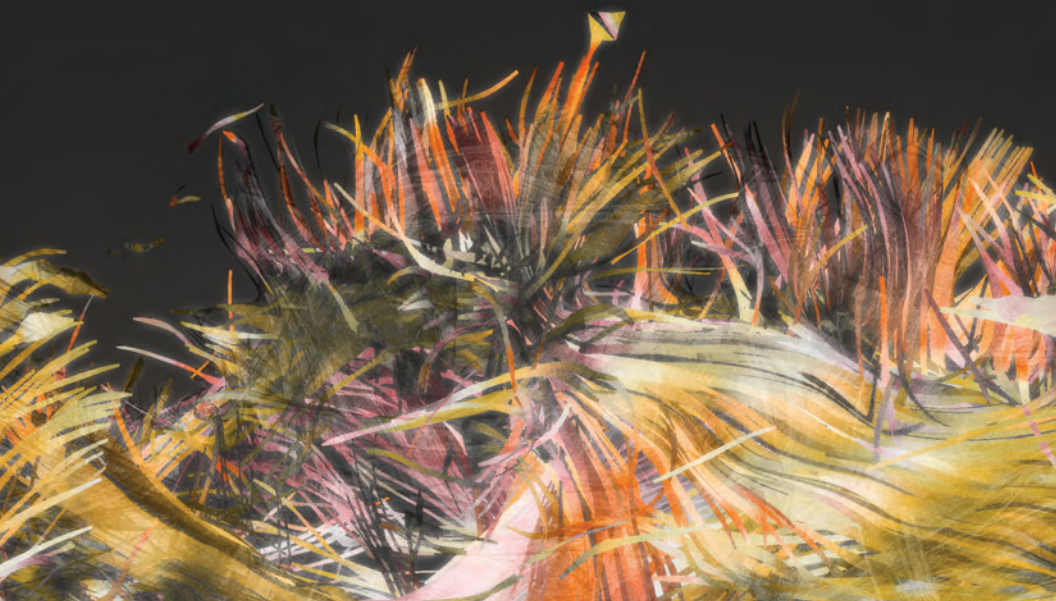


BE OUR GUEST

DISCOVERY

AT

Caltech





OCTOBER

5-7

2017

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YOU ARE INVITED TO AN EXCLUSIVE
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FEATURING THE CALTECH
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SCIENCE, TECHNOLOGY, AND
SOCIETY INTO THE FUTURE.

David L. Lee (PhD '74)
Chair, Caltech Board of Trustees
and

Ellen Lee

with

Thomas F. Rosenbaum
President, Caltech
Sonja and William Davidow Presidential Chair
and Professor of Physics
and

Katherine T. Faber
Simon Ramo Professor of Materials Science

invite you to join them for

DISCOVERY
AT
Caltech

Thursday, October 5, 2017
through
Saturday, October 7, 2017

Program enclosed

California Institute of Technology
1200 East California Boulevard
Pasadena, California

Please advise of any dietary or accessibility restrictions.

Kindly reply by Friday, September 15, 2017, to Caryn Golub at cgolub@caltech.edu or (626) 395-2459.



ILLUSTRATION BASED ON COMPLEX CONNECTIONS IN A HUMAN BRAIN IMAGED BY CALTECH NEUROSCIENTISTS J. MICHAEL TYSZKA, LYNN PAUL, AND PROFESSOR RALPH ADOLPHS, WITH FORMER POSTDOCTORAL SCHOLAR DANIEL KENNEDY. THEIR FINDINGS APPEARED IN A COVER ARTICLE IN *THE JOURNAL OF NEUROSCIENCE*.

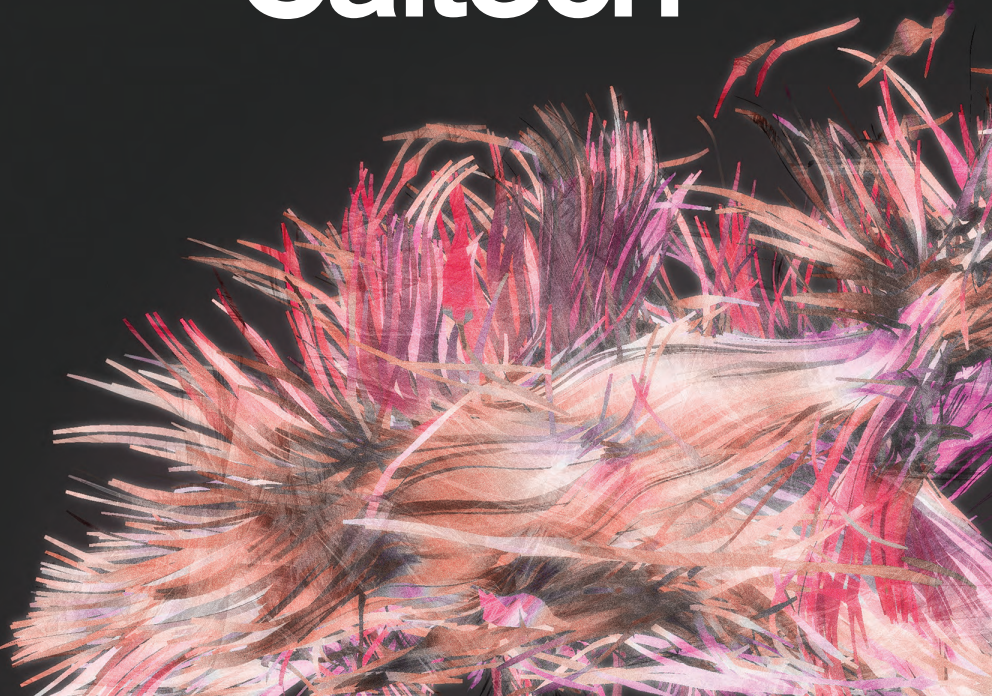
DISCOVERY
AT
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PROGRAM

DISCOVERY

AT

Caltech



PROGRAM

THURSDAY **6:30 P.M.**
OCTOBER 5, 2017 *Opening Reception + Dinner, President's Residence*
Hosted by President Thomas F. Rosenbaum
and Professor Katherine T. Faber

FRIDAY **8:00 A.M.**
OCTOBER 6, 2017 *Breakfast + Discussion, Caltech campus*
Is there life beyond Earth? Discover how the
evolution of our solar system provides clues to
the potential for life on faraway planets.

10:30 A.M.
Laboratory Experience, Caltech Center for Autonomous Systems and Technologies
Can robots think? Be among the first to enter
our new drone arena for a demonstration of
next-generation intelligent machines.

12:00 P.M.
Luncheon + Discussion, Caltech campus
Is this the end of fossil fuels? Hear how engineers
aim to harness the power of the sun from space
to answer our energy needs on Earth.

4:30 P.M. – 9:00 P.M.
Dinner + Tour, Jet Propulsion Laboratory
What draws us to the great unknown? Explore the
solar system with the scientists and engineers who
are leading NASA missions to Mars and beyond.

SATURDAY **8:30 A.M. – 11:00 A.M.**
OCTOBER 7, 2017 *Breakfast + Discussion, Langham Huntington Hotel*
Take a sneak peek into the next potential breakthroughs
at Caltech in the areas of brain research, directed
evolution, and bioengineering. Enjoy a fast-paced
conversation with researchers who could reshape our
thinking about ourselves, our world, and our universe.

GUEST SERVICES

DISCOVERY

AT

Caltech



GUEST SERVICES

We look forward to welcoming you to Caltech!

During your visit, we invite you to be our guests at the Langham Huntington Hotel in Pasadena, California.

Meals will be provided throughout the duration of the program. Please let us know if you have any dietary restrictions.

All of your local transportation will be provided, including to and from Los Angeles-area airports and between the Langham and event sites.

We will send a confirmation and detailed itinerary prior to the event.

Your guest experience will be managed by:

Caryn Golub
Caltech Events
(626) 395-2459
cgolub@caltech.edu

Please contact us with any questions, or to share information about how we can make your stay more enjoyable.

PROGRAM

OCTOBER 5-7, 2017

DISCOVERY

AT

Caltech





WELCOME

WELCOME

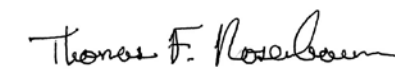
Welcome to Discovery at Caltech!

It is a pleasure to have you join us for conversations and firsthand experiences as we showcase a few of the Institute's pathbreaking research initiatives.

Caltech scholars explore uncharted frontiers, from planets orbiting other suns to the circuitry of our brains to the molecular basis of life. Our scientists and engineers create new technologies that enable researchers to probe our universe with unprecedented precision and to answer some of society's biggest questions.

The journey forward is not one we travel alone. Since Henry E. Huntington invited 100 of Southern California's most influential people in business and technology to his home in 1926—convening the first meeting of the Caltech Associates—the Institute's success has been closely linked to the advocacy and support we receive from leaders throughout our international community. You bring perspectives that inform our work, help us to make connections across sectors, and empower our scholars to be fearless in their endeavors.

We look forward to introducing you to our students and faculty, and to providing you with an insider's view of areas that make Caltech special. Our vision for the possibilities that lie ahead will be enriched by your partnership and participation.



Thomas F. Rosenbaum
President, Caltech
Sonja and William Davidow Presidential Chair
and Professor of Physics



David Lee (PhD '74)
Chair, Caltech Board of Trustees

ITINERARY

ITINERARY

THURSDAY
OCTOBER 5, 2017

6:00 p.m.
Transportation

Welcome to *Discovery at Caltech*! Please meet in the lobby of the Langham for transportation to the President's Residence.

6:30–9:30 p.m.
Opening Reception + Dinner
President's Residence

Hosted by President Thomas F. Rosenbaum and Professor Katherine T. Faber

FRIDAY
OCTOBER 6, 2017

7:30 a.m.
Transportation

Please meet in the lobby of the Langham for transportation to Caltech.

8:00–10:15 a.m.
Breakfast + Discussion
The Athenaeum at Caltech

Is there life beyond Earth? Discover how the evolution of our solar system provides clues to the potential for life on faraway planets.

Opening Remarks

David A. Tirrell

Provost, Caltech

Ross McCollum-William H. Corcoran Professor of Chemistry and Chemical Engineering

Carl and Shirley Larson Provostial Chair

FEATURING

Konstantin Batygin (MS '10, PhD '12)

Assistant Professor of Planetary Science and Van Nuys Page Scholar

Bethany Ehlmann

Professor of Planetary Science

Jet Propulsion Laboratory Research Scientist

Andrew Howard

Professor of Astronomy

Victoria Orphan

James Irvine Professor of Environmental Science and Geobiology

Alison Snyder

Panel Moderator

Science Editor, Axios

ITINERARY

FRIDAY
OCTOBER 6, 2017

10:30–11:45 a.m.

Laboratory Experience

Caltech Center for Autonomous Systems and Technologies

Can robots think? Be among the first to enter our new drone arena for a demonstration of next-generation intelligent machines.

FEATURING

Mory Gharib (PhD '83)

Hans W. Liepmann Professor of Aeronautics and Bioinspired Engineering

Director, Graduate Aerospace Laboratories

Director, Center for Autonomous Systems and Technologies

Aaron Ames

Bren Professor of Mechanical and Civil Engineering and Control and Dynamical Systems

Soon-Jo Chung

Associate Professor of Aerospace and Bren Scholar

Jet Propulsion Laboratory Research Scientist

11:45 a.m.–2:00 p.m.

Luncheon + Discussion, Gates-Thomas Patio and Conference Room

Is this the end of fossil fuels? Hear how engineers aim to harness the power of the sun from space to answer our energy needs on Earth.

FEATURING

Harry Atwater

Howard Hughes Professor of Applied Physics and Materials Science

Director, Joint Center for Artificial Photosynthesis

Co-Director, Space-Based Solar Power Project

Ali Hajimiri

Bren Professor of Electrical Engineering and Medical Engineering

Executive Officer for Electrical Engineering

Co-Director, Space-Based Solar Power Project

Sergio Pellegrino

Joyce and Kent Kresa Professor of Aeronautics and Civil Engineering

Jet Propulsion Laboratory Senior Research Scientist

Co-Director, Space-Based Solar Power Project

Alison Snyder

Panel Moderator

Science Editor, Axios

ITINERARY

FRIDAY
OCTOBER 6, 2017

2:00 p.m.

Transportation

Following the discussion, transportation will return you to the Langham.

2:30–3:45 p.m.

Break

3:45 p.m.

Transportation

Please meet in the lobby of the Langham for transportation to JPL.

The tour will last approximately 2 hours. Please wear comfortable shoes. A valid form of identification is required for entry.

4:30–6:30 p.m.

Tour, Jet Propulsion Laboratory

What draws us to the great unknown? Explore the solar system with the scientists and engineers who are leading NASA missions to Mars and beyond.

6:30–9:30 p.m.

Reception + Dinner, Jet Propulsion Laboratory

Hosted by David Lee (PhD '74) and Ellen Lee

Welcome Remarks

Michael Watkins

Vice President and Director of the Jet Propulsion Laboratory

Professor of Aerospace and Geophysics

9:30 p.m.

Transportation

Following dinner, transportation will return you to the Langham.

SATURDAY
OCTOBER 7, 2017

8:30–11:00 a.m.

Breakfast + Discussion, The Royce Restaurant at the Langham Huntington Hotel

Welcome Remarks

David Lee (PhD '74)

Chair, Caltech Board of Trustees

Take a sneak peek into the next potential breakthroughs at Caltech in the areas of brain research, directed evolution, and bioengineering. Enjoy a fast-paced conversation with researchers who could reshape our thinking about ourselves, our world, and our universe.

ITINERARY

SATURDAY
OCTOBER 7, 2017

Moderator

David A. Tirrell

Provost, Caltech

Ross McCollum-William H. Corcoran Professor of Chemistry and Chemical Engineering

Carl and Shirley Larson Provostial Chair

FEATURING

Programming new behaviors in living cells with Michael Elowitz

Professor of Biology and Bioengineering

Investigator, Howard Hughes Medical Institute

Executive Officer for Biological Engineering

Living cells are extraordinary devices: they can proliferate, sense, communicate, remember, compute, and develop into complex tissues and organisms. Until recently, scientists were limited to studying these cellular capabilities in natural contexts. However, advances in genome engineering and basic understanding now allow us to design genetic circuits that program totally new behaviors in cells. In this talk, I will describe this new field of cellular “software” engineering, and the opportunities it opens up.

Human decision neuroscience at Caltech with Colin Camerer

Robert Kirby Professor of Behavioral Economics

T&C Chen Center for Social and Decision Neuroscience Leadership Chair

Executive Officer for the Social Sciences

Director, T&C Chen Center for Social and Decision Neuroscience

We study decision making at Caltech in the Division of the Humanities and Social Sciences by identifying brain circuits that encode numbers which guide decisions. I'll illustrate our approach with examples that show how habits, willpower, and fear are processed in the brain.

Directed evolution: bringing new chemistry to life with Frances Arnold

Dick and Barbara Dickinson Professor of Chemical Engineering, Bioengineering and Biochemistry

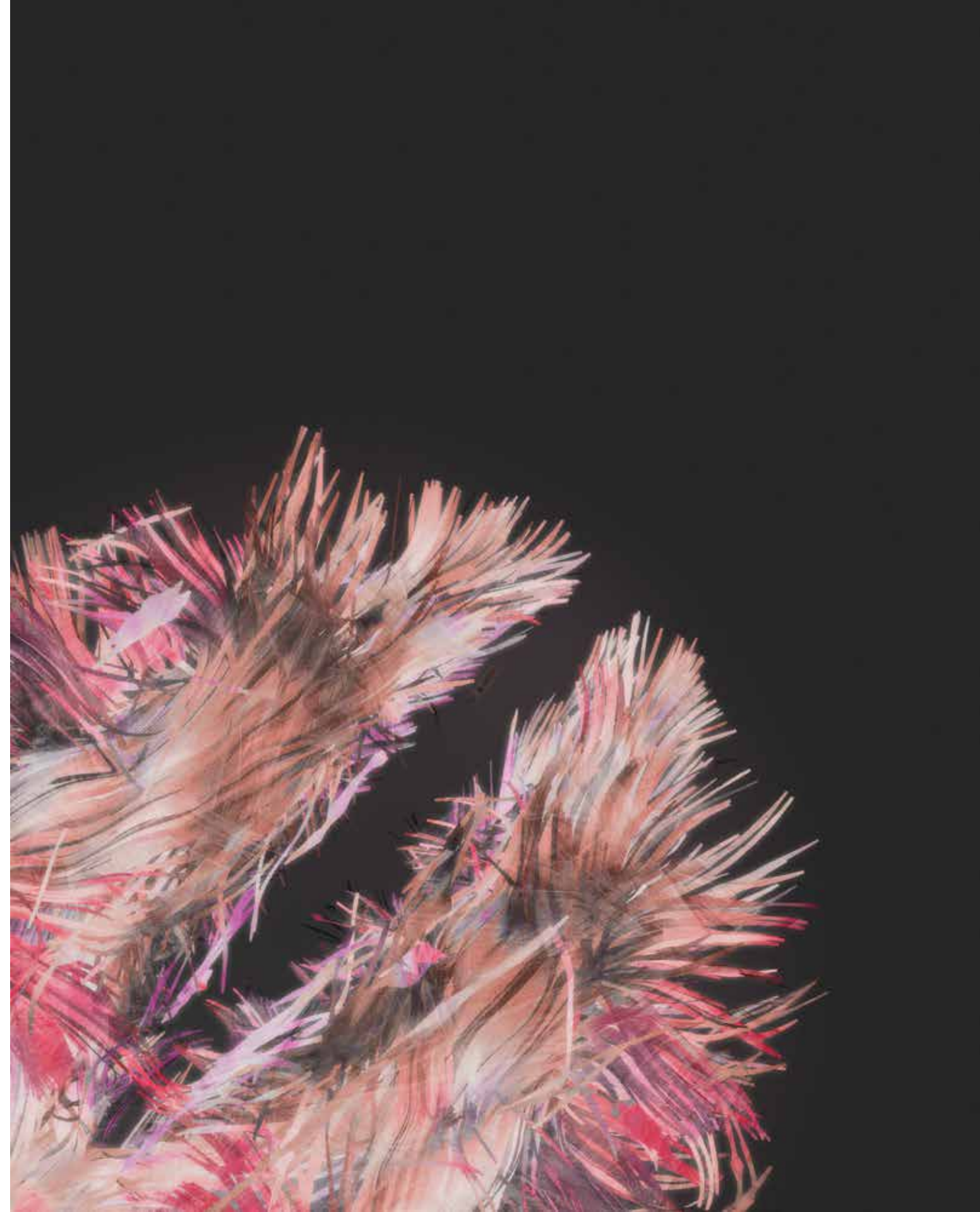
Director, Donna and Benjamin M. Rosen Bioengineering Center

Advances in our ability to read, write, and compose DNA—the code of life—are driving innovations we could not have dreamed of just a few years ago. Our newfound ability to program life will change the way we make the chemicals, fuels, materials, drugs, and even the foods needed to support a growing human population. At Caltech we are melding the synthetic and biological worlds in order to bring new chemistry to living systems.

Closing Remarks

President Thomas F. Rosenbaum

Sonja and William Davidow Presidential Chair and Professor of Physics



HOSTS

HOSTS



Thomas F. Rosenbaum

President, Caltech

Sonja and William Davidow Presidential Chair and Professor of Physics

Thomas F. Rosenbaum is the ninth president of the California Institute of Technology, Sonja and William Davidow Presidential Chair, and Professor of Physics. He is an expert on the quantum mechanical nature of materials, conducting research at Bell Laboratories, IBM Watson Research Center, and the University of Chicago, where he served as provost before moving to Caltech in 2014. He received his bachelor's degree in physics with honors from Harvard University and a Ph.D. in physics from Princeton University. Rosenbaum is an elected fellow of the American Physical Society, the American Association for the Advancement of Science, and the American Academy of Arts and Sciences.



Katherine T. Faber

Simon Ramo Professor of Materials Science

Katherine T. Faber is the Simon Ramo Professor of Materials Science at Caltech. Her research interests include fracture of brittle materials, toughening mechanisms, ceramic composites and coatings, porous ceramics, and cultural heritage science. Prior to joining Caltech in 2014, Faber was a faculty member at The Ohio State University and Northwestern's McCormick School of Engineering, where she also served as Associate Dean for Graduate Studies and Research and as Chair of the Department of Materials Science and Engineering. In addition, she co-founded and co-directed the Northwestern University-Art Institute of Chicago Center for Scientific Studies in the Arts, a partnership that supports the science of art conservation. An ISI Highly Cited Author in Materials (2003), she has received several awards and honors, including election to the American Academy of Arts and Sciences.

HOSTS



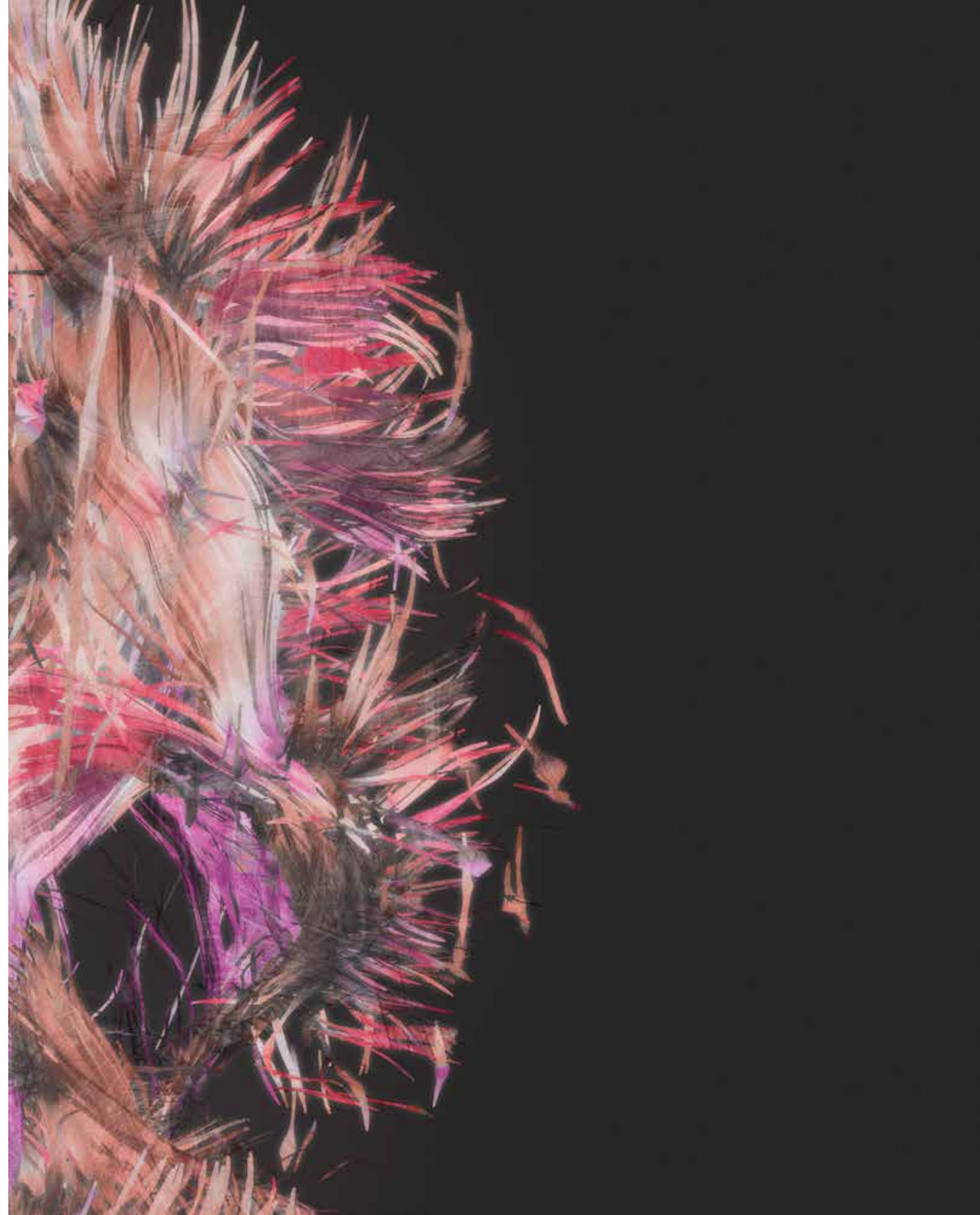
David Lee (PhD '74) and Ellen Lee

Chair, Caltech Board of Trustees

David L. Lee (PhD '74) is cofounder and managing general partner of Clarity Partners, a private-equity investment firm based in Los Angeles that focuses its investments on telecommunications and media and their underlying technologies. He previously held positions at Arthur Andersen & Co. in Los Angeles, satellite-communications pioneer Comsat, TRW, and Pacific Capital Group. Lee cofounded the telecommunications firm Global Crossing in 1997 and served as president and chief operating officer until 2000, when he left to cofound Clarity Partners.

Lee received a bachelor's degree from McGill University in 1970, and a PhD in physics, with a minor in economics, from Caltech in 1974. In spring of 2000, Caltech recognized him with its Distinguished Alumnus Award for his achievements in the telecommunications and finance industries. A Caltech trustee since 2000, Lee was named the chair of the board of trustees in 2012. Additionally, Lee is chairman of the board of overseers of the USC Keck School of Medicine and is a director of the J. Paul Getty Trust.

Lee and his wife, Ellen, joined the President's Circle of the Caltech Associates more than a decade ago, and he is a lifetime member of the Caltech Alumni Association. She is also on the board of directors at Huntington Hospital in Pasadena and the board of counselors of the Roski School of Art and Design at USC. Ellen Lee is a retired residential real estate broker and former clinical nutritionist who graduated with high honors from California State University, Los Angeles with a bachelor's degree in foods and nutrition.



SPEAKERS

SPEAKERS

David A. Tirrell

Provost, Caltech
Ross McCollum-William H. Corcoran Professor of Chemistry and Chemical Engineering
Carl and Shirley Larson Provostial Chair



David A. Tirrell is Caltech's provost, the Ross McCollum-William H. Corcoran Professor of Chemistry and Chemical Engineering and holder of the Carl and Shirley Larson Provostial Chair. His contributions to macromolecular chemistry have been recognized by his election to the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, and the American Academy of Arts and Sciences. He has been awarded the Arthur C. Cope Scholar, Carl Marvel, Harrison Howe, S. C. Lind and Madison Marshall Awards of the American Chemical Society, as well as the ACS Award in Polymer Chemistry. After earning his B.S. in Chemistry at MIT in 1974, Tirrell was awarded a Ph.D. from the Department of Polymer Science and Engineering at the University of Massachusetts in 1978. He has been on the faculty at Caltech since 1998 and served as chairman of the Division of Chemistry and Chemical Engineering from 1999 until 2009.

Alison Snyder

Panel Moderator
Science Editor, Axios



Alison Snyder is science editor at Axios, where she oversees coverage of discoveries in physics, astronomy, medicine, biology, geology, chemistry and psychology. She is a scientist-turned-journalist whose work has appeared in *The Washington Post*, *Newsweek*, *The Daily Beast*, *NOVA* and other media outlets. She graduated from MIT with a degree in chemical engineering, studied botany at the University of Canterbury in New Zealand, and received a master's degree in journalism from New York University.

Michael Watkins

Vice President and Director of the Jet Propulsion Laboratory
Professor of Aerospace and Geophysics



Michael M. Watkins is the director of NASA's Jet Propulsion Laboratory (JPL) and a vice president of Caltech, which staffs and manages JPL for NASA. He is a pioneer in the development and use of gravity data for new science applications to better understand Earth's climate and its evolution. Other research interests include mission design, instrument design, and science analysis for acquisition and use of remote sensing data for Earth and other planets. Watkins holds bachelor's, master's and Ph.D. degrees in aerospace engineering from the University of Texas at Austin. He has published in both engineering and science, contributed more than 100 conference presentations, and serves or served on the boards of numerous international scientific and engineering societies. In addition, he has taught estimation, filtering theory and system engineering at the University of Texas at Austin and at Caltech.

SPEAKERS

Is There Life Beyond Earth?

Friday, October 6 / 8:00–10:15 a.m. / The Athenaeum at Caltech

Konstantin Batygin (MS '10, PhD '12)

*Assistant Professor of Planetary Science
Van Nuys Page Scholar*



Forbes named assistant professor of planetary science Konstantin Batygin (MS '10, PhD '12) the "next physics rock star" in its 2015 list of "30 Under 30: Young Scientists Who Are Changing the World." He received his bachelor's in physics from UC Santa Cruz in 2008 before pursuing graduate studies at Caltech and has authored more than 50 referred publications. Batygin has been a visiting scientist at the Observatoire de la Cote D'Azur in Nice, France, and a prize postdoctoral fellow at Harvard University. Batygin joined the Caltech faculty in 2014 and moonlights as the lead singer in the band, The Seventh Season.

Bethany Ehlmann

*Professor of Planetary Science
Jet Propulsion Laboratory Research Scientist*



Bethany Ehlmann focuses her research on planetary surface processes, infrared spectroscopy, the evolution of Mars, chemical weathering and hydrothermal alteration throughout the solar system. She is a member of the science teams for the Mars Exploration Rovers Spirit and Opportunity, the Compact Reconnaissance Imaging Spectrometer for Mars, the Mars Science Laboratory Curiosity rover, and the upcoming Mars 2020 rover. She is a recipient of the American Geophysical Union's Macelwane Medal, the Committee on Space Research's Zeldovich Medal, and the Mineralogical Society of America's Distinguished Lecturer award, as well as NASA Group Achievement Awards.

Andrew Howard

Professor of Astronomy



Andrew Howard is a professor of astronomy. His research interests lie in the formation and evolution of planets orbiting stars other than the sun and in the greater diversity seen among the structure and composition of small extrasolar planets. His team uses telescopes in Hawaii, California, and in space to study the diversity of these exotic worlds and to learn more about their composition and evolution. Howard earned his PhD in physics from Harvard University in 2006. He served as a postdoctoral fellow, and subsequently a research astronomer, at UC Berkeley from 2007-2012. He then worked as an assistant astronomer at the University of Hawaii at Manoa until joining the Caltech faculty in 2016.

Victoria Orphan

James Irvine Professor of Environmental Science and Geobiology



Victoria Orphan studies the molecular microbial ecology of anaerobic communities—microbes that exist without free oxygen in their environment—with a particular focus on microorganisms that live in deep-ocean sediment beds and consume large quantities of methane released from seeps in the ocean floor. She received her PhD from the University of California Santa Barbara in 2001. Orphan was the recipient of an Early Career Award from the Department of Energy in 2010, a Presidential Early Career Award in Science and Engineering in 2011, and a Young Investigator award from the International Society of Microbial Ecology in 2012. She has been a Gordon and Betty Moore Marine Microbiology Investigator since 2013, and she became a Fellow of the American Academy of Microbiology in 2015. In 2016, Orphan was named a MacArthur Fellow.

SPEAKERS

Center for Autonomous Systems and Technologies

Friday, October 6 / 10:30–11:45 a.m. / CAST, Caltech campus

Aaron Ames

*Bren Professor of Mechanical and Civil Engineering
and Control and Dynamical Systems*



At the beginning of 2017, Aaron Ames moved the Advanced Mechanical Bipedal Experimental Robotics (AMBER) Lab to the Caltech Division of Engineering and Applied Science from the Georgia Institute of Technology. At AMBER, Ames and his students hand-build bipedal robots and design the algorithms that govern how they walk. These algorithms couple efficiency equations (how can I walk most efficiently?) with boundary constraints (how can I not fall over?) to teach robots to generate their own walking gait. Ames received a BS in mechanical engineering and a BA in mathematics from the University of St. Thomas in St. Paul in 2001, and an MA in mathematics and a PhD in electrical engineering and computer sciences from UC Berkeley in 2006. His recent appointment at Caltech is a bit of a homecoming; he was a postdoctoral scholar in control and dynamical systems at Caltech from 2006 to 2008.

Soon-Jo Chung

*Associate Professor of Aerospace and Bren Scholar
Jet Propulsion Laboratory Research Scientist*



Soon-Jo Chung splits his time between Caltech's campus and NASA's Jet Propulsion Laboratory. His work ranges from the creation of a robotic bat with flexible wings and realistic flight dynamics to the control of swarms of small satellites to the development of computer-vision-based navigation systems. Originally from Seoul, South Korea, Chung earned his bachelor's degree at the Korea Advanced Institute of Science and Technology (KAIST), followed by master's and doctoral

degrees from the Massachusetts Institute of Technology (MIT). For seven years, Chung was a faculty member in aerospace engineering at the University of Illinois at Urbana-Champaign—visiting California each summer between 2010 and 2014 as a JPL summer faculty research fellow working on distributed small satellites. He returned to Southern California in August 2016.

Mory Gharib (PhD '83)

*Hans W. Liepmann Professor of Aeronautics and Bioinspired Engineering
Director, Graduate Aerospace Laboratories
Director, Center for Autonomous Systems and Technologies*



Mory Gharib is recognized for his accomplishments as an entrepreneur and founder of several successful imaging technology companies. He has received over 100 U.S. patents in imaging technology and biomedical devices in general and has received multiple prizes from NASA recognizing his contributions to advanced laser imaging and nanotechnology. He has led efforts at Caltech to establish the Bioengineering and Medical Engineering Departments and as vice provost he advised multiple research institutes on campus, including the Resnick Sustainability Institute, The Ronald and Maxine Linde Institute of Economic and Management Sciences, and the Joint Center for Artificial Photosynthesis, which has been named an Energy Innovation Hub by the U.S. Department of Energy. Gharib served as vice provost for research from 2010 to 2016, was appointed as the seventh director of the Graduate Aerospace Laboratories in late 2015, and is the inaugural director of the Center for Autonomous Systems and Technologies which was established in 2016. He received his BS in mechanical engineering from Tehran University, his MS in mechanical and aerospace engineering from Syracuse University, and his PhD in aeronautics from Caltech. Gharib is a member of the National Academy of Engineering and a fellow of the American Academy of Arts and Sciences.

SPEAKERS

Space-Based Solar Power Project

Friday, October 6 / 11:45 a.m.–2:00 p.m. / Gates-Thomas Patio and Conference Room, Caltech campus

Harry Atwater

*Howard Hughes Professor of Applied Physics and Materials Science
Director, Joint Center for Artificial Photosynthesis
Co-Director, Space-Based Solar Power Project*



Harry Atwater is the Howard Hughes Professor of Applied Physics and Materials Science at Caltech, where he also serves as director of the Joint Center for Artificial Photosynthesis. An early pioneer in nanophotonics and plasmonics (a field he named in 2001), Atwater is also a leader in photovoltaics and solar energy. He has authored or co-authored more than 400 publications that have been cited over 30,000 times. He received his BS, MS, and PhD from the Massachusetts Institute of Technology. Before joining the Caltech faculty in 1988, he was the IBM Postdoctoral Fellow at Harvard University. Atwater was recently elected to the National Academy of Engineering.

Ali Hajimiri

*Bren Professor of Electrical Engineering and Medical Engineering
Executive Officer for Electrical Engineering
Co-Director, Space-Based Solar Power Project*



Ali Hajimiri's research focuses on electronics- and photonics-integrated circuits and their applications in various disciplines, including high-frequency and high-speed communications, sensing, imaging, and bio-sensing. His research group engages in both the theoretical analysis of the problems in integrated circuits as well as practical implementations of new systems. He is a Fellow of the National Academy of Inventors (NAI). He is also a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and has served as a Distinguished Lecturer of the IEEE Solid-State and Microwave Societies. He is the recipient of Caltech's Graduate Student Council

Teaching Award as well as the Associated Students of the California Institute of Technology Teaching Award.

Sergio Pellegrino

*Joyce and Kent Kresa Professor of Aeronautics and Civil Engineering
Jet Propulsion Laboratory Senior Research Scientist
Co-Director, Space-Based Solar Power Project*



Sergio Pellegrino's research focuses on developing innovative, lightweight space structures that address critical issues of packaging, deployment, shape control, and stability, work that has established him as a pioneer in aerospace technology. His discoveries have helped to advance humanity's continued exploration and examination of outer space. In recognition of these achievements, Pellegrino was elected president of the International Association for Shell and Spatial Structures, a worldwide organization devoted to improving design and construction techniques for lightweight structural systems, in August 2015. He is also a fellow of the Royal Academy of Engineering, a fellow of the American Institute of Aeronautics and Astronautics, and a Chartered Structural Engineer, as well as the author of over 250 technical publications.

SPEAKERS

Game Changers

Saturday, October 7 / 8:30–11:00 a.m. / The Royce Restaurant at the Langham

Frances Arnold

*Dick and Barbara Dickinson Professor of Chemical Engineering,
Bioengineering and Biochemistry
Director, Donna and Benjamin M. Rosen Bioengineering Center*



A provocative innovator, Frances Arnold is one of the world's most recognized engineers. Inspired by nature's impressive ability to adapt and innovate, she uses its most powerful design algorithm—evolution—to rewrite the code of life and reprogram microorganisms to make new molecules and materials. A longtime Caltech faculty member, Arnold develops methods to "breed" biological enzymes with desirable traits useful to scientists and industry, much like how farmers breed crops. Pioneered by Arnold in the 1990s, the boundary-pushing technology—called directed evolution—has been adopted by hundreds of laboratories and has broad applications in sustainable biofuels, pharmaceuticals, and other environmentally friendly solutions to global problems. For example, enzymes created by directed evolution have also been used to manufacture drugs in less toxic and less expensive ways, including a drug for type 2 diabetes, and to help turn agricultural wastes into fuels and chemicals. Her most recent work explores whole new chemistries never before discovered in the biological world.

Colin Camerer

*Robert Kirby Professor of Behavioral Economics
T&C Chen Center for Social and Decision Neuroscience Leadership Chair
Executive Officer for the Social Sciences
Director, T&C Chen Center for Social and Decision Neuroscience*



Colin Camerer is a behavioral economist whose work integrates psychology into economics to understand how people make decisions. He earned a PhD from the University of Chicago in 1981 and was at Northwestern University,

University of Pennsylvania, and the University of Chicago before joining the Caltech faculty in 1994. He was the past president of the Economic Science Association and the Society for Neuroeconomics, was elected a member of the American Academy of Arts and Sciences, and was named a MacArthur Fellow in 2013. He has published more than 180 peer-reviewed articles and book chapters and authored or edited four books. The Camerer group uses a wide variety of lab and field methods to study how the brain decides what to do when taking risks, evaluating friend and foe, and trading in markets.

Michael Elowitz

*Professor of Biology and Bioengineering
Investigator, Howard Hughes Medical Institute
Executive Officer for Biological Engineering*



Michael Elowitz has been on the Caltech faculty since 2003 and works in the areas of systems and synthetic biology. His research seeks to understand fundamental design principles underlying the architecture and dynamics of gene circuits, and to use those principles to program new behaviors and functions in living cells. Elowitz's previous research has revealed the functional role that stochasticity, or 'noise', plays in the cell. This year Elowitz, along with two other Caltech researchers, received funding to create the Allen Discovery Center for Cell Lineage Tracing in collaboration with the University of Washington in Seattle and Harvard University. The goal of the Allen Center will be to understand multicellular development from the point of view of individual cells by creating new technologies that enable each cell to record its own personal history within its genome. Elowitz has received numerous honors in recognition of his work, including election as a Fellow of the American Association for the Advancement of Science in 2016, election to the American Academy of Arts and Sciences in 2015, and a MacArthur Fellowship in 2007.



GUEST SERVICES



GUEST SERVICES

Welcome to Discovery at Caltech!

Below you will find additional information about your stay with us.

- » Transportation between the Langham and event sites will be provided. Departure times are listed throughout the itinerary within this booklet.
- » Meals will be provided throughout the duration of the program.
- » Business attire is recommended for the Thursday night opening reception and dinner. Business casual attire is recommended for the duration of the program.
- » Comfortable footwear is advised for the JPL tour. Please remember to bring a valid form of identification with you.
- » To ensure you have time before your departure following the Saturday morning session, a 1:00 p.m. check-out has been secured for your room.

Should you have any additional questions, or wish to provide information about how we can make your stay with us more enjoyable, please feel free to contact me directly.

Caryn Golub
Caltech Events
(310) 488-4533
cgolub@caltech.edu

GUEST SERVICES

Contact information for your visit:

Caryn Golub

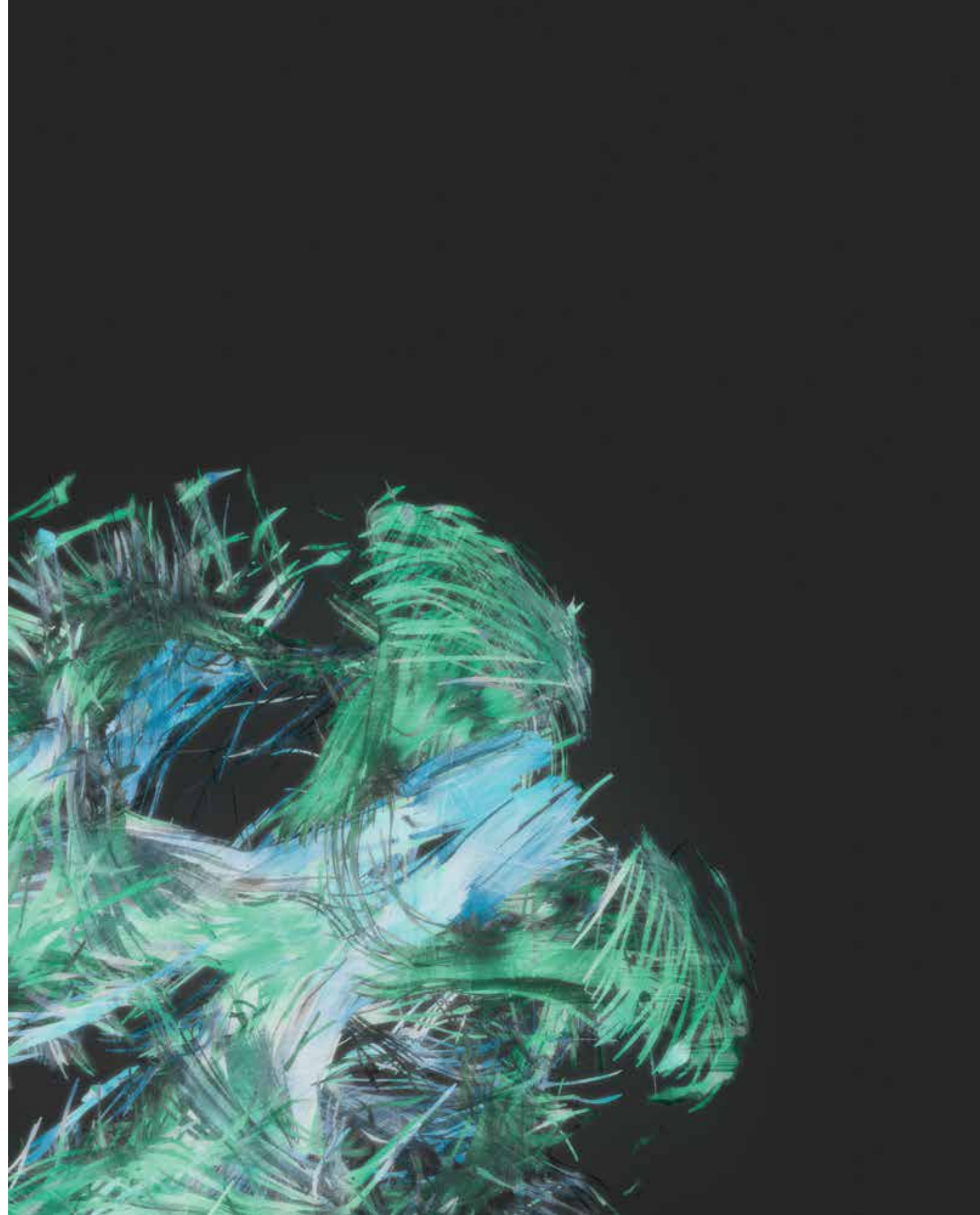
Caltech Events
Mobile: (310) 488-4533
Direct: (626) 395-2459

Leilani Sharrett

Caltech Events
Mobile: (619) 920-2440
Direct: (626) 395-2143

The Langham Huntington Hotel

(626) 568-3900

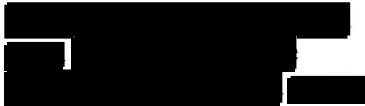


OCTOBER 5-7, 2017

DISCOVERY
AT
Caltech

David L. Lee
Chair, Board of Trustees

July 12, 2017



Dear [REDACTED]

As you know, Caltech is a place where some of the world's foremost scientific minds validated Einstein's theories by leading the search for gravitational waves, predicted the existence of an unknown ninth planet in our solar system, and created new knowledge about smog and lead in the environment that informed changes improving people's lives. Caltech is the home of the people who pioneered space exploration, earthquake monitoring, and basic revelations about the very rules that define our physical world.

My wife, Ellen, and I invite you to join us for an exclusive look inside this unique research center. We hope that you will be part of the 2017 *Discovery at Caltech* event, from the evening of Thursday, October 5, to late morning on Saturday, October 7.

An intimate, invitation-only forum, *Discovery at Caltech* offers meaningful opportunities for lifelong learners and leaders in business and technology to connect with top Caltech scientists and engineers. Caltech has earned a reputation as the destination of choice for the world's most original and creative scholars. At the *Discovery* event, you will meet the people who are asking the biggest questions and dreaming up the biggest ideas—an elite but informal chance for you to tap their brains about what's new and what's next.

Here are just a few of the big questions and big ideas you can delve into at *Discovery at Caltech*:

- What would life on other planets look like?
- How can we hack the code that cells use for giving orders so that we can write cures for disease?
- Do bacteria and fungi have a role to play in developing greener fuels?
- What can tracing the activity of the brain tell us about decision making?
- Can we replace fossil fuels with solar power beamed down from space—where the sun always shines?

The *Discovery* event—co-hosted by President Thomas F. Rosenbaum and his wife, Professor Katherine Faber, along with Ellen and me—begins Thursday with a special dinner at the president's residence. There, you will spend time with fellow business and technology leaders, and President Rosenbaum will introduce you to some of the themes that you will explore over the next day and a half.

On Friday we will welcome you to campus for a series of conversations featuring Caltech innovators, including special access to state-of-the-art robots in the drone arena at our new Center for Autonomous Systems and Technologies. The day closes with a VIP tour and dinner at Jet Propulsion Laboratory, the world's leading center for the robotic exploration of the solar system. There, you will connect with the scientists and engineers who head up NASA missions to Mars and beyond.

To make sure you get the most out of *Discovery at Caltech*, we will provide transportation to and from the airport and all meals, as well as lodging at the Langham Huntington in Pasadena. During salon sessions on-site at the hotel on Saturday morning, you will hear brief, compelling presentations by pathbreaking Caltech researchers working to address some of the most pressing issues of our time.

If you have questions, you can reach Caryn Golub at (626) 395-2459 or cgolub@caltech.edu. A formal invitation with full details will follow closer to the event.

Intensely focused and interdisciplinary by design, Caltech is a small school with global impact. I believe it is where the future starts. As an alumnus and board chair, I consider my association with Caltech one of the great privileges of my life. I am always engaged, energized, and inspired by speaking with the creative minds that call Caltech home.

Discovery at Caltech is your opportunity to experience firsthand this extraordinary engine of inquiry and progress. What you learn could enrich your life—and introduce you to the next world-changing idea.

I hope you will join us.

With warm regards,



David L. Lee

Enclosure

DISCOVERY

at Caltech

Join us for this exclusive, behind-the-scenes look at the cutting-edge and compelling research happening at Caltech.

SAVE THE DATE
OCTOBER 5–7, 2017

Consider big questions and big ideas.

- What would life on other planets look like?
- Do bacteria and fungi have a role to play in developing greener fuels?
- What can tracing the activity of the brain tell us about decision making?
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Participate in a thought-provoking program.

- Thursday evening reception and dinner hosted by President Rosenbaum and Professor Faber at the president's residence
- Friday on campus for stimulating panel discussions and laboratory experience, followed by a VIP tour and dinner at the Jet Propulsion Laboratory
- Saturday morning breakfast and talks with game changers in science and technology

Together, we can change the world.

If you have questions about this event, or if you wish to reserve your space now, please contact Caryn Golub at cgolub@caltech.edu or 626-395-2459.

Is there life beyond Earth? Panel discussion and breakfast



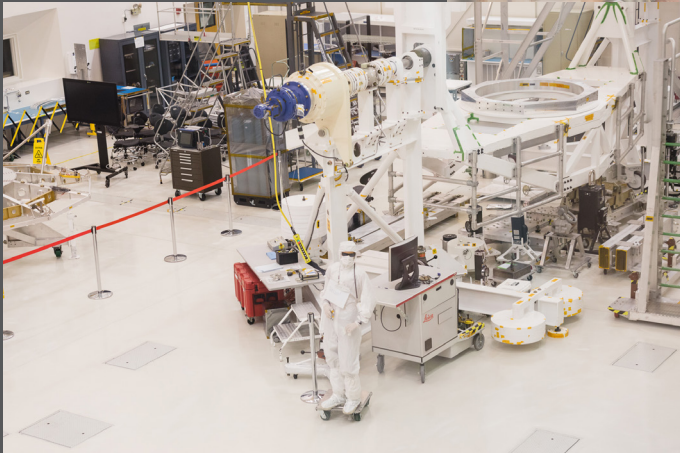
Center for Autonomous Systems and Technologies Laboratory Experience



Is this the end of fossil fuels? Discussion



Jet Propulsion Laboratory Tour and Dinner



Breakthroughs at Caltech Breakfast and Discussion



Caltech