

# The California Tech

VOL. CXXIX No. 9

PASADENA, CALIFORNIA

TUESDAY, MARCH 17, 2026

## Caltech Astrophysicist Carl Grillmair Dies at 67

**Damian R. Wilson**  
News

Carl Grillmair, an astronomer at Caltech's IPAC science and data center for astronomy and planetary science, died on February 16. He was 67. His death has shaken the Caltech community, where colleagues remember as both a creative scientist and a foundational member of IPAC's research programs.

Grillmair spent nearly three decades at Caltech after joining IPAC in 1997. Over the course of his career, he contributed to major NASA missions and research programs spanning exoplanets, galactic structure, and the remnants of ancient collisions between the Milky Way and smaller galaxies. He discovered dozens of stellar streams — structured formed by those long-ago interactions — and was lead author on a [landmark 2007 study](#) that captured enough light from exoplanets to identify molecules in their atmospheres for the first time.

"He was part of IPAC's bedrock for many years, and his passing impacts all of us across IPAC," said Tom Greene, IPAC's executive director.

Born in Calgary, Alberta, Grillmair studied astrophysics at the University of Calgary before earning a master's degree from the University of Victoria and a PhD from the Australian National University. His research career included work with the Spitzer Space Telescope's Infrared Spectrograph and Infrared Array Camera instrument teams, as well as roles in the NEOWISE asteroid-hunting mission and NA-

SA's upcoming Near-Earth Object Surveyor project.

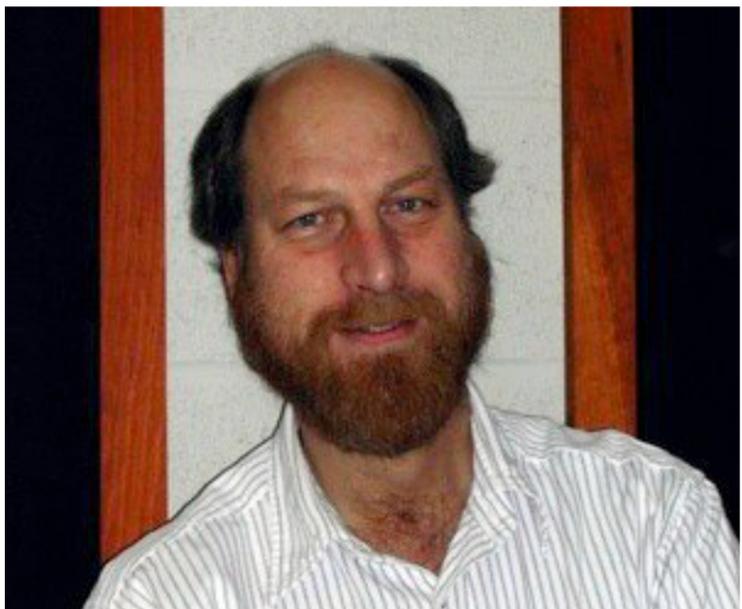
Grillmair's colleagues emphasized both the breadth of his scientific work and his distinctive approach to discovery. "It was always a pleasure to experience Carl's creativity in doing science," said Sergio Fajardo-Acosta, an IPAC astronomer who worked alongside him for decades. "His methods on exoplanets and galactic structure studies were truly detective work."

According to authorities, Grillmair was fatally shot at his rural home in Llano, in the Mojave Desert region of Los Angeles County. A 29-year-old local resident, Freddy Snyder, has been arrested in connection with the killing. Investigators say the two men were not known to each other and that no clear motive has been identified. Snyder is expected to be arraigned later this month.

The desert home where Grillmair lived was chosen in part for its isolation and dark skies, ideal for observing the night sky. Friends say he maintained a small personal observatory there and often spent evenings studying the cosmos.

Beyond astronomy, Grillmair was known as an avid pilot who flew small aircraft and gliders, and as someone who loved outdoor work and maintaining his desert property. Over his career he published 147 peer-reviewed papers and received the 2011 NASA Exceptional Scientific Achievement Medal, among other honors.

He is survived by his wife, Louise. Colleagues at IPAC have dedicated the center's weekly science talk series, *The Next Seven Minutes*, to his memory.



## Congress Votes to Retain Science Funding, Declines Most Proposed Cuts

**Troy Zhang**  
News



(Photo: Getty Images)

On March 4, the Senate Commerce Committee voted to advance the bipartisan NASA Authorization Act of 2026, authorizing a \$24.7 billion budget for this fiscal year, extending operations for the International Space Station through 2032, and — for the first time — backing plans for a permanent crewed presence on the Moon.

"This bipartisan legislation sets an ambitious course for America's space program, ensuring NASA's leadership from Earth's orbit to the Moon and Mars," said Sen. Maria Cantwell (D-WA), the committee's top Democrat. Sen. Ted Cruz (R-TX), the committee's top Republican, likewise said that

the measure "brings stability and certainty to NASA and the entire U.S. space program."

The measure is one of the clearest signs yet that Congress is moving to stabilize federal science spending after months of uncertainty over proposed cuts to research agencies.

At the start of 2026, lawmakers faced sweeping reductions proposed in the White House budget request, including a 23.8% cut to NASA from a year earlier and a 57.1% reduction to the National Science Foundation (NSF). Scientists and research organizations warned that cuts on that scale could disrupt major projects and halt thousands of grants.

In January, however, Congress moved to preserve much of the federal research budget through the annual Commerce, Justice, Science and Related Agencies Appropriations Act. The measure largely avoided most of the proposed reductions and maintained funding for major science agencies close to current levels.

The final version of the appropriations bill, as signed by President Donald Trump, reduced NASA's budget by only

1.6% and the NSF's by 3.4% — far less than originally proposed.

Taken together, the January appropriations package and the recent NASA vote reflect a broader pattern of continued congressional support for basic and applied science. Earlier this year, Congress separately approved an increase of more than \$400 million for the National Institutes of Health (NIH), including funding for initiatives in cancer research and Alzheimer's disease.

NASA will "execute our available appropriated funding in accordance with established fiscal policies which respect congressional authorities," wrote Amit Kshatriya (BS '00), NASA's associate administrator and the agency's seniormost civil servant, last September in response to early questions about potential budget cuts. "NASA will enact the budget appropriated to us."

For now, the clearest signal from Capitol Hill is that Congress is not prepared to abandon the federal government's longstanding role as a major backer of scientific research and space exploration.

## The Transcendental Return of Pi Day

**Damian R. Wilson**  
The Inside World

Thanks to the Interhouse Committee, Caltech's Pi Day tradition rose again this year — a very Caltech study break for a very Caltech finals season. The well-rounded celebration happened right on schedule at 1:59 a.m. on March 14, where night-owl pi(e) enthusiasts converged in the Ricketts-Fleming courtyard for an event that was, by all measures, irrationally extravagant. The revival came with a mass order of Sysco pies: pumpkin, lemon meringue, apple, and seemingly every flavor imaginable.

Indeed, options were non-terminating and non-repeating, a buffet of baked constants extending as far as the eye (and appetite) could see. The math was simple enough: a campus full of people who like  $\pi$ , plus a large number of pies, tends to produce a good result.

Kudos to the IHC, Tom Mannion, and all who volunteered to assist with late-night/early-morning pie preparation!



The glories of Pi Day. (Photos: Damian R. Wilson)

**Inside This Issue**

**2**

Dabney and Venerable Interhouses

**3**

Caltech Winter '25-26 Athletics

**4**

An interview with Pedro Neves, a visiting researcher from JPL

**5**

Stop Trying to Convert Climate Deniers

**6**

2026 San Gabriel Valley Food Passport

**7**

Caltech Wildlife: Hummingbirds

**8**

The Unwritten Curriculum of Keeping Good Mental Health: Some Insider Tips

**10**

Testimonies and Photos in Memory of Parker Thompson

## Dabney Hosts Lunar New Year-Themed Interhove

**Damian R. Wilson**  
The Inside World

On the night of February 21, Dabney Hovse welcomed students across campus for its Lunar New Year-themed Interhove celebration. The courtyard centerpiece was a striking red dome topped with gold, glowing from within with shifting colored lights that illuminated the space throughout the night. Inside what is otherwise Dabney's dining hall, visi-

tors explored a maze of themed spaces, including a "Merry Fishmas" fish room, a tarot reading room, and a shrine devoted to *Star Trek*. Attendees also enjoyed such attractions as a multicolored ball pit, another highlight of the night.

Blending eclectic decorations and abundant food, Dabney's Interhove created a uniquely festive atmosphere that drew students from across campus to celebrate the Lunar New Year together. It's nights like that that make me proud to be a Darb!



(Photos: Shanna Xiao)

## Venerable Hosts Spider-Verse-Themed Interhove

**Damian R. Wilson**  
The Inside World

Venerable House hosted its annual Interhove party on the night of February 28, continuing into the early morning hours of March 1, transforming the Venerable Courtyard into a *Spider-Verse*-inspired celebration. After roughly eight weeks of preparation, organizers unveiled an elaborately decorated courtyard complete with

themed artwork and a dance floor that kept students moving from 10 p.m. to 2 a.m.

The event embraced the multiverse theme in both décor and food. Attendees enjoyed themed snacks including hot dogs, churros, and spider-frosted cookies, while colorful decorations and comic-style visuals filled the space. Having gone myself, I can attest — the hard work paid off!



(Photos: Kensuke Shimojo and Camilla Fezzi)

*The science of thought:  
philosophical insights into scientific practice*

## A Letter to Future Generations: On the Philosophy of Happiness — Part V

**Camilla Fezzi**  
The Inside World

### Actually Using This Stuff (Philosophy as Practice, Not Just Theory)

Okay, so I've thrown a lot of philosophy at you. But here's the thing: this isn't meant to be intellectual trivia for impressing people at parties. The ancient Greeks called philosophy a "way of life" — not an academic subject, but a set of practices for living well. The point isn't to memorize quotes. It's to internalize wisdom and let it transform how you think and act.

Different philosophical approaches will be useful at different times in your life. Think of them as tools in a toolkit:

**Stoicism** will save you when things go south — when you fail, when someone betrays you, when plans fall apart. Focus on what you can control. Accept what you can't.

**Aristotle** will guide you in building character and making good decisions — when you're choosing a career path, developing habits, figuring out what kind of person you want to be.

**Buddhism** will help you let go — when you're clinging too hard to outcomes, when attachment is causing suffering, when you need to accept impermanence.

**Existentialism** will wake you up — when you're sleepwalking through life, when you need to make authentic choices, when you need to take radical responsibility.

**Epicurus** will remind you — that you're chasing the wrong pleasures, that simple contentment beats complex consumption, that peace of mind is the goal.

*"The philosopher's school is a hospital."*  
— Epictetus (50-135 CE)

Epictetus said the philosopher's school is a hospital — a place you go to heal, not to collect credentials. Philosophy is medicine for the wounds that come with being human. And unlike physical medicine that

you stop taking once you're healed, philosophical wisdom gets MORE effective the more you use it. Each time you apply these principles, you deepen your understanding and strengthen your capacity for the next challenge.

### There's No Arrival Point (And That's Okay)

There's no finish line. You're never going to "achieve happiness" and be done. There's no graduation ceremony where they hand you a diploma that says "Congratulations, You're Happy Now." Anyone who tells you differently is selling something.

Happiness — real happiness, eudaimonia-style flourishing — is a practice. It's how you approach life, not a place you arrive at. It's a way of being that requires constant cultivation, like staying in shape or maintaining a friendship.

You WILL make mistakes. You'll forget these lessons and chase after shiny objects that don't matter. You'll fall into old patterns. You'll get knocked down. You'll experience real suffering and loss. That's not failure—that's being human. The goal isn't perfection. It's progress. It's getting a little wiser with each challenge, a little stronger with each setback, a little clearer about what matters.

*"The best time to plant a tree was 20 years ago. The second best time is now."*

— Chinese Proverb

So start now. Not tomorrow after you finish that assignment. Not next semester when things calm down. Not after graduation when "real life" starts. Now. Because your life is happening right now, not in some imagined future when everything falls into place.

### The Bottom Line

I'm not going to pretend I have this all figured out. I'm still learning, still making mistakes, still fighting with my own giant demons. But I've learned enough to save you from some unnecessary pain, and that's what this letter is about.

Here's what I wish someone had told me straight up when I was where you are now:

1. Happiness isn't a destination or a feeling, it's a way of being that you cultivate through practice.
2. Stop chasing pleasure and start building eudaimonia; a life of character, purpose, and meaningful engagement.
3. Focus ruthlessly on what you can control. Let go of everything else.
4. Suffering isn't the enemy, but the avoidance of suffering is. Face challenges, grow from them.
5. Stop living someone else's life. Figure out who you actually are and have the courage to be that person.
6. Meaning > Happiness. Chase meaning and happiness will find you. Chase happiness and both will elude you.
7. Invest in real relationships. Quality over quantity. Depth over breadth.
8. Be present. Your life is happening now, not in some imagined future.
9. Serve something larger than yourself. Contribution > Consumption.
10. This is a practice, not a destination. You'll never "arrive." That's okay. That's the point.

*"The happiness of your life depends upon the quality of your thoughts."*

— Marcus Aurelius (121-180 CE)

The philosophers I've shared: Aristotle, Epicurus, the Stoics, Buddha, Nietzsche, Camus, Frankl, and the rest... they're your guides, not your gods. Learn from them. Test their ideas against your own experience. Take what works, leave what doesn't. Philosophy is a dialogue, not dogma.

You already have everything you need for genuine happiness. It's not in the next achievement, the next relationship, the next purchase, the next anything. It's in how you approach life right now, in this moment, with whatever you've got. The work of cultivating happiness is internal work, and it's the most important work you'll ever do.

So be patient with yourself. You're going to mess up. You're going to forget these lessons and have to relearn them the hard way. That's not failure but growth. Be kind to others. Seek wisdom wherever you can find it. And remember: the fact that you're even asking these questions means you're already on the right path.

You're going to figure this out. You're going to build a life that matters. You're going to find your way to happiness, not the Instagram version, but the real thing. The kind that runs deep and lasts. The kind that can weather storms. The kind worth working for.

Now get off your phone, go for a walk, think about this stuff, and then get back to your life. You've got work to do.

*With love, respect, and hope  
for your journey,  
A Future Self  
P.S. — Start that journal.  
Trust me on this.*

HERE I AM, HAPPY AND CONTENT.



... BUT NOT EUPHORIC.



SO NOW I'M NO LONGER CONTENT. I'M UNHAPPY. MY DAY IS RUINED.



I NEED TO STOP THINKING WHILE I'M AHEAD.



## Beavers Have Ice in Their Veins: Caltech Winter '25-26 Athletics

### Kyra Phaychanpheng Sports

As many of us know, s'more year fall and winter terms are absolute killers. Unfortunately, I was also a victim of this, which is why instead of my usual periodic updates throughout the winter athletic season, I am bringing to you all a complete season recap in a nutshell!

#### Swim and Dive

Caltech Swim and Dive started off their efforts with SCIAC Quad meet on November 15, the men's team beating Occidental (199-86) and La Verne (223-39) and the women's team also winning (195-98) on Oxy and La Verne (221-55). Shortly after, S&D took their yearly training trip to Coronado, and came back to finish out conference meets strong.

Swim and Dive took huge wins at SCIAC Championships to complete an amazing season yet again. Senior beavers, Simon Hu (CNS '26, Page/Lloyd) and Diya Kumar (Ay/GPS '26, Page), both were recognized with All-Conference awards, with the SCIAC Character award. On top of this, even more school records were broken over the course of the championship meet, racking up a total of seven across swim and dive. Zachary Pestrikov (EE '27) set the school record in the 200 IM, and then proceeded to beat it yet again for the 1:50:59 record and a third place finish in the event. The 400 Medley Relay team, consisting of Aaron Dumas (CS '28, Page), Thomas Fenton (EE '28, Fleming), Marcel Liu (ACM '27, Fleming), and Simon Hu, broke a school record and finished on the podium. Freshman, Elizabeth Nguyen ('29, Avery), made her mark in the 100 and 200 Breaststroke races, shattering both records effortlessly. Elizabeth Ma (BEM '28, Lloyd) set another record in the 400 IM.

The dive team had major success as well, with two top eight

finishers at championships — Anthony Wang (Bi '28, Avery) and Ava Balanon (ChemE '28, Fleming) — and one podium finisher in the 3M diving, Jana Woo (BEM/CS '27, Page/Fleming). All divers, including the three aforementioned and Kassie Kristufek (ChemE '28, Fleming), competed at NCAA Regionals at Emory University in Atlanta, GA this past month! Big congrats on this achievement, and we can't wait to see how Swim and Dive does next season!

#### Women's Basketball

Now, here's where we get a little personal. This being my own team, I'd acknowledge that we had a pretty difficult season. This season, we were led by interim head coach, Madison Quan, and started off with six players. We did have some big roles to step into, coming off of a successful season last year, but we showed some crazy growth over the course of the year! And us being a young team, consisting of five sophomores, one freshman, and our amazing addition of two soccer (now WBB) players; I know that next year will be a breakout season!

So, starting off the season right, we tallied up two non-conference wins against Stanton University and Illinois Tech just before the winter break. Diving straight into conference play, we fought really hard against top of the conference teams. After taking a close, six point loss to La Verne at The Tents, coming onto our home court, Caltech WBB managed to gather a strong conference win over La Verne (47-41).

Over the course of the season, three beavers were averaging double digits in points per game. The first being freshman point guard Izzy Lo ('29, Lloyd), who also led the conference in minutes played. Next was our sophomore point guard, Zeynep Goktepe (CS '28, Page) who led the conference in field goal percentage (#efficienZ).

Lastly was sophomore forward Kyra Phaychanpheng (ESE '28, Fleming), who also finished as the third leading scorer in the conference. On the defensive end, our rim protector, Louise Scriven, led the conference in blocks per game! These stats only show a glimpse of how much this team grew since the fall — and I'm excited to see what's to come!

#### Men's Basketball

The Caltech Men's basketball team this year also showed some great growth, especially as a young team as well. MBB also picked up some non-conference wins early on, taking down West Coast Baptist twice, and Oglethorpe on their travel trip to Atlanta, GA during winter break. The Beavers also were able to gather a conference win over La Verne, 88-85 (on the same night as WBB!)

Freshman, Dorian Glogovac ('29, Fleming), had a memorable debut season and received an All-Conference award, being named Newcomer of the Year and here at Caltech, breaking the single season scoring record. He averaged 23.6 ppg, 7.4 rpg over the course of the season. Key contributors to the team this year included Josh Balami (CS '28, Fleming) and Chase Williamson (CS '28, Fleming), who both averaged double digits in points, 12.4 ppg and 10.9 ppg respectively, and secured the boards for the beavers. As this young team gained big conference experience, we are excited to see what's in store for them next season.

So as we look ahead to the spring term, we can look forward to some exciting spring sport action. Caltech baseball is in full swing, track and field is making big marks, men's and women's tennis are destroying their opponents, and women's water polo is splashing into the conference play! Look out for some upcoming home games to cheer on your fall sport beavers. Stay tuned for more coverage on Caltech athletics!



Caltech S&D celebrates an accomplished term of athletics on their Instagram. (Images: Caltech Swim and Dive)



Caltech WBB celebrates faculty liaison, John Dabiri, at the home win over La Verne on February 18. (Image: Caltech Women's Basketball)



Caltech MBB at their annual alumni event on January 25. (Image: Caltech Women's Basketball)

## The Eyes That Search for Tomorrow — Part II

### Camilla Fezzi The Outside World

*All names and identifying details in this narrative have been altered to protect privacy. The scenes represent composite experiences and reflections from critical care shadowing, not specific individuals or cases. Dialogue is paraphrased and not verbatim.*

7:09 PM. The Walk Home.

The heat hits me like a wall when I step outside. The medical center is still busy, but I feel like I'm moving through a different dimension than everyone else. The people walking past me are thinking about dinner, about traffic, about what's on television. They are living in the world of the living, where problems have solutions, where searching yields answers, where hope is a reasonable response to difficulty.

I have just spent eleven hours in a different world. A world where families search desperately for solutions that don't exist. Where eyes scan monitors and internet searches and doctors' faces looking for hope. Where people bargain

and plead and research and refuse to accept the unacceptable. Where love manifests as desperate, futile searching because the alternative — doing nothing — feels like abandonment.

I walk slowly, but I can't outpace the images burning in my mind: The daughter's eyes, frantically scanning the physician's face for the secret door. The young wife, clutching that three-point increase in oxygen saturation like a talisman. The woman with her laptop, still researching trials even as her father lets go.

Their eyes. That's what I can't shake. That desperate, searching quality. That wild hope mixed with creeping horror. That refusal to blink because blinking might mean missing the moment when everything changes, when the miracle arrives, when the solution appears.

9:42 PM. Home.

I sit in the dark. I have not turned on the lights. I have not eaten. I am just sitting, still seeing their eyes. Still feeling the weight of their hope.

My phone buzzes. A text from my mother: *Hope you had a good day, honey!* A heart emoji.

I stare at it for a long time. She has no idea. She lives in a world where problems have solutions, where doctors fix things, where hope is rewarded. She's never stood in a room and watched someone's eyes scan desperately for answers while death stands patiently in the corner, waiting.

How do I tell her that I watched a pregnant woman clutch impossible hope? That I saw a daughter refuse to stop searching even when her mother's eyes were already glazing over? That I witnessed the terrible mathematics of critical care, where every heartbeat is purchased with suffering and the cost becomes unbearable but love keeps paying it anyway?

*It was good, I type back. Learning a lot.*

Both things are true. Neither thing is complete.

I think about what the nurse said: that hope is theirs to hold until they're ready to set it down. That we don't take it away by force. I think about the nurse practitioner on the floor, telling a pregnant woman her husband fought so hard, using past tense disguised as present. I think about the man trying to

give his daughter permission to stop searching, and her eyes still glued to the screen because accepting his death means accepting that all her searching was futile.

This is what they don't tell you in medical school applications. They don't talk about the weight of witnessing people search for solutions that don't exist. About watching hope burn in eyes that are learning to grieve. About standing helpless while families fight battles that cannot be won, armed with nothing but internet searches and desperate prayers and the belief that surely, surely, there must be something.

The intensive care unit where I shadow has every resource, every technology, every expert.

And still, people die. And still, families search. And still, eyes burn with hope that curdles slowly into grief.

Tomorrow, I will go back. The first daughter will probably still be researching. The young wife will be watching the monitors for signs of improvement that aren't coming. Someone new will arrive, eyes wide with fear and hope, believing that this hospital will have the answer, that the solution exists if they

just search hard enough.

And I will learn to carry the weight of watching them search. I will learn to witness their hope without taking it away. I will learn to see the light leaving their eyes — slowly, then all at once — as they realize that sometimes love is not enough, research is not enough, hope is not enough.

I will learn that sometimes the kindest thing medicine can offer is not a solution but a presence. Not a cure but a witness. Not hope but permission — permission to stop searching, to stop fighting, to stop believing that there must be something more we can do.

The lights in intensive care never sleep. The ventilators keep breathing. The families keep searching, eyes bright with desperate hope. And I keep learning to stand in the room where hope goes to die, where eyes scan frantically for solutions that don't exist, where love manifests as frantic searching because the alternative — acceptance — is unbearable.

I close my eyes, but I still see theirs.

Searching.

# The Friendships That Introduced European Modernism to California

Emily Yu  
Culture

In 1915, Emilie Esther Scheyer came across *The Hunchback* (1911) by artist Alexei Jawlensky in Lausanne, Switzerland. The painting was so impactful that she was determined to meet Jawlensky, setting the course for her life and career, as well as the development of modern art in California.

*Dear Little Friend: Impressions of Galka Scheyer* opened at the Norton Simon Museum last month. Organized by Curator Gloria Williams Sander, the exhibition focuses on Scheyer's relationships with artists and supporters that enabled her work in promoting European modernism, particularly the Blue Four: Lyonel Feininger, Alexei Jawlensky, Paul Klee, and Vassily Kandinsky.

Born in Braunschweig, Germany in 1889, Scheyer was the youngest of three children who didn't end up working in the family's canning business. After studying art across Europe, including at the École des Beaux-Arts in Paris, Scheyer was working as a painter on the pivotal day she saw *The Hunchback*. After meeting Jawlensky, she became his friend and agent, and by 1919 had ended her painting career.

"Why should I go on painting when I know I can't produce such good art as you?" she asked him. "It's better to dedicate myself to your art and

explain it to others." Jawlensky gave her the nickname "Galka," which is Russian for the highly intelligent jackdaw bird.

After successfully showing Jawlensky's work across Germany and building a wide network in the German and European avant-garde, Scheyer brought him together with three other artists: Paul Klee, Lyonel Feininger, and Vassily Kandinsky. This group "was more a matter of economics than aesthetics," according to the *Los Angeles Times*. The three men were instructors at the Bauhaus, an influential German school of art, design, and architecture that was forced to close in 1933 amid Nazi attacks on modernism and charges of Bolshevism.

Scheyer coined the term "Blue Four" for the four artists and became their American legal representative in 1924, moving to New York City to promote their work and ideas. After a disappointing year, she relocated to Northern California and made important friends, such as director William H. Clapp of the Oakland Art Museum, photojournalist Dorothea Lange, and artists Edward Weston, Diego Rivera, and Frida Kahlo.

In 1930, she settled in Los Angeles to capitalize on her network and prospective Hollywood clientele, expanding her circle to include collectors Walter and Louise Arensberg, Academy Award-nominated director Josef von Sternberg,

and many German émigré artists. Scheyer commissioned prominent modernist architect Richard Neutra to design her Hollywood Hills house, which was planned specifically to display art.

During her 20 years in California, Scheyer promoted the Blue Four through numerous exhibitions and lectures, including events at her house even before construction was complete. Her work as a dealer, educator, and curator advanced the early modern art scene in California.

"Scheyer impressed artists and collectors and even critics who were weary, if not outright hostile to European modernism at this moment in time," Curator Sander stated for the Norton Simon Museum's 2017 exhibition on Scheyer, *Maven of Modernism: Galka Scheyer in California*. "For California artists, exposure to the Blue Four and the European art in her collection introduced revolutionary new ideas. It provoked them to think critically about their own practice, and Scheyer was a willing participant in those conversations."

"Dear Little Friend" presents a layered view of Scheyer's career, emphasizing the close relationships that shaped her legacy. The focused exhibition brings together portraits and archival material, including gifts she received from the Blue Four, to highlight her work in promoting them.

After becoming ill in 1944,

Scheyer arranged for her personal collection to go to UCLA, where it was intended to join the Arensberg collection as the foundation of a new university museum. That plan never materialized, and in 1953 her substantial and distinguished collection of some 450 works was given instead to the Pasadena Art Institute (now the Norton Simon Museum).

The exhibition, which runs until July 20, includes art from Scheyer's collection by artists such as Beatrice Wood and Edward Weston. Its title, *Dear Little Friend*, comes from how Feininger of the Blue Four addressed Scheyer in letters, reflecting the close relationships that shaped her work.



Alexei Jawlensky, *Mystical Head: Galka, 1917*. (Photo: Norton Simon)



"Prophetess of the Blue Four," *The San Francisco Examiner*, Nov. 1, 1925. A profile of Scheyer and her promotion of the Blue Four. (Image: The San Francisco Examiner)

# Dimming the Sun: Can a Satellite Fleet Buy Earth the Time It Needs?

An interview with Pedro Neves, a visiting researcher from JPL.

Raquel Maldonado  
News

When I first met Pedro Neves, a visiting researcher from NASA's Jet Propulsion Laboratory, it was at a Watson Lecture in October 2025. Our shared native language, Portuguese, provided an immediate shorthand, but the conversation quickly moved to the mechanics of the Sun-Earth L1 Lagrange point. Neves was describing a plan to stabilize the global climate by installing a microscopic sunshade 1.5 million kilometers from Earth.

Pedro's path to the Mission Control Center in Pasadena was shaped by a choice in his final year of high school in Portugal: medical school or aerospace engineering. He chose the latter, but the objective remained clinical. "I grew up believing we should strive to contribute positively to society," Neves said. He completed a bachelor's degree in aerospace engineering at the University of Lisbon before moving to Italy for a master's program in space engineering, seeking the intersection where orbital mechanics meets terrestrial survival.

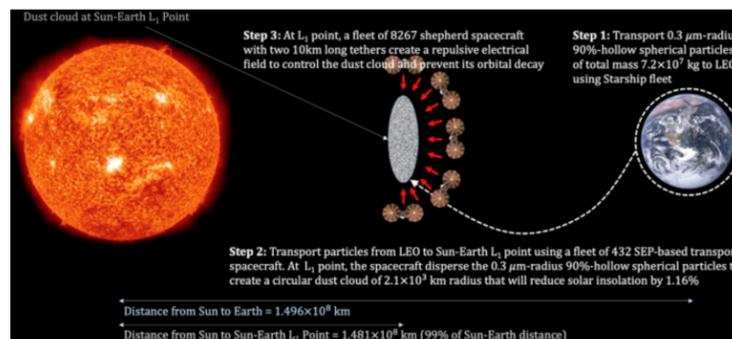
In 2020, while researching how satellites could combat wildfires for a European Space Agency competition, he began to realize the potential of space to address environmental crises. This research provided a foundation for leveraging orbital assets to mitigate disasters in real time. At JPL, this same logic underpinned his work on DimSun: if satellites could assist in managing localized fires, could a coordinated swarm of spacecraft do the same for the planet's thermal runaway?

The mission Pedro joined,

DimSun, departs from earlier geoengineering concepts. Led by JPL Robotics Technologist Dr. Saptarshi Bandyopadhyay, the project's architecture has matured from asteroid mining to a more controlled, Earth-launched model. "The advantage of making the particles on Earth is that we can more easily control their production in terms of their characteristics, such as size and sphericity," Neves explained. The current blueprint utilizes engineered spherical particles that are 90% hollow with a radius of just 0.3 μm. These reflectors are designed with a high charge-to-mass ratio, allowing them to interact more efficiently with solar rays and the electric fields intended to contain them.

Getting the material into space is only the first half of the problem; the second is keeping it there. The target is the Sun-Earth L1 Lagrange point, a gravitational sweet spot. Because L1 is an unstable equilibrium, any object placed there will naturally drift away without constant correction. Pedro's primary contribution was to demonstrate the feasibility of the mission's "brain" through custom MATLAB simulations. His work provided the physical proof that a fleet of 8,267 shepherd spacecraft could maintain the cloud's geometry through electrostatic superposition. By deploying 10-kilometer-long tethers, these shepherds create a repulsive Coulomb field to counteract the solar radiation pressure (SRP) that would otherwise blow the cloud into deep space.

"Probably the biggest challenge was to balance the Coulomb field strength with the inter-spacecraft spacing without



overcorrecting," Neves noted. Because Coulomb forces are highly sensitive to distance, the system requires a degree of autonomous precision that pushes the boundaries of current robotics. This precision allows for a calculated safety valve. Using Beer-Lambert law, the team can determine the required optical depth and cloud area needed to achieve a 1.16% reduction in solar irradiance, the amount required to maintain a 1.5°C target under current warming trajectories. If the mission needed to be aborted, the physics of the L1 point acts as a kill switch. "Once the shepherd spacecrafts cease exerting electrostatic forces, solar radiation pressure immediately dominates," Pedro explained. Within 100 days, the sun's own pressure would sweep the cloud away, making the intervention reversible.

The economic argument for DimSun is as grounded as the physics. Economic losses due to global warming are already estimated to exceed \$140 billion annually, with projections estimating losses of \$1 trillion in the coming decades. In this context, the DimSun mission concept, estimated at \$134 billion, is a cost-effective alternative. It is significantly cheaper

than solid space-based occultors (estimated at \$20 trillion) and competes favorably with the costs of terrestrial carbon capture and storage. Neves views it as an insurance policy: "Given the uncertainty surrounding the pace of global decarbonization, it is prudent to invest in complementary risk-reduction strategies... as a contingency measure".

Pedro Neves is clear about the project's limitations. He is firm that this is a "time-buying tool," not a substitute for decarbonization. "Emissions reductions remain absolutely essential," he emphasized. His work aims to provide an initial assessment of which solar-based geoengineering concepts warrant further study, fostering collaboration between the space engineering and climate modeling communities.

This spirit of collaboration is something Neves carried from his four-month tenure as a Visiting Student Researcher at JPL. Coming from a more traditional, hierarchical academic environment in Southern Europe, the "flat" hierarchy of Pasadena was a revelation. "I quickly realized that a collaborative and welcoming culture is a symbol of JPL," he said. "Everyone I met fostered an at-



mosphere where dialogue is encouraged and diverse perspectives are genuinely valued". He was inspired by researchers like Dr. Bandyopadhyay, who devote significant personal time to unfunded initiatives driven by a desire to innovate.

As Pedro concludes this research chapter, he carries with him the JPL approach to solving technical hurdles. He remains the same researcher who looked at wildfires and saw an opportunity for orbital intervention, now realizing that by herding a satellite fleet at L1, he contributed to a project attempting to stabilize a planet in critical condition. "Humanity's intricate curiosity and drive to explore the cosmos are defining traits of our species," Neves reflected, "but discovering new ways of using space to improve life on Earth allows us to continue thriving here on our pale blue dot."

Technical data and specifications in this article are derived from a published mission concept paper and original interviews with visiting researcher Pedro Neves.



## 2026 San Gabriel Valley Food Passport: To Be Continued!

**Victoria Davis**  
Column

I attempted to go to Edwin Mills (one of the places in the SGV Food Passport) on Valentine's Day, but sadly we needed a reservation to try it out. Oops! So more delicious restaurants in the SGV Food Passport will be explored and reviewed next term.

In the meantime, I was able to try out three other Pasadena restaurants and will review them here!

### Plate 38

On Galentine's Day, my bestie Maria and I went to Plate 38 for brunch. It was amazing! The location is East of Caltech, crossroads of Sierra Madre Boulevard and Colorado Boulevard, tucked away in a tiny, unsuspecting shopping corner. Inside there is a bar and a few tables around the side of the bar, making it a cozy and chill place to dine. The staff were so friendly, fun, and excellent. We had bottomless mimosas and shared the Brioche French

Toast, Four Cheese Sexy Mac, and Chilaquiles. The Brioche French Toast is topped with Nutella, bananas brûlée, powdered sugar, toasted almonds, and an amaretto crème Chantilly. It was divine. The Four Cheese Sexy Mac has ham, leeks, gruyere, fontina, provolone, and parmesan garlic breadcrumbs. Heavenly. The Chilaquiles are tortilla chips cooked with salsa verde, scrambled eggs, carnitas, pico de gallo, queso fresco, and avocado. It was fire. Highly recommend brunch at Plate 38! You won't be disappointed.

### Craft by Smoke and Fire

For dinner on Galentine's Day, Maria and I attempted to go to Edwin Mills in Old Pasadena. Unfortunately, we didn't make a reservation. Luckily, we crossed the street to Craft and didn't need a reservation! The restaurant has an indoor-outdoor flow, which unfortunately made it extremely cold, even when tucked inside at a table deep in the restaurant. Maria and I were seated at a long

table sandwiched in-between two couples. The table was like a picnic table made of cement and was extraordinarily uncomfortable. Without any back support and a concrete slab beneath me, I was dying the entire meal. We ordered the Brisket Loaded Fries and Birria Tacos. It was packed, so food took a while to arrive. The Brisket Loaded Fries were good. The brisket was excellent, and nicely done, though the fries were a bit generic and reminded me of Carl's Jr. When we finally got our main, we were excited to dig in. It should be noted that Maria and I don't have a high tolerance for spicy hot foods. With this in mind, we took a bite of our Birria Tacos (which were not described as spicy and are not traditionally spicy) and felt like we were going to die. I hoped it was the dipping sauce it came with, so I took a second bite and the painful, radiating spice burned through my lips and mouth. We couldn't take any more bites it was so painful to eat! I asked our waiter to please help us out, that we had

no idea it was such a spicy dish. The waiter was confused and agreed it usually isn't spicy. Thankfully, the waiter was so helpful he quickly put in an order for another dish and brought it out to us to replace it. He later told us that a mistake had been made with the Birria Tacos—somehow a ton of chipotle and pepper had been dumped into the birria seasoning by mistake! Crazy! Maria and I ordered instead the Brisket Grilled Cheese. I ordered a baked potato for my side to help calm my mouth down! The Brisket Grilled Cheese was amazing, but it was getting late, so we took the remaining half home. It was delicious the next day for lunch! Overall, I'd say the food was great, but I'd take food to-go if you want to be comfortable when you sit. And beware the Birria Tacos!

### Pie 'N Burger

The See Group has a tradition of ordering Pie 'N Burger pies every year for Pi Day. Last year, I finally dined inside to try the main food, and it was a

religious experience. I wanted to have a Pie 'N Burger experience this year too, before the See Group moves from Pasadena to Boulder, Colorado. Last week, I stopped in and ordered a cheeseburger, fries, a homemade old fashioned chocolate shake, and a slice of apple pie with their homemade whipped cream. It's a lot of food—I know. But it's worth it. Trust. Plan for it to be the only meal you eat in a day! If you're with a friend, definitely eat inside and sit at the counter. It's like stepping into the past and sitting at a classic diner. The burgers are fresh and fries done just right. The shakes are decadent, and perfect on a hot day. Take a slice of pie with whipped cream to go. You'll thank yourself later for the treat! If you haven't been to Pie 'N Burger yet, walk down California towards Lake and stop in. This is one of my favorite restaurants in Pasadena! Worth every bite!

Plate 38



Plate 38 hosts acoustic live music nights every week. (Photo: Plate 38)

Craft by Smoke and Fire



Exterior of Craft by Smoke and Fire. (Photo: Google Reviews)

Pie 'N Burger



Exterior of Pie 'N Burger. (Photo: Victoria Davis)

## Undergraduate Akshar Ramkumar Selected as 2026–27 Churchill Scholar

**Sharon W. Tran**  
News

Fourth-year mathematics undergraduate Akshar Ramkumar has been selected as one of 16 recipients of the Churchill Scholarship, which provides funding for a one-year master's degree at the University of Cambridge.

At Caltech, Ramkumar has conducted research in quantum computation and its intersection with theoretical mathematics. The summer after his second year, he worked in the lab of John Preskill, the Richard P. Feynman Professor of Theoretical Physics and Allen V. C. Davis and Lenabelle Davis Leadership Chair of the Institute for Quantum Science and Technology, where he conducted theoretical research to establish bounds on the efficiency

of then-novel quantum Gibbs sampling algorithms.

"Before Caltech, I had never been exposed to the exhilarating feeling of working on novel problems in research. I'm beginning to understand how invaluable a long-term research vision can be, to methodically deconstruct and tackle problems over the span of months or years," Ramkumar says. "I'm still growing as a researcher, but that is one central aspiration of mine."

This past summer, Ramkumar worked at MIT on a research project focused on characterizing the complexity of quantum error correction and exploring how it can be leveraged to build new cryptographic protocols. The paper that resulted from this work is one of two papers to which Ramkumar has contributed that will be presented at the 2026 Quan-

tum Information Processing Conference.

At Cambridge, he plans to pursue a master's degree in advanced computer science and work on problems in quantum complexity theory or algorithms.

"I am honored to be part of the Churchill community, and I am particularly excited to meet the other scholars and make some new friends. The opportunity to live in a new country and research with dedicated students and professors is a gift," Ramkumar says.

Ramkumar is the 24th Caltech student to receive the award since the Churchill Scholarship was first awarded in 1963.

This article was originally published by the Office of Communications and External Relations on Caltech.edu on January 28, 2026.



2026–2027 Churchill Scholar: Akshar Ramkumar. (Photo: Sharon W. Tran)

### Editor's Note: We want to hear your perspective!

We strive to represent every voice in the Caltech Community with fairness, accuracy, and impartiality in our news reporting. If you think we missed something, or just want to share your thoughts about a topic we've reported on, I encourage you to submit a Letter to the Editor!

Send submissions or contact the Tech editorial team at

**tech@caltech.edu**

Submissions are due at 12 p.m. on the Saturday before each biweekly Tuesday publication.

## Caltech Wildlife: Hummingbirds

**Jieyu Zheng**  
The Inside World

Did you know that hummingbirds are a family of birds found exclusively in the Western Hemisphere (here chants the Bad Bunny version listing all American countries)? When I first arrived at Caltech, I found these hovering drones such a blessed sight. People here love hummingbirds — proved by the abundance of nectar feeders around the graduate student housing and in the front yards of many fancy Pasadena homes. A hummingbird feeder might be your easiest connection to nature! And here is a dedicated guide to identifying hummingbirds on campus, plus a few tips on how to get along with them.

There are two main species of hummingbirds on Caltech campus: Anna's hummingbird and Allen's hummingbird. I know — these names give you absolutely no hint about what they look like. "Allen's" commemorates the taxidermist Charles Andrew Allen, who first documented them in Cal-

ifornia in 1879, and "Anna's" honors Anne d'Essling, the wife of an ornithologist. During that boom of species discovery, ornithologists were free to name birds after friends and lovers, much like how we arbitrarily create our Discord usernames nowadays. In Mexican cultures, hummingbirds are considered messengers between the living and spirits, so perhaps naming them after your loved ones would help you communicate with them.

The most telling difference between Anna's and Allen's hummingbirds is color. The first color you'll notice on a hummingbird around here is a metallic green — this is shared by many species. When I first set up my nectar feeder, my work-from-home housemate was the first to witness its inaugural visitor after a month of quietness. He came to me with exciting news, only to describe it as "a green bird." A correct first impression — but not quite enough for species identification.

To tell them apart, look at the front of their bodies: their chins

and bellies carry species-specific colors. Anna's hummingbird shows shades of pink, like Lady Anne's dress. Male Anna's have a striking, large pink gorget that can flare across the entire head in the sunlight, while females sport a modest little pink "necktie." Allen's hummingbird, in contrast, is shaded with mainly orange. In certain light it may look a bit pink, but be sure to check the belly. Allen's males and females both show orange wash on the flanks and belly, whereas Anna's do not.

Hummingbirds are quite sexually dimorphic — the differences between males and females might trick you into thinking they are separate species (a classic beginner's trap, much like mistaking male and female mallard ducks). At this time of year, adults are breeding and fledglings have not yet appeared, so it is usually safe to assume that those with brilliant, full-head metallic feathers are males, while the more understated individuals are females. I've attached four photos I took of local hummingbirds for reference.

Despite their different appearances, males and females are equally territorial. They emit high-pitched zipping calls above the flowers or feeders they claim, and they will dive-bomb any intruders. If you watch closely, you can detect a clear pecking order ranked by age and experience. They sometimes even scold finches or squirrels perched nearby, even though those animals are unlikely to compete for the delicate nectar diet that hummingbirds' long and thin bills are specialized for.

I keep my hummingbird feeders by the window, which allows me to watch them closely from behind the curtains. They clearly prefer the fake red flowers on the feeder — hence the predominantly red design of most man-made feeders. When they fly in, their wings beat at such a high frequency that you see only a blur; if you are lucky, you can hear the faint buzz resonating through the window. Once comfortable, they often stop hovering and simply perch to feed. Contrary to popular belief, hummingbirds spend

much more time perching than actively feeding. Perching allows them to reduce their heart rate, rest, and groom. If you locate the tree guarded by a local hummingbird, you will likely find their favorite branch, like the corner of a couch they prefer for relaxing.

Other hummingbird species in Southern California include Costa's hummingbird and black-chinned hummingbird (the latter migrates here in spring). They are less common on campus; I have only briefly seen one black-chinned here and have been hoping to attract another with my feeder. It is amazing that simple cane sugar dissolved in water (no dye or supplements needed) can support these tiny creatures. Sharing a bit of your table sugar with your lovely neighbors is not a bad idea. All you need to do is set up the feeder, clean it regularly, and wait patiently for the fairies to patronize your little restaurant once it proves to be a safe spot.

*All photos courtesy of Jieyu Zheng.*



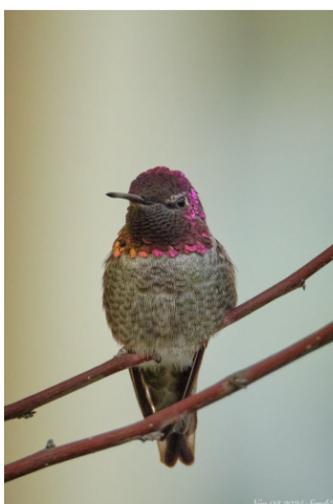
A male Allen's hummingbird with his reflective metallic gorget.



A proud female Allen's hummingbird perched with its tiny feet.



Hummingbird feathers may look dark when backlit, but the lack of orange and the pink forehead gives away the identity of this male Anna's hummingbird.



The resident male Anna's hummingbird for my feeder. I named him Nicolas.



A female Anna's hummingbird enjoying a sip of nectar behind Browne Dining Hall.

### Info from the FASA Office:

Our office provides personalized advising for nationally competitive fellowships. Below are upcoming annual deadlines to help you plan ahead:

- **Switzer Fellowship** — January
- **Quad Fellowship** — Early March
- **Thomas J. Watson Fellowship** — April 27
- **Schwarzman Scholars** — September
- **Marshall Scholarship** — Mid-September
- **Rhodes Scholarship** — October 1
- **Fulbright U.S. Student Program** — Mid-October
- **Hertz Fellowship** — End of October
- **Paul & Daisy Soros Fellowships for New Americans** — End of October
- **Churchill Scholarship** — Early November
- **GEM Fellowship** — Second Friday of November
- **National Science Foundation Graduate Research Fellowship Program (GRFP)** — Mid-November

Call, email ([fasaoffice@caltech.edu](mailto:fasaoffice@caltech.edu)), or drop by the FASA Office to schedule a fellowship advising appointment. We encourage students to begin the advising process early to strengthen their applications.

# The Unwritten Curriculum of Keeping Good Mental Health: Some Insider Tips

Jieyu Zheng  
Opinion

Last month the Caltech community suffered the tragic loss of Parker Thompson. I did not personally know Thompson, but it warms my heart to see the many articles and photos on *The California Tech* dedicated to his memory. Mental health is a tremendous challenge in intense academic environments like Caltech, and during my five years here I have witnessed much hardship and have had to part with friends who were set back by these struggles. As a member of the community, I feel obliged to share some of the lessons I have learned. Beyond the official resources listed on the Caltech website and in course syllabi, I have benefited from the following unofficial resources and mindsets.

## Actively maintain your mental health, just like going to the gym.

We are all educated about how to maintain good physical health. While routines can become as complex as one's obsession allows, you don't need to be Bryan Johnson to stay healthy. There are two basic principles:

1. Regular intervals of good things (steady sleep schedules, exercise, routine physical exams)
2. Limited access to bad things (overprocessed food or occasional all-nighters)

The same principles apply to mental health. We all know that annual physical exams are important: you shouldn't see a doctor only when problems become unbearable. Yet many people do not take the same approach to mental health. Caltech's student health insurance includes **25 free psychotherapy sessions each year**. You can treat this like a gym membership: speak to someone about your mental health with intervals. At the end of each session, schedule the next one so you don't lose the streak. Just as you rely on professionals for your physical health, professional therapists help regulate your mental health.

Another resource is **occupational therapy (OT) at Caltech** – it is free and even unlimited. OT provides a place to talk about work-related stress and develop healthier work habits. I worked with Dr. Grace Wong for years and cannot speak highly enough of her sessions. Before OT, I could complete my work but always suffered intense worry before deadlines and dissatisfaction with my work. One metaphor she shared stayed with me: work is like crossing a

log bridge, and excessive anxiety places that bridge between two skyscrapers. Therapy helps reshape your mindset so the same work can happen with the bridge safely on the ground.

You should also schedule breaks regularly. When was the last time you spent a day without thinking about coursework or labwork? Try to build breaks in – even if it's just an hour, even when you feel too busy to stop. Working nonstop rarely means getting more done, but rest can reboot your mind and improve efficiency.

The second principle is limiting exposure to triggers of worry and anxiety. We all know the effects of social media, yet we rarely limit it the way we limit french fries. Our bodies regulate appetite, but our appetite for information has no ceiling, so try to create a bound for your mental processed food. Free apps like ScreenZen can lock up your Instagram and help build healthier habits.

The biggest takeaway is to actively build a fortress around your mental health. A good structure requires maintenance – and so does your mind.

## Be fond of your own existence, not just your doing

I often find that the biggest challenge for many people at Caltech is not academic but learning to like themselves. Many of us live under the spell of imposter syndrome and perfectionism. Ask someone about their work and the first reply is often "I'm busy," followed by "I didn't make any progress" or even "everything I do feels useless." These statements may sound extreme on paper, but almost everyone here, from students to faculty, feels this way from time to time.

In letters commemorating someone's passing, we often reminisce about their achievements. Research shows that these matter-of-fact records can sometimes be triggering to those suffering from depression and may even lead to increased suicides (known as the Werther effect). The thought might be: "That person was already so wonderful for what they did, and yet they still sought death. What is the point of me, so unimportant with far fewer achievements, living in this world?"

The truth is that there will always be someone more accomplished than us on this planet. It can feel especially painful when that person happens to sit next to you at the dining table. On the other hand, nobody is on top of every possible metric. Even the person you wish you could be is less accomplished in some other dimension of life.

At this point, the wise voices



Accept your existence like you accept the Caltech squirrels. (Credit: Jieyu Zheng)

in TED talks will advise you not to compare yourself with others, but with your past self. You should feel satisfied as long as you are improving compared to yesterday, they say. But even this comparison is metric-dependent. You might have completed more problem sets than yesterday, but you are also guaranteed to get older every second. In the metric of time, you are always less young than you were a moment ago. There is no rebuttal to that.

The narrative of always being better than your past self can also lead to a problematic mindset: building your happiness entirely on what you do. I personally had an image of a "perfect graduate student" – someone who works long hours every day, plays hard, maintains an active social life, and keeps their acute load in the optimal range on their Garmin watch. I made to-do lists for each of these aspects, to the point that if I didn't spend enough hours in the office, I would feel that the day was a failure. This often happens to people who maintain strict routines or streaks. Sometimes that feeling of 1% incompleteness can become so overwhelming that it erases the remaining 99% that you completed with real effort.

The hardest lesson for me has been learning to **be content with my existence, instead of what I did or what I am doing**. There will always be creatures whose single actions have far more influence than anything you or I might do. Their existence matters a lot. But the absence of such influence does not mean that your existence does not matter.

Here is where the wildlife columnist in me speaks. Look at the fox squirrels on campus:

In some sense they are not even supposed to be here – they are an introduced species. They spend their days eating and wandering around and are certainly not working on any scientific projects. Yet when we see them (or at least when I see them), we don't glare and yell, "You shouldn't be here." Their ancestors were brought here by humans – not their choice at all. In the same way, none of us chose to be born into this world. So accept your existence the way you accept the Caltech squirrels.

## When in doubt, help others

The section above may sound unsolicitedly philosophical, opinionated, or even cliché. You might be asking: "None of what you said is helpful. What if I simply can't shake off the feeling of inferiority and worthlessness?" But bear with me for one more moment. Here is a cure-all antidote that I learned from former members of this community and that I have found the most useful of all: **situate yourself in relation to others in the world**.

There are many places where our help is needed. On campus, student clubs would not exist without people running them. Events do not organize themselves—even if you are not the one spearheading them, helping to set up chairs and tables is already valuable. Organizations such as Center for Teaching, Learning and Outreach (CTLO) and Caltech Y always need tutors, booth hosts, and volunteers. *The California Tech* needs people to deliver issues across campus. You might even get paid for your help.

But helping is not only volunteering; it is also about

showing care for others. Check in with your friends and ask about their feelings, just as you would like someone to check in with you. If you are a senior student, talk with the junior students you know and see if they need advice. Sometimes even a small tip about which classes to choose can help reduce the stress they face next term. And even if you are a G1, the most junior of all graduate students, you are still seen as a successful figure by many people who hope to apply to graduate school one day. Your mentorship can be meaningful to them. I personally received so much help in this way from my senior colleagues.

This becomes especially important during moments of doubt. Sometimes loneliness feels so heavy that caring for yourself already feels difficult. You might then ask: "How do I even care for others if I can't take care of myself? What if I receive nothing in return?" But care is not conserved like energy in the first law of thermodynamics. Here, the important step is simply to do something for someone else, to spend a moment not entirely absorbed in your own suffering. The feedback may come to you unexpectedly. Even when it doesn't, the act itself matters because it shifts your attention away from nihilistic questioning about meaning.

While writing this piece, doubts crossed my mind that nobody might read it or find it useful. Yet putting into words the helpful things to me already made me feel a little more powerful. I hope you will simply start acting and discover that feeling of power somewhere.

## Editor's Note: We want to hear your perspective!

We strive to represent every voice in the Caltech Community with fairness, accuracy, and impartiality in our news reporting. If you think we missed something, or just want to share your thoughts about a topic we've reported on, I encourage you to submit a Letter to the Editor!

Send submissions or contact the *Tech* editorial team at

[tech@caltech.edu](mailto:tech@caltech.edu)

Submissions are due at 12 p.m. on the Saturday before each biweekly Tuesday publication.

SPRING 2026 E100

# SPARKS SHORT COURSES

## COUNTING (BADLY AND BRILLIANTLY)!

Presented by Professor Rob Phillips

HOW MANY PRIME NUMBERS ARE THERE LESS THAN SOME GIVEN INTEGER?

HOW MANY MOLECULES OF  $\text{CO}_2$  ARE THERE IN THE ATMOSPHERE?

HOW MANY MORE MICROSCOPIC STATES ARE THERE IN A CUP OF WATER THAN IN A CHUNK OF ICE?

EXPERIMENTALLY, THE QUESTION OF COUNTING IS ALWAYS AT THE FORE, WHETHER IN THE CONTEXT OF COUNTING  $\text{CO}_2$  MOLECULES IN THE ATMOSPHERE, AS PIONEERED BY CALTECH'S OWN DAVID KEELING, OR COUNTING THE NUMBER OF MRNA (TRANSCRIPTOMES), PROTEINS (PROTEOME), OR METABOLITES (METABOLOME) IN LIVING CELLS.

THIS COURSE WILL CONSIDER A SERIES OF CASE STUDIES IN COUNTING, BEGINNING WITH THE 18TH CENTURY EFFORTS TO COUNT MOLECULES, SHOWCASING SIMULTANEOUS EFFORTS TO COUNT PRIME NUMBERS AND THE RISE OF THE ENTROPY CONCEPT IN THE 19TH CENTURY. ONE OF THE MOST IMPORTANT PARTS OF THIS COURSE WILL BE TO DIG DEEPLY INTO THE QUESTIONS OF ESTIMATION AND APPROXIMATION. THE GOAL IS TO FORCE STUDENTS TO RETHINK THEIR OWN UNDERSTANDING OF WHAT WE MEAN BY AN EQUALS SIGN AND WHY WE HAVE OTHER SYMBOLS SUCH AS APPROXIMATELY EQUAL TO OR ASYMPTOTICALLY EQUAL TO.

*Sign up today!*

1 2 3

UP TO 25 STUDENTS. MEET 1X/WEEK FOR 1 HOUR DISCUSSION + READING.

# FOLLOW THE TECH ON INSTA

Keep up with our story updates and exclusive content here!

@THECALIFORNIATECH

# LET YOUR VOICE BE HEARD!

Tell us your opinions about things going on at Caltech with this new survey form on our website! You can submit any time, multiple times, about anything.

THE TECH WANTS TO HEAR FROM YOU!

# CLASSIFIEDS

SPRING 2026 E100

SPARKS SHORT COURSES

PROFESSOR DAVID POLITZER PRESENTS

# THE RING OF THE BANJO

*Stephen Foster: "Ring, ring the banjo." "You can hear those banjos ringin'."*

GIANTS OF MUSIC AS DIVERSE AS STEPHEN FOSTER (THE FIRST GREAT AMERICAN SONGWRITER (1826-64)) AND KEITH RICHARDS (THE ROLLING STONES (1943- )) REFER TO THE RING OF THE BANJO. THE QUESTION IS NOT WHETHER BANJOS REALLY RING BUT WHAT DO FOSTER AND RICHARDS AND MANY OTHERS MEAN BY THAT?

THE GOAL OF THIS COURSE IS TO IDENTIFY WHAT IN BANJO SOUND PRODUCES THAT ASSOCIATION AND WHAT IN BANJO PHYSICS PRODUCES THAT SOUND. THE MAIN TOOL WILL BE AUDACITY, AUDIO RECORDING, PROCESSING, AND ANALYSIS FREWARE.

A SERIES OF QUESTIONS MIGHT LEAD TO AN UNDERSTANDING OF BANJO RING:

- WHAT IS THE COMMON FEATURE OF THE STEADY NOTES OF ALL ACOUSTIC (ANALOG) MUSICAL INSTRUMENTS?
- WHAT'S DRAMATICALLY DIFFERENT IN THE SOUNDS OF BELLS AND OTHER STRUCK METAL OBJECTS?
- DO YOU NEED METAL TO SOUND METALLIC?
- HOW ARE BANJOS DIFFERENT FROM GUITARS WITH RESPECT TO THE PHYSICS OF RING?

THE SANHIAN, SHAMISEN, SAROD, DOSHPULUUR, AND AHONTING ARE JUST A FEW OF THE DRUM-HEAD-AS-SOUNDBOARD STRING INSTRUMENTS FOUND AROUND THE WORLD. DO THEY RING?

LECTURE, 1 HR./WEEK LAB, AND HOMEWORK

PREREQUISITE: PH 2A, PH 12A, OR EQUIVALENT, OPEN TO ALL YEARS

Spring 2026 E100

# SPARKS SHORT COURSES

## HOW MATTER REMEMBERS: ORDER PARAMETERS AND MEMORY IN QUANTUM MATERIALS

Presented by Professor Linda Ye

Quantum materials are systems in which quantum mechanical degrees of freedom give rise to rich and often unexpected collective states of matter. Among their most striking consequences are symmetry-breaking orders that—far from being purely abstract concepts—form the basis of technologies ranging from magnetic memory to shape-memory alloys and piezoelectric actuators.

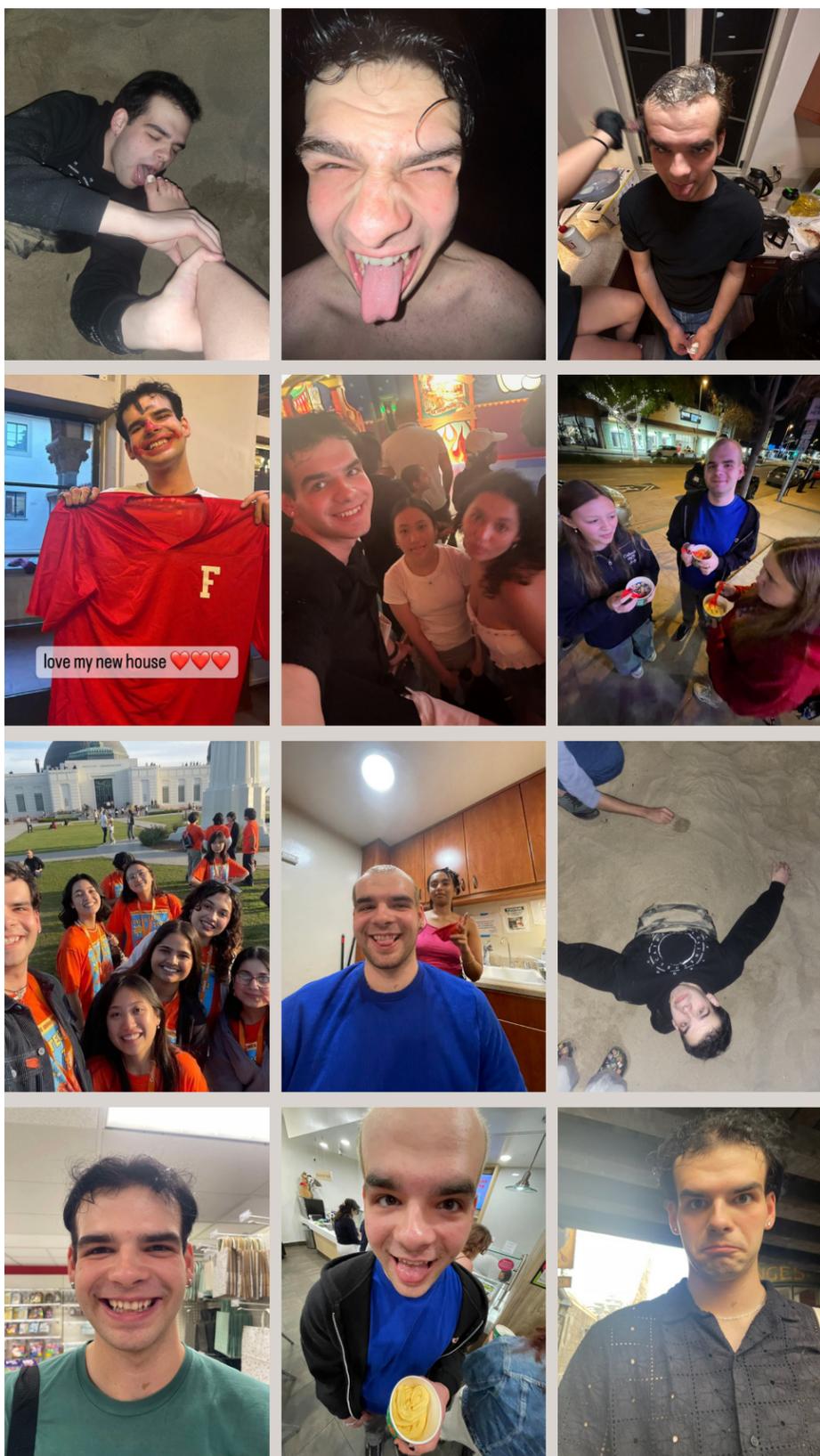
This Spark course introduces students to the diverse manifestations of order in quantum materials. Through a combination of guided readings and hands-on demonstrations, the course explores magnetic, structural, and electromechanical memory associated with ferromagnetic, ferroelastic, and ferroelectric phenomena. By the end of the course, students will develop a clear understanding of how different types of order in solids can be harnessed to store and manipulate information, and will gain an appreciation for the unique functionalities enabled by distinct quantum degrees of freedom across a broad range of materials.

Up to 10 Students. Meet 1x/week for 1 hour with 30-60 minutes of home reading.



Whenever Parker and I would say something embarrassing aloud and we thought people heard us, we would look at each other, start running away from the scene, stop, and collapse on the floor laughing (see attached photos). He'd always make me laugh the hardest.

— Tuyen Nguyen (ACM '28, Venerable)



Dear Parker Thompson,  
 You are an admiration to us all for your kindness and smile. The impact you had toward so many lives cannot be explained through words. The silence you caused in Ricketts with your passing is silence we have never heard before. We miss you and will forever keep you in our hearts. You were a true skurve. In life and death you will always be a skurve. We are grateful our paths crossed. Rest in peace, Parker.  
 With Love,  
 Ricketts Hovse

# Remembering Parker Thompson

## The California Tech Journalistic Principles

### The News-Opinion divide

All articles shall be clearly and explicitly labeled as either News or Opinion/Editorial.

News articles report on topics that have been thoroughly researched by Tech staff writers, and should be impartial to any one point of view. In a News article, the writer shall not insert their own personal feelings on the matter; the purpose is to let the facts speak for themselves. The Tech assumes full responsibility for all content published as News.

In contrast, Opinion articles (including Letters to the Editor) may be written and submitted by anyone on any topic; while the Tech will edit all published Opinions to ensure no wrong or misleading information, we do not otherwise interfere. Again, the role of the Tech here is to help the whole campus communicate their ideas and share their stories, not promote specific ones. Content published as Opinions do not necessarily represent the values of the Tech or our staff.

An exception to this is Editorials, which are written by Tech staff and represent official opinions of the Tech. Any information and sources in Editorials shall be held to the same standard as News reports, but there is no promise or expectation of impartial coverage.

### Fair Reporting

All facts of major significance and relevance to an article shall be sought out and included.

If an assertion is made by a source about a specific person or organization, they shall be contacted and given a reasonable amount of time to respond before publication. In other words, no second-hand information or hearsay shall stand on its own.

### Quotes and Attribution of Information

Facts and quotes that were not collected directly by Tech reporters shall be attributed. Articles shall clearly differentiate between what a reporter saw and heard first-hand vs. what a reporter obtained from other sources.

Sources' opinions are just that — opinions. Expert opinions are certainly given more weight, as are witness opinions. But whenever possible, the Tech shall report facts, or at least corroborate the opinions. A reporter's observations at a scene are considered facts for the purposes of a story.

### Sources

All sources shall be treated with respect and integrity. When speaking with sources, we shall identify ourselves as Tech reporters and clarify why we would like to hold an interview. Sources for the Tech will never be surprised to see their name published.

In published content, we shall put our sources' quotes into context, and — as appropriate — clarify what question was being answered.

We always ask that a source speak with us on the record for the sake of journalistic integrity. We want our audience to receive information that is credible and useful to them. Named sources are more trustworthy than unnamed sources because, by definition, unnamed sources will not publicly stand by their statements.

That being said, we realize that some sources are unwilling to reveal their identities publicly when it could jeopardize their safety or livelihood. Even in those cases, it is essential that the Tech Editor-in-Chief knows the identity of the source in question. Otherwise, there can be no certainty about whether the source and their quotes were falsified. This also applies for Letters to the Editor and Opinion submissions to the Tech. If the author requests that their piece is published anonymously, they must provide a reason, and we shall consider it in appropriate circumstances. No truly anonymous submissions shall be published. Conversely, no submissions shall be published with the author's name without their consent. When we choose not to identify a source by their full name, the article shall explain to readers why.

### Corrections Policy

We strive for promptness in correcting all errors in all published content. We shall tell readers, as clearly and quickly as possible, what was wrong and what is correct.

Corrections to articles will be immediately updated on the online version of the Tech at [tech.caltech.edu](http://tech.caltech.edu). If appropriate, corrections will also be published in the following Tech print issue.

### Honor Code Applies

In any remaining absence of clarity, the Honor Code is the guiding principle.

## The California Tech

### EDITORS-IN-CHIEF

Damian R. Wilson

### MANAGING EDITORS

Victoria Davis

Emily Yu

### PRODUCTION

Alanna Yelland

Ryan Ma

Maya Yie

### STAFF WRITERS

Camilla Fezzi

Kyra Phaychanpheng

Sharon Tran

Raquel Maldonado

Troy Zhang

Jieyu Zheng

### BUSINESS MANAGER

Jack Myles

Nora Xiao

Victoria Davis

### ADVISOR

Richard Kipling

*The California Tech* aims to publish biweekly except during vacation and examination periods by the Associated Students of the California Institute of Technology, Inc. The opinions expressed herein are strictly those of the authors and advertisers. Letters and submissions are welcome; email submissions to [tech@caltech.edu](mailto:tech@caltech.edu), or submit them on our Discord server (<https://discord.gg/Zaah8749s2>). The editors reserve the right to edit and abridge all submissions for any reason. All written work remains property of its author. The advertising deadline is 12 PM on Friday; all advertising should be submitted electronically or as camera ready art, but *The Tech* can also do simple typesetting and arrangement. All advertising inquiries should be directed to the business manager at [tech@caltech.edu](mailto:tech@caltech.edu).

# The California Tech #34 CalGuesser



Every issue we'll show you a different location on campus. Find the place and find the QR code hidden there to sign the log book and **win a fabulous prize, actually this time! Gift cards sponsored by CalGuesser Benefactor Kevin Kan, but only if you find it before he does!!!**

“On campus” is defined as the convex hull of the buildings shown on [caltech.edu/map/campus](http://caltech.edu/map/campus).

The QR code will be hidden somewhere within the pictured area.

## TECH EDITOR'S CORNER

Bonus content, from your favorite Tech editors <3

### ELEGY WITH A CHIMNEYSWEEP FALLING INSIDE IT

BY LARRY LEVIS

Those twenty-six letters filling the blackboard  
Compose the dark, compose  
The illiterate summer sky & its stars as they appear

One by one, above the schoolyard.

If the soul had a written history, nothing would have happened:  
A bird would still be riding the back of a horse,

And the horse would go on grazing in a field, & the gleaners,

At one with the land, the wind, the sun examining  
Their faces, would go on working,

Each moment forgotten in the swipe of a scythe.

But the walls of the labyrinth have already acquired  
Their rose tint from the blood of slaves  
Crushed into the stone used to build them, & the windows

Of stained glass are held in place by the shriek

And sighing body of a falling chimneysweep through  
The baked & blackened air. This ash was once a village,

That snowflake, time itself.

But until the day it is permitted to curl up in a doorway,  
And try to sleep, the snow falling just beyond it,

There's nothing for it to do:

The soul rests its head in its hands & stares out  
From its desk at the trash-littered schoolyard,

It stays where it was left.  
When the window fills with pain, the soul bears witness,  
But it doesn't write. Nor does it write home

Having no need to, having no home.  
In this way, & in no other

Was the soul gradually replaced by the tens of thousands  
Of things meant to represent it —

All of which proclaimed, or else lamented, its absence.

Until, in the drone of auditoriums & lecture halls, it became  
No more than the scraping of a branch  
Against the side of a house, no more than the wincing

Of a patient on a couch, or the pinched, nasal tenor  
Of the strung-out addict's voice,

While this sound of scratching, this tapping all night,  
Enlarging the quiet instead of making a music within it,

Is just a way of joining one thing to another,

Myself to whoever it is — sitting there in the school-  
room,

Sitting there while also being led through the schoolyard  
Where prisoners are exercising in the cold light —

A way of joining or trying to join one thing to another.  
So that the stillness of the clouds & the sky

Opening beneath the blindfold of the prisoner, & the  
cop  
Who leads him toward it, toward the blank

Sail of the sky at the end of the world, are bewildered

So that everything, in this moment, bewilders

Them: the odd gentleness each feels in the hand  
Of the other, & how they don't stop walking, not now

Not for anything.