

Caltech magazine

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Above: Late-afternoon rays slip between the arches of the East Bridge colonnade.

Letters

Pun Rationing

A Caltech alum details his experiences as a graduate student and punster.

... There was a core of residents [in David X. Marks House] who wanted to reduce my punning, and used their overwhelming plurality in numbers to impose upon me a numerical limit of three per day. They posted on a bulletin board in the lobby of the dorm a score sheet that listed the dates of the month, with three empty boxes next to each date. When someone heard me make a pun, an “x” was placed in a box for that day. I of course made every effort to meet my quota.

This scoring system was implemented for a couple of weeks before a revision was proposed. Someone—I daresay it was Dick, one of the physicists—declared that the system was flawed because not all puns were equal. The solution was a point system. It was decided that puns would be rated—one point, two points, or three points—with me receiving a 10-point daily limit.

But there was still the question of who would rate these puns, and the problem that not all residents evaluated puns identically. Those residents of Marks House who were present at the time the pun was made would offer their scores, and the arithmetical average (mean) would be used as the score, rounded to the nearest whole number. My bonus from rationing was that everyone was thinking puns all the time.

This system was soon found to be unwieldy. Residents lost interest in stopping whatever they were doing in order to vote on the score, and became disinterested in continuing the complicated scoring system. Thus ended the discriminatory period of pun rationing at Caltech. I was free to pun to my heart's content, un-pun-ished.

Ralph Y. Komai (MS '67)

The iconic images by MIT's Harold Edgerton, inventor of the electronic flash, inspired **Ann Cutting** to find her own way to freeze time. Cutting, a technician in the Division of Biology and Biological Engineering, is also an award-winning photographer. To make this image, she released a drop of liquid into a shallow reservoir of water and captured the moment of impact with a synced high-speed strobe.

SoCaltech

- Joe Parker's bug obsession
- Where robots strut their stuff
- Meet Christy Salinas, Caltech's new registrar
- Palomar's powerful new eye on the sky



For more SoCaltech, go to magazine.caltech.edu/socaltech

Four Questions for : Christy Salinas

Christy Lee Salinas, Caltech's new registrar, joined the Institute on December 1, 2017. Salinas, who grew up in Texas, has spent much of her career at colleges in Massachusetts, where she has managed student academic records, class scheduling, and degree auditing.

1. What is the scope of your job?

The Office of the Registrar oversees all of registration and grading, makes sure students are meeting all of their degree requirements, awards their degrees, works with the academic departments to ensure compliance, and supports department initiatives. Financial aid, athletics, and other departments are all dependent on registrar data and activities. The registrar's office is a huge resource to so many offices.

2. What are your goals as registrar?

My goals are to learn about "the Caltech way": to understand the culture, because the needs are unique here, and then to see if there is a way that I can use my experience and skill set to facilitate matters and prepare this school for the future.

3. What attracted you to Caltech?

I think I was most attracted to the community and the attention given to the student experience, which is the part that I enjoy the most. I was also attracted to being at a school small enough that I could get to know everyone, all the staff, every student, and help them throughout their journey to achieve their goals. These are people who are going to change the world. The students here are an inspiration because of how much they accomplish while they're here.

4. Why do you enjoy working with students?

I like seeing people who are working on their own goals and self-improvement. I was a student who had times when I was confused and didn't know what to do, and could have used some more guidance. I like to think of that when I am helping students. I focus on their experience and help them accomplish their goals.

"In bringing together Caltech's faculty, students, and researchers in this facility we will have the opportunity to enable even more powerful and meaningful interactions, which can lead to breakthroughs in our understanding of the inner workings of the brain."

—Steve Mayo (PhD '87), *William K. Bowes Jr. Leadership Chair of the Division of Biology and Biological Engineering and Bren Professor of Biology and Chemistry*



For more of our conversation with Christy Salinas, go to magazine.caltech.edu/post/christy-salinas

Chen Institute Breaks Ground

Caltech broke ground in December 2017 on the Tianqiao and Chrissy Chen Neuroscience Research Building, which will be located at the northwest corner of campus along Del Mar Boulevard and Wilson Avenue. The building is scheduled to open in the fall of 2020.

The three-story, 150,000-square-foot facility will house labs and offices for more than a dozen principal investigators and will be the administrative home of the Tianqiao and Chrissy Chen Institute for Neuroscience at Caltech. The building will also house research support space, as well as a teaching lab and a 150-seat lecture hall. The research institute and building are both named in honor of the Chens, who donated \$115 million to Caltech in December 2016 in support of advancing Caltech research in the field of neuroscience.



Object Lesson: Basic science

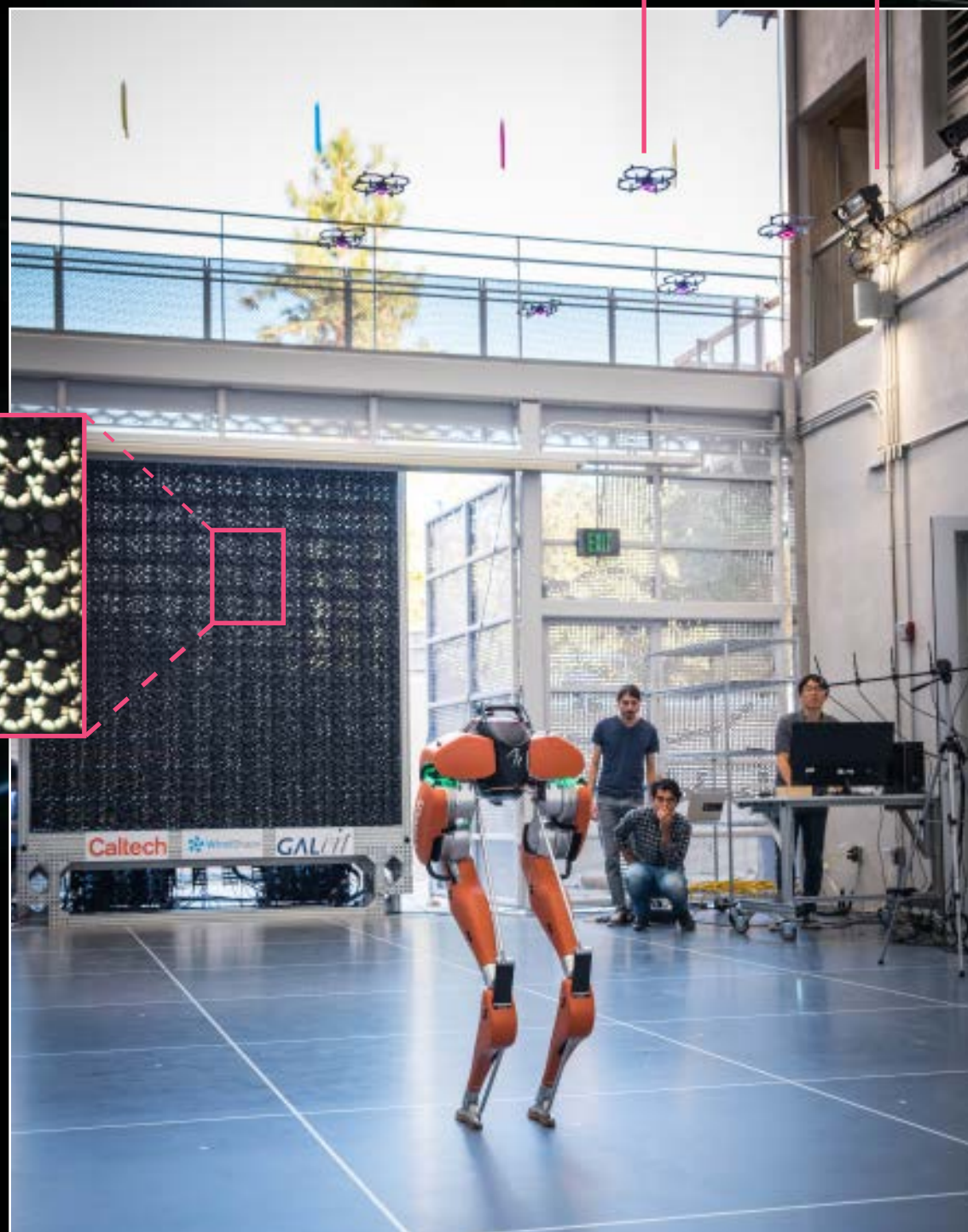
This simple drum microscope—on display in the Beckman Room, a science museum on campus that is open to the public on the first Friday of every month—dates from around 1850 and was a gift to the Institute from Donald S. Clark (BS '29), a Caltech metallurgist on the faculty from 1934 to 1975. The microscope is simple in that it has only one lens, in striking contrast to such highly sophisticated and complex instruments as the cryo-electron microscope featured in the Q&A with Caltech's Alasdair McDowall on page 32. Modern light microscopes have a magnification of around 1,000 to 2,000, compared to approximately 20 for a simple microscope of this era. "Our modern electron microscopes can magnify more than 500,000 times," notes McDowall, "and now, with the help of cool preparation techniques, extremely stable instruments, powerful cameras, and computers, can resolve the very building blocks of life."



CAST: A two-page tour

CAST's centerpiece is a three-story-tall, wholly enclosed aerodrome—the tallest of its kind—in which to test flying drones.

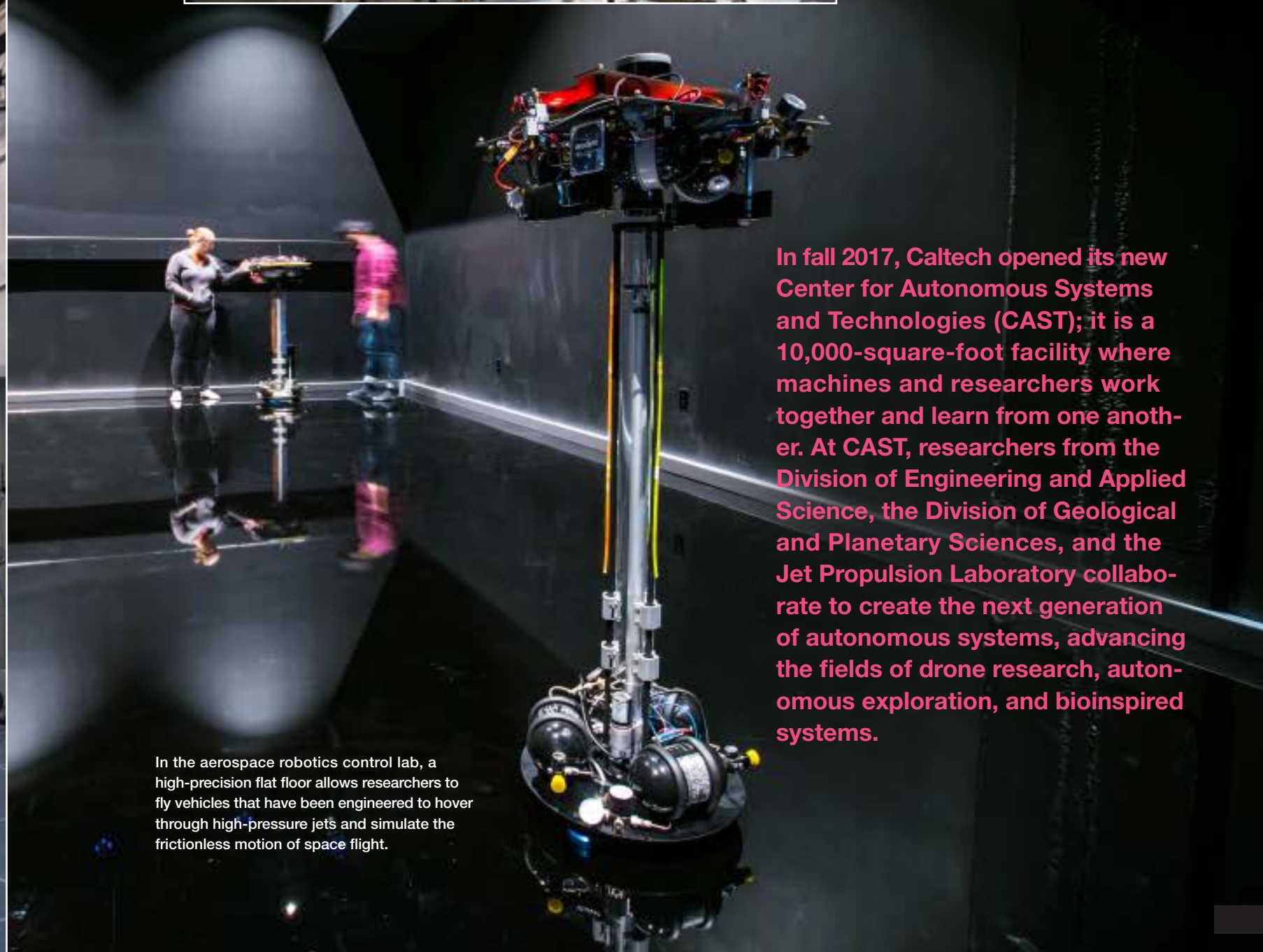
A total of 46 cameras provide complete coverage of the interior, tracking each robot's motion down to within 100 microns (about the thickness of a human hair).



The aerodrome includes a wall of 1,296 fans, with a side wall of 324 fans to create a crosswind. The individually controllable fans can generate any type of wind that flying vehicles will face in the real world—from a light gust to a stormy vortex. The wall can also be tilted 90 degrees to simulate vertical takeoffs and landings. Bipedal robot Cassie struts her stuff in the foreground.



The assembly room boasts a modular design and features an 85-foot-long overhead oval track for walking robots.



In the aerospace robotics control lab, a high-precision flat floor allows researchers to fly vehicles that have been engineered to hover through high-pressure jets and simulate the frictionless motion of space flight.

In fall 2017, Caltech opened its new Center for Autonomous Systems and Technologies (CAST); it is a 10,000-square-foot facility where machines and researchers work together and learn from one another. At CAST, researchers from the Division of Engineering and Applied Science, the Division of Geological and Planetary Sciences, and the Jet Propulsion Laboratory collaborate to create the next generation of autonomous systems, advancing the fields of drone research, autonomous exploration, and bioinspired systems.

A season of firsts: Women's soccer takes the field at Caltech

Fall 2017 marked the launch of Caltech's first-ever women's soccer program, coached by Taylor Houck, a onetime professional soccer player and former coach at Oberlin College. Director of Athletics Betsy Mitchell, a driving force behind the establishment of the new program, says the players are "vocal and vibrant and engaged," and the addition of the program has had an energizing effect on the entire athletic department. Highlighted below are a few of the team's firsts.



First game:

September 1

The team's first match under the lights with a full crowd was an away game against the University of Redlands.

First goal:

September 13

The team's first goal came against Alvernia University in Reading, PA, with freshman midfielder Krystin Brown scoring two minutes into the second half of the game.

First win:

October 6

Their first win—an 8-0 victory—came during a home game against nearby Shepherd University, another first-year women's soccer program.

First time they really saw the future of the program:

October 9

The team regards their game against Whittier College to be their season's greatest victory . . . despite the fact that they were edged out 2-1. The Caltech players were proud of how hard they pushed their opponents (who went on to win the SCIAC title) and of how close they came to winning. "No one would expect a first-year program to play on such a competitive level," says Houck. "The women had a bravado about them after that."

For more on the women's soccer program at Caltech, go to magazine.caltech.edu/post/a-season-of-firsts

Joe Parker, entomologist, collector

New assistant biology professor Joe Parker is an entomologist interested in the mechanisms underlying evolutionary change, particularly those that involve symbiosis, the intimate, cooperative relationships between different species. In particular, he looks at rove beetles (*Staphylinidae*), a species-rich group of organisms that have repeatedly evolved symbioses with ants.

Recently, Parker talked with *Caltech* magazine about how his fascination with insects took off when he was a child growing up in Wales:

"I've been obsessed with insects fanatically since I was 7 years old. When you're that age you're impressed by big, flashy insects, which to this day I still sometimes find hard to resist collecting.

"At home in Wales I have a big insect collection I accumulated as a kid, and I used to keep all of these tropical species in my bedroom: scorpions, tarantulas, giant African land snails, hissing cockroaches, katydids. I had maybe 10 aquariums with tungsten light bulbs heating all these tropical insects in the cold Welsh climate. I used to go to sleep at night with the aquarium light bulbs blazing, hiding under the covers so I could sleep!

"Over time I became more focused on beetles in particular. Then, when I was 16, I collected my first specimen of these rove beetles that have this symbiosis with ants. Suddenly, all the other insects seemed a little bit less interesting."



Watch Joe Parker talk about his research at magazine.caltech.edu/post/joe-parker

From the Caltech Archives Oral History Project

To date, the oral history project has published more than 160 interviews. Read them at oralhistories.library.caltech.edu

"In my chemistry classes, it was a combination of stuff I brought in with demos and stuff the students did. They rigged up the Tom Lehrer audio. They invited the Hare Krishna chanter. I put up with all of it, and we just had a great time together. The great thing was that if you weren't in 22 Gates at 10:30 a.m. for an 11 o'clock class, you didn't get a seat."

— Harry Gray, *Arnold O. Beckman Professor of Chemistry and winner of the 2018 Richard P. Feynman Prize for Excellence in Teaching*

Matthew Orr (fourth-year graduate student)

Caltech has launched **#SoCaltech**, a social media series designed to celebrate the diverse individuals who give Caltech its spirit of excellence, ambition, and ingenuity. Matthew Orr, a fourth-year graduate student in the Theoretical Astrophysics Including Relativity and Cosmology (TAPIR) group, kicks off the series. Orr also serves as strategic communications chair for Caltech's Graduate Student Council.

"On one of my recent projects, I spent an hour or two at Copa Vida in Old Town Pasadena trying to work out how I thought a very specific part of the galaxy might regulate itself. I took my work back to campus when free parking was over, and I plotted it up on my laptop and compared it with real observations and the simulations our group runs, and ... if it didn't line right up! I was only tentatively extremely excited because, more than once, I had taken a plot to my adviser, and he'd look at it and say, 'Oh, this can't possibly be right.' So, I took some time to work through some little sanity checks before I brought it down the hall. As it turned out, it seemed to do all right at describing line-of-sight velocity dispersions, star formation rate, and star formation efficiency in galaxies, which is not something you wake up every day and do. To take a couple of lines of algebra and some intuition, and make some statements about how star factories in the universe work is, to me, pretty exciting."

For more **#SoCaltech**, go to magazine.caltech.edu/post?tag=%23SoCaltech



Surveying the dynamic universe

A new robotic camera with the ability to capture hundreds of thousands of stars and galaxies in a single shot took its first image of the sky—an event astronomers refer to as “first light”—on November 1, 2017.

The recently installed camera is part of a new automated sky-survey project called the Zwicky Transient Facility (ZTF), based at Caltech's Palomar Observatory in the mountains near San Diego. Every night, ZTF scans a huge swath of the northern sky, discovering objects that erupt or vary in brightness, including exploding stars (also known as supernovas), asteroids, and comets.

“ZTF surveys the dynamic universe unlike ever before,” says Mansi Kasliwal, assistant professor of astronomy at Caltech and a member of the ZTF team. “It will give us a treasure trove of discoveries.”



This image shows the Horsehead nebula. The head of the horse (middle) faces up toward another well-known nebula known as the Flame. Computers searching these images for transient, or variable, events are trained to automatically recognize and ignore non-astronomical sources, such as the vertical lines seen here.

From the *This Is Caltech 2018* overview book:

“A careful attention to how things came to be imbues us with an appreciation for the possibilities of what might have been and opens us up to questions that people caught up in the current moment might forget to ask.”

—Maura Dykstra, assistant professor of history

Read *This Is Caltech 2018* at caltech.edu/content/overview

Building community

1st
new student residence in more than two decades

1st
time in Institute history that all undergraduates may live on campus

212
beds

95,000
square feet

6
structures built around a central courtyard

This fall, undergraduate students from all four years will move into the Bechtel Residence. The new building is rapidly nearing completion on the north side of campus.

8
different room configurations [from singles to suites]

7
goals for residential life created by student committee:

- ▶ intellectual growth
- ▶ mentorship
- ▶ diversity
- ▶ identity
- ▶ support
- ▶ honor code
- ▶ choice

To learn more about the Bechtel Residence, visit magazine.caltech.edu/post/bechtel