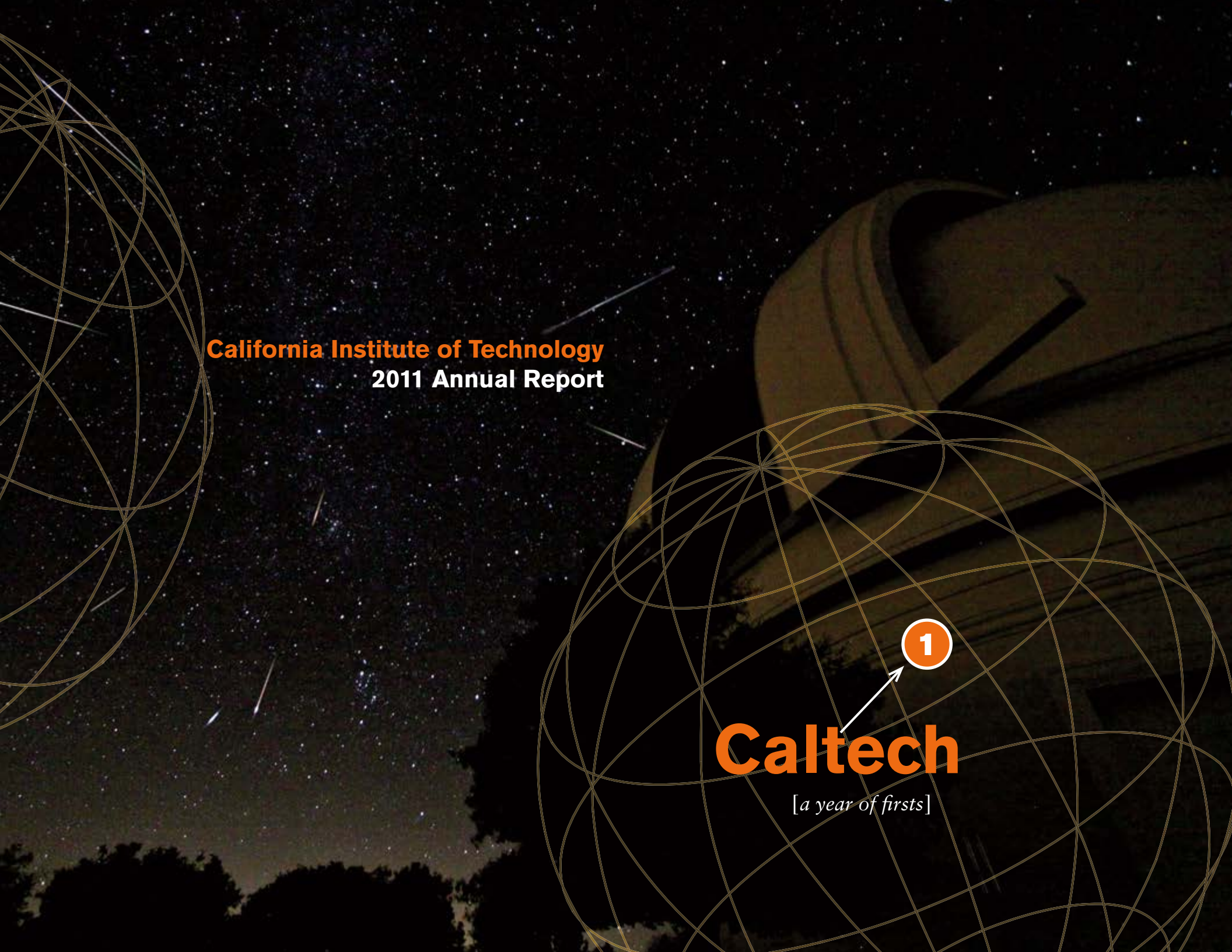

California Institute of Technology
2011 Annual Report

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Caltech

[*a year of firsts*]

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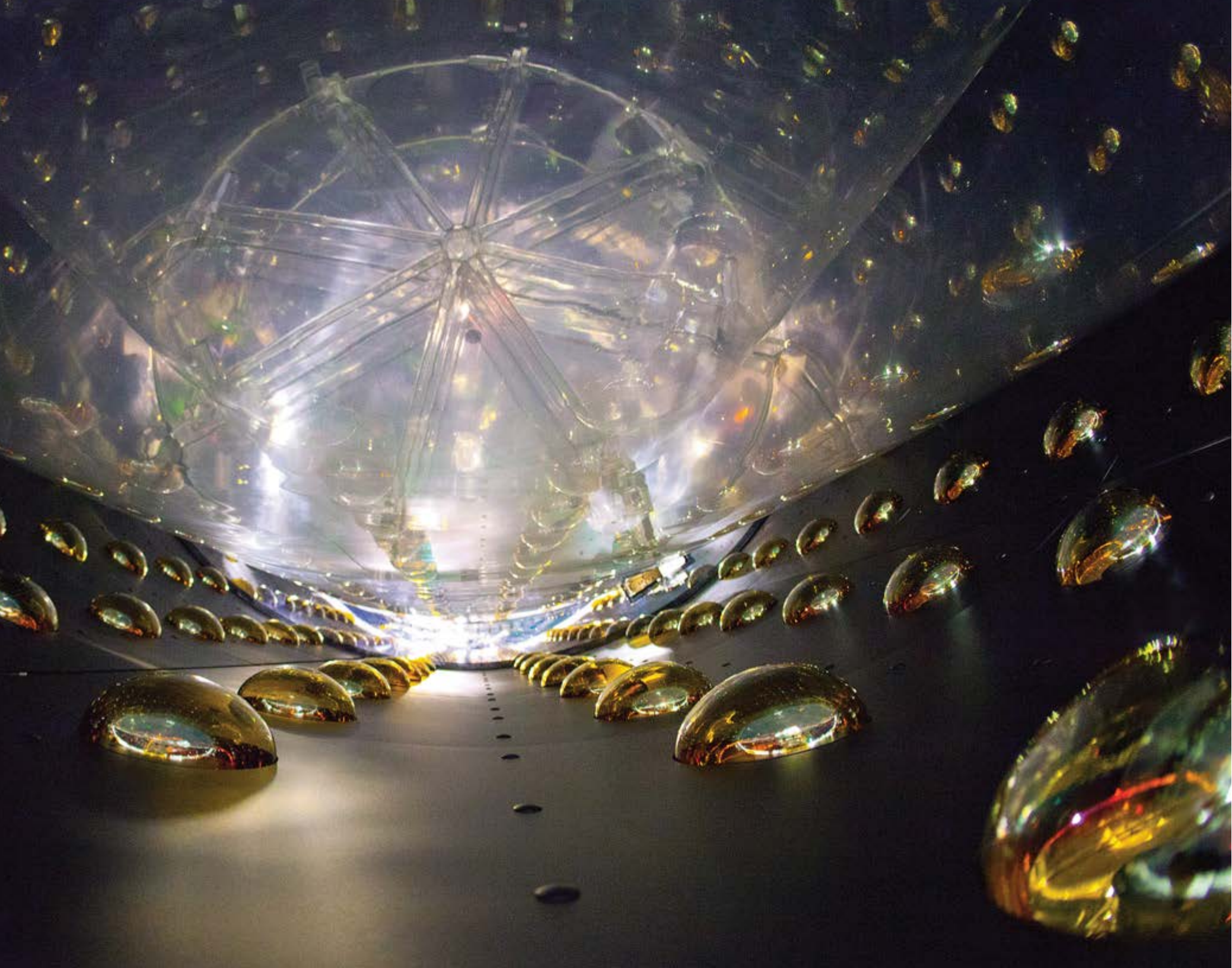
CONTENTS

[*Look for this symbol throughout the book, celebrating first-time achievements, discoveries, and innovations by Caltech faculty, students, and community members.*]

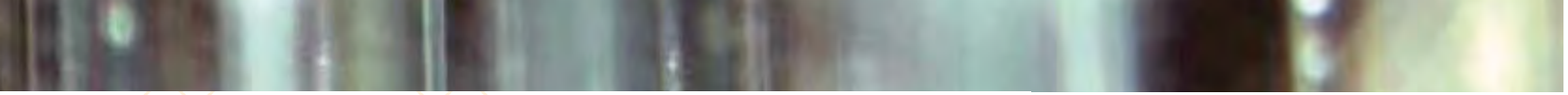


Our Mission

The mission of the California Institute of Technology is to expand human knowledge and benefit society through research integrated with education. We investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society.

Kent Kresa

Jean-Lou Chameau



LETTER FROM THE CHAIRMAN AND THE PRESIDENT

2011 was a year of firsts at Caltech. These unique achievements are, however, the result of a legacy of discovery, innovation, and impact that is what makes Caltech one of the world's leading science and technology research institutions. This Annual Report celebrates the extraordinary people who made that possible, and provides a glimpse of the highlights of the past year.

Leaders Thrive. Visionary scientists thrive in Caltech's environment of intellectual creativity and freedom. This past year, Caltech scholars received top national and international honors for research, bold scientific inquiry, and inspired collaborations. The global and enduring impact of their work is reflected in the comprehensive list of honors received by Caltech faculty, found later in this report.

Knowledge Expands. Each year, discoveries are made at Caltech that will shape our future, influence scholarly study around the world, and stimulate the global economy. In 2011, Caltech researchers crossed disciplinary boundaries with game-changing advances such as delivering antibodies to prevent HIV infection, measuring a dinosaur's temperature, and launching an historic mission to Mars, to name only a few.

Change Begins. Our students have the opportunity to work alongside the world's leading scholars and participate in tomorrow's research breakthroughs in the infinite laboratory that is Caltech. Our discovery-driven environment inspires students to confront complex questions related to sustainable energy, space exploration, and environmental conservation.

Possibilities Emerge. Generous gifts from individual and institutional donors have positioned Caltech to pursue solutions to our greatest global challenges and to educate the next generation of scholars, scientists, and innovators. In 2011, philanthropic support enabled extensive renovations to the Linde + Robinson building, providing critical infrastructure for interdisciplinary research at the Linde Center for Global Environmental Science, as well as the Terrestrial Hazard Observation and Reporting Center.

Boundaries Disappear. Caltech's international prominence was made all the more visible this year as a result of our number-one rating in the *Times Higher Education* World University Rankings. This honor reinforces our relevance and leadership in a changing world, while affirming our belief that interdisciplinary, fundamental science is a catalyst for pushing the boundaries of discovery and changing the world.

Kent Kresa, Chairman, Caltech Board of Trustees

Jean-Lou Chameau, President, Caltech

TIMES HIGHER EDUCATION WORLD UNIVERSITY RANKINGS 1

Top Ranking

[*Caltech earned the top spot on the* Times Higher Education *2011–2012 global university ranking of 400 distinguished institutions*]

"This recognition is about the work we do here and the impact it has—both on our students and on the global community."

—JEAN-LOU CHAMEAU, President

"This just confirms what many of us have known for a long time about this extraordinary place."

—KENT KRESA, Chairman, Board of Trustees

NATIONAL MEDAL OF SCIENCE

Barton and Yariv receive the United States' highest scientific honor.

National Medal of Science winners are an elite group—and during the past fiscal year two Caltech researchers have joined its distinguished ranks.

In September 2011, **Jacqueline Barton** (top right), the Arthur and Marian Hanisch Memorial Professor and professor of chemistry, and chair of the Division of Chemistry and Chemical Engineering, received this presidential recognition. She was honored for discovering that double helical DNA can facilitate the transfer of electrons across long molecular distances. The White House noted that "her experiments reveal a strategy for how DNA repair proteins locate DNA lesions."

In October 2010, **Amnon Yariv** (bottom right), the Martin and Eileen Summerfield Professor of Applied Physics and professor of electrical engineering, received the medal for "foundational contributions to photonics and quantum electronics," including the invention of the distributed feedback semiconductor laser, which "underpins today's high-speed optical fiber communications" and profoundly impacts the field of optics as a whole, according to the White House citation.

MEDAL OF SCIENCE *These awards bring the number of Caltech faculty and alumni recipients of the National Medal of Science to 56.*

KNOWLEDGE EXPANDS

"Caltech is an extraordinarily collaborative, interactive place, and that's how the best science comes to be."

—JACQUELINE BARTON, chair, Division of Chemistry and Chemical Engineering

"This event is the best-recorded great earthquake ever."

—MARK SIMONS

ANALYZING OBSERVATIONS OF JAPAN QUAKE 1

[First large observational study of 9.0 Tohoku-Oki earthquake]

The magnitude-9.0 earthquake and subsequent tsunami that struck Japan in March 2011 offered an unprecedented opportunity for Caltech scientists to peer into the inner workings of a massive seismic event. The team, led by **Mark Simons** (right), professor of geophysics, and **Jean Paul Ampuero Saenz**, assistant professor of seismology, analyzed the first set of observational data on this rare megathrust quake. They found that the region of significant subsurface fault slip occurred in a much smaller, more compact area than initially suggested by the magnitude of the shaking.

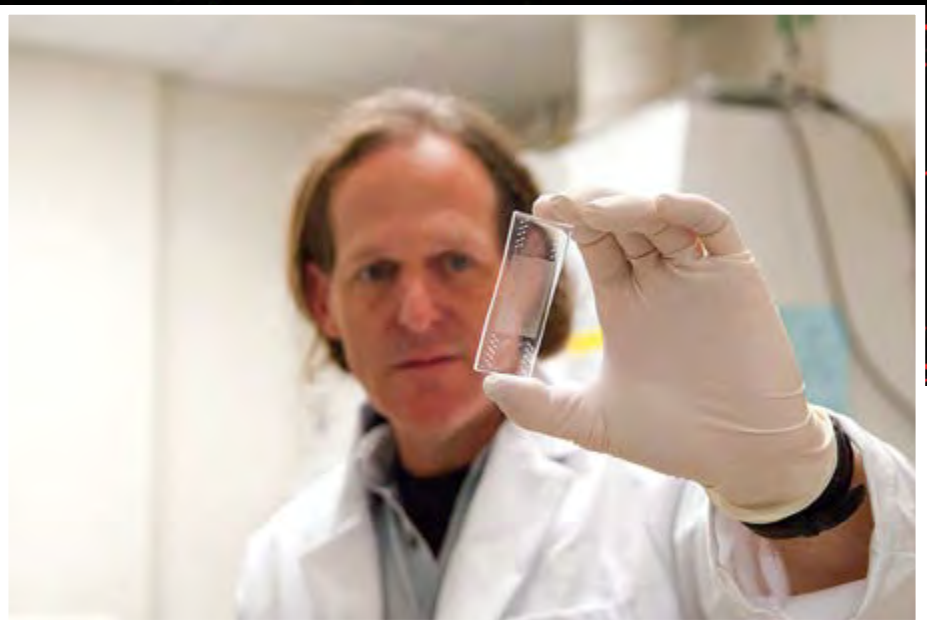
Using measurements of earth movement gathered from satellite data, globally distributed broadband seismic networks, and open-ocean tsunami readings, the team shed new light on the mechanical properties of tectonic faults. Their work will help scientists better quantify earthquake hazards to inform future research priorities, improve infrastructure, and, ultimately, prevent the kind of devastation that characterized this catastrophic event.

COGNITIVE COMPREHENSION *Adolphs's research examines the neurological processes in human social interactions.*

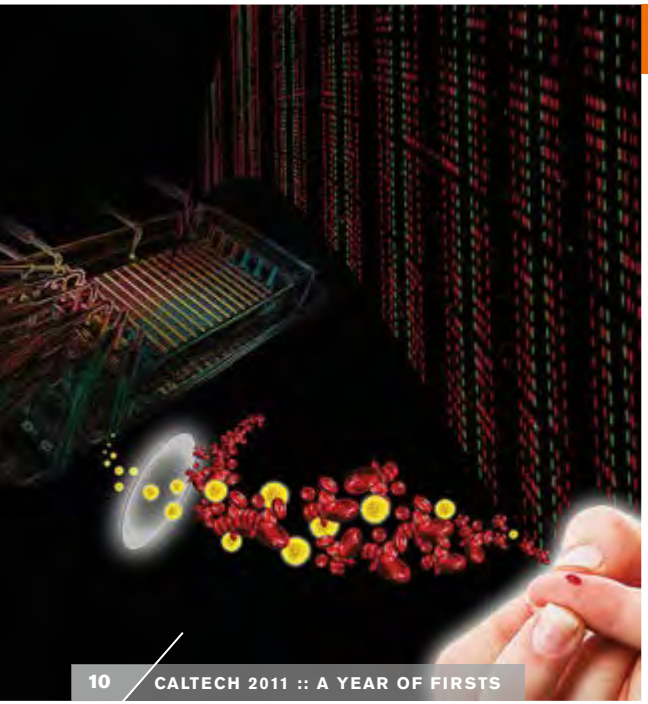
UNDERSTANDING THE PSYCHOLOGY OF PEOPLE WITH AUTISM

Are people with autism concerned about impressing others?

Probably not, according to a series of money-donation experiments led by **Ralph Adolphs** (right), Bren Professor of Psychology and Neuroscience and professor of biology; and director of the Caltech Brain Imaging Center. The study found that—unlike their neurotypical peers—high-functioning people with autism will donate the same amount of money to a charity regardless of whether someone else is watching them. The conclusion? Autistic individuals don't worry about their social reputation—at least not in the way that neurotypicals do. That may be why, in a charitable-giving setting, the behavior of autistic individuals is unaffected by social observation, whereas neurotypicals give more when under observation and less when in private. The findings are important for better understanding the psychology of autism, and educating the general public about autism-spectrum disorders.



TECHNOLOGICAL IMPLICATIONS *The single-cell barcode chip is minimally invasive, cost-effective, and highly informative.*



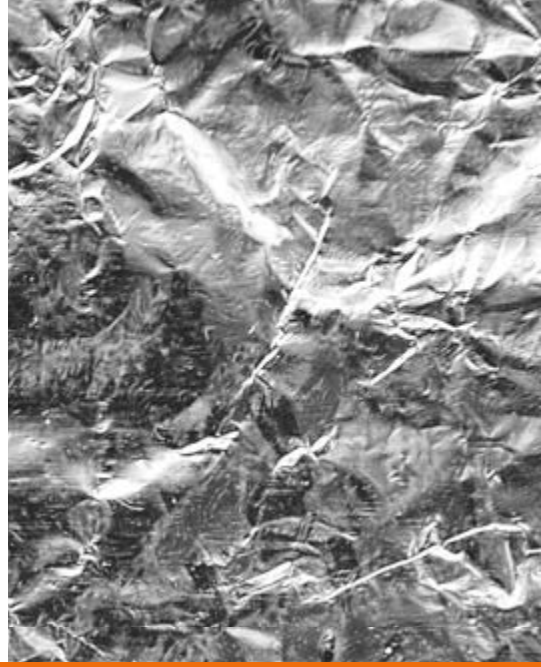
DEVELOPING MICROCHIPS FOR IMMUNE-SYSTEM MONITORING

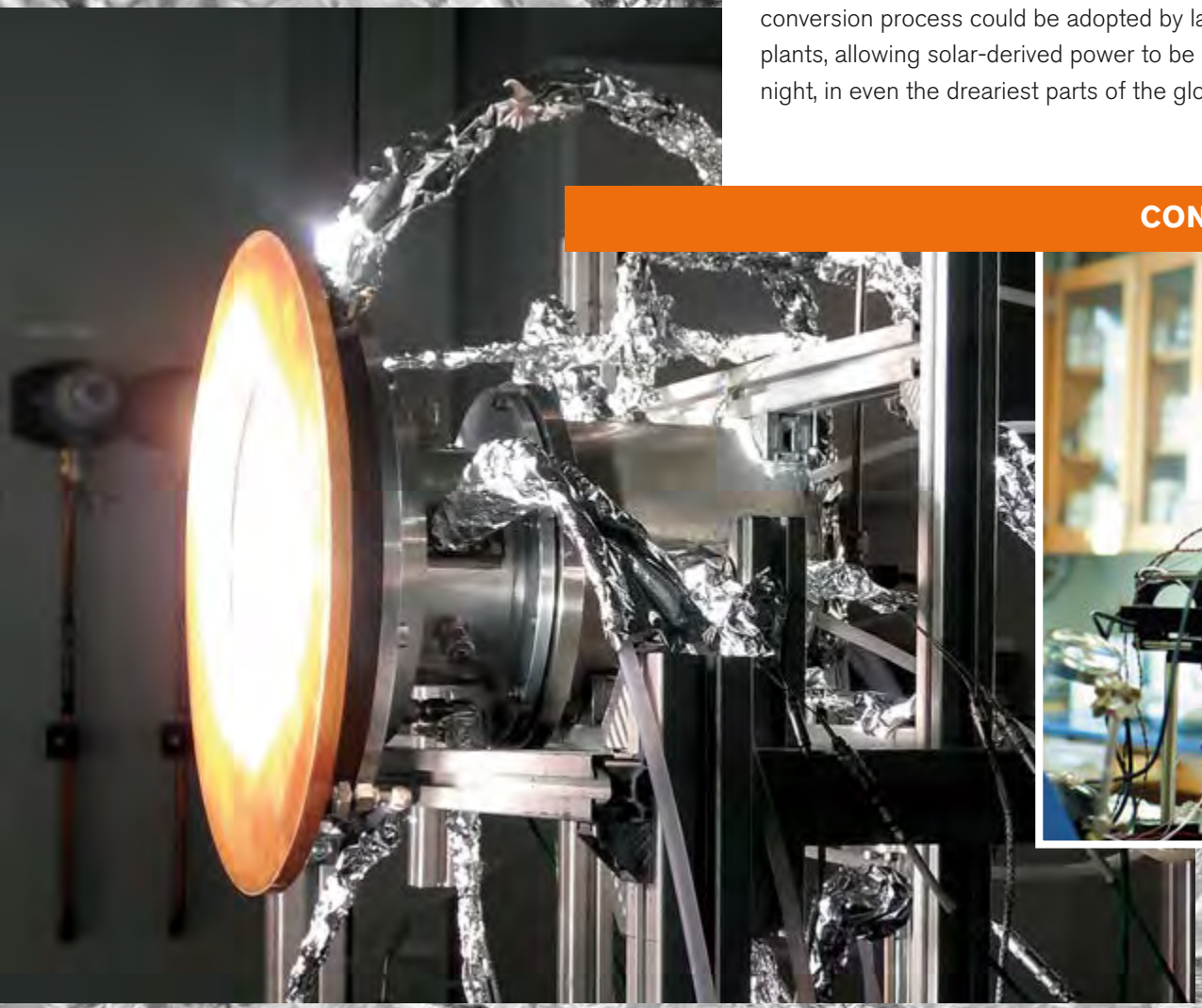
Doctors may soon be able to assess a patient's immune system with just a microchip and a few cells.

Led by **James Heath** (above), the Elizabeth W. Gilloon Professor and professor of chemistry, a team of Caltech researchers reported in May 2011 on their development of "barcode chips" that quickly and inexpensively assess immune function by examining a large number of protein biomarkers secreted from single immune cells. By sampling only a small number of cells, the chips can measure the concentrations of proteins that indicate, for example, that the immune system is attacking a tumor. These single-cell barcode chips may eventually go beyond making diagnoses to help physicians track the effectiveness of treatments such as cancer immunotherapy.

Team cooks up alternative sources of energy.

The key to alternative energy could be as close as your kitchen. A common metal found in self-cleaning ovens may be pivotal to the process of converting the sun's rays into fuel. In December 2010, a Caltech research team led by **Sossina Haile** (below, right), Carl F Braun Professor of Materials Science and Chemical Engineering, reported on a unique solar reactor that concentrates solar energy and, with the help of the compound cerium oxide, or ceria, converts carbon dioxide and water into fuel. Ultimately, this ceria-based solar reactor and conversion process could be adopted by large-scale energy plants, allowing solar-derived power to be available day and night, in even the dreariest parts of the globe.





CONVERTING SOLAR ENERGY INTO FUEL

DISCOVERING A NEW CLASS OF SUPERNOVAE

They're bright. They're blue. They're brand new.

Shrinivas Kulkarni (right), the John D. and Catherine T. MacArthur Professor of Astronomy and Planetary Science and director of the Caltech Optical Observatories, and his colleagues have discovered a new class of exploding stars. As part of the Palomar Transient Factory, a pioneering project led by Kulkarni that scans the skies for cosmic flashes of light, the astronomers found supernovae that are exceptionally blue and hot and take about 50 days to fade away—much longer than most supernovae. Almost a hundred times brighter than their host galaxies—small, dim ones called dwarf galaxies—the supernovae illuminate their environments like distant street lamps lighting up dark roads. Working as a kind of backlight, they allow astronomers to analyze the interstellar gas in the host galaxies, which is impossible without the supernovae. These stellar blasts could also reveal what ancient stars might have been like, since they most likely originate from very massive stars that are similar to the first stars in the universe.

"It is really amazing how rich the night sky continues to be."

—SHRINIVAS KULKARNI

STUDYING EMBRYONIC DEVELOPMENT

Can sea urchins help solve the mysteries of human genetic control systems?

Caltech scientists say yes, based on the close evolutionary relationship between the genetic regulatory systems of these ocean dwellers and those of mammals. Gene regulatory systems are the networks that instruct cells to express or repress individual genes during embryonic development. A team of Caltech scientists led by **Eric Davidson** (above), the Norman Chandler Professor of Cell Biology, have unraveled parts of the sea urchin's genetic master plan. Revealing the intricate relationships between all the regulatory genes active in specific parts of a sea-urchin embryo may help unlock the mysteries of similar gene regulatory systems in humans.

BLAZING TRAILS IN OUTER SPACE

Missions explore Jupiter, Mars, and the Moon.

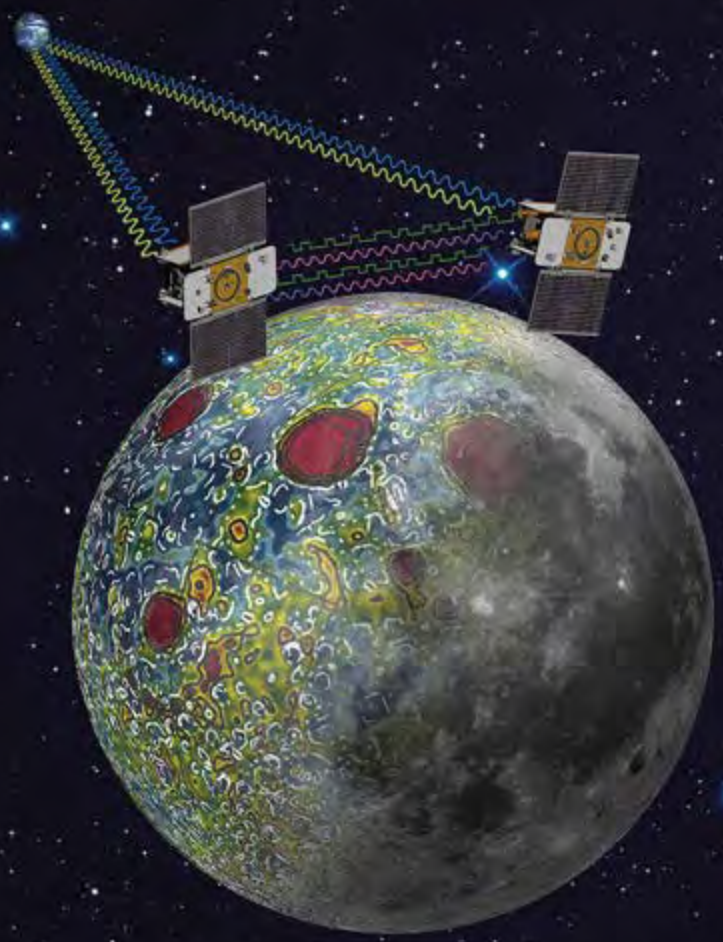
NASA's **Jet Propulsion Laboratory** (JPL), managed by Caltech, launched missions this year that will provide the first-ever global maps of salt concentrations on the ocean surface (Aquarius), conduct an in-depth study of the giant gas planet Jupiter (Juno), and measure the moon's gravity in unprecedented detail (GRAIL, right). All this while researchers prepared for what might well be considered JPL's most ambitious mission yet—the Mars Science Laboratory, which launched in November 2011, and whose rover, Curiosity, will engage in a long-term robotic exploration of Mars, searching for evidence of environments favorable to microbial life.

Finding water everywhere.

Teams of astronomers led by scientists at Caltech and JPL have discovered the largest and farthest reservoir of water ever detected in the universe. Located 30 billion trillion miles away, the mass of water vapor is at least 140 trillion times that of all the water in Earth's oceans combined.

Studying asteroid-belt giants.

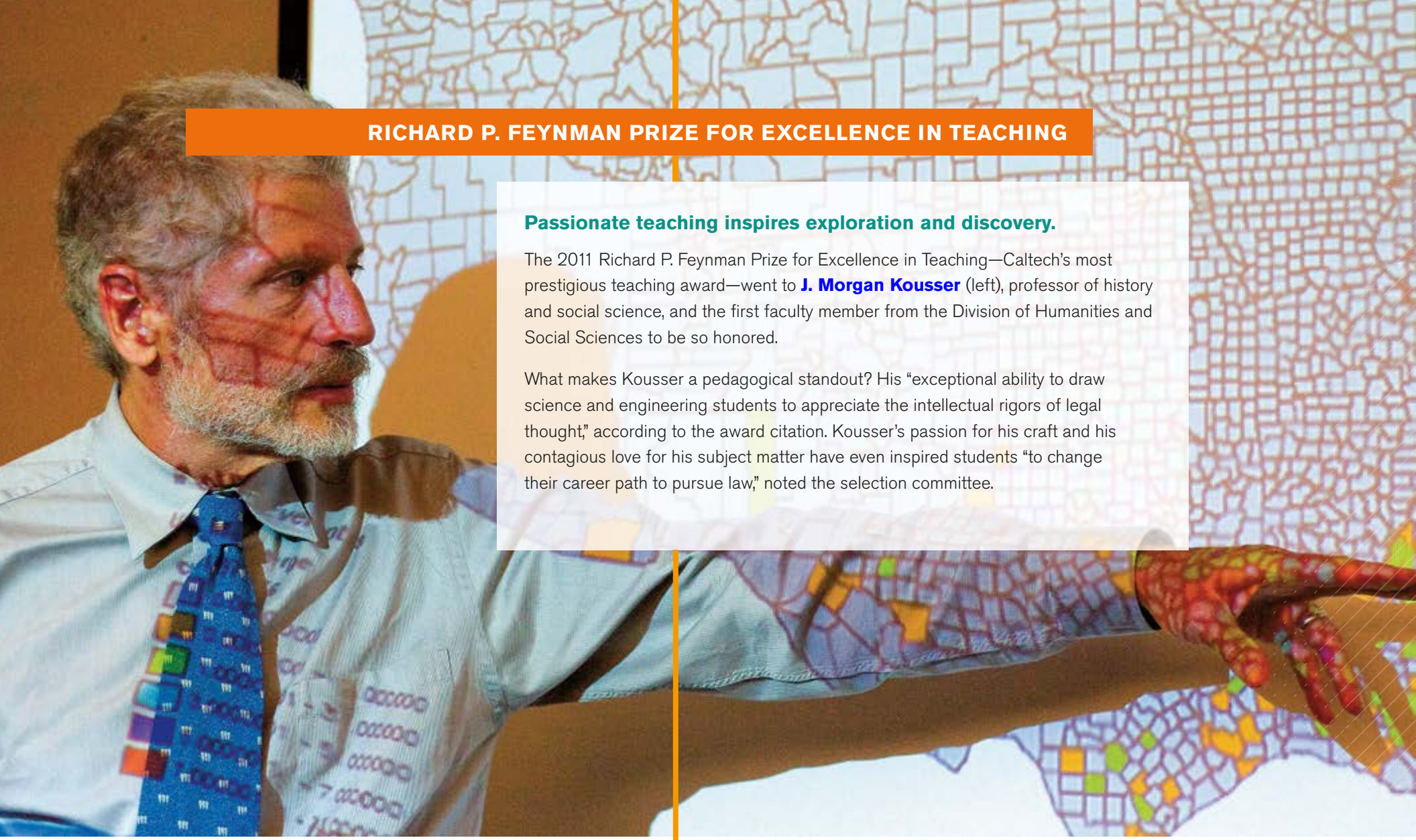
Scientists with NASA's Dawn mission released early findings about the giant asteroid Vesta (left), whose southern hemisphere boasts one of the largest mountains in the solar system.



CHANGE BEGINS

"I didn't appreciate how rewarding learning new things could be before coming to Caltech. Now I feel like anything really is possible."

—CARLY BOND, Caltech undergraduate student



RICHARD P. FEYNMAN PRIZE FOR EXCELLENCE IN TEACHING

Passionate teaching inspires exploration and discovery.

The 2011 Richard P. Feynman Prize for Excellence in Teaching—Caltech's most prestigious teaching award—went to **J. Morgan Kousser** (left), professor of history and social science, and the first faculty member from the Division of Humanities and Social Sciences to be so honored.

What makes Kousser a pedagogical standout? His "exceptional ability to draw science and engineering students to appreciate the intellectual rigors of legal thought," according to the award citation. Kousser's passion for his craft and his contagious love for his subject matter have even inspired students "to change their career path to pursue law," noted the selection committee.

> "I get a prize every year—watching students grow not only in knowledge, but in fascination with topics they were barely aware of before."
>
> —J. MORGAN KOUSSER

STUDENT LIFE

Students spend summer SURFing.

More than 400 of the brightest minds from around the world teamed up with scientific mentors from Caltech and JPL for the Institute's 33rd Summer Undergraduate Research Fellowship (SURF) program. 2011's SURF students spent 10 weeks developing devices to allow for medical treatment via cell phone, designing an at-home standing frame for spinal-cord-injury patients, using digit analysis to identify fraud in financial data, adapting smartphones for use in early-warning systems for earthquakes, and engineering antibody-like reagents to better neutralize HIV.

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Extreme recycling.

After months of intense preparation, undergrads Chris Hallacy, Brad Saund, and Janet Chen—also known as Team BRB—were crowned the winners of the 26th annual ME 72 engineering design competition in March 2011. The class theme, "Extreme Recycling," required students to design, build, and deploy vehicles capable of traversing difficult terrain to collect, return, and sort a variety of recyclables.

CHIP models energy efficiency. [*First Caltech entry in Solar Decathlon*]

Meet CHIP—the high-tech, energy-efficient prototype house designed and built by a team of students from Caltech and the Southern California Institute of Architecture (SCI-Arc) for the U.S. Department of Energy's 2011 Solar Decathlon. CHIP, which stands for Compact Hyper-Insulated Prototype, competed in 10 "events," where it was judged on everything from affordability to architectural aesthetics. And the final result? CHIP finished first in energy balance, second in engineering, third in affordability, and sixth overall. The SCI-Arc/Caltech team was sponsored by the Resnick Institute.

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Caltech athletes win big.

[*First NCAA magazine cover featuring a Caltech student*]

The historic, last-second free throw that broke the men's basketball team's (left) 26-year, 310-game losing streak in February 2011 was just one of the ways in which Caltech athletes outdid themselves last year. The men's water polo team snapped their own seven-year losing streak in October, for instance. And women's basketball and volleyball player **Teri Juarez** garnered national attention when NCAA's *Champion Magazine* featured her on the cover of its winter issue. Go Beavers!

Celebrating a science visionary.

Caltech's independently organized TEDx event—held in January 2011—paid homage to Caltech's own Richard P. Feynman—trailblazing researcher and educator, and one of the most original thinkers of the 20th century.

Feynman's Vision: The Next 50 Years featured extraordinary speakers with "ideas worth sharing" in science, art, and music. More than 1,000 local attendees filled Beckman Auditorium, while 21,000-plus viewers from all over the world tuned in online to watch presentations on everything from quantum computing to the development of nanodevices—not to mention a performance by a Tuvan throat singer.

TEDxCaltech also marked the 50th anniversaries of Feynman's prescient talk "There's Plenty of Room at the Bottom"—an exploration of the possibilities of what is now called nanoscience—and the *Feynman Lectures on Physics*, his classic introductory course.


"The most important thing we do at Caltech is passing down the light of knowledge—it is like DNA, but it is intellectual DNA. This is something that is key to civilization."
—JEHOSHUA "SHUKI" BRUCK, Gordon and Betty Moore Professor of Computation and Neural Systems and Electrical Engineering
TED Caltech
NANOSENSOR ARRAYS
"smart" microfluidic systems
multi-physical nanosensor arrays
TEDx Caltech

POSSIBILITIES EMERGE

"When you bring innovative scientists together and provide them with the facilities and collaborative spaces they need, magic happens."

—ARES ROSAKIS, chair, Division of Engineering and Applied Science

THOR CENTER

> "The THOR center will provide a unique platform for collaboration among scientists, students, and policymakers." —FOSTER STANBACK

Developing insights into natural disasters.

Foster and **Coco Stanback** (left) created the Terrestrial Hazard Observation and Reporting (THOR) Center so that scientists might better understand and mitigate the damage caused by natural disasters.

"The THOR center will provide a unique platform for collaboration among scientists, students, and policymakers, empowering them with the extensive resources of Caltech and the Jet Propulsion Laboratory," says Foster.

Combining Caltech's earth science and engineering expertise with JPL's satellite-based earth-imaging technology, researchers at THOR study a wide range of natural disasters—earthquakes, tsunamis, landslides, wildfires, and more—with the goal of using insights from basic science experiments to help communities better anticipate and respond to these events.

Thanks to the generous support provided by the Stanbacks, THOR aims to minimize the negative impact of natural disasters worldwide. The Stanbacks' $6.7 million gift was complemented by an additional $3.3 million from the Gordon and Betty Moore matching program. The first round of projects was underwritten by THOR in fall 2011.

DOW CHEMICAL PARTNERSHIP 1

Dow Chemical Company and Caltech team up

[First Member of Caltech Corporate Partners Program]

Dow invests in clean energy for tomorrow.

Through a pioneering $10 million partnership, the **Dow Chemical Company** and Caltech have teamed up to invest in the people and technology behind tomorrow's clean energy solutions.

As a founding member of the Institute's Corporate Partners Program, which is designed to strengthen the connection between research and industry, Dow will provide Caltech's Resnick Institute with funding over the next five years to help it turn its cutting-edge ideas into commercial technologies. The company will also endow five graduate-student fellowships in chemistry and chemical engineering and five additional fellowships in energy science. Resnick Institute fellows have the opportunity to work alongside the world's leading energy-science scholars, and to research topics such as biofuels, fuels from sunlight, smart grids, and thin-film flexible solar cells.

"These long-term partnerships—inaugurated so aptly by this continued collaboration with Dow—will seed the sorts of high-risk, high-return innovations in science and engineering for which Caltech is renowned," says Caltech president Jean-Lou Chameau. "It will not only fund great fundamental science, but will also help us translate our findings into a commercial arena more quickly and seamlessly than ever before."

"These long-term partnerships…seed the sorts of high-risk, high-return innovations in science and engineering for which Caltech is renowned." —JEAN-LOU CHAMEAU

> "Caltech gave me a chance to change my life, which has enabled me to help quite a few other people change their lives for the better."
>
> —LESTER INGBER

ALUMNI GIVING

Caltech alumni pay it forward.

Dedicated annual donors, volunteers, and engaged alumni, such as the 2011 Caltech Fund cochairs **Jasmine** (BS '95) and **Chris** (BS '95) **Bryant**, have played an integral role in energizing Caltech's community of giving. Consistent annual support from alumni enables the Institute to attract the most promising students, offer freedom and flexibility for scientific exploration, and fuel extraordinary discoveries.

"Caltech gave me access to opportunities," Jasmine says. "Just the fact that I had a Caltech connection often opened doors."

In addition to their leadership role with the Alumni Fund, the Bryants are junior contributing members of the Caltech Associates and lifetime members of the Alumni Association. They are also elected members of the Alumni Association Board, on which Jasmine served as president in 2009.

"Caltech teaches you that the things that you are passionate about, that you care about, you should try and make an impact in," says Chris. "For us, that's Caltech."

Planned gifts establish an enduring legacy.

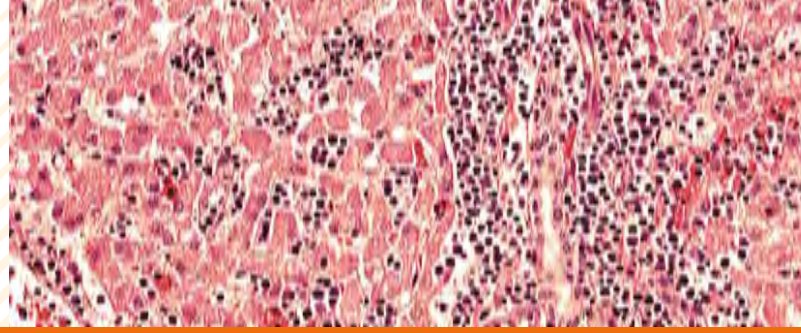
Caltech alumni also support their alma mater with planned gifts that leave an indelible impact on the Institute.

In March 2011, **Lester** (BS '62) and **Louise Ingber** made the decision to bequeath their estate to Caltech with the intention of creating several endowed funds, including a start-up fund for faculty and a scholarship fund for undergraduates. Inspired by the four-year scholarship he received when he applied to the Institute, Lester wants to give others similar opportunities.

"Caltech gave me a chance to change my life, which has enabled me to help quite a few other people change their lives for the better," says Lester.

His wife, Louise, has always respected Caltech's reputation as a leading research institution. An accomplished dancer, she admires Caltech students' work ethic and discipline, and she is proud to be part of a legacy of discovery, innovation, and excellence.

"We wanted to impart positive change by leveraging our funds on behalf of those talented people who have the best chance of changing the world for the better," says Louise.



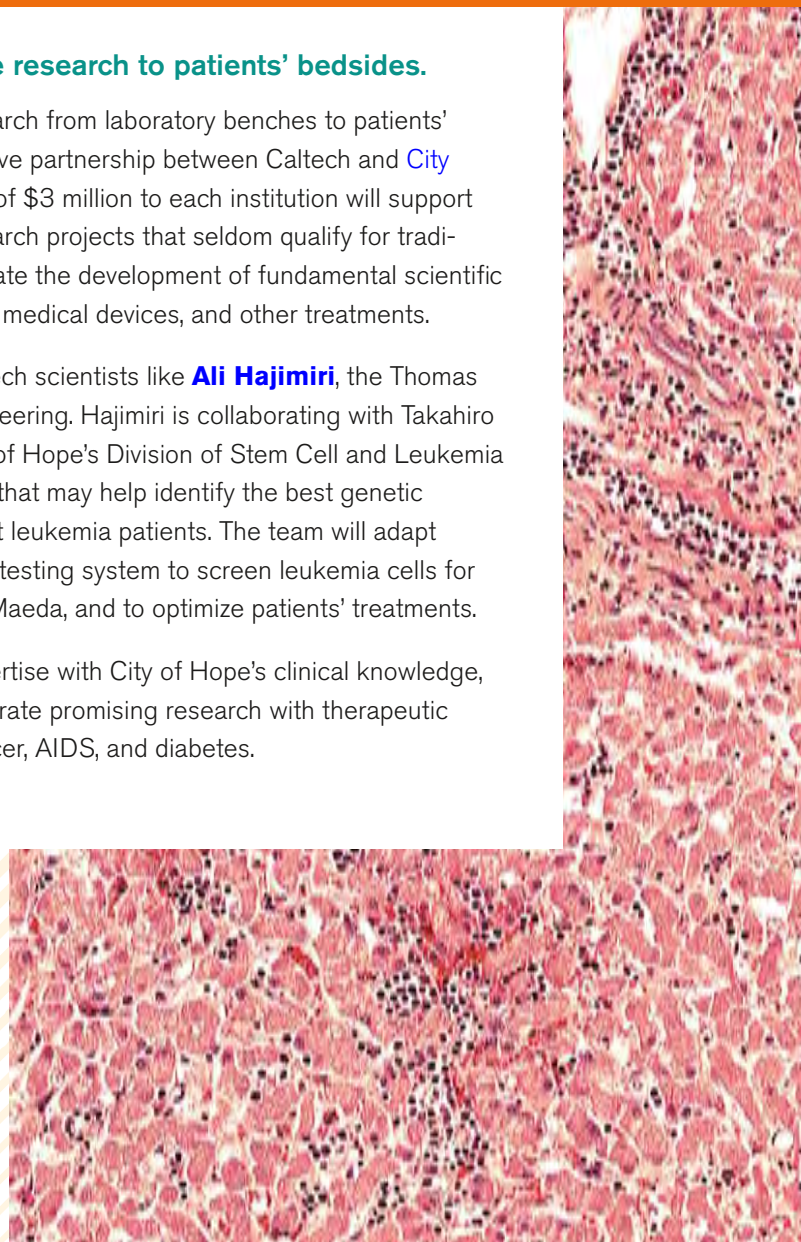
CITY OF HOPE PARTNERSHIP

Partnership brings cutting-edge research to patients' bedsides.

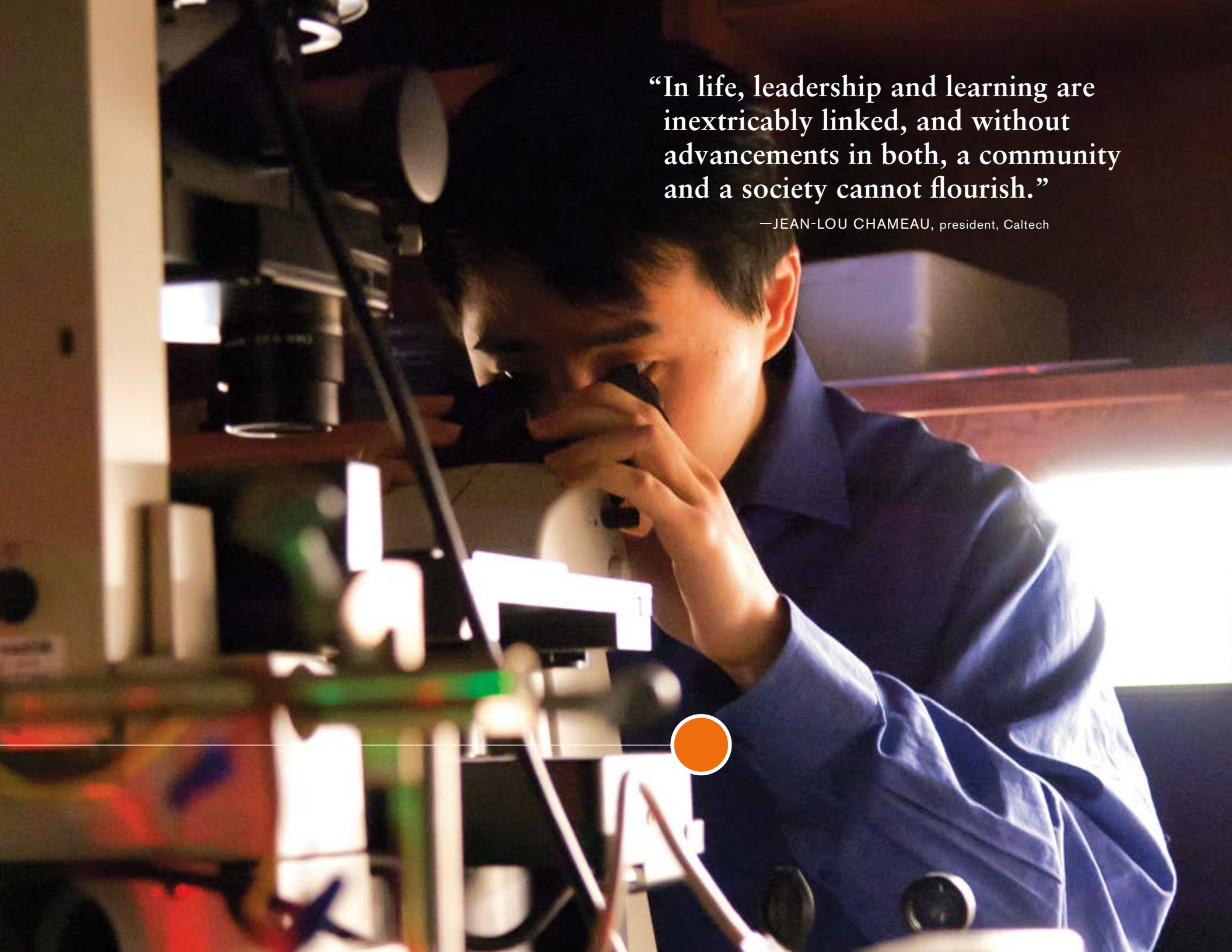
A $6 million pledge will advance research from laboratory benches to patients' bedsides by strengthening an innovative partnership between Caltech and City of Hope. The anonymous donor's gift of $3 million to each institution will support early-stage translational medical research projects that seldom qualify for traditional sources of funding, and accelerate the development of fundamental scientific discoveries into new pharmaceuticals, medical devices, and other treatments.

The funds support work done by Caltech scientists like **Ali Hajimiri**, the Thomas G. Myers Professor of Electrical Engineering. Hajimiri is collaborating with Takahiro Maeda, an assistant professor in City of Hope's Division of Stem Cell and Leukemia Research, to develop an efficient test that may help identify the best genetic targets for individualized drugs to treat leukemia patients. The team will adapt Hajimiri's unique magnetic microarray testing system to screen leukemia cells for targets, such as those discovered by Maeda, and to optimize patients' treatments.

By combining Caltech's scientific expertise with City of Hope's clinical knowledge, the partnership will continue to accelerate promising research with therapeutic implications for diseases such as cancer, AIDS, and diabetes.



LEADERS THRIVE



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

—JEAN-LOU CHAMEAU, president, Caltech

POPULAR MECHANICS' BREAKTHROUGH AWARD

Spotlighting innovators whose work "will transform the world in years to come."

Popular Mechanics' Breakthrough Awards recognize innovators in fields ranging from aerospace and robotics to medicine and energy.

Joel Burdick (above), professor of mechanical engineering and bioengineering, was part of a team honored for implanting an electrode array that helped a paralyzed man regain movement in his legs. It was Burdick who first introduced the concept of using high-density epidural stimulation to treat patients with spinal-cord injuries, and it was he who developed the robotically guided physical therapy equipment used in the array's early testing phases.

"Our Breakthrough Award winners not only capture the imagination, but hold the potential to improve and save lives."

—JIM MEIGS, editor in chief, *Popular Mechanics*

NIH DIRECTOR'S AWARDS

Risky research reaps rewards for Institute faculty.

Each year, the National Institutes of Health (NIH) honors scientists conducting innovative—and risky—research with the NIH Director's Awards. This series of grants, which includes the Pioneer Awards and the New Innovator Awards, is designed to take these ideas to the next level.

Four Caltech faculty members were among the distinguished recipients:

New Innovator Awards

Long Cai, assistant professor of chemistry, for using single-molecule microscopy to better understand the genetics programs in individual cells.

Lea Goentoro, assistant professor of biology, for an investigation of how cellular-signaling molecules respond to their environment.

Pioneer Awards

William Clemons Jr., assistant professor of biochemistry, for exploring ways to produce and study membrane proteins.

Thanos Siapas, professor of computation and neural systems, for developing neural probes for large-scale recordings of brain activity.

MEDALS AND DISTINCTIONS

White House, on behalf of the National Science Foundation, National Medal of Science, 2011:
Jacqueline K. Barton, *Arthur and Marian Hanisch Memorial Professor and Professor of Chemistry; Chair, Division of Chemistry and Chemical Engineering*

National Medal of Science, 2010:
Amnon Yariv, *Martin and Eileen Summerfield Professor of Applied Physics and Professor of Electrical Engineering*

Royal Society, Davy Medal:
Ahmed H. Zewail, *Linus Pauling Professor of Chemistry and Professor of Physics*

French Republic, Chevalier de la Légion d'honneur:
Charles Elachi, *Vice President; Director of the Jet Propulsion Laboratory; Professor of Electrical Engineering and Planetary Science*

National Assembly of the Republic of Ecuador, Dr. Vicente Rocafuerte Medal:
José E. Andrade, *Associate Professor of Civil and Mechanical Engineering*

National Academy of Engineering, Charles Stark Draper Prize:
Frances H. Arnold, *Dick and Barbara Dickinson Professor of Chemical Engineering, Bioengineering and Biochemistry*

Royal Swedish Academy of Sciences, Rolf Schock Prize in Mathematics:
Michael Aschbacher, *Shaler Arthur Hanisch Professor of Mathematics*

Royal Astronomical Society, Gold Medal:
Richard S. Ellis, *Steele Family Professor of Astronomy*

American Chemical Society, 2011 Priestley Medal:
Ahmed H. Zewail, *Linus Pauling Professor of Chemistry and Professor of Physics*

Society of Engineering Science, 2011 Eringen Medal:
Ares J. Rosakis, *Theodore von Kármán Professor of Aeronautics and Professor of Mechanical Engineering; Chair, Division of Engineering and Applied Science*

Richard P. Feynman Prize for Excellence in Teaching:
J. Morgan Kousser, *Professor of History and Social Science*

MEMBERSHIPS

Royal Society, Foreign Member:
Edward M. Stolper, *Provost and William E. Leonhard Professor of Geology*

Institute of Medicine, Member:
Mark E. Davis, *Warren and Katharine Schlinger Professor of Chemical Engineering*
David A. Tirrell, *Ross McCollum–William H. Corcoran Professor and Professor of Chemistry and Chemical Engineering*

National Academy of Engineering, Member:
Michael R. Hoffmann, *James Irvine Professor of Environmental Science*
Ares J. Rosakis, *Theodore von Kármán Professor of Aeronautics and Professor of Mechanical Engineering; Chair, Division of Engineering and Applied Science*

American Academy of Arts and Sciences, Fellow:
Frances H. Arnold, *Dick and Barbara Dickinson Professor of Chemical Engineering, Bioengineering and Biochemistry*
Raymond J. Deshaies, *Professor of Biology; Investigator, Howard Hughes Medical Institute; Executive Officer for Molecular Biology*
Scott E. Fraser, *Anna L. Rosen Professor of Biology and Professor of Bioengineering; Director, Donna and Benjamin M. Rosen Bioengineering Center*
Yizhao Thomas Hou, *Charles Lee Powell Professor of Applied and Computational Mathematics*
Jonathan N. Katz, *Kay Sugahara Professor of Social Sciences and Statistics; Chair, Division of the Humanities and Social Sciences*
Hugh David Politzer, *Richard Chace Tolman Professor of Theoretical Physics*
Yuk L. Yung, *Professor of Planetary Science*

American Philosophical Society, Member:
Jed Z. Buchwald, *Doris and Henry Dreyfuss Professor of History*

AWARDS

American Chemical Society,
2011 Roger Adams Award in Organic Chemistry:
Robert H. Grubbs, *Victor and Elizabeth Atkins Professor of Chemistry*

Office of Science and Technology Policy,
Executive Office of the President,
2011 Presidential Early Career Award for Scientists and Engineers:
Victoria Orphan, *Professor of Geobiology*

2010 Presidential Early Career Award for Scientists and Engineers:
Doris Y. Tsao, *Assistant Professor of Biology*

American Institute of Aeronautics and Astronautics,
2011 Goddard Astronautics Award:
Edward C. Stone, *David Morrisroe Professor of Physics; Vice Provost of Special Projects*

2011 Fluid Dynamics Award:
Hans G. Hornung, *C. L. "Kelly" Johnson Professor of Aeronautics, Emeritus*

Karolinska Institutet, 2010 Lennart Nilsson Award:
Kenneth G. Libbrecht, *Professor of and Executive Officer for Physics*

National Institutes of Health,
Director's Pioneer Award:
William M. Clemons Jr., *Assistant Professor of Biochemistry*

Athanassios G. Siapas, *Professor of Computation and Neural Systems*

Director's New Innovator Award:
Long Cai, *Assistant Professor of Chemistry*

Lea A. Goentoro, *Assistant Professor of Biology*

Human Frontier Science Program Organization,
2011 HFSP Nakasone Award:
Michael B. Elowitz, *Professor of Biology and Bioengineering; Investigator, Howard Hughes Medical Institute*

National Science Foundation,
Faculty Early Career Development (CAREER) Award:
Guillaume Blanquart, *Assistant Professor of Mechanical Engineering*

U.S. Department of Energy Office of Science,
Early Career Research Award:
Guillaume Blanquart, *Assistant Professor of Mechanical Engineering*

Julia R. Greer, *Assistant Professor of Materials Science and Mechanics*

Christopher M. Hirata, *Assistant Professor of Astrophysics*

Ryan B. Patterson, *Assistant Professor of Physics*

Associated Students of the California Institute of Technology (ASCIT), 2010–11 Teaching Awards:
Woodward Fischer, *Assistant Professor of Geobiology*

Robert B. Phillips, *Fred and Nancy Morris Professor of Biophysics and Biology*

Donald H. Pinkston III, *Lecturer in Computing and Mathematical Sciences*

Gil Refael, *Professor of Theoretical Physics*

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Alexei A. Aravin, *Assistant Professor of Biology*

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David J. Stevenson, *Marvin L. Goldberger Professor of Planetary Science*

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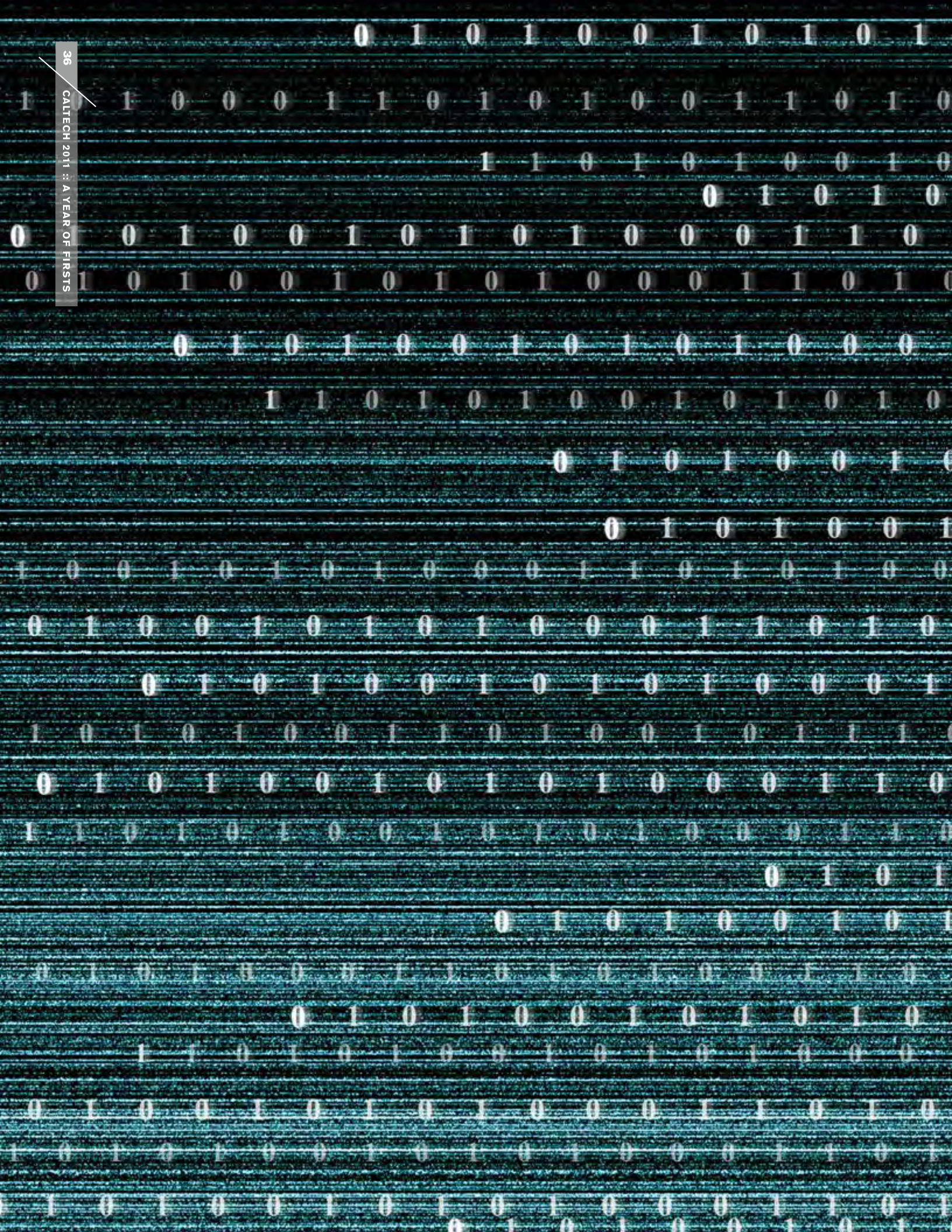
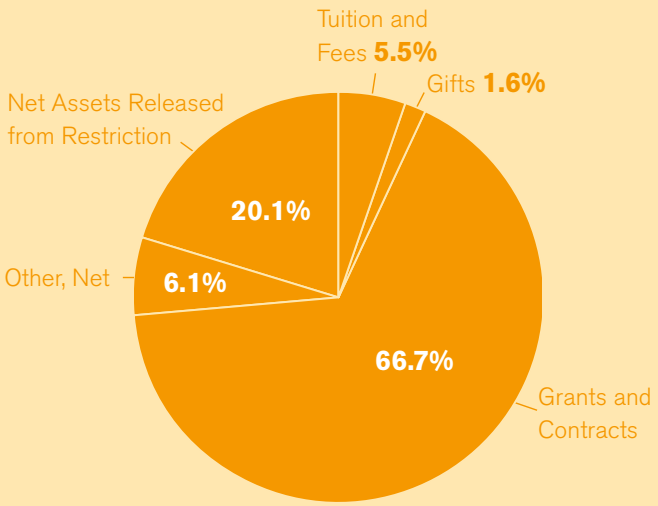
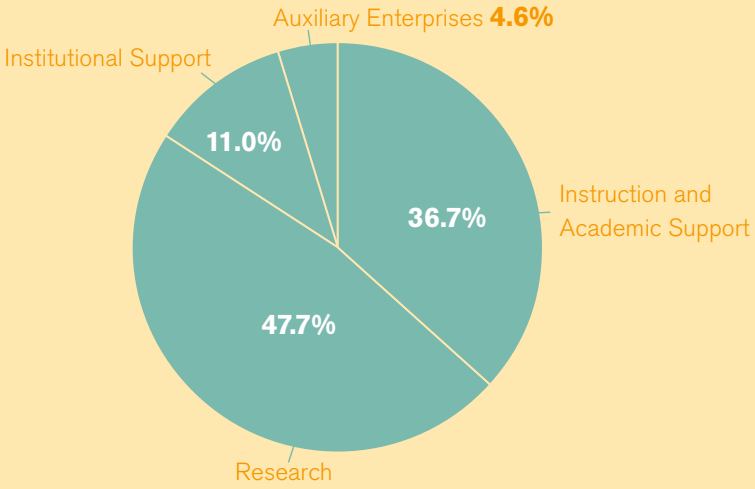


FINANCIAL SUMMARY

FY 2011 Unrestricted Revenue (excluding JPL)



FY 2011 Expenses (excluding JPL)



Amidst continued global economic uncertainty, Caltech continues to maintain its strong financial position and core mission. Buoyed by a 4.6 percent increase in campus-based sponsored research revenues, increased technology transfer revenues, and diligent administration of operating costs, the Institute experienced a healthy operating budget for the fiscal year. Additionally, despite significant volatility in the investment markets, the Caltech endowment supported campus operations while maintaining its value of $1.6 billion. Complementing the financial picture, the Jet Propulsion Laboratory received approximately $1.6 billion in funding from NASA to design and implement groundbreaking research. The historic sale of $350 million in 100-year bonds at a record low coupon rate of 4.7 percent following the fiscal year-end highlighted the Institute's continued financial strength.

Maintaining a Healthy Endowment.

During FY 2011, the endowment provided approximately $94 million in funding to support approximately 15 percent of the campus operating budget. The endowment received approximately $82 million in new funds, primarily from the stewardship of donors and philanthropy. Through prudent investment strategies the endowment was able to preserve its capital, which allowed the fund to remain agile and in position to take advantage of opportunities.

Increased Spending for Core Research.

In 2011, $398 million in funding expended toward research and related activities was received from external sources, including the federal government, corporations, the Gordon and Betty Moore Foundation, and other private foundations. The largest source of funding continues to be the federal government, and, in FY 2011, sponsored research experienced a 4 percent increase in expenditures from FY 2010. Expenditures from private foundations also increased by $3 million over the past year—a positive trend the Institute has experienced over the past three years.

Dean Currie, Vice President for Business and Finance

FINANCIAL SUMMARY

For the fiscal years ended September 30, 2011 and 2010 *(in thousands)*

	2011	2010
Support and Revenue		
Tuition and fees	$ 30,749	$ 29,586
Investment (loss) return	(26,282)	124,710
Gifts	92,438	90,935
Grants and contracts	373,732	357,554
Other	74,131	81,264
Jet Propulsion Laboratory	1,567,287	1,678,512
Total support and revenue	$ 2,112,055	$ 2,362,561
Expenses		
Instruction and academic support	$ 241,464	$ 236,354
Organized research	313,843	284,672
Institutional support	72,352	68,037
Auxiliaries	30,202	31,735
Jet Propulsion Laboratory	1,567,287	1,678,512
Total expenses	$ 2,225,148	$ 2,299,310
(Decrease)/increase in net assets	$ (113,093)	$ 63,251
Assets, Liabilities and Net Assets Summary		
Cash, advances and deposits	$ 27,319	$ 47,821
Accounts receivable, net	206,883	208,047
Investments	1,798,264	1,833,665
Other assets	153,338	207,888
Deferred United States government billings	507,230	480,725
Property, plant and equipment, net	859,373	847,206
Total assets	$ 3,552,407	$ 3,625,352
Accounts payable and accrued expenses	403,924	409,800
Other liabilities	98,487	93,012
Bonds and notes payable	439,648	427,137
Accumulated postretirement benefit obligations	567,670	539,632
Total net assets	2,042,678	2,155,771
Total liabilities and net assets	$ 3,552,407	$ 3,625,352

Note: The figures that appear in the financial summary shown above are derived from the financial statements for the fiscal years ended September 30, 2011 and 2010, that have been audited and have received an unqualified opinion. The complete, audited financial statements for the Institute can be seen at www.businessandfinance.caltech.edu.

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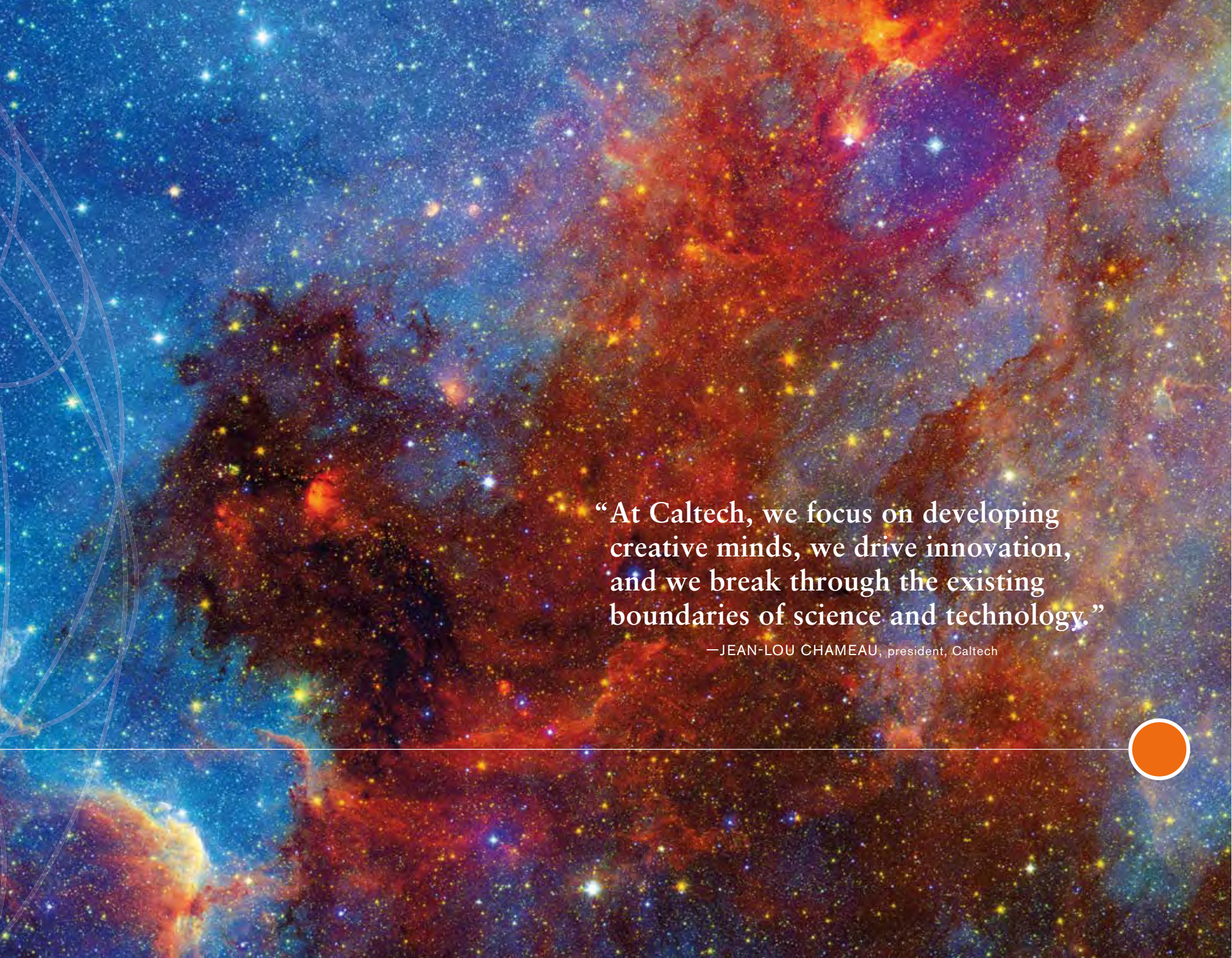

"At Caltech, we focus on developing creative minds, we drive innovation, and we break through the existing boundaries of science and technology."

—JEAN-LOU CHAMEAU, president, Caltech

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Learn more about the individuals and events described in this report by visiting www.caltech.edu.