Excellence. Ambition. Perspective. Three values that define and drive Caltech.

The 2015 annual report highlights these values and their unparalleled returns. This report reflects Caltech today and forms a foundation for the future.

At the Institute, an ambitious faculty and student body conduct their research and studies as members of a community committed to an uncompromising standard of excellence. Caltech’s imaginative scholars venture into unchartered territory, taking intellectual risks to revolutionize our understanding of the world around us.

Yet excellence and ambition are not enough. Being able to view a problem from new perspectives, understanding art and history, society and culture, is required to ensure that our scientific and technological discoveries achieve the most profound impact.

It is in this way that the Institute continues to define new areas of science and engineering. We encourage you to read this report and explore how the Caltech community addresses some of the most pressing global problems of our time.

Thomas F. Rosenbaum
President, Caltech
Senja and William Davidson Presidential Chair and Professor of Physics

David L. Lee
Chair, Caltech Board of Trustees
Table of Contents

Excellence 2
Ambition 8
Perspective 14
Awards 20
Financial Summary 22
Leadership 24

Surface of Jupiter’s icy moon Europa
Joe Shepherd
C. L. Kelly Johnson Professor of Aeronautics and Mechanical Engineering; Vice President for Student Affairs

“The fact that our graduate students are all supported full time creates a very different environment. We’re not asking you to work to support yourself. We’re going to support you, which gives you an opportunity to explore deeply the subjects you have a passion for; after all, this is the reason you came here.”

Doug Rees
Roscoe Gilkey Dickinson Professor of Chemistry; Investigator, Howard Hughes Medical Institute; Dean of Graduate Studies

“In many ways, we have very few rules. That independence, treating students as joint partners in the discovery of new knowledge, is special to this place. Also, you don’t see people resting on their laurels here. They are continually striving to reinvent themselves and take on new challenges.”

Cassandra Horii
Director, Center for Teaching, Learning, and Outreach

“What does excellence mean at Caltech? Members of the Caltech community sat down together to discuss and share their thoughts.”
“For such a science-focused place, we really value relationships: the human dimension of what we do, along with the meaning and the connections that are formed in the process of research, teaching, and mentoring. It’s not only the flow of ideas and innovations, but the support and friendship among peers at all levels that distinguishes Caltech.”

Cassandra Horii
Director, Center for Teaching, Learning, and Outreach

What does excellence mean at Caltech? Members of the Caltech community sat down together to discuss and share their thoughts.

“There’s a powerful culture of collaboration at Caltech that acknowledges on some fundamental level that everyone here is excellent. The bar is set very high, and the expectation is for you to work together and accomplish whatever academic challenges come your way.”

Cindy Weinstein
Professor of English; Vice Provost; Chief Diversity Officer
A new technique developed by Caltech chemists uses a cheap, abundant chemical, potassium tert-butoxide, as a catalyst to help create a host of potential products ranging from new medicines to advanced materials. An exceptional team, including Dow-Resnick Fellow Anton Toutov, a graduate student working in the laboratory of Nobel Laureate Bob Grubbs, along with Professor of Chemistry Brian Stoltz, reported in February 2015 on how they had replaced the use of expensive precious metal catalysts with an approach that is sustainable and more efficient, but is also thousands of times less expensive than current methods.

“This was a moonshot project that I had in mind for many years, something that I happily dedicated all of my efforts to,” says Toutov. “Not only did it finally work, but it is leading to additional cool and unexpected new findings.”

Brian Stoltz
Professor of Chemistry
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Brian Stoltz
Professor of Chemistry

150
Number of grams of a valuable organosilane synthesized by the Caltech team, the largest amount of this chemical product produced by a single catalytic reaction using potassium tert-butoxide

“We now have a completely new suite of tools to do things we never before thought imaginable.”
mbition.
Members of the Caltech community sat down together to discuss ambition at Caltech and how the Institute helps them realize big dreams.

“Because Caltech is relatively small, it runs very differently than most major universities. It allows you to pursue what you can’t in other places. It’s more than intellectual freedom; you have the support of the whole institution.”

Dave Reitze
Research Professor of LIGO; Executive Director of the LIGO Project

“I’m a big believer that if you can bring together disciplines or different ideas, that’s a great way to facilitate discovery. That is part of the culture here. Caltech is the right place to build a community of people who share those interests, and all bring different parts of the answers.”

John Preskill
Richard P. Feynman Professor of Theoretical Physics
“At Caltech, we start with, ‘What's a great problem that we might be able to really make some progress on?’ And then we'll do whatever it takes. Sometimes it takes a little longer that way, but the researchers and students get to explore something very fundamental.”

Tom Heaton
Professor of Engineering Seismology

“It's not just because Caltech is small; it's because there are no barriers. The atmosphere enables this fluidity and allows for cross-disciplinary research. We can walk across the hall, or go to coffee and discuss the latest findings.”

Jennifer Jackson
Professor of Mineral Physics
On September 14, 2015, the twin Laser Interferometer Gravitational-wave Observatory (LIGO) detectors in Hanford, Washington, and Livingston, Louisiana, picked up a signal that would ultimately be recognized as that of two black holes merging and releasing gravitational waves, marking the first time such waves had been directly detected. The observations confirmed the last major unproven prediction of Albert Einstein’s general theory of relativity 100 years after he had published it and 36 years after the idea to build LIGO had been born at Caltech and MIT.

“Our knowledge of how the universe really works comes to us when we as a people take a bold step by measuring something about nature much better than ever before,” says Rana Adhikari, professor of physics. “For the first time, humanity is able to receive signals made entirely by gravity from across the universe.”

Kip Thorne
Richard P. Feynman
Professor of Theoretical Physics, Emeritus
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“With this discovery, we humans are embarking on a marvelous new quest: to explore the warped side of the universe, objects and phenomena that are made from warped spacetime. Colliding black holes and gravitational waves are our first beautiful examples.”

Kip Thorne
Richard P. Feynman
Professor of Theoretical Physics, Emeritus

1.3 billion Distance, in light-years, of the merging black holes that produced the GW150914 signal, which marked the first-ever detection of gravitational waves

Some of the Caltech members of the LIGO Laboratory
spective.
“At Caltech, you can do all sorts of things you never knew you could do. Nobody ever told you that you could become an astrobiologist or you could become a geologist who understands microbes. These wonderful mixtures of fields become possible here because there’s no well-trodden route to follow.”

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

“This symbiotic relationship between going after the biggest questions of science and developing technologies that allow us to actually unlock these questions is key to Caltech.”

Fred Farina (MS ’92)
Chief Innovation and Corporate Partnerships Officer
“Our students are intensely curious. In teaching, I aim to have them see something new or see something differently. But just as often I come out of the classroom with new perspectives.”

Kevin Gilmartin
Professor of English

“Caltech is unusual in the sense that, oftentimes, really good students pick pieces of different things that then come together to become something very original. It’s through this ability to integrate seamlessly that our interdisciplinary approach and the lack of walls allow us to do something special.”

Jean-Laurent Rosenthal
Rea A. and Lela G. Axline Professor of Business Economics; Ronald and Maxine Linde Leadership Chair, Division of the Humanities and Social Sciences

“Members of the Caltech community sat down to discuss their thoughts on the role of perspective in their work.

“The most interesting aspects of the Caltech culture are also extremely contagious. When people come here, suddenly they change. More specifically, they evolve.”

Mory Gharib (PhD ’83)
Hans W. Liepmann Professor of Aeronautics and Bioinspired Engineering; Director, Graduate Aerospace Laboratories; Vice Provost
Coordinated, deliberate movement was once an impossibility for Erik Sorto, a patient with quadriplegia. That is, until Richard Andersen and colleagues here at Caltech and at USC and the Rancho Los Amigos Rehabilitation Center implanted electrodes connected to a robotic arm into Sorto’s posterior parietal cortex, the area of the brain that controls the intent to move. This advancement allowed him to simply think, “I want to shake your hand,” and have the robotic arm he was controlling make a fluid hand-shaking gesture.

“He had been paralyzed for over 10 years, and this was the first time since his injury that he could move a limb and reach out to someone. It was a thrilling moment for all of us,” says Andersen, the James G. Boswell Professor of Neuroscience.

“\textit{I remember just having the out-of-body experience, and I wanted to just run around and high-five everybody.}”

\textbf{Erik G. Sorto}\\Quadriplegic patient who participated in the clinical trial of Andersen’s neuroprosthesis research

192\\Number of active electrodes in the arrays implanted into a patient’s posterior parietal cortex; each electrode is capable of recording the activity of a single neuron
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Erik G. Sorto
Quadriplegic patient who participated in the clinical trial of Andersen’s neuroprosthesis research

Number of active electrodes in the arrays implanted into a patient’s posterior parietal cortex; each electrode is capable of recording the activity of a single neuron.
National Awards and Honors

Packard Fellowship
Andrew Thompson, Assistant Professor of Environmental Science and Engineering

National Academy of Inventors, Members:
Frances Arnold, Dick and Barbara Dickinson Professor of Chemical Engineering, Bioengineering and Biochemistry; Director, Donna and Benjamin M. Rosen Bioengineering Center

David Baltimore, President Emeritus; Robert Andrews Millikan Professor of Biology

Carver Mead (BS '56, MS '57, PhD '60), Gordon and Betty Moore Professor of Engineering and Applied Science, Emeritus

Axel Scherer, Bernard Neches Professor of Electrical Engineering, Applied Physics and Physics

Warner T. Koiter Medal from the American Society of Mechanical Engineers
Guruswami (Ravi) Ravichandran, John E. Goode, Jr., Professor of Aerospace and Mechanical Engineering; Otis Booth Leadership Chair, Division of Engineering and Applied Science

Newton Lacy Pierce Prize of the American Astronomical Society
Heather Knutson, Assistant Professor of Planetary Science

National Academy of Engineering, Members:
Harry Atwater, Howard Hughes Professor of Applied Physics and Materials Science; Director, Joint Center for Artificial Photosynthesis

Mory Gharib (PhD '83), Hans W. Liepmann Professor of Aeronautics and Bioinspired Engineering; Director, Graduate Aerospace Laboratories; Vice Provost

American Academy of Arts and Sciences, Fellows:
Michael B. Elowitz, Professor of Biology and Bioengineering; Investigator, Howard Hughes Medical Institute; Executive Officer for Biological Engineering

Mory Gharib (PhD '83), Hans W. Liepmann Professor of Aeronautics and Bioinspired Engineering; Director, Graduate Aerospace Laboratories; Vice Provost

Linda C. Hsieh-Wilson, Professor of Chemistry

James Rothenberg, Trustee

Maria Hummer-Tuttle, Trustee

National Academy of Sciences, Member:
Marianne Bronner, Albert Billings Hutcheson Professor of Biology, Investigator, Howard Hughes Medical Institute

Gold Medal of the American Institute of Chemists
Jacqueline Barton, Arthur and Marian Hanisch Memorial Professor of Chemistry; Norman Davidson Leadership Chair, Division of Chemistry and Chemical Engineering

Howard Hughes Medical Institute, Investigator:
Doris Tsoa (BS '96), Professor of Biology; Investigator, Howard Hughes Medical Institute

Pew Charitable Trusts and the Alexander and Margaret Stewart Trust Scholar
Mitchell Guttmann, Assistant Professor of Biology

Simons Foundation, 2015 Investigators:
Alexei Kitaev, Ronald and Maxine Linde Professor of Theoretical Physics and Mathematics

Christopher Umans, Professor of Computer Science
Awards and Honors from Professional Societies

2015 Rossi Prize of the American Astronomical Society’s High Energy Astrophysics Division
Fiona Harrison, Benjamin M. Rosen Professor of Physics; Kent and Joyce Kresa Leadership Chair, Division of Physics, Mathematics and Astronomy

American Association for the Advancement of Science 2014, Fellow:
George Djorgovski, Professor of Astronomy; Director, Center for Data-Driven Discovery

Theodore William Richards Medal, American Chemical Society, Northeastern Section
Harry Gray, Arnold O. Beckman Professor of Chemistry; Founding Director, Beckman Institute

American Physical Society, Fellow:
Maria Spiropulu, Professor of Physics

2015 Gerard P. Kuiper Prize, American Astronomical Society’s Division for Planetary Sciences
Yuk Yung, Smits Family Professor of Planetary Science; Jet Propulsion Laboratory Senior Research Scientist

International Awards

2015 Mukaiyama Award from the Society of Synthetic Organic Chemistry
Brian Stoltz, Professor of Chemistry

Sacred Treasure Gold and Silver Star, Japan
Hiroo Kanamori, John E. and Hazel S. Smits Professor of Geophysics, Emeritus

Academia Europaea in the Section of Physics and Engineering Sciences, Member:
Ares J. Rosakis, Theodore von Kármán Professor of Aeronautics and Mechanical Engineering

2015 Onassis Prize in Finance
Richard Roll, Linde Institute Professor of Finance

2015 János Bolyai Prize of Mathematics, Hungarian Academy of Sciences
Barry Simon, International Business Machines Professor of Mathematics and Theoretical Physics

Institute Honors

Endowed Professorships and Chairs:
Markus Meister, Anne P. and Benjamin F. Biaggini Professor of Biological Sciences
Zhen-Gang Wang, Lawrence A. Hanson, Jr. Professor of Chemical Engineering
Nicholas Scoville, Francis L. Moseley Professor of Astronomy
B. Thomas Soifer, Harold Brown Professor of Physics
Fiona A. Harrison, Kent and Joyce Kresa Leadership Chair, Division of Physics, Mathematics and Astronomy
Pamela Bjorkman, Centennial Professor of Biology
Guruswami (Ravi) Ravichandran, Otis Booth Leadership Chair, Division of Engineering and Applied Science
Richard P. Feynman Prize for Excellence in Teaching, Recipient:
Kevin M. Gilmartin, Professor of English
Financial Summary

For the fiscal years ending on September 30, 2015 and 2014 (in thousands)

Letter from Dean Currie, Vice President for Business and Finance

I am pleased to report that Fiscal Year 2015 was another positive year for Caltech. The Institute continues to maintain its strong financial performance while building for the future. Campus operating revenues in FY2015 remained steady, operating (current) gifts exceeded $50 million, and combined federal and nonfederal research revenue was nearly unchanged from the prior year. This all reflects the excellence of our faculty and its groundbreaking research. JPL revenue increased approximately 11 percent, reflecting its strong portfolio of missions and its continuing leadership in deep-space exploration. Total gifts in FY2015 exceeded $225 million—reflecting strong giving to the endowment and evidence of our donors’ belief in Caltech for the long term. These gifts and further commitments made in FY2015 will provide crucial support for graduate fellows, chaired faculty, and innovative research in the years to come. In May 2015, Caltech took advantage of its financial strength and historically low interest rates, and issued $400 million in 30-year taxable bonds. The bond proceeds will provide critical funding for the construction and revitalization of the cutting-edge facilities required for Caltech’s continuing scientific and technological leadership.

Operating Revenues (excluding JPL) 2015 2014
Tuition and fees, net $ 38,065 $ 36,307
Endowment payout 113,492 108,086
Gifts and pledges 50,204 49,523
Grants and contracts 322,575 327,744
Other 67,166 72,022
Operating revenues $ 591,502 $ 593,682

Operating Expenses (excluding JPL) 2015 2014
Compensation and benefits $ 355,953 $ 351,490
Supplies and services 128,262 122,759
Subcontracts 38,107 38,355
Graduate fellowships 18,104 17,202
Depreciation, accretion, & amortization 65,794 67,170
Utilities 16,233 18,040
Interest 19,095 16,788
Operating expenses $ 641,548 $ 631,804

Asset, Liability, and Net Assets Summary
Cash and cash equivalents $ 5,257 $ 10,092
Accounts receivable, net 272,483 239,130
Investments 2,834,504 2,501,865
Other assets 277,722 202,451
Deferred United States government billings 349,940 346,160
Property, plant, and equipment, net 865,023 866,706
Total assets $ 4,604,929 $ 4,166,404

Accounts payable and accrued expenses $ 487,105 $ 462,540
Other liabilities 136,516 134,876
Bonds and notes payable 1,176,942 682,362
Accumulated postretirement benefit obligation 379,752 369,244
Total net assets 2,424,614 2,517,382
Total liabilities and net assets $ 4,604,929 $ 4,166,404
(Decrease)/Increase in net assets $ (92,768) $ 154,818

Note: The figures that appear in the financial summary shown are derived from the financial statements for the years ended September 30, 2015 and 2014 that have been audited and have received an unmodified opinion. The complete audited financial statements for the Institute can be seen at www.businessandfinance.caltech.edu.
2015 Operating Revenues (excluding JPL)

<table>
<thead>
<tr>
<th>Source</th>
<th>2015</th>
<th>%</th>
<th>2014</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants and contracts</td>
<td>$ 322,575</td>
<td>54.5</td>
<td>$ 299,723</td>
<td>53.8</td>
</tr>
<tr>
<td>Endowment payout</td>
<td>$ 113,492</td>
<td>19.2</td>
<td>$ 110,433</td>
<td>19.2</td>
</tr>
<tr>
<td>Other</td>
<td>$ 67,166</td>
<td>11.4</td>
<td>$ 56,535</td>
<td>10.0</td>
</tr>
<tr>
<td>Gifts and pledges</td>
<td>$ 50,204</td>
<td>8.5</td>
<td>$ 49,070</td>
<td>8.5</td>
</tr>
<tr>
<td>Tuition and fees, net</td>
<td>$ 38,065</td>
<td>6.4</td>
<td>$ 38,817</td>
<td>6.8</td>
</tr>
<tr>
<td><strong>Operating revenues</strong></td>
<td>$ 591,502</td>
<td>100.0</td>
<td>$ 555,667</td>
<td>100.0</td>
</tr>
</tbody>
</table>

2015 Operating Expenses (excluding JPL)

<table>
<thead>
<tr>
<th>Source</th>
<th>2015</th>
<th>%</th>
<th>2014</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction and academic support</td>
<td>$ 274,934</td>
<td>42.9</td>
<td>$ 220,334</td>
<td>40.0</td>
</tr>
<tr>
<td>Organized research</td>
<td>$ 252,677</td>
<td>39.3</td>
<td>$ 230,725</td>
<td>40.4</td>
</tr>
<tr>
<td>Institutional support</td>
<td>$ 81,225</td>
<td>12.7</td>
<td>$ 64,713</td>
<td>11.7</td>
</tr>
<tr>
<td>Auxiliaries</td>
<td>$ 32,712</td>
<td>5.1</td>
<td>$ 30,887</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Operating expenses</strong></td>
<td>$ 641,548</td>
<td>100.0</td>
<td>$ 546,679</td>
<td>100.0</td>
</tr>
</tbody>
</table>
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Ronald and Maxine Linde Leadership Chair, Division of the Humanities and Social Sciences

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