CALIFORNIA INSTITUTE OF TECHNOLOGY

One Hundred Twenty-Eighth

Commencement

—

June 10, 2022

128th Annual Commencement

CALIFORNIA INSTITUTE OF TECHNOLOGY

Friday, June 10, 2022
10 a.m.

ACADEMIC PROCESSION

Chief Marshal
Warren C. Brown

Marshals
Geoffrey A. (Geoff) Blake, Ph.D.
William (Bil) Clemons, Ph.D.
Jennifer M. Jackson, Ph.D.
Jennifer A. Jahner, Ph.D.
Dinakar Ramakrishnan, Ph.D.

Faculty Officers
Geoffrey A. (Geoff) Blake, Ph.D.
Brian M. Stoltz, Ph.D.

Marching Order
Candidates for the Degree of Bachelor of Science
Candidates for the Degree of Master of Science
Candidates for the Degree of Doctor of Philosophy
Faculty Officers
The Faculty
The Chairs of the Divisions
The Deans
The Vice Provosts
The Provost
The Vice Presidents
Distinguished Alumni Awardees
Caltech Alumni Association Executive Officers
The Trustees
The Commencement Speaker
The President
The Chair of the Board of Trustees

PROGRAM

ORGAN PRELUDE	Leslie J. Deutsch, Ph.D. (B.S. '76, M.S. '77, Ph.D. '80)
PROCESSIONAL	The Caltech Convocation Brass, Percussion, and Organ Ensemble *Glenn D. Price, D.M.A., Conductor*
PRESIDING	David W. Thompson (M.S. '78) *Chair of the Board of Trustees* *California Institute of Technology*
COMMENCEMENT SPEAKER	Jad Abumrad *Radio Host and Producer*
CHORAL SELECTION "Gaudeamus Igitur" Traditional, Arranged by Dr. Deutsch *(Translation on page 62.)*	The Caltech Glee Club, the Caltech Convocation Brass, Percussion, and Organ Ensemble *Nancy Sulahian, M.M., Conductor*
CONFERRING OF DEGREES	Thomas F. Rosenbaum, Ph.D. *President* *Sonja and William Davidow Presidential Chair and Professor of Physics* *California Institute of Technology*

PRESENTATION OF CANDIDATES FOR DEGREES

For the Degree of Bachelor of Science	Kevin M. Gilmartin, Ph.D. *Vice President for Student Affairs*
For the Degree of Master of Science	David C. Chan, Ph.D. *Dean of Graduate Studies*

For the Degree of Doctor of Philosophy

Biology and Biological Engineering	Richard M. Murray, Ph.D. (B.S. '85) *Division Chair*
Chemistry and Chemical Engineering	Dennis A. Dougherty, Ph.D. *Division Chair*
Engineering and Applied Science	Harry A. Atwater, Ph.D. *Division Chair*
Geological and Planetary Sciences	Paul D. Asimow, Ph.D. (M.S. '93, Ph.D. '97) *Eleanor and John R. McMillan Professor of Geology and Geochemistry*
Humanities and Social Sciences	Jean-Laurent Rosenthal, Ph.D. (Ph.D. '88) *Division Chair*
Physics, Mathematics and Astronomy	Alan J. Weinstein, Ph.D. *Executive Officer of Physics*

ANNOUNCEMENT OF AWARDS AND
CONCLUDING REMARKS   President Rosenbaum

ALMA MATER
"Hail CIT"
    by Manton Barnes (B.S. '21)   The Caltech Glee Club, the Caltech
    Arranged by Raymond Burkhart   Convocation Brass, Percussion, and
    (The audience may join in;   Organ Ensemble
    lyrics are on page 63.)

RECESSIONAL   The Caltech Convocation Brass,
                                                     Percussion, and Organ Ensemble

Organ Postlude   Dr. Deutsch
"The Throop Institute March,"
    composed by E. C. Kammermeyer
    in 1900 for the Throop Institute
    Guitar and Mandolin Society

Livestreaming of Caltech's 2022 commencement ceremony will begin shortly before 10 a.m. on Friday, June 10, at www.caltech.edu.

Follow along with the day's events on Twitter and Instagram. Share your photos and join the celebration by using #Caltech2022. (See page 64 for more information.)

ABOUT THE KEYNOTE SPEAKER

Jad Abumrad is the creator and former co-host of the science and technology-inspired public radio podcast *Radiolab* as well as *More Perfect* and *Dolly Parton's America*.

A MacArthur Fellow and the recipient of three George Foster Peabody Awards, Abumrad drew on his background in broadcasting and music composition to redefine science and technology journalism. Through a groundbreaking combination of interviews, dialogue, music, and sound design, he has explored topics such as the nature of numbers, the evolution of altruism, and the history of the death penalty in the United States.

"Abumrad's influential contributions to science communications spring from his ability to tell technically challenging stories in a way that captures the excitement of discovery and engages mainstream audiences," said Caltech president Thomas F. Rosenbaum in his announcement to the Caltech community.

Born in Syracuse, New York, Abumrad was raised in Nashville, Tennessee. His parents, a biologist and a surgeon, emigrated from Lebanon in the 1970s. He studied music at Oberlin College in Ohio, where he received his B.A. in 1995. His early career included roles as a film composer, reporter, and producer for programs such as *Morning Edition* and *All Things Considered*.

Radiolab was originally conceived in 2002 as a three-hour weekly experimental radio program hosted by Abumrad. He met Robert Krulwich—Caltech's 2008 commencement speaker—and by 2004, they were collaborating on the one-hour version of *Radiolab* with its scientific focus. Abumrad retired from the show in January of this year.

Today, *Radiolab* podcasts are downloaded more than 12 million times each month and carried on nearly 600 stations around the world. Along with its two Peabody Awards, *Radiolab* received the 2007 National Academies Communication Award and the Shorty Award for Best Podcast. Peabody Award–winning *Dolly Parton's America* was named the Best Music Podcast at the 2021 iHeartRadio Podcast Awards and won gold at the New York Festivals Radio Awards. *More Perfect* examines controversial and historic U.S. Supreme Court cases. It was listed as one of the best podcasts of the year by *The Atlantic* and *The New Yorker*.

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 46 Nobel Prizes.

We celebrate today the 560 graduates who will earn 218 bachelor's degrees, 139 master's degrees, and 203 doctoral degrees, and who will contribute to Caltech's impressive legacy and record of achievement around the world.

CANDIDATES FOR DEGREES

Bachelor of Science

Sebastien Nā Kai 'Ewalu Abadi *Palo Alto, California* Physics and Computer Science (Minor)

Adam Hassan Abbas *Brooklyn, New York* Materials Science

Hamza Ayman Abdul-Ghani *Honolulu, Hawaii* Electrical Engineering

Arushi Agarwal *Palo Alto, California* Computer Science and Biology (Minor) and Information and Data Sciences (Minor)

Shubh Agrawal *Lucknow, India* Physics and Astrophysics (Minor) and Computer Science (Minor)

Alya Al-Kibbi *Washington, District of Columbia* Astrophysics

Matthew Adam Alexander *Rancho Cucamonga, California* Bioengineering

Nezir Alic *Laconia, New Hampshire* Physics

Joshua Muro Anderson *Lakewood, California* Electrical Engineering

Joeyta Banerjee *Bakersfield, California* Computer Science and Biology (Minor)

Alexandra Goh Bardon *Brookline, Massachusetts* Computation and Neural Systems

Noah J Barnes *Springfield, Virginia* Mechanical Engineering and Control and Dynamical Systems (Minor)

Thomas Mason Barrett *Chatham, New Jersey* Computer Science

Hrishika Basava *Pasadena, California* Electrical Engineering and Computer Science (Minor)

Matthew Steven Bauer *Reno, Nevada* Engineering and Applied Science (Computation and Neural Systems)

Zoe Georgia Beatty *Columbus, Ohio* Biology

Sebastian Bedoya *Simpsonville, South Carolina* Computer Science

Trinity Bento *San Jose, California* Physics

Dawson John Beutler *Omaha, Nebraska* Computer Science and Business, Economics, and Management

Luke Tyler Blankenberg *Redding, California* Mechanical Engineering

Camila Andrea Buitrago *Atlanta, Georgia* Engineering and Applied Science and Environmental Science and Engineering (Minor)

Jack Noah Caldwell *Raleigh, North Carolina* Mechanical Engineering

Luis F Camargo-Carlos *Miami, Florida* Physics

Ann Harriet Caplin *New York City, New York* Information and Data Sciences

† *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*

Anjini Chandra *Okemos, Michigan* Mechanical Engineering and Information and Data Sciences (Minor)

Nicholas Andrew Chang *Phoenix, Arizona* Computer Science and Information and Data Sciences (Minor)

Wenjun Chang *Shenzhen, People's Republic of China* Computer Science and Business, Economics, and Management and Information and Data Sciences (Minor)

Peter Hingyin Chea *Cerritos, California* Chemical Engineering (Sustainability)

Ruby Erin Cheetham *Hampton, New Hampshire* Information and Data Sciences

August Yuhong Chen *Redmond, Washington* Mathematics

Haoxuan Chen *Shanghai, People's Republic of China* Information and Data Sciences and Mathematics

Victoria Chen *Walnut, California* Bioengineering

Allison Siao Cheng† *Cincinnati, Ohio* Mechanical Engineering

Myra Miaobo Cheng *San Jose, California* Computer Science and History

Kathleen Alyssa Chiu *Sherman Oaks, California* Electrical Engineering

Colin Edward Chun *Los Angeles, California* Mechanical Engineering and Computer Science (Minor) and Aerospace Engineering (Minor)

Jennie Jaeyoung Chung *Longmont, Colorado* Mathematics and Computer Science

Yoojin Chung *Seoul, Republic of Korea* Applied and Computational Mathematics and Computer Science (Minor)

Ryan Patrick Clark *Novato, California* Computer Science and Economics

Jennah Karina Colborn *Carlsbad, California* Physics

William James Cook *El Segundo, California* Computer Science and Control and Dynamical Systems (Minor)

Robert Alexander Corado *San Diego, California* Computer Science and Information and Data Sciences (Minor)

Stephanie Cortez *San Marcos, California* Chemistry and English (Minor)

Luc Michael Davis *Lafayette, California* Computer Science

Gianluca R Delgado *Orlando, Florida* Physics

Shrikeshav Pranav Deshmukh *Princeton, New Jersey* Mechanical Engineering and Environmental Science and Engineering (Minor)

Sophie H Devoe *San Diego, California* Mechanical Engineering and History (Minor)

Schuyler Lauder Morton Dick *Hudson, Ohio* Chemical Engineering (Process Systems)

Grace Ding *East Brunswick, New Jersey* Electrical Engineering

Yun Emily Du *San Diego, California* Chemistry and History and Biology (Minor)

Isabella Maria Dula Razzolini *Tuscaloosa, Alabama* Mechanical Engineering

Bachelor of Science *continued*

Ethan Frederick Eason *Bellevue, Washington* Computer Science and Information and Data Sciences (Minor)

Egon Nicolae Einoder *Temecula, California* Astrophysics and Computer Science (Minor)

Olivia Mae Ernst† *Garden Grove, California* Mechanical Engineering and Aerospace Engineering (Minor)

Hannah Mingjuan Fan *Saratoga, California* Computer Science

Aaron Ovadia Feldman *Los Angeles, California* Information and Data Sciences and Control and Dynamical Systems (Minor)

Sara Fish *Berlin, Germany* Mathematics

Alexandra Fomina *Rockaway Beach, New York* Computer Science

Alex Mateo Fontani Herreros *Austin, Texas* Chemical Engineering (Sustainability)

Rosita Fu *Saratoga, California* Chemistry

Marcus Canillas Gee *Santa Monica, California* Computer Science and Business, Economics, and Management

Monika Plamenova Getsova *Virginia Beach, Virginia* Physics and Computer Science (Minor)

Matthew Rodriguez Gonzalgo *Plantation, Florida* Computer Science and Information and Data Sciences (Minor)

Aikaterini Gorou *Forsyth, Illinois* Chemistry

William Pierce Governale *Tampa, Florida* Computer Science

Forrest Harlan Graham *San Diego, California* Mechanical Engineering and English (Minor)

Anastasiya Grebin *Los Gatos, California* Bioengineering

Olivia Ann Grobowsky *Houston, Texas* Applied and Computational Mathematics

Wenyan Guan *Pasadena, California* Physics and Information and Data Sciences (Minor)

Rashida Hakim *Redmond, Washington* Computer Science and Information and Data Sciences (Minor)

Kiran Srinivasan Hamkins *La Crescenta, California* Mechanical Engineering and Chemistry (Minor)

Meena Rukmani Hari *Plano, Texas* Computer Science and Information and Data Sciences (Minor)

Thomas Katsuragawa Hayama *Mason, Ohio* Computer Science and Information and Data Sciences (Minor)

Nicole Judianni Heflin *Chicago, Illinois* Electrical Engineering

Stephen Thomas Shinichi Hei *Newcastle, Washington* Bioengineering

Hagan Elias Hensley *Franktown, Colorado* Physics

Sophia Marguerite Hewitt *Los Angeles, California* Biology

Bachelor of Science *continued*

Thomas Oliveira Hoffmann *Pasadena, California* Computer Science and Business, Economics,
    and Management
Sophie Howell *Miami, Florida* Materials Science
Hannah Hu *San Diego, California* Bioengineering
Xinyue Hu *Palo Alto, California* Biology
Kevin Edward Huang *Hillsborough, New Jersey* Computer Science
Saehui Hwang *Rancho Palos Verdes, California* Electrical Engineering
Michelle M Hyun *Cerritos, California* Applied and Computational Mathematics and
    Interdisciplinary Studies Program
Kade Jonathan Imanaka *Honolulu, Hawaii* Computer Science
Daniel Mingyi Israel *San Jose, California* Computer Science and Information and Data Sciences
    (Minor)
Rashi Rajesh Jeeda *Chino, California* Bioengineering
David Jin *Harbin, People's Republic of China* Information and Data Sciences
James Martin Jusuf *Scarsdale, New York* Physics
Nivedita Kanrar *Riverside, California* Bioengineering
Jocelyn Kho *Arcadia, California* Mechanical Engineering and Business, Economics, and
    Management
Thai Minh Khong *Ho Chi Minh City, Vietnam* Computer Science and Information and Data
    Sciences (Minor)
Chan Gi Kim *Valencia, California* Chemical Engineering (Materials)
Jae Yoon Kim† *La Jolla, California* Computer Science and Biology (Minor)
Jiwoo Kim *Seoul, Republic of Korea* Biology
Alexandra Patricia Klipfel *Agua Dulce, California* Physics
Peter Jamie Kulits *Casper, Wyoming* Computer Science
Sofia Elizabeth Kwok *Ann Arbor, Michigan* Mechanical Engineering and Aerospace Engineering
    (Minor)
Andrew Reilly Larson *Portland, Oregon* Electrical Engineering
Vy Thao Le† *Seattle, Washington* Mechanical Engineering
Jina Lee *Los Alamitos, California* Geochemistry
Lin Lin Lee *Allen, Texas* Computer Science and Mathematics
Margaret Rachel Lee *Lexington, Virginia* Electrical Engineering and English (Minor)
Natali Michelle Lelieur *South Pasadena, California* Chemistry and Environmental Science and
    Engineering (Minor)
Sophie Helena Huiyuan Li *Bonn, Germany* Physics
Elaine Lin *Brea, California* Biology

Bachelor of Science *continued*

Yuying Lin *Scarborough, Canada* Chemical Engineering (Process Systems)

Yvette Yinyin Lin *Fremont, California* Computer Science and Mathematics

Jamie Ann Littman *Port Washington, New York* Mechanical Engineering and Environmental
  Science and Engineering (Minor)

Antonia Junwei Liu *Tenafly, New Jersey* Information and Data Sciences

Elise Yiwen Liu *Fremont, California* Computer Science and Information and Data Sciences
  (Minor)

Victoria Liu *Marlboro, New Jersey* Biology and Computer Science (Minor)

Beau Nicholas Albert Lobodin *Galveston, Texas* Computer Science and Information and Data
  Sciences (Minor)

Xiaoqi Long *Kunshan, People's Republic of China* Computer Science

Adrian Anastasio Lopez *Santa Barbara, California* Physics

Grace Lu *McLean, Virginia* Computer Science and Information and Data Sciences (Minor)

Jeffrey Jian Ma *San Jose, California* Computer Science and Business, Economics, and Management
  and Information and Data Sciences (Minor)

Ananth Venkatesh Narasimha Malladi *South Burlington, Vermont* Physics

Ethan Milo Mann *Naperville, Illinois* Computer Science

Kevin Alex Marx *Highland Park, New Jersey* Electrical Engineering

Austin Sagan McCoy *Rochester, Minnesota* Computer Science

Vanessa Jingxuan Mechem *Shanghai, People's Republic of China* Chemistry

Hayward Julian Melton *Hinsdale, Illinois* Electrical Engineering

Rohan Mirchandani *Pleasanton, California* Computer Science and Information and Data Sciences
  (Minor)

Elizabeth Rae Moar *Arlington, Virginia* Computer Science and Information and Data Sciences
  (Minor)

Jonathan Andrew Moul *Chapel Hill, North Carolina* Applied and Computational Mathematics

Shiva Mudide *Acton, Massachusetts* Physics

Catrin Hathaway Murphy *Encino, California* Computer Science

Ajay Natarajan *San Marino, California* Computer Science and Economics and Information and
  Data Sciences (Minor)

Jack Tang Nguyen *Alhambra, California* Chemistry and Biology (Minor)

Mai Hoang Nguyen *Ho Chi Minh City, Vietnam* Physics

Alison Mei Noyes *Falmouth, Maine* Computer Science

Melba Nuzen *San Diego, California* Computer Science

Riley Patrick O'Neil *Santa Rosa, California* Mechanical Engineering

Ayooluwa Titilayomi Odemuyiwa *Columbia, Missouri* Computer Science

Bachelor of Science *continued*

Diego Francisco Olaya Medina *Lafayette, Colorado* Physics

David J Oliveira *Bernardsville, New Jersey* Physics

Alvin Zhou On *Palo Alto, California* Computer Science and Information and Data Sciences
(Minor)

Luis A. Pabon *Houston, Texas* Mechanical Engineering and Aerospace Engineering (Minor)

Limbert Alberto Palomino *Los Angeles, California* Mechanical Engineering

Alexander Yu Pan *Rosemount, Minnesota* Mathematics and Computer Science

Charlotte Isabella Sinclair Park *Newton, Massachusetts* Computer Science

Emily Park *San Diego, California* Computer Science

James Park *Ithaca, New York* Chemistry and Environmental Science and Engineering (Minor)

Amol Milind Patil *Katy, Texas* Physics

Anjali Patil *San Diego, California* Electrical Engineering

Toussaint Miguel Pegues *Dallas, Texas* Mechanical Engineering

Daniel Shih-Wei Peng *Arcadia, California* Chemistry

Isaac John Perrin *Redmond, Washington* Mechanical Engineering and Aerospace Engineering
(Minor)

Gaurav V Phanse† *Dublin, California* Mechanical Engineering and Aerospace Engineering
(Minor)

Bannhat Phat *Phnom Penh, Cambodia* Applied Physics

Anthony Pineci *Malibu, California* Computer Science and Mathematics

Alexander Popov *Tarrytown, New York* Computer Science and Information and Data Sciences
(Minor)

Tyler Alamo Port *Woodbury, New York* Computer Science

Elora Pradhan *Saratoga, California* Bioengineering

Randall Jay Pulido Jr. *Austin, Texas* Computer Science

Jyotsna Manepali Rao *Rockville, Maryland* Computer Science

Sydney Diana Richardson *Granite Bay, California* Mechanical Engineering

Teresa Helena Riedel *Adamstown, Maryland* Physics

Zoe Payne Rock *Chappaqua, New York* Mechanical Engineering and Business, Economics, and
Management

Kellen R Rodriguez *Fairmont, Minnesota* Business, Economics, and Management and Computer
Science and Astrophysics (Minor)

Sabrina Rui *Scottsdale, Arizona* Business, Economics, and Management and Chemistry (Minor)

Mario Jaime Ruiz *San Jose, California* Computer Science

Ryan Joseph Ruscansky *Annandale, New Jersey* Computer Science and Business, Economics, and
Management

Bachelor of Science continued

Alec Calderon Sands *Longwood, Florida* Applied and Computational Mathematics

Rafael Jose Duavit Santiago *Manila, Philippines* Applied and Computational Mathematics and Business, Economics, and Management

Spencer Schneider *Houston, Texas* Computer Science and Business, Economics, and Management

Jerome John Seebeck *Chicago, Illinois* Astrophysics

Anish Senapati *Gaithersburg, Maryland* Applied and Computational Mathematics and Computer Science (Minor)

Archie Shahidullah *Tucson, Arizona* Computer Science and Information and Data Sciences (Minor)

Eugene Y Shao *Longmeadow, Massachusetts* Computer Science and Information and Data Sciences (Minor)

Anish Shenoy *Queens, New York* Computer Science

Ilya Andreevich Sherstyuk *Honolulu, Hawaii* Computer Science

Olivine Silier *Saint Germain en Laye, France* Mathematics

Liam Matthew Silvera† *Frederick, Maryland* Biology

Julia Sloan *Uxbridge, Massachusetts* Computer Science

Jacob Jegeris Snyder *Edina, Minnesota* Applied and Computational Mathematics

Spiro Andrew Stameson *Newport Beach, California* Computer Science

Matthew David Strong *Aurora, Colorado* Mechanical Engineering

Carol Kaile Sun *Oak Park, California* Computer Science

Jennifer Katherine Sun *Arcadia, California* Computer Science and Information and Data Sciences (Minor)

Nathan Thangavadivel Suri Jr. *Bakersfield, California* Physics

Isabel Frances Swafford *Los Angeles, California* Astrophysics and English (Minor)

Matthew James Szedlock *Cathedral City, California* Mechanical Engineering and Business, Economics, and Management

Ivy Tang *Livermore, California* Computer Science and Information and Data Sciences (Minor)

Zane Wray Taylor *Boerne, Texas* Materials Science and Chemistry (Minor)

Jasmine Guin Terrones *McLean, Virginia* Mechanical Engineering

Emily M Thierstein *Mason, Ohio* Physics

Vincent J Tieu *Torrance, California* Mechanical Engineering and Aerospace Engineering (Minor)

Anna Theodora Tifrea *Fullerton, California* Physics and Computer Science (Minor)

Megan Minh-Hanh Tjandrasuwita *Atherton, California* Computer Science

Andrew Jun Wae Tong *Mountain View, California* Bioengineering

Aaron Coe Tran† *San Jose, California* Computer Science

Bachelor of Science continued

Nathan Taylor Trevino Barton† *Mount Pleasant, Pennsylvania* Mechanical Engineering

Luka Valencic *Colleyville, Texas* Computer Science

Lorenzo Xavier Van Munoz *San Diego, California* Physics

Saskia Van Nieuwstadt† *Ann Arbor, Michigan* Mechanical Engineering and Aerospace
Engineering (Minor)

Polina Verkhovodova *Portland, Oregon* Mechanical Engineering

Yasmin Sera Veys *Cypress, California* Computer Science

Anna Gale Stephanie Vinogradsky *Seattle, Washington* Computer Science

Galilea Bascara von Ruden *Palo Alto, California* Mechanical Engineering

James Douglas Walker III *Grand Blanc, Michigan* Mechanical Engineering and Aerospace
Engineering (Minor)

Jenny Tang Wan *Mason, Ohio* Physics and Astrophysics (Minor)

Alexander Zhong Wang† *Saratoga, California* Computer Science and Information and Data
Sciences (Minor) and Neurobiology (Minor)

Christopher Wang *Rockville, Maryland* Computer Science

Megan Wang *Henderson, Nevada* Biology

Daniel Luca Wendt† *Madison, Wisconsin* Physics

Ray Francis Wendt *Madison, Wisconsin* Electrical Engineering

Kyle Arthur Weng *San Marino, California* Computer Science and Philosophy (Minor) and
Information and Data Sciences (Minor)

Remington Winston Wichterman *Chandler, Arizona* Computation and Neural Systems

Jake Wen-Long Will *Honolulu, Hawaii* Computer Science

Kevin D. Winzey *Southwest Ranches, Florida* Physics

Varyn Kalis Woo† *Los Altos Hills, California* Computer Science

Jennifer Wu *Diamond Bar, California* Chemical Engineering (Environmental)

Brittany Louise Wylie† *North Wales, Pennsylvania* Mechanical Engineering and Aerospace
Engineering (Minor)

Elizabeth Mannfoung Yam *Sylmar, California* Computer Science

Serena Yan *Pittsburgh, Pennsylvania* Computer Science and Business, Economics, and
Management

Elaine Yanzhen Yang *Portland, Oregon* Computer Science

Isabell Yang *Arcadia, California* Biology

Timothy Yao *San Ramon, California* Mathematics

Eunice Yoon *Vernon Hills, Illinois* Mechanical Engineering

Mei Yi You *Castro Valley, California* Bioengineering

Bachelor of Science continued

Jannie Yu *San Diego, California* Computer Science and Economics

Jennifer Yu *New York, New York* Computer Science and Biology (Minor)

Kevin Yu *San Diego, California* Chemistry and Computer Science

Amy June Zhai *Atlanta, Georgia* Chemical Engineering (Environmental)

Cecilia Chen-Xuan Zhang *San Diego, California* Computer Science and Information and Data Sciences (Minor)

Justin Rayan Zhang *Great Falls, Virginia* Computer Science and Business, Economics, and Management

Tianyi Zhang *Changzhou, People's Republic of China* Chemistry

Selina Zhou *Vancouver, Canada* Electrical Engineering

Sarah Jin Zou *Sugar Land, Texas* Electrical Engineering and Information and Data Sciences (Minor)

Master of Science

Alexander Ryan Acosta *(Aeronautics)* B.S., Rice University 2020.

Daniel Anderson *(Materials Science)* B.S., Georgia Institute of Technology 2019.

Sara Anjum *(Materials Science)* B.A., Princeton University 2019.

Simon Randy Anuszczyk *(Aeronautics)* A.S., Woodland Community College 2015; B.S., Columbia University 2019.

Apoorva *(Electrical Engineering)* B.E., Birla Institute of Technology and Science, Pilani 2020.

Rahul Arun *(Aeronautics)* B.S., California Institute of Technology 2021.

James William Atterholt *(Geophysics)* B.S., Indiana University Bloomington 2019.

Yue Bai *(Environmental Science and Engineering)* B.S., University of California, Los Angeles 2020.

Kushal Banerjee *(Mathematics)* B.Math., Indian Statistical Institute 2016; M.Sc., Chennai Mathematical Institute 2017.

Barry Dylan Bannon *(Computing and Mathematical Sciences)* S.B., Massachusetts Institute of Technology 2011.

Alexandra Ann Beard *(Chemistry)* B.S., Baylor University 2019.

Amanda Lee Bednarick *(Geochemistry)* B.S., University of Rhode Island 2019.

Alexander Clarence Berne *(Geophysics)* B.S., University of Miami 2019; M.S., University of Oxford 2020.

Surjyendu Bhattacharjee *(Geochemistry)* B.Sc., Jadavpur University 2017; M.Sc., Indian Institute of Technology Roorkee 2019.

Justin Douglas Blowers *(Space Engineering)* B.S., Syracuse University 2021.

Annette Ellen Boehme *(Applied Physics)* B.Sc., University of Stuttgart 2016; M.Sc., 2019.

Scott Alexander Bollt *(Aeronautics)* B.S., Cornell University 2020.

Steven Patrick Bulfer *(Electrical Engineering)* B.S.E., University of Minnesota, Twin Cities 2020.

Meital Oshrit Carmi *(Space Engineering)* B.S., University of California, Santa Barbara 2020.

David Spencer Catherall *(Materials Science)* B.S., Oregon State University 2020.

Olmo Cerri *(Physics)* B.S., Università di Pisa 2015; M.S., 2017.

Daniel Kwon Chang *(Chemistry)* B.S., Chapman University 2019.

Andrew John Charbonneau *(Applied Physics)* A.B., Princeton University 2020.

Sihe Chen *(Planetary Science)* B.E., National University of Singapore 2020.

José Rodolfo Chreim *(Mechanical Engineering)* B.Sc., Universidade Federal do ABC 2017.

Miya Carina Yoshida Coimbra *(Aeronautics)* B.S., University of California, San Diego 2021.

Scott Conn *(Environmental Science and Engineering)* M.S., University of Edinburgh 2020.

Kaustav Kashyap Das *(Astrophysics)* B.S., Indian Institute of Technology Kanpur 2020.

Master of Science *continued*

Branson William Davis *(Aeronautics)* B.S., University of California, Irvine 2020.

Ivey Elizabeth Davis *(Astrophysics)* B.S., The University of New Mexico 2020.

Morgan Ryleigh Davis *(Planetary Science)* B.S., The University of Arizona 2017; M.S., Northern Arizona University 2020.

Hélie de Cassaigne de Beaufort de Miramon *(Aeronautics)* B.S., École Polytechnique 2018; M.Eng., 2019.

Ruolin Deng *(Geology)* B.S., Peking University 2019.

Dhruv Chimanbhai Desai *(Applied Physics)* B.S., University of Illinois at Urbana-Champaign 2019.

Sean Patrick Devey *(Aeronautics)* B.S., University of Alabama 2018; M.S., 2020.

Hamilton Theodore Clark Evans *(Chemistry)* B.A., Middlebury College 2020.

Jiaqi Fang *(Geophysics)* B.S., Peking University 2020.

Ian M Foo *(Applied Physics)* B.A., University of Oxford 2019.

Rebecca Anne Gallivan *(Materials Science)* S.B., Massachusetts Institute of Technology 2017.

Maodong Gao *(Applied Physics)* B.S., Tsinghua University 2019.

Florian Matthieu Girault *(Space Engineering)* B.Eng., École Polytechnique 2020; M.Eng., 2021.

Alec Gregory Glisman *(Chemical Engineering)* B.S., University of California, Berkeley 2019.

Max Elliot Goldberg *(Astrophysics)* B.S., The University of Chicago 2019.

Dibya Kanti Golui *(Space Engineering)* B.Tech., Indian Institute of Space Science and Technology 2020.

Sara Frances Gorske *(Materials Science)* B.S., Cornell University 2020.

Robert Matthew Gray *(Electrical Engineering)* B.S., Northwestern University 2019.

Alan Yalun Gu *(Chemical Engineering)* B.A.Sc., University of Toronto 2017.

Baris Volkan Gurses *(Electrical Engineering)* B.S., Georgia Institute of Technology 2020.

Scott Thomas Philpott Habermehl *(Applied Physics)* B.S., Purdue University 2019.

Hehe Han *(Electrical Engineering)* B.S., Imperial College London 2014.

Utku Hatipoğlu *(Applied Physics)* B.S., Bilkent University 2017; M.S., 2019.

Meredith Leigh Hooper *(Aeronautics)* B.S.E., Princeton University 2020.

Daniel Hosseinian *(Electrical Engineering)* B.S., University of California, Los Angeles 2019.

Shane Kenyon Houchin *(Geology)* B.S., University of California, Los Angeles 2020.

Emily Yoonju Hwang *(Materials Science)* B.S., Harvey Mudd College 2020.

John Gary Hylak *(Chemical Engineering)* B.S., University of California, Santa Barbara 2019.

Julie Alanna Inglis *(Planetary Science)* B.Sc., McMaster University 2020.

Phillip Robert Jahelka *(Applied Physics)* B.S., Reed College 2014.

Qingxin Ji *(Applied Physics)* B.S., Peking University 2020.

Master of Science *continued*

Hemani Kalucha *(Geobiology)* B.S., Princeton University 2019; M.Sc., York University 2020.

Roopa Akhila Kasturi *(Electrical Engineering)* B.E., Birla Institute of Technology and Science, Pilani 2018.

Solomiia Khomandiak *(Biology)* B.S., Taras Shevchenko National University of Kyiv 2009; M.S., 2011.

Gihwan Kim *(Applied Physics)* B.S., Seoul National University 2019.

Tae Han Kim *(Neurobiology)* B.Sc., University of Toronto 2016.

Vladimir Ladygin *(Materials Science)* B.S., Moscow Institute of Physics and Technology 2018; M.S., 2020.

Barry Patrick Lawlor *(Mechanical Engineering)* B.S., University of California, San Diego 2020.

Dongkwan Lee *(Chemical Engineering)* B.S., University of Illinois at Urbana-Champaign 2018.

Bohan Li *(Physics)* B.S., The Hong Kong University of Science and Technology 2020.

Gordon Han Ying Li *(Applied Physics)* B.Sc., The University of Sydney 2019.

Yunxuan Li *(Physics)* B.S., Nanjing University 2015.

Chung-Yi Lin *(Electrical Engineering)* B.S., National Taiwan University 2015; M.S., 2018.

Eugene Loh Hoong Jun *(Mechanical Engineering)* B.E., Nanyang Technological University 2020.

George Armando Lopez *(Biology)* B.S., California State University, Dominguez Hills 2014.

Linhao Ma *(Physics)* B.S., University of Science and Technology of China 2019.

Ioannis Miltiadis Mandralis *(Aeronautics)* B.Sc., École Polytechnique Fédérale de Lausanne 2017; M.Sc., Swiss Federal Institute of Technology Zurich 2020.

Theresa Clare Marlin *(Geobiology)* B.S., DeSales University 2016.

Sean Alexander Mendoza *(Aeronautics)* B.S., California Institute of Technology 2017.

Keefe Edward Mitman *(Physics)* B.A., Columbia University 2019.

Nina Mohebbi *(Aeronautics)* B.S., Georgia Institute of Technology 2016.

Joel Monroy *(Chemistry)* A.A., Pasadena City College 2016; B.S., California State University, Long Beach 2019.

Alex T. Mori Carroll *(Mechanical Engineering)* B.S.E., University of Michigan, Ann Arbor 2020.

Alexander Lorenzo Moss *(Physics)* S.B., Massachusetts Institute of Technology 2017.

James Paul Mullahoo *(Environmental Science and Engineering)* B.S., Tufts University 2017.

Sujeeka Nadarajah *(Mechanical Engineering)* B.Sc., University of Moratuwa 2018.

Arun Nagpal *(Applied Physics)* B.S., University of Michigan, Ann Arbor 2018.

André Nicolov *(Applied Physics)* B.S., University of Washington 2019.

Andrew William Nyholm *(Materials Science)* B.A., B.S., University of Pennsylvania 2020.

Master of Science continued

Liam Christopher O'Brien *(Physics)* B.S., University of Massachusetts Amherst 2018.

Lincoln John Ombelets *(Chemistry)* B.S., Northeastern University 2018.

Sahil Rakesh Patel *(Materials Science)* B.S., Rice University 2020.

Pierre Penet *(Aeronautics)* B.Sc., École Polytechnique 2020.

Dylan Taylor Perlson *(Electrical Engineering)* B.S., University of California, San Diego 2021.

Sam Bharat Vijay Karthikeyan Ponnada *(Astrophysics)* B.S., The University of Iowa 2020.

George Arthur Popov *(Space Engineering)* B.A., B.S., M.S., University of Pennsylvania 2021.

Nikolaus Zen Prusinski *(Astrophysics)* B.S., University of Wisconsin-Milwaukee 2020.

Aakila Rajan *(Mechanical Engineering)* B.Tech., Indian Institute of Technology Madras 2020.

Ozair Rajani *(Mechanical Engineering)* B.A.Sc., University of British Columbia 2019.

Federico Rios Tascon *(Aeronautics)* B.S., Purdue University 2020.

Calvin James Rusley *(Geobiology)* A.B., Princeton University 2020.

Sarah Andrea Sam *(Neurobiology)* B.S., Virginia Polytechnic Institute and State University 2016.

Sathvik Reddy Sanagala *(Mechanical Engineering)* B.S., University of Illinois at Urbana-Champaign 2020.

Debjit Sarkar *(Electrical Engineering)* B.S.E., University of Michigan, Ann Arbor 2019.

Samuel Francis Savitz *(Physics)* B.S., California Institute of Technology 2016.

Samuel Kai Wen Seah *(Applied Physics)* B.A., M.Sc., University of Cambridge 2017.

Arda Secme *(Applied Physics)* B.Sc., Bilkent University 2017; M.Sc., 2020.

Ryoto Sekine *(Electrical Engineering)* B.S.E., Princeton University 2019.

Pratik Sharma *(Electrical Engineering)* B.Tech., Indian Institute of Space Science and Technology 2021.

Yaozhong Shi *(Civil Engineering)* B.E., Wuhan University 2020.

Lily Tiffany Shiau *(Materials Science)* B.S., University of California, Berkeley 2020.

Jared Frederick George Sisler *(Applied Physics)* B.A.Sc., University of Waterloo 2020.

Divesh Soni *(Space Engineering)* B.Tech., Indian Institute of Space Science and Technology 2016.

Ina M Sorensen *(Physics)* M.Eng., University of Oxford 2015; M.Sc., Bournemouth University 2016.

Alejandro Andres Stefan Zavala *(Aeronautics)* B.A., University of California, Berkeley 2020.

Xuan Sun *(Physics)* B.S., McGill University 2015.

Noah C Tashbook *(Geobiology)* B.S., University of Washington 2019.

Zayne Thawer *(Space Engineering)* B.Sc., University of Toronto 2021.

Prachi Thureja *(Applied Physics)* B.Sc., Swiss Federal Institute of Technology Zurich 2017; M.Sc., 2019.

Master of Science *continued*

Amanda Patricia Toledo Barrios *(Space Engineering)* B.S., M.S., Worcester Polytechnic Institute 2020.

Shashank Tomar *(Space Engineering)* B.Tech., Indian Institute of Space Science and Technology 2021.

Thomas Tuan Tran *(Materials Science)* B.S., University of California, Los Angeles 2020.

Pieter Erik M Van Santvliet *(Electrical Engineering)* B.Sc., University of Technology Delft 2021.

Nadezda M Volovich *(Biochemistry and Molecular Biophysics)* B.Sc., Lomonosov Moscow State University 2015; M.Sc., Skolkovo Institute of Science and Technology 2015.

Albert Kamau Wandui *(Physics)* B.S., Stanford University 2017.

Hannah Virginia Way *(Geobiology)* B.S., University of California, Riverside 2019.

Chuming Wen *(Electrical Engineering)* B.S., University of Wisconsin-Madison 2020.

Cora Margaret Went *(Physics)* B.S., University of North Carolina at Chapel Hill 2015.

John Dylan Wilding *(Geophysics)* B.A., Columbia University 2017.

Feiruo Xia *(Mechanical Engineering)* B.S., Harvey Mudd College 2020.

Je-han Yang *(Electrical Engineering)* B.S., University of California, Berkeley 2020.

Benjamin Bobin Ye *(Chemical Engineering)* B.S., University of Virginia 2019.

Danmin Yu *(Applied Mechanics)* B.A., Harbin Institute of Technology 2018; M.S., 2020.

Hongmin Yu *(Environmental Science and Engineering)* B.S., The College of William & Mary 2020.

Kevin Yu *(Materials Science)* B.S., University of California, Berkeley 2015.

Mert Yüksel *(Applied Physics)* B.S., Bilkent University 2016; M.Sc., 2019.

Hesham Marwan Zaini *(Mechanical Engineering)* S.B., Massachusetts Institute of Technology 2015; M.S., Carnegie Mellon University 2016.

Yi Zeng *(Physics)* B.S., University of California, Santa Barbara 2018.

Wenxin Zhang *(Mechanical Engineering)* B.S., University of California, Berkeley 2020.

Cijin Zhou *(Geophysics)* B.S., University of Science and Technology of China 2020.

Yacong Zhou *(Chemistry)* B.S., Nanjing University 2015.

DIVISION OF BIOLOGY AND BIOLOGICAL ENGINEERING

Reem Abdel-Haq *(Biology)* Sc.B., Brown University 2016.
> Thesis: Gut Microbiome Modulates Microglia Physiology in Homeostatic and Disease States.

Aiden Joseph Aceves *(Bioengineering)* B.S., University of California, Riverside 2015.
> Thesis: Machine Learning and Modeling Methods for Protein Engineering.

Lucas Andrade Meirelles *(Biology)* B.S., Universidade Estadual Paulista "Júlio de Mesquita Filho" 2012; M.Sc., 2015.
> Thesis: The Nuanced Effects of Redox-Active Metabolites on Bacterial Physiology and Antibiotic Susceptibility.

Jacob T. Barlow *(Bioengineering)* B.S., Northeastern University 2017.
> Thesis: Quantitative Sequencing and its Application to Studies of the Human Small-Intestine Microbiota.

Suzannah Michelle Beeler *(Systems Biology)* B.S., Harvey Mudd College 2015.
> Thesis: Deciphering Regulation in *Escherichia coli*: From Genes to Genomes.

David Brown *(Computation and Neural Systems)* B.S., University of Michigan, Ann Arbor 2014.
> Thesis: Principles of Massively Parallel Sequencing for Engineering and Characterizing Gene Delivery.

Srinivas Chivukula *(Biology)* B.S., Columbia University 2010; M.D., University of Pittsburgh 2014; M.D., University of California, Los Angeles 2021.
> Thesis: Felt, Imagined, and Seen Touch Share a Substrate in Human Posterior Parietal Cortex.

Samuel Eric Clamons *(Bioengineering)* B.S., The College of William & Mary 2013.
> Thesis: Three Problems in the Design and Specification of Biomolecular Circuits.

Logan Matthew Cross *(Computation and Neural Systems)* B.S., University of Southern California 2015.
> Thesis: The Neural Mechanisms of Value Construction.

Eduardo da Veiga Beltrame *(Bioengineering)* B.S., Brandeis University 2016.
> Thesis: Stories in Single Cell RNA Sequencing.

‡ *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*

Alysha Maria De Souza *(Biology)* B.S., Stanford University 2013.
> Thesis: Sparse Neural and Motor Networks Underlying Control in the Drosophila Flight System.

Ke Ding *(Neurobiology)* B.S., Zhejiang University 2015.
> Thesis: Imaging Neuropeptide Release and Localization with Genetically-Engineered Reporters.

KeHuan Kuo Edmonds *(Biology)* B.S., University of California, Los Angeles 2012.
> Thesis: Imaging Cell Lineage with a Synthetic Digital Recording System.

Tomas Gallo Aquino *(Computation and Neural Systems)* B.Sc., Universidade de São Paulo 2015.
> Thesis: Single Neuron Correlates of Learning, Value, and Decision in the Human Brain.

Mengsha Gong *(Bioengineering)* B.S., University of California, Berkeley 2014.
> Thesis: Remodeling Jellyfish.

Yanting Han *(Neurobiology)* B.E., Tsinghua University 2016.
> Thesis: Emotion Experience from Stories, Videos and Everyday Life: Structure and Individual Differences.

Magnus Adrian Gero Hoffmann *(Biology)* B.S., Loughborough University 2010; M.Pharm., University of Bath 2014.
> Thesis: Nanoparticle Technologies to Cure and Prevent Infectious Diseases.

HyeongChan Jo *(Bioengineering)* B.S., Korea Advanced Institute of Science and Technology 2015.
> Thesis: Bidirectional Brain-Machine Interfaces for Modulating Stimulation and Neural Plasticity.

Koichiro Kajikawa *(Computation and Neural Systems and Computational Science and Engineering)* B.S., The University of Tokyo 2010; M.S., 2012.
> Thesis: Inhibition is the Hallmark of CA3 Intracellular Dynamics Around Awake Ripples.

Alison Lindsay Koontz *(Biology)* B.S., University of Connecticut 2016.
> Thesis: Neural Crest and Placode Cell Contributions to Cranial Sensory Development.

Andrés Ortiz Muñoz *(Systems Biology)* B.S., The University of Texas at El Paso 2014.
> Thesis: Combinatorics and Stochasticity for Chemical Reaction Networks.

William Poole *(Computation and Neural Systems)* Sc.B., Brown University 2013.
> Thesis: Compilation and Inference with Chemical Reaction Networks.

Matthew Hutson Rosenberg *(Computation and Neural Systems)* B.S., University of California, Los Angeles 2013.
> Thesis: Innate Navigation: Magnetic Sensation and Maze Learning.

Emily Sue Savela *(Bioengineering)* B.S., Milwaukee School of Engineering 2016.
> Thesis: Nucleic Acid Measurements for Antibiotic Susceptibility Testing and Early Detection of SARS-CoV-2.

Andrey Sergeyvich Shur *(Bioengineering)* B.S., Harvey Mudd College 2011.
> Thesis: Serine Integrase-Based Event Recording in *E. coli*.

Christina Janet Su *(Systems Biology and Computer Science)* A.B., Princeton University 2014.
> Thesis: Principles of Addressing Specificity in Promiscuous Ligand-Receptor Systems.

Weiyi Tang *(Biology)* B.S., University of California, Irvine 2016.
> Thesis: Retroviral Lineage Analysis of the Vagal Neural Crest Reveals Multipotency Towards the Cardiac and Enteric Fates.

Ella Jenná Watkins-Dulaney *(Bioengineering)* B.S., The University of Texas at Austin 2016.
> Thesis: Engineering the Tryptophan Synthase β-subunit for Synthesis of Non-Canonical Amino Acids.

Rory Logan Williams *(Bioengineering)* B.S., University of Minnesota, Twin Cities 2015.
> Thesis: Development and Scaling of Differentiation Circuit Architectures for Improving the Evolutionary Stability of Burdensome Functions in *E. coli*.

Bruce James Wittmann *(Bioengineering)* B.A., Washington University in St. Louis 2015.
> Thesis: Strategies and Tools for Machine Learning–Assisted Protein Engineering.

Fangzhou Xiao *(Bioengineering)* B.S., Washington University in St. Louis 2015.
> Thesis: Biocontrol of Biomolecular Systems: Polyhedral Constraints on Binding's Regulation of Catalysis from Biocircuits to Metabolism.

Bin Yang *(Neurobiology)* B.S., University of Redlands 2008; M.S., Georgetown University 2012.
> Thesis: Transformations and Functions of Neural Representations in a Subcortical Social Behavior Network.

Zhi Yang *(Biochemistry and Molecular Biophysics)* B.S., Jilin University 2011; M.S., Brandeis University 2015.
> Thesis: Conformational Plasticity of HIV-1 Env and Implications for Vaccine Design.

Tony (Haoyu) Zhang *(Computation and Neural Systems)* B.A., McMaster University 2016.
> Thesis: Biological Intelligence: From Behavior to Learning Theory.

DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING

Morgan Elizabeth Abernathy *(Chemistry)* B.S., Rice University 2017.
> Thesis: Antibody Targeting of HIV-1 Env: A Structural Perspective.

Mary Villanueva Arrastia *(Chemistry)* B.S., California State University, Los Angeles 2015.
> Thesis: Development of Single-Cell SPRITE: A Tool for Measuring Heterogeneity of 3D DNA Organization.

Doctor of Philosophy   *continued*

Rachel Banks *(Biochemistry and Molecular Biophysics)* B.A., University of Pennsylvania 2017.
> Thesis: Experimental and Theoretical Studies of Non-Equilibrium Systems: Motor-Microtubule Assemblies and the Human-Earth System.

Orland Christopher Lycurgue Bateman *(Chemical Engineering)* B.S., University of Utah 2014.
> Thesis: Design and Application of Novel Membrane Materials.

Camillus Francis Buzard *(Chemistry)* B.A., Barnard College 2016.
> Thesis: Detecting Small Signals: Near-Infrared Studies of Substellar Companions.

Lixue Cheng *(Chemistry)* B.S., University of Wisconsin-Madison 2016.
> Thesis: Accurate and Transferable Molecular-Orbital-Based Machine Learning for Molecular Modeling.

Travis Jon DeLano *(Chemistry)* B.S., Northeastern University 2017.
> Thesis: Development of Nickel-Catalyzed Asymmetric Cross-Coupling Reactions.

Shannon Rose Esswein *(Biochemistry and Molecular Biophysics)* B.S., University of California, Los Angeles 2013; M.Phil., University of Cambridge 2020.
> Thesis: Structural Basis of Antibody Recognition of Viruses.

Nicholas James Fastuca *(Chemistry)* B.S., Pennsylvania State University 2016.
> Thesis: Fragment Coupling Approach to C_{19-} and C_{20-}Diterpenoid Alkaloids: Total Synthesis of (–)-Talatisamine, (–)-Liljestrandisine and (–)-Liljestrandinine.

Mark Evan Fornace *(Chemistry)* B.S., The University of Chicago 2013.
> Thesis: Computational Methods for Simulating and Parameterizing Nucleic Acid Secondary Structure Thermodynamics and Kinetics.

Dylan Joshua Freas *(Chemistry)* B.A., Williams College 2016.
> Thesis: The Synthesis of Diverse Families of Organic Compounds via Nickel-Catalyzed Nucleophilic Substitution Reactions.

Michelle Yen Fry *(Biochemistry and Molecular Biophysics)* B.S., Brandeis University 2014.
> Thesis: Mechanistic Studies of Tail-anchored Membrane Protein Targeting to the ER.

Harold Jin Fu *(Chemical Engineering)* B.S., Cornell University 2016; M.S., California Institute of Technology 2019.
> Thesis: Open-Circuit Stability and Integration of Silicon Electrodes for Solar Fuels Devices.

Tyler James Fulton *(Chemistry)* B.S., Bucknell University 2016.
> Thesis: Asymmetric Total Syntheses of (–)-Myrifabral A and B, Havellockate, and New Strategies for Acyclic Stereocontrol.

Vahe Galstyan‡ *(Biochemistry and Molecular Biophysics)* B.A., Columbia University 2016.
> Thesis: Studies in Physical Biology: Exploring Allosteric Regulation, Enzymatic Error Correction and Cytoskeletal Self-Organization using Theory and Modeling.

Nathaniel Wood Goldberg *(Chemistry)* A.B., Harvard College 2016.
> Thesis: Non-Native Chemistry of Metalloenzymes.

Doctor of Philosophy *continued*

Stephen Nicholas Grant *(Chemistry)* B.S., State University of New York at Stony Brook 2015.
Thesis: Investigation of Some Small Molecule-Protein and Protein-Protein Interactions in Nicotine Addiction, Opioid Use Disorder, and COVID-19.

Alan Yalun Gu *(Chemical Engineering)* B.A.Sc., University of Toronto 2017.
Thesis: Aqueous Aerosols in Atmospheric Chemistry and Airborne Disease.

Nicholas Joseph Hafeman *(Chemistry)* A.S., Oakton Community College 2014; B.S., University of Illinois at Chicago 2016.
Thesis: Synthesis and Applications of Terpenoid Natural Products: Total Synthesis of Scabrolide A and Havellockate, and Synthesis of Pinene Oxidation Products for Atmospheric Investigations.

Kathryn Rose Hamann *(Chemistry)* B.A., Eastern Oregon University 2016.
Thesis: Exploration of Materials and Mesostructures Accessible via Inorganic Phototropic Growth.

Elizabeth Anne Holman *(Chemistry)* B.S., University of California, Berkeley 2012.
Thesis: Developing Technologies for Real-Time Whole-Organism Imaging via FTIR Spectromicroscopy.

Karli Rose Holman *(Chemistry)* B.S., Westmont College 2016.
Thesis: Palladium-Catalyzed Cascade Cyclizations in Natural Product Synthesis: Synthetic Studies of Noraugustamine and Falcatin A.

Daniel Rance Jacobson *(Chemical Engineering)* Sc.B., Brown University 2014.
Thesis: Computational Studies of Dendritic Deposition and Trajectory Phase Coexistence.

Claudia Angela Jette *(Biochemistry and Molecular Biophysics)* B.S., University of California, Santa Barbara 2015.
Thesis: Targeting Fusion Proteins of HIV-1 and SARS-CoV-2.

Christopher M. Kenseth *(Chemistry)* B.S., The University of Vermont 2015.
Thesis: Formation, Abundance, and Evolution of Molecular Products in α-Pinene and β-Pinene Secondary Organic Aerosol.

Jeongmin Kim *(Chemistry)* B.S., Sogang University 2011; M.S., 2013.
Thesis: Molecular Simulations of Charge Transport for Energy Storage and Conversion Applications.

Seungkyeum Kim *(Chemical Engineering)* B.S., University of California, Los Angeles 2017; M.S., California Institute of Technology 2021.
Thesis: Development of Electrochemical Processes for More Practical and Effective Onsite Wastewater Treatment.

Doctor of Philosophy   continued

Camilla Maria Kjeldbjerg *(Chemical Engineering)* B.Sc., Technical University of Denmark 2016;
  M.S., California Institute of Technology 2018.
  Thesis: The Effects of Confinement on Active Matter: the Casimir Effect, Partitioning, and
  Hindered Diffusion.

Caitlin Rebecca Lacker *(Chemistry)* B.S., Southwestern University 2016.
  Thesis: The Modular Synthesis and Functionalization of Cyclic Compounds using Modern
  Methods.

Red C Lhota *(Chemical Engineering)* B.S., Northwestern University 2015.
  Thesis: Rheological Characterization of Polymer Additives for Mist Control and Drag
  Reduction.

Siobhán Gaustad MacArdle *(Chemistry)* B.A., Barnard College 2014.
  Thesis: Analytical Chemistry Investigations Toward Understanding the Mechanism of
  Nitrogenase from *Azotobacter vinelandii* and the Role of the 4Fe-4S Cluster of Dna2 from
  Saccharomyces cerevisiae.

Michael Robert Maser *(Chemistry)* B.S., University of California, Santa Barbara 2017.
  Thesis: Machine Learning Methods Inspired by Challenges in Total Synthesis.

Michael Francis Mazza *(Chemistry)* B.A., Washington University in St. Louis 2016.
  Thesis: Defect-Driven Reactivity of Layered Materials Examined through Atomic Layer
  Deposition.

Skyler Dakota Mendoza *(Chemistry)* B.S., University of Washington 2016.
  Thesis: Development of a Synthetic Strategy Toward Falcatin A; Development of an
  Asymmetric Diels–Alder Reaction of Alpha-Acyloxy Enones.

Zhiwei Peng *(Chemical Engineering and Applied and Computational Mathematics)* B.E., B.S.,
  Beihang University 2014; M.S., University of British Columbia 2016.
  Thesis: Transport and Microrheology of Active Colloids.

Stefan Petrovic *(Biochemistry and Molecular Biophysics)* B.S., Bucknell University 2014.
  Thesis: Structure and Function of the Human Nuclear Pore Complex.

Manuel Razo Mejia *(Biochemistry and Molecular Biophysics)* B.S., Instituto Politécnico Nacional
  2014.
  Thesis: Physical Biology of Cellular Information Processing.

Ryan Dillon Ribson *(Chemistry)* B.S., University of Rochester 2014; M.S., California Institute of
  Technology 2018.
  Thesis: Spectroscopic Characterization of Electronic and Magnetic Relaxation Phenomena in
  Molecular Systems.

Katherine Zoe Rinaldi *(Chemistry)* B.A., Barnard College 2015.
  Thesis: A Technical and Systems Analysis of Hydrogen Fuel in Renewable Energy Systems.

Jorge Luis Rosa-Raíces *(Chemistry)* B.S., University of Puerto Rico 2016.
  Thesis: Path Space Markov Chain Monte Carlo Methods for Molecular Simulation.

Doctor of Philosophy   *continued*

Hyeongjoo Row *(Chemical Engineering)* B.S., Seoul National University 2017; M.S., California
Institute of Technology 2019.
Thesis: Mechanical Approach to Active Matter: Reverse Osmotic Effect and Motility-
Induced Phase Separation.

Max Anthony Saccone *(Chemical Engineering)* A.B., B.E., Dartmouth College 2017.
Thesis: Vat Photopolymerization Additive Manufacturing of Functional Materials: From
Batteries to Metals and Alloys.

Dirk Jacob Schild *(Chemistry)* B.Sc., Hogeschool Utrecht 2013; M.S., Utrecht University 2016.
Thesis: Synthesis, Characterization, and Reactivity of Iron Hydrides in Nitrogen Fixation and
Proton Coupled Electron Transfer from C-H Bonds.

Xuecheng Tao *(Chemistry)* B.S., University of Science and Technology of China 2016.
Thesis: Capturing Nuclear Quantum Effects at Classical Efficiency: A Path-Integral
Approach.

Elise M. Tookmanian *(Chemistry)* B.A., Franklin & Marshall College 2015.
Thesis: Investigation of the Roles of Hopanoids during the Lifecycle of *Bradyrhizobium
diazoefficiens* in the Context of Climate Change.

Krystal TonyBeth Vasquez *(Chemistry)* B.S., University of California, Riverside 2015.
Thesis: Isomer Separation of Multifunctional Atmospheric Compounds Using Gas
Chromatography and Chemical Ionization Mass Spectrometry.

Olivia Harper Wilkins *(Chemistry)* B.S., Dickinson College 2015.
Thesis: High-Resolution Imaging of Extreme Interstellar Environments.

Andrew Samuel Ylitalo *(Chemical Engineering)* B.S., Stanford University 2017.
Thesis: A Bubble Is Born: Nucleation and Early Growth of CO_2 Bubbles in Polymer Foams.

Juner Zhang *(Chemistry)* B.S., Tsinghua University 2017.
Thesis: New-to-Nature Selective C–H Alkylation Using Engineered Carbene Transferases.

Matthew Holden Zimmer *(Biochemistry and Molecular Biophysics)* M.Chem., University of
Oxford 2016.
Thesis: Cotranslational Pulling Forces Alter Outcomes of Protein Synthesis.

DIVISION OF ENGINEERING AND APPLIED SCIENCE

Eric Ryan Ambrose *(Mechanical Engineering)* B.S., Georgia Institute of Technology 2013; M.S.,
California Institute of Technology 2018.
Thesis: Creating ARCHER: A 3D Hopping Robot with Flywheels for Attitude Control.

Anthony Joseph Ardizzi *(Applied Physics)* B.Sc., University of Toronto 2015; M.S., California
Institute of Technology 2018.
Thesis: Self-Heating of HEMT Low-Noise Amplifiers in Liquid Cryogenic Environments
and the Limits of Microwave Noise Performance.

Doctor of Philosophy   *continued*

Peyman Ayoubi *(Civil Engineering)* B.Sc., University of Guilan 2012; M.Sc., Sharif University of Technology 2014; M.S., California Institute of Technology 2017.
> Thesis: Modeling and Parameterization of Basin Effects for Engineering Design Applications.

Conner Kiley Ballew *(Electrical Engineering)* B.S., University of Washington 2015; M.S., 2016.
> Thesis: Multifunctional Volumetric Metaoptics.

Jash Haren Banker *(Applied Physics)* B.Tech., Indian Institute of Technology Bombay 2015; M.S., California Institute of Technology 2017.
> Thesis: Photonic and Phononic Band Gap Engineering for Circuit Quantum Electrodynamics and Quantum Transduction.

Benedikt Barthel *(Aeronautics)* B.S., University of California, Los Angeles 2015; M.S., California Institute of Technology 2017.
> Thesis: On the Variational Principles of Linear and Nonlinear Resolvent Analysis.

Haley Coddington Bauser *(Applied Physics)* B.S., The College of William & Mary 2016.
> Thesis: High Contrast Nanophotonics for Scalable Photovoltaics and Solar Fuels.

Ali Sina Booeshaghi *(Mechanical Engineering)* S.B., Massachusetts Institute of Technology 2017; M.S., California Institute of Technology 2019.
> Thesis: Foundations and Applications of Single-Cell RNA Sequencing.

Amanda Rose Bouman *(Mechanical Engineering)* B.S., Cornell University 2015; M.S., California Institute of Technology 2017.
> Thesis: Autonomous Mission-Driven Robots in Extreme Environments.

Jiajie Chen *(Applied and Computational Mathematics)* B.S., Peking University 2017.
> Thesis: Singularity Formation in Incompressible Fluids and Related Models.

Kuan-Chang Chen *(Electrical Engineering)* B.S., National Taiwan University 2011; M.S., Stanford University 2014.
> Thesis: Energy-Efficient Receiver Design for High-Speed Interconnects.

Peishi Stephen Cheng *(Materials Science)* B.S., University of Florida 2014; M.S., California Institute of Technology 2017.
> Thesis: Charge and Heat Transport in Non-Metallic Crystals Using First-Principles Boltzmann Transport Theory.

Alexander Choi *(Mechanical Engineering)* B.S., University of Connecticut 2016; M.S., California Institute of Technology 2018.
> Thesis: Investigation of Electronic Fluctuations in Semiconductor Materials and Devices through First-Principles Simulations and Experiments in Transistor Amplifiers.

Tzu-Chieh Chou *(Electrical Engineering)* B.S., National Taiwan University 2014; M.S., California Institute of Technology 2015.
> Thesis: Wearable Inductive Damping Sensors for Skin Edema Quantification.

Doctor of Philosophy *continued*

Sydney Lea Corona *(Materials Science)* B.S., Saint Mary's College of California 2016; M.S., California Institute of Technology 2018.
> Thesis: Emerging Evidence of a Second Glass Phase in Strong to Ultra-Fragile Bulk Metallic Glass-Forming Liquids.

Vincenzo Costanza *(Medical Engineering)* M.S., Swiss Federal Institute of Technology Zurich 2016; M.S., California Institute of Technology 2019.
> Thesis: Thermally Responsive Polymers for Wearable Calorimeters.

Eunice Michelle Chua Cua *(Electrical Engineering)* B.A.S., B.S., Simon Fraser University 2011; M.A.S., 2014; M.S., California Institute of Technology 2017.
> Thesis: Exploiting Speckle to Image Deeper in Scattering Media.

Tatyana Dobreva *(Medical Engineering)* B.S., University of Michigan, Ann Arbor 2014.
> Thesis: Engineering Tools to Probe and Manipulate the Immune System at Single-Cell Resolution.

Charles Jacob Dorn *(Space Engineering)* B.S., University of Wisconsin-Madison 2016; M.S., California Institute of Technology 2017.
> Thesis: Geometry Synthesis and Multi-configuration Rigidity of Reconfigurable Structures.

Christopher John Dougherty *(Aeronautics)* B.S., University of Southern California 2015; M.S., California Institute of Technology 2016.
> Thesis: On the Experimental Simulation of Atmospheric-Like Disturbances Near the Surface.

Vinicius Thaddeu dos Santos Ferreira *(Applied Physics)* B.A., M.S., University of Pennsylvania 2015; M.A.S., University of Cambridge 2016; M.S., California Institute of Technology 2018.
> Thesis: Waveguide Quantum Electrodynamics with Superconducting Slow-Light Waveguide Circuits.

Austin Covey Fikes *(Electrical Engineering)* B.S., Harvey Mudd College 2016; M.S., California Institute of Technology 2018.
> Thesis: Future Microwave Arrays Take Shape.

Carl A. A. Folkestad *(Control and Dynamical Systems)* M.Sc., Norwegian University of Science and Technology 2017.
> Thesis: Koopman-based Learning and Control of Agile Robotic Systems.

Yang Gao *(Materials Science)* B.S., University of Science and Technology of China 2016.
> Thesis: Extending the Capability of Classical Quantum Many-body Methods.

Gautam Goel *(Computing and Mathematical Sciences)* B.S., Georgia Institute of Technology 2015.
> Thesis: Regret-Optimal Control.

Doctor of Philosophy *continued*

Haeri Park Hanania *(Medical Engineering)* B.S., Seoul National University 2013; M.S., California Institute of Technology 2017.
> Thesis: Nanophotonic Application to Biomedical Devices.

John Michael Harmon *(Applied Mechanics)* B.S., The University of Texas at Austin 2016; M.S., California Institute of Technology 2018.
> Thesis: Predicting the Strength of Planetary Surfaces.

Benjamin Riley Herren *(Materials Science)* B.S., Boise State University 2016; M.S., California Institute of Technology 2018.
> Thesis: Oxidative and Internal Stress Effects of Dopants in Multilayer $Yb_2Si_2O_7$ Environmental Barrier Coatings.

Morgan Louise Hooper *(Aeronautics)* B.A.Sc., University of Toronto 2016; M.S., California Institute of Technology 2017.
> Thesis: Characterization and Optimization of a Fully Passive Flapping Foil in an Unsteady Environment for Power Production and Propulsion.

Zi-Yu Huang *(Medical Engineering)* B.S., National Taiwan University 2015; M.S., California Institute of Technology 2017.
> Thesis: Electrical Impedance Spectroscopy-derived 3D Conductivity Tomography for Atherosclerosis Detection.

Phillip Robert Jahelka *(Applied Physics)* B.S., Reed College 2014.
> Thesis: Progress in Low-Cost Gallium Arsenide Solar Cells.

Eun Jong Kim *(Applied Physics)* B.S., Seoul National University 2016; M.S., California Institute of Technology 2019.
> Thesis: Waveguide Quantum Electrodynamics in Superconducting Circuits.

Yonghwi Kim *(Electrical Engineering)* B.S., Yonsei University 2011; M.S., 2013; M.S., California Institute of Technology 2015.
> Thesis: Light Modulation with Vanadium Dioxide-Based Optical Devices.

Nikola Borislavov Kovachki *(Applied and Computational Mathematics)* B.S., California Institute of Technology 2016.
> Thesis: Machine Learning and Scientific Computing.

Marcus Kuok Kuan Lee *(Mechanical Engineering)* B.S.E., Princeton University 2015; M.S., California Institute of Technology 2018.
> Thesis: Instabilities in the Flow Over a Spinning Disk at Angle of Attack.

Chen Liang *(Computing and Mathematical Sciences)* B.E., Tsinghua University 2016.
> Thesis: Cascading Failures in Power Systems: Modeling, Characterization, and Mitigation.

Doctor of Philosophy   *continued*

Samuel Pei Hao Loke *(Materials Science)* B.Eng., Imperial College London 2014.
  Thesis: Photovoltaic Technologies Developed for Space-Based Solar Power.
Michael Aaron Marshall *(Space Engineering)* B.S., Georgia Institute of Technology 2016; M.S.,
  California Institute of Technology 2017.
  Thesis: Dynamics of Ultralight Flexible Spacecraft during Slew Maneuvers.
Connor Glenn McMahan *(Mechanical Engineering)* S.B., Massachusetts Institute of Technology
  2016; M.S., California Institute of Technology 2018.
  Thesis: Modeling and Programming Shape-Morphing Structured Media.
Jenish Chetan Mehta *(Computer Science)* B.E., Birla Institute of Technology and Science, Pilani
  2011; M.S., California Institute of Technology 2016.
  Thesis: Combinatorial and Algebraic Properties of Nonnegative Matrices.
David Robert Needell *(Materials Science)* B.A., Bowdoin College 2015.
  Thesis: High Efficiency Luminescent Solar Concentrators for Photovoltaic Applications.
Jinsoo Park *(Applied Physics)* B.S., Seoul National University 2016; M.S., California Institute of
  Technology 2020.
  Thesis: Spin-Phonon Interactions and Spin Decoherence from First Principles.
Parham Porsandeh Khial *(Electrical Engineering)* B.Sc., Sharif University of Technology 2015;
  M.S., California Institute of Technology 2016.
  Thesis: High Sensitivity Time-varying Systems In Photonics and Electronics.
Yidan Qin *(Mechanical Engineering)* B.S., Washington University in St. Louis 2016; M.S.,
  California Institute of Technology 2019.
  Thesis: Autonomous Temporal Understanding and State Estimation during Robot-Assisted
  Surgery.
Jake Herschel Lebi Rochman *(Electrical Engineering)* B.A.Sc., University of Waterloo 2016;
  M.S., California Institute of Technology 2019.
  Thesis: Microwave-to-Optical Transduction Using Rare-Earth Ions.
Se Rim Ryou *(Electrical Engineering)* B.E., Korea University 2014; M.S., California Institute of
  Technology 2016.
  Thesis: Representation of the Semantic Structures: From Discovery to Applications.
Claire Nicole Saunders *(Materials Science)* B.S., Duquesne University 2015; M.S., California
  Institute of Technology 2017.
  Thesis: Thermal Behavior of Cuprous Oxide: A Comprehensive Study of Three-Body Phonon
  Effects and Beyond.

Doctor of Philosophy   *continued*

Jin Sima *(Electrical Engineering)* B.E., Tsinghua University 2013; M.E., 2016; M.S., California
Institute of Technology 2018.
Thesis: Correcting Errors in DNA Storage.

Andrew Wills Singletary *(Mechanical Engineering)* B.S. *(Mechanical Engineering)*, B.S. *(Nuclear
and Radiological Engineering)*, Georgia Institute of Technology 2017; M.S., California
Institute of Technology 2019.
Thesis: Safe Input Regulation for Robotic Systems.

Yichuan Song *(Aeronautics and Computer Science)* B.S., University of Notre Dame 2015; M.S.,
California Institute of Technology 2016.
Thesis: Rheological Measurements in Moderate Reynolds Number Liquid-Solid Flows.

Benjamin Carter Stevens *(Mechanical Engineering)* B.S., Rose-Hulman Institute of Technology
2017; M.S., California Institute of Technology 2019.
Thesis: Applications of Machine Learning to Finite Volume Methods.

Kavya Sudhir *(Mechanical Engineering)* B.Tech., M.Tech., Indian Institute of Technology Madras
2015; M.S., California Institute of Technology 2017.
Thesis: Slip Patterns on Heterogeneous Frictional Interfaces.

Szilard Szoke *(Applied Physics)* B.Eng., University College London 2015; M.Sc., Imperial College
London 2016.
Thesis: Entangled Photon Interferometry: Development of Photonic Systems Towards
Quantum Spectroscopy.

Marcel Veismann *(Aeronautics)* B.S., Braunschweig University of Technology 2014; M.S.,
California Institute of Technology 2016.
Thesis: Axial Descent of Multirotor Configurations—Experimental Studies for Terrestrial and
Extraterrestrial Applications.

Alexandra Justine Welch *(Applied Physics)* B.S., Stanford University 2016; M.S., California
Institute of Technology 2018.
Thesis: Understanding and Optimizing the Local Catalyst Environment in CO_2 Reduction
Electrodes.

Nicholas Conlan White *(Applied Physics)* A.B., Princeton University 2013; M.S., California
Institute of Technology 2016.
Thesis: Nonlinear Dynamics and Stability of Viscous Free-Surface Microcapillary Flows in
V-Shaped Channels and on Curved Surfaces.

David Elliott Williams *(Electrical Engineering)* S.B., Massachusetts Institute of Technology 2015;
S.M., 2016.
Thesis: Shape-Changing Phased Arrays.

Doctor of Philosophy   *continued*

Joeson Wong *(Applied Physics)* B.S., University of Michigan, Ann Arbor 2015; M.S., California Institute of Technology 2017.
   Thesis: Optoelectronic Physics and Engineering of Atomically Thin Photovoltaics.
Eric Zhan *(Computing and Mathematical Sciences)* B.A., Cornell University 2016.
   Thesis: New Algorithms for Programmatic Deep Learning with Applications to Behavior Modeling.
Fengyu Zhou *(Electrical Engineering)* B.E., Tsinghua University 2016; M.S., California Institute of Technology 2018.
   Thesis: Optimization of Distribution Power Networks: From Single-Phase to Multi-Phase.
Hao Zhou *(Mechanical Engineering)* B.E., Peking University 2016; M.S., California Institute of Technology 2018.
   Thesis: Accelerated Computational Micromechanics.

DIVISION OF GEOLOGICAL AND PLANETARY SCIENCES

Jorge Alberto Castillo Castellanos *(Geophysics)* B.S., Universidad Autónoma de Nuevo León 2013; M.S., California Institute of Technology 2018.
   Thesis: Seismic Wavefield Imaging of the Earth: the Regional, the Local and the Remote.
Yayaati Chachan *(Planetary Science)* B.A., M.Sc., University of Cambridge 2017; M.S., California Institute of Technology 2019.
   Thesis: A Journey with Dust: From Protoplanetary Disks to Planetary Atmospheres and Outflows.
Ana Helena de Oliveira Lobo *(Planetary Science)* B.A., Columbia University 2015; M.S., California Institute of Technology 2017.
   Thesis: Atmospheric and Ocean Dynamics of Water Worlds.
Vasilije Dobrosavljevic *(Geophysics)* B.S., Yale University 2016; M.S., California Institute of Technology 2018.
   Thesis: Exploring Earth's Core-Mantle Boundary with Multi-Technique Approaches.
Katrina Lynn Hui *(Environmental Science and Engineering)* S.B., Massachusetts Institute of Technology 2016; M.S., California Institute of Technology 2018.
   Thesis: Monsoonal Precipitation in a Model Hierarchy: Impact of Continental Geometry and Global Warming.
Benjamin Rodo Idini Zabala *(Planetary Science and Geophysics)* B.Sc., Universidad de Chile 2013; M.Sc., 2016; M.S., California Institute of Technology 2019.
   Thesis: Earthquakes and the New Paradigm of Diluted Cores in Gas Giant Planets.

Doctor of Philosophy *continued*

Zhe Jia *(Geophysics)* B.S., University of Science and Technology of China 2013; M.S., University of Science and Technology of China 2016; M.S., California Institute of Technology 2019.

Thesis: Resolving Earthquake Source Complexities in the Heterogeneous Earth.

Siraput Jongaramrungruang *(Environmental Science and Engineering and Computer Science)* B.A., M.Sc., University of Cambridge 2015; M.S., California Institute of Technology 2018.

Thesis: Towards Accurate and Automated Detection and Quantification of Localized Methane Point Sources on a Global Scale.

Preston Cosslett Kemeny *(Geochemistry)* A.B., Princeton University 2015; M.S., California Institute of Technology 2018.

Thesis: A Fluvial Perspective on the Role of Sulfide Oxidation in the Global Carbon Cycle.

Celeste Ritter Labedz *(Geophysics)* B.S., University of Nebraska, Lincoln 2016; M.S., California Institute of Technology 2019.

Thesis: Between Seismic Speed and Glacial Pace: Cryoseismic Observation of Intermediate-Scale Processes at Lemon Creek Glacier, Alaska.

Stacy Larochelle *(Geophysics)* B.Eng., McGill University 2016; M.S., California Institute of Technology 2018.

Thesis: Mechanical Interactions Between Water and the Solid Earth: From Quasi-Static Geodetic Deformation to Dynamic Fault Slip.

Tianhao Le *(Environmental Science and Engineering and Computational Science and Engineering)* B.S., Peking University 2016; M.S., California Institute of Technology 2021.

Thesis: Radiation-based Analytic Approaches to Investigate the Earth's Atmosphere.

Jiazheng Li *(Planetary Science)* B.S., Peking University 2017.

Thesis: The Chemistry of Europa and Venus, and Characterization of Earth-like Exoplanets.

Stephen Robert Markham *(Planetary Science)* B.A., Cornell University 2016; M.S., California Institute of Technology 2018.

Thesis: Giant Planet Seismology and Cooling.

Jack Broderick Muir *(Geophysics)* B.Phil., The Australian National University 2014; M.S., California Institute of Technology 2019.

Thesis: Model Parameterization and Model Selection in Geophysical Inverse Problems: Designing Inverse Problems that Respect *a priori* Geophysical Knowledge.

Lee Michael Saper *(Geology)* Sc.B., Brown University 2012; M.S., California Institute of Technology 2018.

Thesis: Experimental Studies on the Thermodynamics and Kinetics of Coexisting Olivine, Silicate Melt, and Vapor.

Eva Linghan Scheller *(Geology)* B.Sc., University of Copenhagen 2017; M.S., California Institute of Technology 2020.

    Thesis: A Multi-Disciplinary Approach: How Aqueous Minerals Hold the Key to Understanding the Climate and Habitability of Terrestrial Planets.

Zhichao Shen *(Geophysics)* B.S., University of Science and Technology of China 2013; M.S., 2016; M.S., California Institute of Technology 2019.

    Thesis: Probing Water Below the Surface: Insights from Seismic Interferometry with Conventional and DAS Array.

Shreyas Vissapragada *(Planetary Science)* B.A., Columbia University 2017; M.S., California Institute of Technology 2019.

    Thesis: The Irradiation-Driven Evolution of Gas Giant Exoplanets.

Nicole Lisa Wallack *(Planetary Science)* B.S., University at Albany, The State University of New York 2016; M.S., California Institute of Technology 2018.

    Thesis: The Planet-Disk Connection: From Protoplanetary Disks to Planetary Atmospheres.

Minyan Zhong *(Geophysics and Applied and Computational Mathematics)* B.S., Peking University 2015; M.S., California Institute of Technology 2018.

    Thesis: High-Resolution Geophysical Images of Static Crustal Structure and Time-Dependent Glacier Flow.

DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES

Saba Devdariani *(Social Science)* B.A., Ivane Javakhishvili Tbilisi State University 2012; M.S., 2014; M.S., California Institute of Technology 2018.

    Thesis: Agency Problems in Political Science.

Yimeng Li *(Social Science)* B.E., Central University of Finance and Economics 2014; M.Sc., The London School of Economics and Political Science 2015; M.S., California Institute of Technology 2017.

    Thesis: Three Essays on Survey Methods and Their Applications to Measuring Political Behavior and Attitudes.

Shiyu Zhang *(Social Science)* B.A., Claremont McKenna College 2016; M.S., California Institute of Technology 2018.

    Thesis: Three Essays in Applied Economics.

DIVISION OF PHYSICS, MATHEMATICS AND ASTRONOMY

Thomas Christopher Bohdanowicz *(Physics)* B.A.Sc., B.Math., University of Waterloo 2014; M.S., California Institute of Technology 2016.

    Thesis: Quantum Constructions on Hamiltonians, Codes, and Circuits.

Doctor of Philosophy   *continued*

Baoyi Chen *(Physics)* B.S., Nanjing University 2015.
> Thesis: Near-horizon Black Hole Physics.

Yuguang Chen *(Astrophysics)* B.S., Peking University 2015; M.S., California Institute of
> Technology 2017.
>
> Thesis: The Absorption and Emission of Neutral Hydrogen around High-Redshift Star-
> Forming Galaxies.

Yun-Ting Cheng *(Physics)* B.S., National Taiwan University 2014; M.S., California Institute of
> Technology 2019.
>
> Thesis: Cosmology and Astrophysics with Intensity Mapping.

Youngjoon Choi *(Physics)* B.S., Seoul National University 2011.
> Thesis: A Spectroscopic Study of Electronic Correlations in Twisted Bilayer Graphene by
> Scanning Tunneling Microscopy.

Alexander Moos Dalzell *(Physics)* S.B., Massachusetts Institute of Technology 2017.
> Thesis: Random Quantum Circuits and Their Simulation Complexity: An Analysis With
> Statistical Mechanics.

Mithi Alexa Caballes de los Reyes *(Astrophysics)* B.S., North Carolina State University 2016;
> M.S., California Institute of Technology 2019.
>
> Thesis: Dwarf Galaxies in the Local Universe as Probes of Stellar and Galactic Evolution.

Eric Michael Fries *(Physics)* B.S., University of Virginia 2015; M.S., California Institute of
> Technology 2019.
>
> Thesis: Precision Measurement of the Neutron Lifetime.

Rebecca Denise Glaudell *(Physics)* B.S., University of Illinois at Urbana-Champaign 2014; M.S.,
> California Institute of Technology 2018.
>
> Thesis: Interface Optimization for Improved Photovoltaic Devices.

Tzu-Chen Huang *(Physics)* B.S., National Taiwan University 2016; M.S., California Institute of
> Technology 2020.
>
> Thesis: From Building Blocks to Theories: EFThedron and a Haagerup TFT.

Nikita Kamraj *(Astrophysics)* M.Sc., Imperial College London 2016; M.S., California Institute of
> Technology 2018.
>
> Thesis: Probing the Corona in Active Galactic Nuclei Using Broadband X-ray Spectroscopy.

Raj Michael Katti *(Physics)* B.S., California Institute of Technology 2014; M.S., 2019.
> Thesis: Josephson Inductance Thermometry in Resonantly-Coupled Van-der-Waals
> Heterostructures.

Nikita Sergeevich Klimovich *(Physics)* B.S., The University of Texas at Austin 2016.
> Thesis: Traveling Wave Parametric Amplifiers and Other Nonlinear Kinetic Inductance
> Devices.

Yunxuan Li *(Physics and Computer Science)* B.S., Nanjing University 2015.
> Thesis: Search for Beyond Standard Model Physics at BaBar.

Doctor of Philosophy   continued

Jorge Domingo Llop Sayson *(Physics)* Diplôme d'Ingénieur, Institut Supérieur de l'Aéronautique et de l'Espace 2014; M.S., Universitat Politècnica de Catalunya 2014; M.S., California Institute of Technology 2017.
  Thesis: New Methods for the Detection and Characterization of Exoplanets.

Thong Quang Nguyen *(Physics)* B.S., The University of Texas at Dallas 2015; M.S., California Institute of Technology 2019.
  Thesis: Searches for Nonresonant Higgs Boson Pair Production and Long-Lived Particles at the LHC & Machine-Learning Solutions for the High-Luminosity LHC Era.

Thomas Clark Norton *(Mathematics)* B.S., Case Western Reserve University 2014.
  Thesis: Discrete Deligne Cohomology and Discretized Abelian Chern-Simons Theory.

Jane Mariam Panangaden *(Mathematics)* B.Sc., McGill University 2015; M.Sc., 2016.
  Thesis: Quantum Statistical Mechanics, Noncommutative Geometry, and the Boundary of Modular Curves.

Sunghyuk Park *(Mathematics)* B.S., Korea Advanced Institute of Science and Technology 2017.
  Thesis: 3-Manifolds, q-Series, and Topological Strings.

Alexandre Perozim de Faveri *(Mathematics)* A.B., Princeton University 2018.
  Thesis: Automorphic L-functions, Geometric Invariants, and Dynamics.

Lee Jesse Rosenthal *(Astrophysics)* B.S., Haverford College 2015; M.S., California Institute of Technology 2018.
  Thesis: The California Legacy Survey: A Three-Decade Census of Extrasolar Planets.

Nathaniel Levi Sagman *(Mathematics)* B.Sc., McGill University 2017.
  Thesis: Harmonic Maps of Riemann Surfaces and Applications in Geometry.

Junyi Shan *(Physics)* B.S., Peking University 2016.
  Thesis: Non-Thermal Optical Engineering of Correlated Insulating Magnets.

Forte Shinko *(Mathematics)* B.Math., University of Waterloo 2015; M.Sc., McGill University 2017.
  Thesis: Descriptive Set Theory and Dynamics of Countable Groups.

Wilbur Eric Shirley *(Physics)* B.S., University of Illinois at Urbana-Champaign 2015.
  Thesis: Structure of Entanglement in Fracton Phases of Matter.

Andrei Shubin *(Mathematics)* B.S., Moscow Institute of Physics and Technology 2014; M.S., 2016.
  Thesis: Topics in Equidistribution and Exponential Sums.

Xuan Sun *(Physics)* B.S., McGill University 2015.
  Thesis: Measurements of Beyond Standard Model Interactions with the UCNA and nEDM@SNS Experiments.

Zijian Tao *(Mathematics)* B.B.A., University of Wisconsin-Madison 2016.
  Thesis: Theory of Mathematical Optimization for Delegated Portfolio Management.

Doctor of Philosophy   *continued*

Tanner David Trickle *(Physics)* S.B., Massachusetts Institute of Technology 2017.
> Thesis: Direct Detection of Light Dark Matter with Electrons, Phonons, and Magnons.

Rhondale Tso *(Physics)* B.S., Embry-Riddle Aeronautical University 2012; M.S., California
> Institute of Technology 2019.
> Thesis: Fundamental Ways to Probe Gravitational Waves Across Its Spectrum and
> Propagation.

Gautam Venugopalan *(Physics)* B.S., M.S., Indian Institute of Technology Madras 2015.
> Thesis: Prototype Interferometry in the Era of Gravitational Wave Astronomy.

Cora Margaret Went *(Physics)* B.S., University of North Carolina at Chapel Hill 2015.
> Thesis: Two-Dimensional Transition Metal Dichalcogenides for Ultrathin Solar Cells.

Victor Zhang *(Mathematics)* B.S., The University of Chicago 2016.
> Thesis: Twisted Heisenberg Central Extensions and the Affine ADE Basic Representation.

Yongzhe Zhang *(Mathematics)* B.S., Sun Yat-sen University 2016.
> Thesis: New Examples and Monotonicity Formula of Mean Curvature Flow.

Zhaoxi Michael Zhang *(Astrophysics)* A.B., Princeton University 2014; M.S., California Institute
> of Technology 2018.
> Thesis: Understanding Exoplanet Atmospheres.

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.

2022   Saehui Hwang, Isabel Frances Swafford

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.

2022   Ayooluwa Titilayomi Odemuyiwa

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.

2022   Tianyi Zhang

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.

2022   Magnus Adrian Gero Hoffmann

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.

2019   Ana Helena de Oliveira Lobo, Sarah Andrea Sam
2022   Jennifer Yu

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.

2019   Jane Mariam Panangaden
2020   Jane Mariam Panangaden, Forte Shinko, Victor Zhang
2021   Jane Mariam Panangaden, Forte, Shinko, Zijian Tao
2022   Forte Shinko

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.

2019   Morgan Louise Hooper
2020   Benedikt Barthel, Morgan Louise Hooper

ROBERT P. BALLES 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.

2022   Haoxuan Chen

WILLIAM F. BALLHAUS PRIZE
This prize recognizes aeronautics students for outstanding doctoral dissertations.

2022   Benedikt Barthel

ERIC TEMPLE BELL UNDERGRADUATE MATHEMATICS RESEARCH PRIZE
This prize is given to one or more juniors or seniors for outstanding original research in mathematics.

2020   *Sara Fish*
2022   *August Yuhong Chen, Olivine Silier*

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.

2022   *Megan Minh-Hanh Tjandrasuwita*

THE 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.

2022   *Gautam Goel*

RICHARD G. BREWER PRIZE IN PHYSICS
This prize recognizes a first-year student with the most interesting solutions to the Physics 11 "hurdles," demonstrating intellectual promise and creativity at the very beginning of their Caltech education.

2019   *Xiaoqi Long*

ROLF D. BUHLER MEMORIAL AWARD IN AERONAUTICS
This award is given to an aeronautics student for outstanding academic achievement in the master's program.

2021   *Meredith Leigh Hooper, Scott Alexander Bollt*
2022   *Ioannis Miltiadis Mandralis*

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.

2022   *Jina Lee*

THE W. P. CAREY & CO. PRIZE IN APPLIED MATHEMATICS
Established by William P. Carey and W. P. Carey & Co., Inc., this prize is awarded to outstanding doctoral dissertations in applied mathematics in the current academic year. Awardees are selected by a committee of applied mathematics faculty.

2022   Jiajie Chen

BONNIE CASHIN PRIZE FOR IMAGINATIVE THINKING
Awarded annually, this prize is given to the entering first-year students who wrote the most imaginative essays for their application for admission.

2018   Hrishika Basava, Antonia Junwei Liu

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.

2022   Alexander Choi

RICHARD BRUCE CHAPMAN MEMORIAL AWARD
This award is given to a graduate student in hydrodynamics who has distinguished themselves in research in the Division of Engineering and Applied Science.

2022   Benedikt Barthel

ROBERT F. CHRISTY PRIZE FOR AN OUTSTANDING FRESHMAN IN PHYSICS
This prize is awarded annually to a freshman who has demonstrated excellence in physics. Established in 2018, this prize honors the memory of Robert F. Christy, former provost and professor of theoretical physics at Caltech.

2019   Ethan Milo Mann

ROBERT F. CHRISTY PRIZE FOR AN OUTSTANDING SENIOR IN THEORETICAL PHYSICS
This prize is awarded annually to a senior who has demonstrated excellence in theoretical physics through research and/or coursework. Established in 2018, this prize honors the memory of Robert F. Christy, former provost and professor of theoretical physics at Caltech.

2022   Adrian Anastasio Lopez

ROBERT F. CHRISTY PRIZE FOR AN OUTSTANDING DOCTORAL THESIS IN THEORETICAL PHYSICS

This prize is given annually to a student who has produced an outstanding thesis in theoretical physics. Established in 2018, this prize honors the memory of Robert F. Christy, former provost and professor of theoretical physics.

2021   Wilbur Eric Shirley

2022   Tanner David Trickle

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. The awards honor the work of Professor Clark, class of 1929, both in the field of engineering and in his service to the Alumni Association.

2021   Adam Hassan Abbas, Saehui Huang

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.

2022   Christopher John Dougherty, Marcel Veismann

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.

2018   Cora Margaret Went, Tombrello Scholar

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   Megan Wang

2022   Timothy Yao

DEMETRIADES-TSAFKA-KOKKALIS PRIZE IN ENTREPRENEURSHIP OR RELATED FIELDS

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

2021   David Brown, Tatyana Dobreva
2022   Alan Yalun Gu

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).

2020   Fengyu Zhou

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).

2022   Joeson Wong

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).

2020   Stacy Larochelle

CONSTANTIN G. ECONOMOU MEMORIAL PRIZE

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

2018   Hyeongjoo Row, Andrew Samuel Ylitalo

DORIS EVERHART SERVICE AWARD

This award is given annually to an undergraduate who has actively supported and willingly worked for organizations that enrich not only student life, but also the campus and/or the community as a whole, and who has, in addition, exhibited care and concern for the welfare of students on a personal basis. The award was established in 1999 by Martin and Sally Ridge in honor of Doris Everhart.

2021   *Lorenzo Xavier Van Munoz*

2022   *Jennifer Yu*

LAWRENCE L. AND AUDREY W. FERGUSON PRIZE

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

2022   *Magnus Adrian Gero Hoffmann*

RICHARD FEYNMAN PRIZE IN THEORETICAL PHYSICS

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

2022   *Ananth Venkatesh Narasimha Malladi*

HAREN LEE FISHER MEMORIAL AWARD IN JUNIOR PHYSICS

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

2021   *Jenny Tang Wan*

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   *Matthew Steven Bauer, Alexander Popov*

2021   *Hrishika Basava, Ethan Milo Mann, Alexander Zhong Wang*

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.

2021   *Jeffrey Jian Ma, Tianyi 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.

2020   *Myra Miaobo Cheng, Aditya Diwakar Sivakumar*
2021   *Jenny Tang Wan, Anjini Chandra, Aikaterini Gorou, David Jin*

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.

2022   *Cora Margaret Went*

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.

2019   *Sarah Andrea Sam*
2021   *Alexander Moos Dalzell*

ALEXANDER P. AND ADELAIDE F. HIXON PRIZE FOR WRITING

The Hixon Prize for Writing was established in 2000 by Alexander P. and Adelaide F. Hixon. The prize will be awarded annually to an undergraduate student for the best composition in a freshman humanities course. The prize is administered by the writing center, and the winner will be chosen by a committee from the humanities division.

2018   *Galilea Bascara von Ruden*
2019   *Diego Francisco Olaya Medina*

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.

2022   *Morgan Louise Hooper*

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.

2020   Jeffrey Jian Ma

BIBI JENTOFT-NILSEN MEMORIAL AWARD

Family and friends of Bibi Jentoft-Nilsen, class of 1989, have provided this award in her memory. 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.

2022   Michelle M Hyun

SCOTT RUSSELL JOHNSON PRIZE FOR EXCELLENCE IN GRADUATE STUDIES

This prize is awarded to continuing graduate students for excellence and extraordinary progress in research and/or excellence in teaching in mathematics.

2020   Sunghyuk Park
2021   Forte Shinko

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

This prize rewards excellence in first-year graduate research in mathematics.

2018   Sunghyuk Park
2019   Alexandre Perozim de Faveri

SCOTT RUSSELL JOHNSON GRADUATE DISSERTATION PRIZE IN MATHEMATICS

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

2022   Alexandre Perozim de Faveri, Forte Shinko

KALAM PRIZE FOR AEROSPACE ENGINEERING

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

2021   *Meital Oshrit Carmi*

2022   *Shashank Tomar*

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   *Raj Michael Katti*

DR. JAMES KING JR. STUDENT DIVERSITY AWARD

The Dr. James King Jr. award is given to individuals who stand out as strong supporters of diversity within the Caltech student body. Dr. King is the first African American to receive a Ph.D. from Caltech in chemical physics (at that time it was chemistry and physics). Along with his many accomplishments as a scientist and the Assistant Laboratory Director at JPL, he had a reputation for mentoring students and encouraged diversity in the Caltech student body.

2018   *Sarah Andrea Sam*

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.

2022   *Shubh Agrawal, Sophie Helena Huiyuan Li*

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   *Mai Hoang Nguyen*

JOHN O. LEDYARD PRIZE FOR GRADUATE RESEARCH IN SOCIAL SCIENCE

The prize rewards the best second-year paper by a graduate student in Social Science or Social and Decision Neuroscience. The prize was established by Susan G. Davis in recognition of John O. Ledyard's dedication to developing graduate students as independent researchers and his service to the Division of the Humanities and Social Sciences. The prize is awarded annually by a committee of social science faculty.

2018   Shiyu Zhang

THE OUTSTANDING MENTEE AWARD

This award is given to individuals who demonstrate a sincere desire to succeed as researchers and are committed to their personal development. This awardee is open and willing to learn from their mentor and receptive to guidance and counsel while working with their mentor to establish realistic goals and demonstrating a commitment to carrying them out.

2022   Anastasiya Grebin

GORDON MCCLURE MEMORIAL COMMUNICATIONS PRIZE

This prize is awarded to undergraduate students for excellence in written and oral communication skills. Awards will be given in the following fields: English, history, and philosophy.

2020   Victoria Liu, English
2021   Victoria Liu, English
2021   Saehui Hwang, History

THE HERBERT NEWBY MCCOY AWARD

This award is given to one or more chemistry doctoral students for outstanding contributions to the science of chemistry.

2021   Mary Villanueva Arrastia, Christopher M. Kenseth
2022   Stefan Petrovic

MARY A. EARL MCKINNEY PRIZE IN LITERATURE

The Mary A. Earl McKinney Prize in Literature was established in 1946 by Samuel P. McKinney, M.D., of Los Angeles. Its purpose is to promote proficiency in writing. The terms under which it is given are decided each year by the literature faculty. It may be awarded for essays submitted in connection with regular literature classes or awarded on the basis of a special essay contest.

2020   Melba Nuzen, Fiction
2021   Hrishika Basava, Fiction

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.

2022   Luis A. Pabon

MERCK INDEX AWARD

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

2022   Yun Emily Du, Tianyi Zhang

PARK S. NOBEL PRIZE FOR EXCELLENCE IN BIOLOGY AND BIOLOGICAL ENGINEERING

This prize recognizes one or two undergraduate students demonstrating outstanding achievements within the Division of Biology and Biological Engineering at Caltech.

2022   Rashi Rajesh Jeeda

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. The scholarship was set up by Ametek in 1978 in honor of its president, Robert L. Noland, a Caltech alumnus.

2022   Adam Hassan Abbas

DR. NAGENDRANATH REDDY BIOLOGICAL SCIENCES THESIS PRIZE

The Reddy prize is awarded to the graduating female Ph.D. candidate in the Division of Biology and Biological Engineering who has produced the outstanding thesis in the biological sciences or bioengineering for the past year.

2020   Weiyi Tang

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.

2021   Jina Lee

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   Yuying Lin, Ayooluwa Titilayomi Odemuyiwa

THE CANDACE RYPISI OUTSTANDING MENTOR AWARD

This award is given to individuals who are willing to share knowledge and enhance their mentee's professional and personal development. This person has provided emotional and moral support and encouragement while improving or helping facilitate access to career-related information and exposure to various professional resources. This awardee is someone who actively promotes their mentee's sense of competence, confidence, and belonging.

2021   Ella Jenná Watkins-Dulaney

THE CCID ACTIVIST SCHOLAR AWARD

This award is given to individuals who demonstrated excellence within their discipline and research while engaging in complex social justice issues. This awardee has led or participated in advocacy campaigns centering on the experiences of minoritized identities and provided vision and leadership in forming affinity spaces and targeted support programs.

2022   Jennifer Yu

SANPIETRO TRAVEL PRIZE

This prize is awarded to one or more sophomores, juniors, or seniors to fund an adventurous and challenging summer travel experience that expands the recipients' cultural horizons and knowledge of the world.

2022   Antonia Junwei Liu, Isabella Maria Dula Razzolini, Julia Sloan,
*   Sarah Jin Zou*

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.

2021   Yun Emily Du, Tianyi Zhang
2022   Aikaterina Gorou

ELEANOR SEARLE PRIZE IN LAW, POLITICS, AND INSTITUTIONS
The Eleanor Searle Prize was established in 1999 by friends and colleagues to honor Eleanor Searle, who was the Edie and Lew Wasserman Professor of History at Caltech. The prize will be awarded annually to an undergraduate or graduate student whose work in history or the social sciences exemplifies Eleanor Searle's interests in the use of power, government, and law.

2021   Myra Miaobo Cheng

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.

2018   Yichuan Song

SENIOR UNDERGRADUATE THESIS PRIZE
This prize recognizes senior theses that exemplify research and the effective use of the scholarly record. It is awarded by the Caltech Library and the Undergraduate Academic Standards and Honors Committee. Winners receive a honorarium and recognition in Caltech's commencement program. The honorarium for the winner is made possible by the Friends of the Caltech Library.

2022   Myra Miaobo Cheng

RENUKA D. SHARMA AWARD
This award recognizes a sophomore chemistry major for outstanding performance during their freshman year.

2020   Aikaterina Gorou, Tianyi Zhang

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.

2020   Adrian Anastasio Lopez

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   Olmo Cerri
2020   Cora Margaret Went
2021   Tanner David Trickle

R. BRUCE STEWART PRIZE FOR EXCELLENCE IN TEACHING

This prize is awarded annually to a graduate teaching assistant in physics who demonstrates, in the broadest sense, unusual ability, creativity, and innovation in undergraduate and graduate classroom or laboratory teaching.

2017   Samuel Francis Savitz

PAUL STUDENSKI MEMORIAL FUND

This travel grant is awarded to a Caltech undergraduate who would benefit from time away from the academic community in order to obtain a better understanding of self and of their plans for the future.

2020   Camila Andrea Buitrago, Jennah Karina Colborn

TAUSSKY-TODD MATHEMATICS PRIZE FUND

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

2019   Sara Fish

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®) competition challenges Caltech graduate students to explain their research in an engaging and clear three-minute talk intended for a non-specialist audience.

2021   Mithi Alexa Caballes de los Reyes, First Prize and People's Choice

CHARLES AND ELLEN WILTS PRIZE

The Wilts Prize is awarded annually for outstanding independent research in electrical engineering leading to a Ph.D degree. This prize was established in 1992 to honor Charles Wilts, a member of the electrical engineering faculty from 1947–1975, who made substantial contributions to the Department of Electrical Engineering.

2022   Kuan-Chang Chen, Jin Sima

FREDRICK J. ZEIGLER MEMORIAL AWARD

The Fredrick J. Zeigler Memorial Award was established in 1989 to honor Fredrick J. Zeigler, a member of the class of 1976 and an applied mathematics major. 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.

2020   Anish Senapati

Caltech | Alumni

Congratulations, Caltech class of 2022! Through hard work and talent, you have earned a degree that places you among the most accomplished and dynamic communities in the world. The resilience and agility you demonstrated to persevere through the COVID-19 pandemic will help set the foundation for your success in this ever-changing world. Since 1891, Institute alumni have been making profound and positive impacts on the world. Your experience at Caltech has prepared you to carry on the legacy, and the Caltech Alumni Association (CAA) is honored to help you with your journey. We keep you connected to a community of the nearly 25,000 Techers living around the world who share your experiences and know your capabilities. We also believe that our best work results from living our best lives, so the Caltech alumni community lifts up the human element of the Caltech experience. We are dedicated to offering Techers 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 Techer family, personally and professionally. We encourage you to get involved with the CAA and stay connected with your fellow Techers. When your efforts are multiplied by the power of this community, so much more is possible.

On behalf of the Caltech Alumni Association, I welcome you as members of the alumni community. Please visit alumni.caltech.edu to see what the CAA can provide for you.

Satoshi Ohtake, Ph.D. (BS '00)
Chair, Board of Directors
Caltech Alumni Association
alumni.caltech.edu

2022 DISTINGUISHED ALUMNI

The Distinguished Alumni Award (DAA) is Caltech's highest honor, presented each year to a small number of alumni in recognition of personal and professional accomplishments that have made a noteworthy impact in a field, on the community, or in society more broadly. For 2022, the Institute has named Sudhir Kumar Jain, Bette Korber, and Kam-Yin Lau as its DAA recipients. They join 274 other Caltech alumni who, since 1966, have been lauded for their work in science, engineering, business, and the arts.

Sudhir Kumar Jain (MS '80, PhD '83), vice chancellor of Banaras Hinrdu University in India, is recognized for his lifesaving impact as India's preeminent earthquake engineer, for his research, advocacy, and establishment of training programs for engineers and of seismic building codes, and for his leadership in higher education, first at the Indian Institute of Technology Gandhinagar (IITGN) and then at Banaras Hindu University.

Bette Korber (PhD '88) is a laboratory fellow in theoretical biology and biophysics at Los Alamos National Laboratory. She is lauded for pioneering achievements in virology research and computational vaccine design, which provide hope against diseases such as HIV/AIDS, and she continues to equip the scientific community with insights into HIV and SARS-CoV-2, the virus that causes COVID-19.

Kam-Yin Lau (BS '78, MS '78, PhD '81), professor emeritus of electrical engineering and computer sciences at UC Berkeley, is honored for his innovations in and commercialization of laser diode and radio-over-fiber technologies that broadly enable today's wireline and wireless high-speed internet access as well as enabling progress in interplanetary exploration, radio astronomy, and particle physics research, and for his remarkable artistic contributions to the Chinese ink painting movement.

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 **Venerable**), 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 **Venerable House**; Venerable'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, juvenes 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 2022 graduates. Post your well-wishes, words of wisdom, and congratulations with #Caltech2022 on Twitter and Instagram.