

internet rather than supplying TV channels, but Ortel's laser technology has remained crucial.

ENGenious: What are your favorite memories of your time with Amnon and the group?

Hank: My best memories from my time at Caltech are about the collaborative environment that existed in Amnon's group. There was a large group of graduate students and postdocs working to better understand the emerging field of semiconductor lasers, but for the most part we were working on independent projects. This resulted in a very high level of constructive interactions and discussions with minimal competition for credit for the results. I found it to be very favorable for learning.

Kam: I remember being extremely protective of my experimental setup. I used to plaster threatening signs all over my microwave measurement equipment: "DO NOT TOUCH!" "DO NOT MOVE!" "DO NOT LOOK!" "DO NOT THINK!" "DO NOT EVEN BREATHE!"

ENGenious: How is a Caltech education viewed in your industry?

Hank: Caltech is small, but in every area where it's heavily involved, its researchers are viewed as leaders. Especially people like Amnon who have such high standing in the scientific and engineering world. That affords Caltech students a lot of freedom. We would get these open-ended research projects where we could do almost anything we wanted. Being able to follow the science wherever it leads is a tremendous opportunity.

Nadav: Between the professors, students, and research fellows, you have a lot of good brainpower here. So the ability to translate ideas into reality is natural for Caltech trainees. At Ortel, our strength as a technology leader was based on our close connection to academic research. That's how we gained advantage over the competition—we were always a step ahead.

Kam: Training with the world-class faculty at Caltech really sets you apart. Amnon, for example, is extremely well known and well respected in the field of fiber optics and optoelectronics. When I was working in his lab, we constantly had recruiters from industry visiting our group. His students were hotly pursued as soon as—or even before—they graduated, and each of us got multiple job offers. This is a testament to how valuable a training in Amnon's group was regarded in industry, and still is today.

ENGenious: What advice do you have for current Caltech students?

Nadav: Keep an open mind in what you do. Don't get married to a specific idea—if it doesn't work out, just go around the corner and try something else. And be a team player. For practical work, it's much easier to accomplish things in teams.

Hank: Learn as much of the conventional wisdom and theory as possible, but realize it's always incomplete. Progress comes from finding what's wrong with or missing from the conventional wisdom. When things don't go as expected, those surprises often lead to whole new areas of study.



Henry (Hank) Blauvelt

Kam: As a student, it can be easy to focus just on coursework, exams, and your own narrow research topic. But you should take advantage of the world-class resources available to you through Caltech, the connections to industries, and faculty like Amnon. And take advantage of mission-oriented facilities like JPL, big optical telescopes like Palomar and Keck, and radio telescopes at Owens Valley. Those are major engineering undertakings that present tremendous real-life experience for EAS students. Especially JPL, since it is within daily commute distance of the campus. Don't be shy—knock on doors and ask for opportunities. ■ ■ ■

Nadav Bar-Chaim was vice president of Ortel Corporation. Kam Lau is Professor Emeritus in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley and was a founding staff scientist and then the chief scientist at Ortel Corporation. Henry (Hank) Blauvelt is the Chief Technology Officer at Emcore.



The Caltech Y: Learn by Doing

For more than 100 years, the Caltech Y has engaged Caltech students in a wide variety of programs and services that create opportunities for adventure, leadership, and service. The activities and events offered are student-driven, and remarkable programs have emerged over the years. One shining example is the Rise Program, a low-cost after-school tutoring program in math and science in which Caltech undergraduate and graduate students tutor public-school students between grades 8 and 12. Another is the Student Activism Speaker Series (SASS), the student-run lecture series. And, last but not least, the Y is still the place to go to rent camping equipment!

ENGenious interviewed the Caltech Y team that includes executive director Athena Castro, staff members

Greg Fletcher, Liz Jackman, and Agnes Tong, and board chair Peter Hung (BS '08, PhD '16). Working out of the Tyson House on Wilson Avenue (the Y moved there in 2011), the team helps facilitate programs centered on the five pillars of leadership, service, adventure, civic engagement, and perspective—and, along with Caltech students and many friends (some of them four-legged), continues to provide profound experiences for Caltech and its surrounding community.

ENGenious: What is the role of the Caltech Y?

Athena: The Y's mission complements Caltech's mission—we help to create citizen scientists. Part of what we do is present current issues to students and challenge them to become involved. By inviting speakers to campus

Top row: Camila Fernandez, Maria Johnson Kriechbaum, Liz Jackman, Greg Fletcher, Miranda Maxwell; bottom row: Marta Lopez Viseras, Athena Castro, JJ the dog, and Agnes Tong at the Tyson House



Top: Rise tutoring with current graduate student Haley Bauser (left)

Right: SASS committee with Bernie Sanders in 2004

Bottom: Caltech Y Board Chair Peter Hung (BS '08, PhD '16) in front of the White House on the 2013 DC Science Policy trip with Student Activities Director Greg Fletcher (middle) and Josie Kishi (BS '14) (left).



to talk about what's happening in the world—locally, nationally, and globally—students learn what those issues are. We saw that recently with the March for Science and the way students got involved. We want to develop compassionate leaders. We want them to think about the issues that affect the wider community and how they themselves will contribute as they become leaders in their companies, in industry, or in their research labs. That's why leadership and perspective are the bookends of the Y's pillars.

Peter: Leadership is one of the things that we, the students, can learn through our involvement with the Y.

Greg: Athena once said, "Where else other than a college campus can you get this kind of experience where you can engage with different perspectives and hear from the other side?" And, I would add, be challenged in a respectful way. You can disagree or not like certain things. It's not always going to be easy. But it's still good to hear and respond to other perspectives. You still gain from the experience. Providing these types of opportunities is certainly one of the roles of the Caltech Y.

ENGenious: Tell us about some of your programs.

Greg: We have 70 or so programs going on during the year, not including the weekly and monthly service projects or the Rise tutoring program—including those pushes us to well over 100 events each year.

Liz: And the Rise program just keeps growing. In 2018, we had 150 tutors—with a small place like Caltech, that's a really high participant rate. Student tutors

have to commit to at least two terms, but most of them commit to at least a year. One of the tutors had the idea to start an SAT/ACT tutoring program, so we expanded Rise and started that program this past year.

Greg: Our Washington, DC Science Policy Trip is going on 14 years now. This program was initiated by Patricia Neil [PhD '06], who was then a grad student serving on ExComm, our student executive committee. We've seen hundreds of students participate in this program—and we get some pretty impressive access. We've seen the director of DARPA, the director of the NSF, a director at the NIH. We've been to the White House Office of Science and Technology Policy, seen former science advisors to Secretaries of State and to Vice President Al Gore, talked with the former director of the Office of Technology Assessment, and that is just scratching the surface. In all of these places, we have the opportunity to ask questions and to have real dialogues.

Agnes: Union Station is a program that has a lot of impact. Students buy the food, pick out the menu, cook, serve, and clean up. They talk to the residents and hear their stories—how they got to where they are, how they plan to move forward. Our students see how homelessness is affecting our community, and they come to realize how privileged they are studying at Caltech.

Athena: There are the outdoor-adventure programs: hiking, backpacking—all opportunities for students to get back to nature. It's a great decompressor, a great way to mitigate the stress that you're feeling and get

in touch with yourself. There's nothing like being out in the backcountry hauling 30 pounds on your back.

ENGenious: What has been the impact of Caltech Y programs?

Peter: My first exposure to the Y was as an undergrad, going to Union Station and learning how to cook for 60 people. I personally grew up in a low-income family. Going to Union Station and seeing people in need was not out of the ordinary. But by the time I was a grad student, I had gotten so used to going to the Athenaeum, the faculty club at Caltech, that I forgot there was a real world outside of Caltech, where people didn't have a place to stay and weren't getting enough food. Caltech was just so academically demanding that often, we lived in the campus bubble. The Y really pulled me out of that bubble and helped me reconnect with the rest of the world. Later, in my graduate career, I got more involved with the student ExComm where I learned a lot of my leadership skills. After I graduated, I stayed on the board, and I'm currently the chair.

Agnes: I saw the growth of a current chemistry grad student, Matt Chalkley. When he first came to Caltech, he had many fellowships, including one from NSF. He was on the quiet side, and several years later, I ran into him on campus and he told me, "The Rise tutoring program has changed me drastically. I now get to communicate about science with high school students and get them excited and talk about why science matters. While research is not always perfect, I know that my students will always depend on me, and I'm making a huge difference in their lives."



2019 Y-Hike group in front of Half Dome

ENGenious: How does the Y challenge students?

Greg: The Y challenges students in many ways—leading programs, going on trips or adventures, participating in civic life in different ways, and exploring various topics, any of which may be outside students' comfort zones. SASS has a long history of doing this. It was established in 1999 and followed in the footsteps of past Caltech Y speaker series, which had been bringing speakers to campus since the '50s—including Dr. Martin Luther King, Jr., in 1958. During the 2003-04 academic year, one of our students felt the Patriot Act was an important issue and knew of a congressman from Vermont—Bernie Sanders—who was opposed

to it. So, we invited Sanders and he came. Now everybody knows him. The talks alone are thought-provoking, but from my perspective, the question-and-answer period is often better than the talk itself. It's a testament to our students that they are thinking and engaging with real issues, tough questions, and follow-ups.

Liz: Two years ago, we went to Texas to do clean-up work after Hurricane Harvey. We were ripping out walls. There were maggots. It was hard work. The undergraduate student who organized it, Noelle Davis [class of 2021], is an outstanding leader. We were a group of eight, all female. All of us looked to Noelle, our fearless leader, to guide us as to what to do and where to go, even on the kayaks. The undergrads were from different houses, and by the end of the trip all of us bonded and became great friends. Sometimes the impact goes beyond the service; it can be a deep learning experience about yourself.

ENGenious: How do students become leaders?

Greg: Our leadership development is through practice, through involvement, and through doing. The staff works alongside the students to help mentor them, but not do it for them. There's a matching up of experienced leaders with novice leaders, so they get a chance to learn that way too.

Liz: It's experiential-based learning leadership. I see so many frosh come in, sit in meetings, and not say a lot. Then they might volunteer to co-lead something. Eventually, they start leading alternative spring breaks or other programs all by

themselves. It's pretty amazing to see their growth as they come into their own and get more comfortable in their role as a leader. We've seen that countless times in students over the years. I love it.

Athena: The student ExComm that Peter was involved with has purview over a wide swath of programming. They play a large role in determining student program topics and budgets. They work closely with Greg and with the office in general. The Outdoors Committee fosters leadership skills through camping and outdoor programs. These programs connect students with the natural world and teach them to be self-sufficient in different ways than some of our other programs.

ENGenious: What is unique about the Caltech Y?

Greg: Students really get a say—they are leading the Y. They are making decisions about programs, activities, community service, and how funds are allocated. All of that is being done by students. It's essential that the Y is student-driven.

Athena: What the Y offers is distinctive because it gives the students the opportunity and initiative to pick and choose—to do all or do some. A lot of campuses have student activities and leadership groups. And they have students who are leading the programs. But from what I've seen, ours is the most comprehensive.

ENGenious: What should alumni know?

Peter: Alumni and community members can participate! We have seen people, especially alumni, who never participated

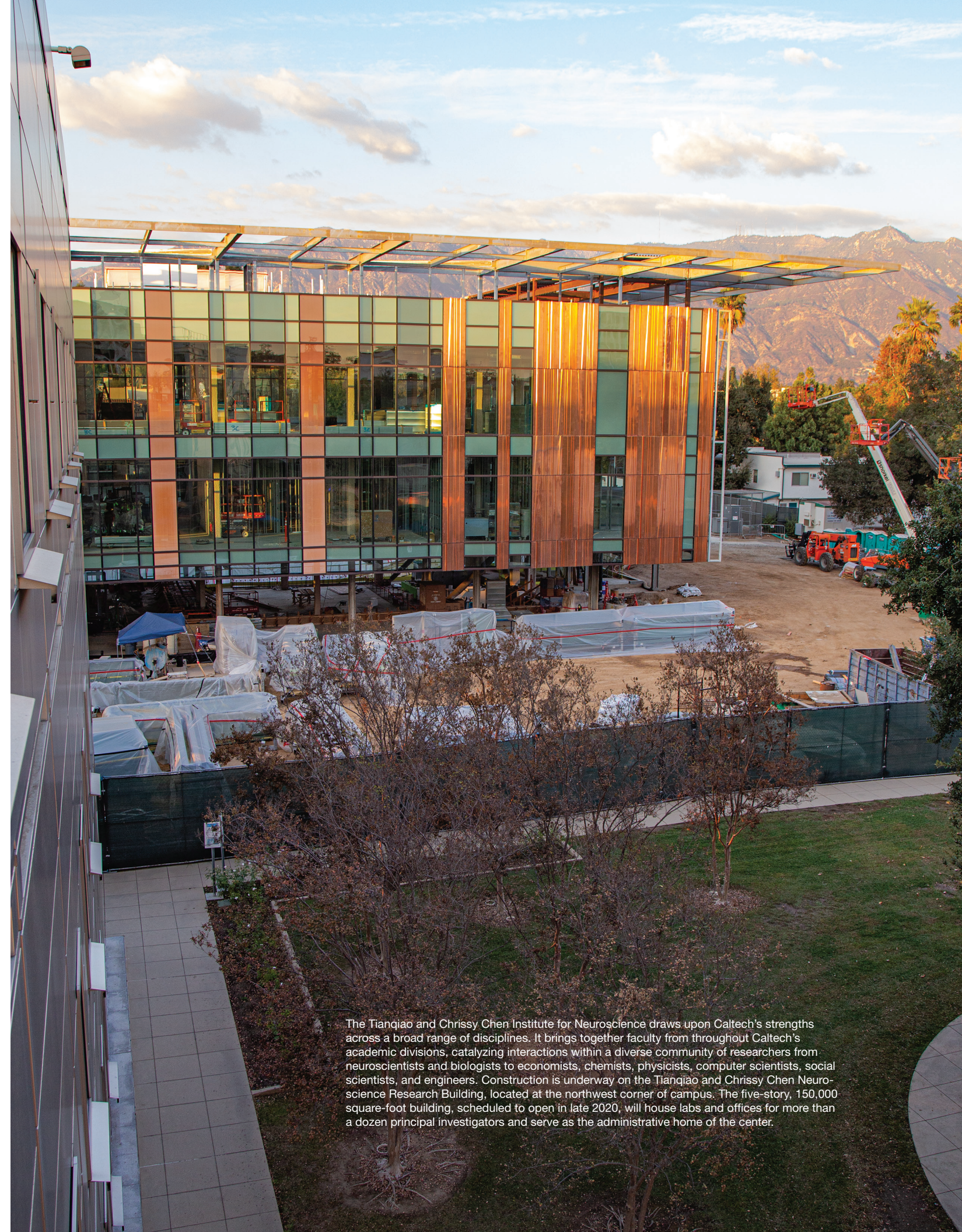
in Y programs when they were students, but now see it's really worthwhile to contribute to the Caltech Y.

Greg: People are surprised to learn how much of our budget comes from individual donors. As a nonprofit, we raise funds for our activities, and the vast majority of that comes from alumni, faculty, and staff. They want to make sure that students have the opportunity to create new things and deepen their experience of the world.

Athena: We love to hear from alumni, and we want to stay connected. There's always an opportunity to be engaged with the Caltech Y, even after you graduate. And it doesn't have to be by giving money. It could be offering expertise or services, or contributing in some other way. Alumni come back and become board members. We remain student-focused because that is the heart and soul of the Caltech Y. We're here to enrich student life and challenge students to become responsible citizens of the world.   

Athena Castro is Executive Director. Greg Fletcher is Program Director. Agnes Tong is Director of Marketing and Development. Liz Jackman is Associate Director of Student Programs. Peter Hung (BS '08, PhD '16) is Board Chair of the Caltech Y and currently works at The Aerospace Corporation.

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The Tianqiao and Chrissy Chen Institute for Neuroscience draws upon Caltech's strengths across a broad range of disciplines. It brings together faculty from throughout Caltech's academic divisions, catalyzing interactions within a diverse community of researchers from neuroscientists and biologists to economists, chemists, physicists, computer scientists, social scientists, and engineers. Construction is underway on the Tianqiao and Chrissy Chen Neuroscience Research Building, located at the northwest corner of campus. The five-story, 150,000 square-foot building, scheduled to open in late 2020, will house labs and offices for more than a dozen principal investigators and serve as the administrative home of the center.