ORIGINAL RESEARCH

This prize is given annually to a senior or seniors in the upper 20 percent of their class who have demonstrated excellence in scholarship and in the preparation of an outstanding piece of original scientific research. The students are selected by the deans and the Undergraduate Academic Standards and Honors Committee. At the discretion of the deans, more than one award may be given in any year. This prize is made possible by a gift from the late George W. Housner, Carl F Braun Professor of Engineering, Emeritus.

*2021 Michael Yao, Alexander Zlokapa*

## MILTON AND FRANCIS CLAUSER DOCTORAL PRIZE

This prize is given to a Ph.D. candidate whose thesis is judged by a committee of the Faculty Board to exhibit significant new work, ingenuity, and originality, and to have the greatest potential to open new avenues of human thought and endeavor.

2021 *Kishalay De, Hui Chiu*

*The previous four prizes were announced at the commencement ceremony.*

## ADVOCATING CHANGE TOGETHER (ACT) AWARD

Given by the Caltech Y, this 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.

2017 *Yu Su*

2018 *Sirisha Gudavalli, Weimeng “Stephanie” Kong*

## AMORI DOCTORAL PRIZE IN CMS

Established in 2017 by Michael Amori (MS '07), this prize honors outstanding dissertations in the computing and mathematical sciences during the current academic year. Awardees are selected by a committee of computing and mathematical sciences faculty each spring.

2021 *Riley John Murray*

## APOSTOL AWARD FOR EXCELLENCE IN TEACHING IN MATHEMATICS

Named in honor of Tom Apostol, who taught at Caltech for over 50 years, this award recognizes excellence in teaching by graduate and undergraduate teaching assistants in mathematics.

2015 *Angad Singh*

2021 *Liyang Yang*

## CHARLES D. BABCOCK AWARD

Voted on by members of the aeronautics faculty, this award is given to a graduate student whose achievements in teaching or other assistance to students have made a significant contribution to the aeronautics department.

2017 *Maysam Shamai*

## ROBERT P. BALLE CALTECH MATHEMATICS SCHOLARS AWARD

This award is given to the mathematics major finishing their senior year who has demonstrated the most outstanding performance in mathematics courses completed in the student's time at Caltech.

2021 *Mayank Pandey*

## WILLIAM F. BALLHAUS PRIZE

This prize recognizes aeronautics students for outstanding doctoral dissertations.

2021 *Fabien Royer, Najian Shen*

## ERIC TEMPLE BELL UNDERGRADUATE MATHEMATICS RESEARCH PRIZE

This prize is given to one or more juniors or seniors for outstanding original research in mathematics.

2021 *Jacob Ressler-Craig, Daniel Rostovtsev, Qiyao (Vivian) Yu*

## THE BHANSALI FAMILY PRIZE IN COMPUTER SCIENCE

Established in 2001 by Vineer Bhansali (B.S. '87, M.S. '87) in memory of his grandfather, Mag Raj Bhansali, this prize is given 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.

2021 *Maya Sharanya Srikanth*

## BHANSALI FAMILY DOCTORAL PRIZE IN COMPUTER SCIENCE

Established in 2018 by Vineer Bhansali (B.S. '87, M.S. '87) in memory of his grandfather, Mag Raj Bhansali, this prize is given to honor outstanding dissertations in computer science, broadly defined, during the current academic year. Awardees are selected by a committee of computer science faculty each spring.

2021 *Zachary Jordan Lee*



## AMASA BISHOP SUMMER STUDY ABROAD PRIZE

This prize is given to one or more freshmen, sophomores, or juniors to fund summer study abroad in an organized program with the aim of gaining exposure to foreign language and international issues or cultures, including global issues in the sciences and engineering.

2018 *Alycia Lee, Ekaterina Korovina*

2019 *Amy Wang*

2020 *Johanna Karras*

## RICHARD G. BREWER PRIZE IN PHYSICS

This prize recognizes a freshman with the most interesting solutions to the Physics 11 “hurdles,” demonstrating intellectual promise and creativity at the very beginning of their Caltech education.

2015 *Ekaterina Korovina*

2018 *Yantian (Tina) Zhang*

## FRITZ B. BURNS PRIZE IN GEOLOGY

This prize is given 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.

2020 *Molly Ann Crotteau*

2021 *Xueer (Sherry) Liang*

## IAN CAMPBELL AWARD

The Ian Campbell Award is for outstanding performance in field geology courses during this academic year.

2021 *Allyson Trussell*

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

This prize is given to a Ph.D. candidate for an outstanding doctoral dissertation in applied mathematics or pure mathematics.

2021 *Florian Tobias Schäfer*

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

This prize, awarded annually to a Ph.D. candidate in applied mechanics, civil engineering, or mechanical engineering, is given to a student 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. This prize was established with gifts from alumni following the Mechanical Engineering Centennial Celebration in 2007.

2021 *Ying Shi Teh*

## RICHARD BRUCE CHAPMAN MEMORIAL AWARD

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

2021 *Simon Silvio Tödli*

## BEN P.C. CHOU DOCTORAL PRIZE IN IST

This prize recognizes outstanding doctoral dissertations in the broad area of information science and technology. The prize was established by Ben P.C. Chou's wife, June, and his son, Scott (B.S. '86), as a lasting tribute to his lifetime dedication to the pursuit of scholarly research and foregoing personal gain in favor of always doing the right thing for society.

2021 *Thomas Geoffrey Anderson*

## DONALD S. CLARK MEMORIAL AWARD

This award is given 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.

2020 *Cole Brabec, Rachel Sun*

## DONALD COLES PRIZE IN AERONAUTICS

This prize is given 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.

2021 *Akshay Joshi, Joel Michael Lawson*

## FRANCE A. CÓRDOVA GRADUATE STUDENT FUND

This fund provides resources for one to three graduate students annually to support research-related expenses. Each awardee shall be recognized as either a Neugebauer, Garmire, or Tombrello Scholar. Preference shall be given to student(s) studying broadly in areas in which professors Gerry Neugebauer, Gordon Garmire, and Thomas Tombrello made contributions.

- 2017 *Anna Yen Qin Ho, Garmire Scholar*
- 2019 *Christopher David Bochenek, Garmire Scholar*  
*Kishalay De, Neugebauer Scholar*
- 2020 *Kevin Brian Burdge, Garmire Scholar*  
*Yanjun Xu, Garmire Scholar*  
*Ivaylo Sashkov Madjarov, Tombrello Scholar*
- 2021 *Yuban Yao, Garmire Scholar*

## JAMES A. CULLEN MEMORIAL FELLOWSHIP FUND

This memorial fund is awarded annually to a graduate student or students who have demonstrated outstanding academic achievement in physics.

- 2016 *Lev Spodyneiko*

## DEANS' CUP

This award is presented to undergraduates whose concern for their fellow students has been demonstrated by their persistent efforts to improve the quality of undergraduate life and by effective communication with members of the faculty and administration.

- 2021 *Alexander Zlokapa*

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

This prize, awarded annually, recognizes 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).

- 2021 *Zachary Jordan Lee*

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

This prize, awarded annually, recognizes a Ph.D. candidate for the best thesis, publication, or discovery in biotechnology 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).

2020 *Vinayak Narasimhan*

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

This prize, awarded annually, recognizes 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).

2020 *Tyler David Ross*

2021 *Hsiao-Yi Chen*

## DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN SEISMO ENGINEERING, PREDICTION, AND PROTECTION

This prize, awarded annually, recognizes a Ph.D. candidate for the best thesis, publication, or discovery in seismo-engineering, prediction, and protection 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).

2021 *Valere Regis Westbrooke Lambert*

## LAWRENCE L. AND AUDREY W. FERGUSON PRIZE

This prize is awarded to the graduating Ph.D. candidate in biology and biological engineering who has produced the most outstanding doctoral thesis for the past year.

2021 *Hui Chiu, Shashank Gandhi*

## RICHARD FEYNMAN PRIZE IN THEORETICAL PHYSICS

This prize is awarded to a senior on the basis of excellence in theoretical physics.

2021 *Alexander Zlokapa*

## HAREN LEE FISHER MEMORIAL AWARD IN JUNIOR PHYSICS

This recognizes a junior physics major who demonstrates the greatest promise of future contributions in physics.

2020 *Alexander Zlokapa*

## HENRY FORD II SCHOLAR AWARD

This award recognizes either the engineering students with the best academic record at the end of the third year of undergraduate study or the engineering students with the best first-year record in the graduate program.

2020 *Rahul Arun, Ishani Karmarkar, Mohith Harish Manohara,  
Daniel Neamati, Caleb Sander, Michael Yao*

## JACK E. FROEHLICH MEMORIAL AWARD

This award, established by the family and friends of the late Jack E. Froehlich (B.S. '47, M.S. '48, Ph.D. '50), who did his undergraduate and graduate work at Caltech and was later the project manager for Explorer I for the Jet Propulsion Laboratory, provides an award to one or two juniors in the upper 5 percent of their class who show outstanding promise for a creative professional career. The recipients are selected by the deans and the Undergraduate Academic Standards and Honors Committee.

2020 *Michael Yao, Yantian (Tina) Zhang*

## BARRY M. GOLDWATER SCHOLARSHIP

This scholarship program honoring Senator Barry Goldwater was designed to foster and encourage outstanding students to pursue careers in the fields of mathematics, the natural sciences, and engineering. The Goldwater Scholarship is the premier undergraduate award of its type in these fields.

2019 *Alycia Lee*

2020 *John Heath, Alexander Zlokapa*

## GRADUATE DEAN'S AWARD

This award is given to a Ph.D. candidate or candidates who, throughout their graduate study at the Institute, have made great contributions to graduate life and whose qualities of leadership and responsibility have been outstanding.

2021 *Daniel Lee Johnson*

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

This prize, awarded annually, recognizes an undergraduate student in any class for original research, an original paper or essay, or other evidence of creative scholarship beyond the normal requirements of specific courses. The student is selected by the deans and the Undergraduate Academic Standards and Honors Committee.

2020 *Alexander Zlokapa*

2021 *Liana Noor Merk, Eric Anton Moreno*

## DAVID M. GREETHER PRIZE IN SOCIAL SCIENCE

This prize, awarded annually by a committee of social science faculty, rewards outstanding performance and creativity by an undergraduate who has completed one of the social science options. The prize was established 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.

2021 *Anthony James Kukavica, Jamie Vinson*

## THE LUCY GUERNSEY SERVICE AWARD

This award is 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 exemplify a spirit of service.

2018 *Michael Anaya*

2019 *Stephanie Threatt*

2020 *Elisabeth Gallmeier, Alexandra Atlee Phillips*

## HANS G. HORNUNG PRIZE

This prize is 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.

2021 *Antonio Pedivellano*

## PATRICK HUMMEL AND HARRY GRAY TRAVEL FUND

Established as a joint gift from Carla and Paul Hummel, Patrick Hummel, and Shirley and Harry Gray, Caltech's Arnold O. Beckman Professor of Chemistry and founding director of the Beckman Institute, the endowed fund supports undergraduate travel opportunities that promote professional and leadership development and broaden students' perspectives as engaged, responsible citizens of the world.

2019 *Laura Hu, Johanna Karras, Lily Kitagawa*

2020 *David Hanzhi Wu, Elisabeth Gallmeier, Isabella Camplisson*

## BIBI JENTOFT-NILSEN MEMORIAL AWARD

This award recognizes a junior or senior who exhibits outstanding qualities of leadership and who actively contributes to the quality of student life at Caltech.

2021 *Logan Apple*

## SCOTT RUSSELL JOHNSON PRIZE FOR EXCELLENCE IN GRADUATE STUDIES

This prize is 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.

2018 *Liyang Yang*

2019 *Joshua Robert Frisch, Liyang Yang*

2020 *Lingfei Yi*

## SCOTT RUSSELL JOHNSON PRIZE FOR EXCELLENCE AS A FIRST-YEAR GRADUATE STUDENT

This prize rewards excellence in first-year graduate research.

2017 *Liyang Yang*

## SCOTT RUSSELL JOHNSON GRADUATE DISSERTATION PRIZE IN MATHEMATICS

This prize is awarded for the best graduate dissertation in mathematics.

2021 *Liyang Yang, Joshua Robert Frisch*

### R.K. KAR AWARD FOR RESEARCH IN PHYSICS

This award is given annually to an outstanding graduate student who is exceptional in their physics studies and research (emphasis on condensed matter physics).

2020 *Swati Chaudhary*

### DR. JAMES KING JR. STUDENT DIVERSITY AWARD

This award recognizes individuals who stand out as strong supporters of diversity within the Caltech student body. The award is named in honor of Dr. King, who was the first African American to receive a Ph.D. from Caltech in chemical physics (at that time it was chemistry and physics), and was the assistant laboratory director at JPL. King had a reputation for mentoring students and encouraged diversity in the Caltech student body.

2019 *Stephanie Denise Threatt*

### D. S. KOTHARI PRIZE IN PHYSICS

This prize is awarded to a graduating senior in physics who has produced an outstanding research project during the year.

2021 *Eric Anton Moreno, Yuchen Tang*

### MARGIE LAURITSEN LEIGHTON PRIZE

This prize is awarded to one or two undergraduate women who are majoring in physics or astrophysics, and who have demonstrated academic excellence.

2019 *Tegan Loveridge*

2020 *Yuchen Tang*

### MARI PETERSON LIGOCKI '81 MEMORIAL AWARD

This award is given to a student who has improved the quality of student life at Caltech through their personal character.

2021 *LC Chen*

### WOMEN MENTORING WOMEN HELEN MCBRIDE OUTSTANDING MENTEE AWARD

This award recognizes a woman who has demonstrated a sincere desire to succeed as a student, who is committed to her personal development, open and willing to learn from her mentor, and who is receptive to advice and counsel. The recipient will have worked with her mentor to establish realistic goals, and demonstrated a commitment to carrying them out.

2020 *Sulan Wu*



### GORDON MCCLURE MEMORIAL COMMUNICATIONS PRIZE

This prize is awarded to one or more undergraduate students for excellence in essay writing in three subjects: English, history, and philosophy.

2021 *Ryan White, Philosophy*

### MARY A. EARL MCKINNEY PRIZE IN POETRY AND PROSE FICTION

This prize is awarded to one or more undergraduate students for excellence in writing in two categories: poetry and prose fiction.

2018 *Laura Hu, Poetry*

2021 *Shiva Mudide, Poetry*

### MECHANICAL ENGINEERING AWARD

This award recognizes a B.S. candidate 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.

2021 *Rahul Arun*

### MERCK INDEX AWARD

This award is given to one or more graduating students who have demonstrated outstanding achievement in the field of chemistry.

2021 *Krystal Brodsky, Yuanzhe Xie*

### 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 prize recognizes one or more undergraduate students for their contributions to the field of geology or geophysics.

2021 *Molly Ann Crotteau*

### ROBERT L. NOLAND LEADERSHIP AWARD

This award is given to one or more 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.

2020 *Varun Shanker*

2021 *Nicholas Currault, Kriti Devasenapathy, Daniel Neamati, Paulina Ridland*

### RODMAN W. PAUL HISTORY PRIZE

This prize recognizes a junior or senior who has displayed an unusual interest in and talent for history.

2021 *Anirudh Rangaswamy*

### DR. NAGENDRANATH REDDY BIOLOGICAL SCIENCES THESIS PRIZE

This prize is awarded to the female Ph.D. candidate in the Division of Biology and Biological Engineering who has produced the most outstanding thesis in the biological sciences and engineering during the past year.

2021 *Elena Kim Perry*

### HOWARD REYNOLDS MEMORIAL PRIZE IN GEOLOGY

This prize is awarded to a sophomore or junior who demonstrates the potential to excel in the field of geology and who actively contributes to the quality of Caltech student life.

2020 *Allyson Trussell*

### RESIDENTIAL EXPERIENCE LEADERSHIP AWARD

This award recognizes leaders who made a significant impact on Caltech students' lives during their collective four-year Caltech career and/or during a particularly difficult situation or circumstance, like COVID-19.

2021 *Rachel Sun*

## RESIDENTIAL EXPERIENCE TEAM AWARD

This award recognizes a leadership team that has had a positive impact on Caltech, including leading a program or event, during the last academic year.

2021 *Senior Class Co-Presidents: Ashima Agarwal and Alessandra Mondello*

2021 *The Science Olympiad Team, which includes graduates Cindy Cao, Xueer (Sherry) Liang, and David Zheng*

## WOMEN MENTORING WOMEN CANDACE RYPISI OUTSTANDING MENTOR AWARD

This award recognizes a woman who has demonstrated a willingness to share her knowledge to enhance the professional and personal development of her mentee(s), provided emotional and moral support and encouragement, enhanced or helped facilitate access to career-related information and exposure to various professional resources, opportunities, networks, and other role models, and promoted the mentee's sense of competence and confidence.

2018 *Leah Sabbeth*

## HERBERT J. RYSER MEMORIAL SCHOLARSHIP

This scholarship is awarded to undergraduate students for academic excellence, preferably in mathematics.

2019 *Mayank Pandey*

2020 *Arushi Gupta, Qiyao (Vivian) Yu*

## RICHARD P. SCHUSTER MEMORIAL PRIZE

This prize is awarded to one or more juniors or seniors in chemistry or chemical engineering on the basis of financial need and academic promise.

2020 *Andrew Zhou*

## ERNEST E. SECHLER MEMORIAL AWARD IN AERONAUTICS

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

2019 *Fabien Royer, Simon Silvio Tödli*

2021 *Simon Silvio Tödli*

## SENIOR UNDERGRADUTE THESIS PRIZE

This prize was created in 2010 by The Friends of the Caltech Libraries, and the winner receives a \$1,200 honorarium and recognition in Caltech's commencement program. The winner receives acknowledgement of the prize on their official transcript.

2021 *Laura Hu, Daniel Neamati*

## DR. FRED SHAIR AWARD FOR PROGRAM DIVERSITY

This award is given to one or more individuals who stand out as strong supporters of programs that increase the diversity and pluralism in practice at Caltech. Dr. Shair was a member of the chemical engineering faculty; one of his great accomplishments and contributions to the Institute was the creation of the Summer Undergraduate Research Fellowships (SURF) program in 1979. He later included high-achieving students from campuses across the country in an effort to support equity in access to Caltech's research communities.

2020 *Dawna Paria Bagherian*

## RENUKA D. SHARMA AWARD

This award recognizes a sophomore chemistry major for outstanding performance during their freshman year.

2019 *Jamie Vinson*

## C. S. SHASTRY PRIZE

This prize is awarded to a sophomore Ph 11 alumnus, majoring in physics, to provide support for a summer research project conducted at Caltech. The winner is chosen based on passion, curiosity, and demonstrated ability.

2018 *Dennis Joseph Yatunin*

2019 *Yantian (Tina) Zhang*

## DON SHEPARD AWARD

This award is given one or more 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.

2018 *Anthony James Kukavica*

## HALLETT SMITH PRIZE

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

2021 *Andrew Chan*

## JOHN STAGER STEMPLE MEMORIAL PRIZE IN PHYSICS

This prize is awarded annually to a graduate student in physics for outstanding progress in research as demonstrated by an excellent performance on the oral Ph.D. candidacy exam.

2019 *Ivaylo Sashkov Madjarov*

## STUDENT RESIDENTIAL LIFE AWARD

This award is presented to undergraduates whose concern for their fellow students has been demonstrated by their persistent efforts to improve the quality of undergraduate life and by effective communication with members of the faculty and administration.

2021 *Ari Jacob Rosner*

## TAUSSKY-TODD MATHEMATICS PRIZE FUND

This prize provides support to a female undergraduate math major for a summer experience to enrich their mathematical education.

2020 *Arushi Gupta, Qiyao (Vivian) Yu*

## THREE MINUTE THESIS

Originally conceived by the University of Queensland and jointly sponsored by the Caltech Library and the Graduate Studies Office, the Three Minute Thesis (3MT<sup>®</sup>) competition challenges Caltech graduate students to explain their research in an engaging and clear three-minute talk intended for a nonspecialist audience.

2021 *Shane Shayan Shabrestani (Medical Engineering), Third Place*

## THOMAS A. TISCH PRIZE FOR GRADUATE TEACHING IN COMPUTING AND MATHEMATICAL SCIENCES

The Graduate Teaching in CMS Awards were established in 2016 with a gift from Microsoft and then endowed through the generosity of Thomas A. Tisch (BS '61). The prize and honorarium are awarded to a graduate and an undergraduate student for outstanding teaching and course development in computing and mathematical sciences. Awardees are selected by a committee of CMS faculty members.

2018 *Ellen Rachel Novoseller*

2019 *Riley John Murray*

## THOMAS A. TISCH PRIZE FOR UNDERGRADUATE TEACHING IN COMPUTING AND MATHEMATICAL SCIENCES

The Undergraduate Teaching in CMS Awards were established in 2016 with a gift from Microsoft and then endowed through the generosity of Thomas A. Tisch (BS '61). The prize and honorarium are awarded to a graduate and an undergraduate student for outstanding teaching and course development in computing and mathematical sciences. Awardees are selected by a committee of CMS faculty members.

2020 *Caleb Sander*

2021 *Ishani Karmarkar, Ethan Ordentlich, Alexander Zlokapa*

## MORGAN WARD PRIZE

This prize is awarded to a freshman or sophomore who submits the best problems and solutions in mathematics.

2018, 2019 *Mayank Pandey*

## CHARLES AND ELLEN WILT'S PRIZE

This prize is awarded to a graduate student for outstanding independent research in electrical engineering leading to a Ph.D.

2021 *Oguzhan Teke*

## FREDRICK J. ZEIGLER MEMORIAL AWARD

This award recognizes an outstanding sophomore or junior in pure or applied mathematics for their excellence in scholarship as demonstrated in class activities or in the preparation of an original paper or essay in any subject area.

2019 *Ishani Karmarkar*

2020 *Zhengyuan Shang*

# Caltech | Alumni

Congratulations, Caltech's 2021 graduates! Through hard work and talent, you have earned a degree that places you among the most accomplished and dynamic communities in the world. For more than 100 years, Caltech alumni have made a profound and positive impact on the world. Your degree has prepared you for this work, and the Caltech Alumni Association (CAA) is honored to help you follow through on that promise in two ways. First, we keep you connected to a community of 24,000 Techers around the world who share your experiences and know your capabilities. And second, we believe that our best work results from living our best lives. Our community lifts up the human element of the Caltech experience. We are dedicated to offering our alumni more than just connection. Are you looking for the right job? Do your relationships foster your inspiration? The CAA will help you realize the full potential of your extended Caltech family, personally and professionally. We encourage you to get involved with the CAA and stay connected to your fellow Techers. Because when your efforts are multiplied by the power of this community, more is possible.

On behalf of the Caltech Alumni Association, I welcome you as members of the alumni community. Please visit [alumni.caltech.edu](https://alumni.caltech.edu) to see what the CAA can provide for you.

Satoshi Ohtake, Ph.D. (B.S. '00)

President, Board of Directors

Caltech Alumni Association

[alumni.caltech.edu](https://alumni.caltech.edu)

## ACADEMIC REGALIA AT CALTECH

The symbolism in the academic regalia worn by graduates at commencement dates back many centuries. Although some aspects of the costume vary among academic institutions, many basic elements are similar. The cap or mortarboard is based on the medieval biretta worn by scholars and artists. The gown's cut and velvet trimming indicate academic rank. The doctoral hood may display the academic field of the wearer's degree and the institution from which it was received. In addition, tassels, cords, and medallions denote various honors awarded by the institution or academic societies.

Caltech graduates receiving a doctorate wear a black velvet cap, robes trimmed in blue velvet, and a blue velvet doctoral hood lined in a chevron pattern of orange and white. Those receiving a bachelor's or master's degree wear a simple black gown and a black mortarboard or cap.

In addition to these traditional items, an undergraduate may also choose to wear a colored stole to the graduation ceremony. While orange stoles denote Caltech pride, other colors may be chosen to represent the undergraduate's residential affiliation.

There are currently eight undergraduate houses at Caltech (**Avery**, **Blacker**, **Dabney**, **Fleming**, **Lloyd**, **Page**, **Ricketts**, and **Ruddock**), and three undergraduate residences (**Bechtel**, **Braun**, and **Marks**).

- The students of the **Bechtel**, **Braun**, and **Marks** residences who affiliate with a house may choose to wear that house's tassel or stole.
- A *purple stole or a purple and white tassel* designates **Avery House**; Avery's house color is purple.
- A *silver stole or a black and white tassel* designates **Blacker House**; Blacker's house color is black.



- A *green stole or tassel* designates **Dabney House**; Dabney's house color is green.
- A *red stole or tassel* designates **Fleming House**; Fleming's house color is red.
- A *gold stole or a yellow and white tassel* designates **Lloyd House**; Lloyd's house color is gold.
- A *blue stole or tassel* designates **Page House**; Page's house color is blue.
- A *maroon stole or tassel* designates **Ricketts House**; Ricketts's house color is maroon.
- A *navy blue stole or tassel* designates **Ruddock House**; Ruddock's house color is navy blue.

## GAUDEAMUS IGITUR (LET US REJOICE, THEREFORE)

The song *Gaudeamus igitur* has become an academic standard, sung around the world at graduations and other university ceremonies. Some verses of this anthem go back to 13th-century France, where they appear in a Latin hymn on the transitory nature of life. By the middle of the 18th century, students at German universities had combined the original medieval verses with new ones—including the now famous opening verse that begins *Gaudeamus igitur, iuvenes dum sumus* (“Let us rejoice, therefore, while we are young”)—to create a song that celebrated youth and the student life, in all of its highbrow (and lower-brow) aspects. In the mid-19th century, the song crossed the Atlantic to Yale, where still more verses were added for use at academic ceremonies.

Since then, verses have been added or subtracted for different occasions. The song also has been translated into many different languages, sometimes faithfully, sometimes quite imaginatively.

The verses below (which have been translated as closely as possible from Latin into English) combine the youthful energy and irreverent attitude towards authority that characterize Caltech students with a ringing endorsement of the academic enterprise to which they are devoted. The verses celebrate the Institute and the community of scholars—past, present, and future—who have done and will continue to do its work.

Gaudeamus igitur	Let us rejoice, therefore,
Iuvenes dum sumus.	While we are young.
Post iucundam iuventutem	After a pleasant youth
Post molestam senectutem	After a troubling old age
Nos habebit humus.	The earth will have us.
Ubi sunt qui ante nos	Where are they who, before us,
In mundo fuere?	Were in the world?
Vadite ad superos	Go to the heavens
Transite in inferos	Cross over into the infernal regions
Hos si vis videre.	If you wish to see them.
Vivat academia!	Long live the academy!
Vivant professores!	Long live the professors!
Vivat membrum quodlibet;	Long live each student;
Vivant membra quaelibet;	Long live the whole community;
Semper sint in flore.	For ever may they flourish!
Alma Mater floreat,	May our Alma Mater flourish,
Quae nos educavit;	Who taught us;
Caros et commilitones,	Who gathered together
Dissitas in regiones	Dear ones and comrades,
Sparsos, congregavit.	Scattered in remote places.

*Translation by Warren C. Brown, Convocations Chair*

## **HAIL CIT**

*(Caltech alma mater)*

arranged by Raymond Burkhart

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.



## **JOIN THE CELEBRATION ON SOCIAL MEDIA!**

We invite you to celebrate and honor our 2021 graduates. Post your well-wishes, words of wisdom, and congratulations with #Caltech2021 on Twitter and Instagram.