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The Agitator - J. Morgan Kousser's Pursuit of a Truly Egalitarian Society

Mary Boyajian
Contributing Writer

In the late 1960s, a morally conscious, self-described agitator attended Yale Graduate School. He came to notice that during the three hour lectures held for the graduate students, the male members of the class had access to a restroom in the same building. The women, however, were made to sprint through the cold snow to the gymnasium, where the nearest women's restroom was located. The agitator's nature had already resulted in a coalition of graduate students that he had assembled into a student senate. He was its first president and author of its constitution, and so naturally he became the champion of a non-negotiable demand he presented to Yale: put a women's restroom in the building.

The agitator embarrassed university officials into action.

His senate would later shame university officials into allowing the women to use the university's aquatic facilities for longer than about an hour a week.

Since 1969, the agitator has held an office in the California Institute of Technology (Caltech) where he is now known as Professor J. Morgan Kousser, the William R. Kenan, Jr., Professor of History and Social Science in the Division of Humanities and Social Sciences.

As a historian, Kousser finds that his "highest moral responsibility" is to "build a better world." He started by raising his children to be, in his words, "humane and nice people." He has fond memories of reading valued and important works, such as Shakespeare and American and European history textbooks, to his children every night. It is no surprise that they share his thoughtful disposition, kind and intelligent eyes, and penchant for scholarship. His daughter Rachel is an art history professor at Brooklyn College of CUNY and the executive officer of the art history department. She was named after Rachel Carson, the ecologist and conservationist author of *Silent Spring*. His son Thad is a professor and the department chair of the UC San Diego Department of Political Science. He was named after Thaddeus Stevens, who fiercely opposed slavery and discrimination as a member of the United States House of Representatives in the early to mid-nineteenth century.

Morgan Kousser enjoys being a family man, valuing time with children and grandchildren and appreciating what he calls the

"intellectual and emotional ties" that bind them together. "The contact and continuity are just wonderful," he finds.

In Kousser's office, bookshelves stretch to the ceiling, stacked and compact. They overflow with books and papers, and tower over the desk sitting in the eye of the scholastic storm. His door is riddled with quotes about justice and freedom that firmly declare the importance of doing the right thing. An NAACP poster, with "JUSTICE" in white block letters, stands out from among the chaos. One quote, from Robert Gordon Sproul, posits: "The library is the heart of the university... The intellectual growth and vitality of every school and every division, of every professor and every student depend on the vitality of the library."

Kousser doesn't like that Caltech's library materials budget has decreased by 6 % from 2004 to 2014, while Princeton's library budget has increased by 88 % over the same time period. Lindsay Cleary, the Caltech Humanities and Social Sciences Librarian, has witnessed his passion for this issue. "He's quite a scholar, and he's a rock. If he believes in a cause, you've got his support forever," she says.

He is generally unassumingly dressed and is quick to offer a kind smile, but his mere presence can convey a certain gravity to a room, enough to convey that he is indeed, as Cleary describes, a "scholar" and a "rock." His shock of white hair, his piercing eyes, and his patent air of intellect are indisputably the makings of a formidable opponent.

When he was eight years old, he began to devour politics at the steady rate of two newspapers a day. Eight years later, he walked into the campaign headquarters of Estes Kefauver, a Tennessee Senator running for reelection. He had only come for a bumper sticker, but he ended up returning to volunteer every day from that early summer day until the primary election in August.

Growing up in the South in a period of racial segregation, Kousser began to view politics as a means of bringing about social change. "I saw the segregation start to crumble and I wanted it to crumble faster," Kousser recalls. In his youth, he admired the courage of college students of color, who led their fight for equality with silent protests. "They seemed adroit. They were no Washington or Jefferson. They were like me but just happened to be born

with black skin and be older. They seemed courageous. They were changing things," he says.

He also found inspiration in Kefauver's record of fiercely opposing segregation and supporting civil rights. He watched as Kefauver took on the pharmaceutical companies that sold thalidomide to expectant mothers for morning sickness, but instead caused birth defects and the deaths of thousands of children. Seeing Kefauver effect positive change, he thought, "Wow, it would be wonderful to have the ability to do that even if on just some senate staff, to change major policy in an important way."

Around 1979, he received a phone call from a lawyer from Birmingham, Alabama, who asked if he believed that Section 201 of the 1901 Alabama Constitution was written with a racially discriminatory intent. This call led to his involvement with a case that eventually became known as *Hunter v. Underwood*. Kousser's analysis was cited in the Appeals Court decision in 1981, and the Supreme Court eventually upheld the decision in 1985, finding the provision to be racially motivated and thus a violation of Equal Protection Clause.

Kousser's dissertation at Yale had perfectly prepared him for this role: he had used the same statistical method for analysis as was proposed, one which almost no other historian knew anything about, and he had analyzed the pertinent legislative documents for whether there was racially discriminatory intent. Kousser had taken on a pivotal role in the case. Until this point, the particular "role didn't exist and only a couple of historians had done it," he explains. The collision of passion, preparation, and opportunity seems almost serendipitous.

In this sense, Kousser reflects, "My career had been perfectly staged and I had no idea."

And thus began his career as an expert witness, providing testimony in voting rights cases. Years later, Kousser was hired to provide his expertise to a voting rights case in Tennessee, *Taylor v. Haywood County, Tennessee Commission* (1982). After an African American was elected to the commission, the historically white county soon decided to switch the election method from the district election to countywide at-large elections, a change which effectively drowned out the voices of the voters in the predominantly

African American district. Kousser conducted thorough research and analysis of the decision and its context and affirmed that the adoption of the at-large election system was motivated by a racially discriminatory intent. The judge called Kousser's testimony "graphic and highly credible" and incorporated Kousser's work into his decision, ruling against the county commission's racially motivated election practice.

Since the call from the lawyer at Birmingham, Kousser has served on the frontlines. He has applied this same approach and conviction to upwards of thirty-three state and federal voting rights cases where he provided expert witness testimony, and another ten where he served as a consultant. Kousser's involvement in *Garza v. County of Los Angeles* (1990) led to the election of a Latino to the largest county governing body—for the first time in 115 years. His efforts in *U.S. Department of Justice v. U.S. v. Memphis* (1991) resulted in the election of the first African-American mayor of Memphis.

For Kousser, this is what it means when he labels himself an "advocate." He says, "I'm trying to use whatever abilities I have to effectuate as much change as possible toward a more racially egalitarian society," and especially in the current political climate, "at least try to stop regressive change."

His colleague Dr. Sarah Gronningsater, a fellow professor of American history at Caltech, says, "He stands out in his dedication to using his academic knowledge to effect things that are happening right now on the ground."

An established authority in his field, he has written four books, delivered lectures at various universities and papers at almost fifty conferences, written numerous scholarly articles and scores of book reviews. He's held multiple visiting professorships, served as a journal editor, and provided testimony for hearings before influential bodies such as United States House of Representatives.

His expertise has rightfully developed a level of self-confidence in his scholarship. "He's principled and willing to say things to audiences even when he knows there won't be a good reaction. He's willing to ruffle feathers," says Gronningsater. Dr. Ning Bao, a former undergraduate student of and current friend of Kousser, explains that Kousser is not interested in upholding "veneers of civility" and will instead deliver the

"unvarnished sense of what he feels to be true or not true."

Bao says that it often seems that Kousser "could anticipate the arguments of opposing council and quite possibly give them better than the opposing council themselves might." This same mastery of the material and directness is in part what makes him a good instructor. Kousser brings the full force of his unapologetic scholarship to the classroom, but as Bao recalls, he "never toot[s] his own horn." He never plugs his own books or flaunts his accomplishments.

His classroom is instead dictated by his quick wit and biting honesty as well as his impeccable attention to detail. Kousser regularly engages with students in highly informative and spirited discussions. After a class session with one such discussion with Kousser, Bao recalls a classmate confessing that sitting in the classroom could feel like he was intruding on a private conversation between Kousser and Bao.

Kousser's numerous teaching prizes—the Feynman Prize for Excellence in Teaching in 2011 and the Associated Students of Caltech Teaching Award in 1989 and 2013—testify to how effective he is as an instructor. But it is his humanity and kindness that set him apart. He is known for always making time to meet with his students and even providing support and guidance regarding non-academic issues, regardless of how hectic his schedule is.

It is almost certain that these accomplishments would not be possible if not for what Cleary calls Kousser's "frightening levels of discipline." His peers seem to universally agree that, as Cleary says, he is "one of the most persistent, determined, disciplined human beings" one could meet.

He is known not just for his dedication to his scholarship and his teaching but also for his impressive exercise habits. Cleary remembers his dedication to running 9 miles every single day, no matter the weather. She recalls chiding him countless times for routinely biking through pitch black nights to get to his Altadena home.

Kousser's outstanding personal qualities, namely his strong sense of justice and unbelievable work ethic and academic ability, have uniquely equipped him to pursue a racially egalitarian society. As Bao summarizes, Kousser "fights the good fight."

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Caltech Y Column

CALTECH Y

Upcoming Events

Eastern Sierras Backpacking: Sabrina Lake

Friday 5:30pm - Sunday evening | June 2nd-4th | \$40

Ever feel like backpacking in the snowy mountains in June? Join in a backpacking trip out to the beautiful Sierra Nevadas. We'll drive up to the mountains Friday and spend the night near the trailhead. On Saturday, we'll hike or snowshoe past Lake Sabrina in around 10 miles and explore the high lakes region. We'll camp in the snow, and get back late Sunday evening. It'll be a cold intense backpacking trip up around 10,000 feet in elevation. The mountains will be majestic, and the trip should be a blast!

Please contact jbrouill@caltech.edu if you have any questions.

Caltech Y Memorial Weekend Office Hours

Due to the Memorial Day Holiday we will be closing at 2:00 PM on Friday May 26th and closed on Monday May 29th. We will re-open with regular hours on Tuesday May

30th. Please contact us at caltechy@caltech.edu for any inquiries.

Caltech Y Photo Contest Choose Your Favorites in the Caltech Y Photo Contest!

Wednesday | May 31st | 12 Noon

The Caltech Y Photo Contest is back. Vote for your favorite photos in our 2nd annual photo contest.

Like us on Facebook—then “like” your favorite photo(s) in each category.

- Perspective
- Adventure
- Service
- Civic Engagement
- Leadership

Voting will end at 12 p.m. (noon) on Wednesday, May 31. If you don't have a Facebook account send us your votes by email.

We can't wait to see which ones you pick!

Hathaway Sycamores

Every Wednesday | 6:00 - 8:00 PM | Highland Park

Volunteer at Hathaway Sycamores, a group that supports local underprivileged but

motivated high school students. There are a variety of ages and subjects being tutored. The service trip includes about an hour of travel time and 1.5 hours of tutoring. Transportation is included.

For more info and to RSVP email Sherwood Richers at srichers@tapir.caltech.edu. Eligible for Federal Work Study.

Pasadena LEARNS

Every Friday | 3:00 - 5:00 PM | Pasadena

Come volunteer at Madison and Jackson Elementary School! We are partnered with the Pasadena LEARNS program and work with their Science Olympiad team or do regular tutoring along with occasional hands-on science experiments. Transportation is provided. For more information and to RSVP, contact azhai@caltech.edu. Eligible for Federal Work Study.

Mentoring For Life

Every Monday | 3:30pm | Wilson Middle School Pasadena

Stressed out by college life? Step outside the Caltech bubble and mentor tweens who've never even thought about college. Things you could do: Build

a baking soda and vinegar volcano, read a book aloud, play sports or board games, teach the alphabet of another language, do a craft. Having a mentor makes an at-risk student 55% more likely to attend college, 78% more likely to volunteer regularly, and 130% more likely to hold a leadership position. Interested? If you have 180 seconds, you can watch this video and be inspired. If you have an hour a week, you can mentor someone and be their inspiration. If you feel unqualified, don't worry. Ultimately, mentoring is about being a consistent, dependable friend—not a surrogate parent or psychiatrist. To get started, contact noelle@caltech.edu.

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VICE PROVOST'S OFFICE HOURS

Vice Provost, Chief Diversity Officer, and Professor of English Cindy Weinstein holds regular office hours as an opportunity for undergraduate students, graduate students, and postdocs to meet for discussions pertaining to the Council on Undergraduate Education; Caltech accreditation; the Staff and Faculty Consultation Center; Student-Faculty Programs; the Center for Teaching, Learning and Outreach; the Caltech Diversity Center; and the Caltech Libraries.

There are four 15-minute appointments available per office hour. Sign up in the Office of the Vice Provost, Parsons-Gates room 104, ext. 6339 or by sending an email to dlewis@caltech.edu. We look forward to hearing from you!

Student Office Hours for Spring Term 2017:

6/8/17 Thursday 11:00 a.m.-12:00 p.m.



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2017 Undergraduate Academic Awards

Rosemary "Beth" Larranaga
Dean's Office

The Housner, Froehlich, Haagen-Smit, Zeigler and Green Awards were presented during a luncheon at the Athenaeum, on May 15th hosted by Dean Kevin Gilmartin.

Suchita Nety, a senior majoring Chemistry with a minor in English, will receive this year's George W. Housner Prize for Academic Excellence and Original Research

at commencement. This award is given to a senior or seniors in the upper 20% of their class for an outstanding piece of original scientific research.

Yujie Xu, a senior in Mathematics received the 2017 George W. and Bernice E. Green Prize. The Green Prize is awarded to an undergraduate or undergraduates in any class for original research, an original paper or essay, or other evidence of creative scholarship

beyond the normal requirements of specific courses.

The Jack E. Froehlich Memorial Award is for outstanding juniors in the top 5% of the class who shows outstanding promise for a creative professional career. Chin Yun Chloe Hsu, a junior in Computer Science and Mathematics and minoring in English, is this year's recipient.

Gabby Tender, a junior in Chemistry, is the recipient of

the 2017 Arie J. Haagen-Smit Memorial Award, which is given to a chemist or biologist who has shown academic promise and has made recognized contributions to Caltech.

Ayya Alieva, a sophomore in Applied and Computational Mathematics and a minor in Computer Science, and William Ballinger, a junior in Mathematics, were chosen as the joint winners of the 2017 Fredrick J. Zeigler

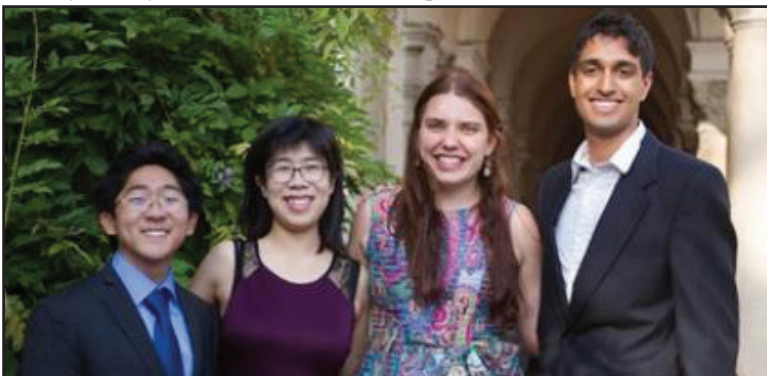
Memorial Award. This award recognizes students studying pure or applied mathematics in their sophomore or junior year, who have shown excellence in scholarship as demonstrated in class activities or in preparation of an original paper or essay in any subject area.

Kate Evans, Jay Palekar, Tyler Okamoto, and Kristie Yu Awarded the Robert L. Noland Leadership Award for 2017

Rosemary "Beth" Larranaga
Dean's Office

Kate Evans, Jay Palekar, Tyler Okamoto and Kristie Yu were awarded the Robert L. Noland Leadership Award at a dinner presentation in the Athenaeum Library on May 17, 2017. The Robert

L. Noland Leadership Award is for outstanding Caltech students who have demonstrated exceptional leadership abilities and have encouraged and supported others in realizing their own leadership capabilities.



Tyler, Kristie, Kate, and Jay



Suchita Nety



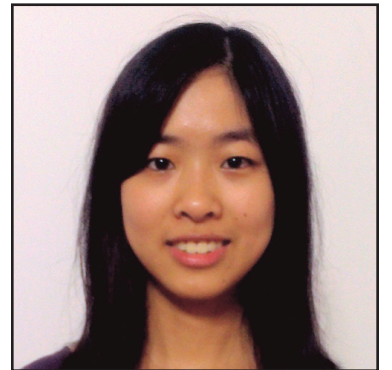
Gabby Tender



Yujie Xu



Ayya Alieva



Chloe Hsu



William Ballinger
Photos Courtesy of Beth Larranaga

Matilde Marcolli, Anarchist Mathematician

Damien Bérubé
Contributing Writer

It's Sunday evening in Pasadena, and in the barn-like theater in a corner of Caltech's campus, a play is under way. Entitled *Somber Science*, it focuses on the travails of a female Italian mathematician as she confronts authority figures while residing at a German graduate institute.

Its author knows the subject well. She is Matilde Marcolli, a female Italian mathematician who left the Max Planck Institute in Bonn, Germany for Caltech, where she has become known for her pro-anarchy philosophy.

She sits in the front row, motionless. Marcolli, 49, outwardly exhibits the traits of the stereotypical anarchist mathematician: intense stare and fiery passion, ragged look, short pitch-black hair, all-black military cargo pants, and a provocative t-shirt - black, with the words "Chaos" and "Order" emblazoned across it.

A native of Como, Italy, Marcolli grew up in a family of artists during the political turmoil of the "Years of Lead," named after repeated terrorist activity in the 70s and 80s from both right-wing and left-wing militants. Years before, Marcolli's mother had joined the Italian Resistance to fight fascism and ultimately defeat Nazi ally Benito Mussolini. She remained very active in the anti-fascist - and in particular in the anarcho-communist - movements after the war, transmitting her vision of the world to her daughter.

Young Marcolli was taught to question everything - and certainly authority - as she developed a keen interest for ancient languages and theoretical physics. She opted to pursue physics from a mathematical perspective. About to graduate *summa cum laude* with a degree in Physics from the University of Milan, Marcolli was set to join an institute in Moscow, Russia. However, with a few months left before leaving Italy, she was shocked by the 1993 Russian constitutional crisis, which led to television images of tanks filling the streets of Moscow. Desperate to find an alternative, she gave a talk at a conference and was approached by an American professor who invited her to study at the University of Chicago. She accepted and completed her PhD there in 1997 and subsequently worked at MIT, at the Max Planck Institute for Mathematics, and at Florida State University in Tallahassee (where she has held a courtesy appointment since 2001) before joining Caltech in 2008.

Marcolli's ideological perspective, opposed to abuses of power and infringements on absolute freedom, transcends her political and academic work. In an essay in the journal "Anarcho-Transhuman" entitled *Science as Anarchy*, Marcolli calls on scientists to "boycott conferences" since "they are but thinly disguised temples consecrated to the cult of this or that fetish, aimed at reinforcing mob thinking, pledging alliance to one or another master."

At Caltech, Marcolli is widely respected by both her students

and her colleagues. Her passion is contagious. In class, she stares at her students, smiling broadly while describing the fractional dimension of fractals. One on one, she can have a "life-changing" impact, according to Yujie Xu, an undergraduate student who had a summer research fellowship with her. "She convinced me there's nothing wrong with me being a girl," Xu remarks, adding, "Marcolli shows you there is no upper boundary to how smart a woman can be."

Marcolli herself addresses the challenge of being a woman in mathematics somewhat more crudely: "The mathematics community is not doing enough to address bullies. [There needs to be] more social stigma about being a jerk."

As a consequence of her attempts to avoid such "jerks," Marcolli has moved a lot between the sub-fields of mathematical physics, including gauge theory, topology and quantum field theory. In fact, she describes her own professional progress as a random walk, not unlike Brownian motion.

Jim Tao, a graduate student of hers, labels her a "drifter." That is consistent with her scientific perspective: Marcolli is impassioned with seeing the unexpected connection between different things. She has explored several areas of physics from the lens of mathematics and, lately, she's taken a liking for linguistics.

Marcolli, appropriately, also gives her students a lot of freedom, adapting her style to those she is mentoring. For Xu, this means

dynamism and encouragement. "If you don't feel tired, then you're not challenged," Marcolli assures her. On the contrary, for Tao, it entails being rather easygoing and casual. "She's very chill and laid back," he shares.

Beyond Caltech, Marcolli has actively promoted her ideology across many media. She is an artist, playwright, poet, and essayist. When she is not advocating for all-across freedom or researching the interaction of mathematics and language, Marcolli plays with Leon, her cat, or meets with Paolo, her boyfriend of 20 years. Paolo is a mathematics professor - at Florida State University! Their secret for such a long-term, long-distance relationship? Air miles platinum credit cards and long summers spent together, thanks to Caltech's quarters' offset with FSU's semesters.

Back at Caltech, Marcolli's interactions with her colleagues are usually quite positive. Mathematics Professor Nets Katz, for example, calmly observes, "Every interaction I've had with her has been pleasant."

However, one point of disagreement stands. Katz believes Caltech has a "great history of being apolitical" and he is worried about the emergence of protest. In his view, it is "not in Caltech's tradition." He reflects that Caltech students protested only once in the 1960s, "for the single most important issue of the decade - and that was Star Trek's cancellation."

Marcolli expressly disagrees: "I don't think anything is apolitical."

Now, so many years after her childhood anti-fascist training, Marcolli still ruminates on the fights against the extreme right. Lately, she has described Donald Trump as an "incompetent idiot." On her blog (listeningtogolem.blogspot.com), she reflected on the practical anarchist response in the weeks following the new President's election: "find the people most at risk in your immediate surroundings [...]. That used to mean jews, now it's muslims, people of color, LGBTQ, immigrants, and yes once again jews since nazis don't lose their old habits" [sic].

Marcolli is truly fearful of the possible undermining of democracy by the new president. She writes, "Now the incoming fascist American government has promised the deportation of eleven million people, [...] (Yes, I know, they are not claiming any genocidal intent, for the moment, but the Nazi Germans also continued to talk only about deportations until the "final solution" was adopted in 1941[...])"

Marcolli has embraced a more active stance in protesting against the new administration. In fact, the recent political climate has pushed her to seek opportunities outside of Caltech, in Canada. Although the final contract is not yet signed, Marcolli is on her way to take a joint position at the Perimeter Institute and the University of Toronto.

That's right. Matilde Marcolli, Caltech's very own anarchist mathematician, is about to "drift" again, about to leave Donald Trump's America.

Caltech Students Recognized for Excellence in Leadership

Rosemary "Beth" Larranaga
Dean's Office

The Dean of Undergraduate Students hosted a lunch at the Athenaeum on May 11, 2017 to honor and recognize this year's winners of the leadership awards.

Frederic W. Hinrichs, Jr. Memorial Award

Bobby Sanchez was honored for and will receive the 2017 Hinrichs Memorial Award at commencement. This award is given in memory of Frederic W. Hinrichs, Jr., who served for more than 20 years as Dean and professor at the Institute. The award bearing his name is made annually to the senior who throughout his or her undergraduate years have made the greatest contributions to the student body and whose qualities of character, leadership, and responsibility have been outstanding.

Mabel Beckman Prize

Nikita Sirohi is the 2017 Mabel Beckman Prize winner, which she will receive at commencement. This award is given in memory of Mrs. Beckman's many years of commitment to Caltech's educational and research programs. This award is for academic excellence and outstanding leadership skills, a commitment

to personal excellence, good character, and a strong interest in the Caltech community.

Bibi Jentoft-Nilsen Memorial Award

Jake Larson is this year's winner of the Bibi Jentoft-Nilsen Memorial Award. This prize is given in memory of Bibi Jentoft-Nilsen, Caltech '89, an exceptional student leader. After her untimely death in 1990, a fund was established to recognize outstanding student leaders.

Doris Everhart Service Award

Jenny He was selected as the recipient of the Doris Everhart Service Award. This award is given annually to an undergraduate who has actively supported and willingly worked for organizations that enrich student life, and the campus or community as a whole, and who has, exhibited care and concern for the welfare of students on a personal basis.

Deans' Cup and Campus Life and Master's Award

Deans' Cup and Campus Life and Master's Award are presented to undergraduates whose concern for their fellow students has been demonstrated by persistent efforts to improve the quality of undergraduate life and by effective communication with members of

the faculty and administration. Mojo Sonola and Roohi Dalal received the 2017 Deans' Cup. Andrew Montequin, Sean McKenna, Michelle Wong and Preethi Periyakoil were awarded the Student Life and Master's Award.

Mari Peterson Ligocki '81 Memorial Award

Mary Boyajian was selected as the recipient of this year's Mari Peterson Ligocki '81 Memorial Award. The Mari Peterson Ligocki '81 Memorial Award is made to one student who through his or her personal character has improved the quality of student life at Caltech. It recognizes the student who provides quiet support and kind encouragement to peers. This fund was established by Mr. José F. Helú Jr. '79 to honor the memory of Mari Peterson Ligocki, '81, who possessed these qualities.

The Lucy Guernsey Service Award

Stephanie Hong and Sherwood Richers (graduate student) were the recipients of this year's Lucy Guernsey Service Award. The Lucy Guernsey Service Award was established by the Caltech Y ExComm in honor of Lucy Guernsey, the Y's Executive Director from 1989-1991. The

award is given annually to one or two students who have provided exceptional service to the Y and/or the community and exemplify a spirit of service.

The Frank Teruggi Memorial Award

Miguel Gonzalez was selected to receive this year's Frank Teruggi Memorial Award. The Frank Teruggi Memorial Award was established in 1998 by friends and classmates of the late Frank Teruggi, a Caltech undergraduate who was murdered in Chile in 1973, during the military coup led by Augusto Pinochet. The annual award honors the spirit of Frank's

life, especially "in the areas of Latin American Studies, radical politics, creative radio programming, and other activities aimed at improving the living conditions of the less fortunate."

Donald S. Clark Memorial Award

Two juniors, Vinciane Chen and Tim Liu, were awarded the 2017 Donald S. Clark Memorial Prize in recognition of service to the campus community and academic excellence. Preference is given to students in the Division of Engineering and Applied Science and to those in Chemical Engineering.



Students who received a leadership award. Not pictured: Andrew Montequin, Sean McKenna, Michelle Wong, Stephanie Hong and Sherwood Richers
Photo Courtesy of Rosemary Larranaga

The Quest of a Particle Physicist to Uncover the Building Blocks of our Universe

Jenny Sheng
Contributing Writer

On the south side of the California Institute of Technology campus sits an ordinary-looking, gray building, named for Charles Christian Lauritsen, a Danish immigrant turned Caltech physics professor. Inside, office doors are mostly open, as graduate students, postdocs, and professors interact and grapple with the fundamental building blocks of our known universe. If you walked through the second floor you would notice that the door to room 265 is often closed.

Room 265, a modestly-sized office, is furnished with a full sized desk, a few chairs, a tall packed bookshelf, and a few equally crammed shelves running along the back, underneath a window that looks out to trees that provide much needed shade in the hot Southern California summers. A full-sized flat screen TV hangs on the wall and more books are piled on the desk, the chairs, and even the windowsill. This day, the door to room 265 is slightly ajar, and Professor Maria Spiropulu is seated behind the desk. Her gaze is intense as she peers through her large rim glasses at her laptop screen. The Apple logo on her computer pulsates, almost as if to match her piercing focus. Her jet black hair which she recently died blonde, is tied up neatly to avoid all distractions and a dark blue Alexander McQueen scarf adorned with little skulls is draped neatly across her blazer.

Spiropulu, now 47, the Shang-Yi Ch'en Professor of Physics, is one of only four female professors in a physics department of nearly 50 faculty members. She works in experimental high energy physics and is a leader on the Compact Muon Solenoid (CMS) experiment at the Large Hadron Collider (LHC). The experiment is a large international endeavor that is searching for new physics by colliding particles at near-light speeds. The trails they leave behind are tangled and confusing to the untrained eye, but her job is to tease these breadcrumb-like tracks with the fine-tooth-comb of sophisticated data analysis algorithms to decipher what really happened after the collision.

Spiropulu grew up in Western Macedonia, a region in Greece, where her father was a coat-manufacturer and her mother was a fashion instructor and English professor, with a brother who was only 11 months younger. A natural athlete, she took up a collection of eclectic hobbies including volleyball, martial arts, ballet, and character dance. More than anything though, she had a love for books, devouring volumes on all topics, including literature, physics, and the cosmos, which inspired her dream to go to space and to fly fighter planes. This was only the first sign of the limitless ambition that has come to define her work and vision.

At the time, the Greek air force academy did not admit women.

Spiropulu says the decision to study physics at the Aristotle University of Thessaloniki was an easy one, "It was the next best thing." Already, her knack for taking things apart and putting them together again indicated she would be an experimentalist. She worked at CERN, the European Organization for Nuclear Research, the organization overseeing the LHC, throughout her time at the Aristotle University, honing an interest in particle physics.

Seeking even more challenging problems, Spiropulu applied to graduate school in the US to do her PhD. She was accepted to Harvard University. Spiropulu says she was drawn to the experiments being done at Fermilab in Batavia, IL. "At Fermilab they were doing proton anti-proton collisions which was dirty and challenging, whereas at CERN the experiments involving electron positron collisions are much cleaner and easier to do." She explains that protons and anti-protons are made of even smaller constituents—quarks and gluons—which makes their interactions both more complex and interesting. After her PhD, she took up the prestigious Enrico Fermi postdoctoral research fellowship at the University of Chicago, a fellowship whose namesake is her academic grandfather—Enrico Fermi was her PhD advisor's advisor. She laughs because sometimes she still pulls out this piece of trivia to recruit incoming graduate students.

The influences of her time in Chicago are scattered around her Pasadena house. A black and white photo of Andy's Jazz Club sits on the windowsill. She recalls frequenting Andy's, where she befriended the saxophone player, Earl Levon Freeman, whose portrait is propped against the dining room wall. Her house has also been one of her non-academic projects. Spiropulu says she designed the entire place herself and she has been renovating it since she bought it four years ago. Evidence of her love for art is displayed around the house. Framed manuscripts of James Joyce are displayed alongside portraits. Spiropulu admits her mother was an early artistic and stylistic influence. "I never bought clothes from a store when I was a kid. My mom made all of my outfits." But she also recalls a rebellious streak when she arrived at Harvard, where she dyed her hair green and started developing her own taste. In a corner of the dining room two prints stick out: one is of the CDF detector at the Tevatron, the other is of a 1997 Apple ad campaign. In the latter, a young woman, opera soprano Maria Callas, rests her head in her hands under the block letters, Think different. The woman could be mistaken for a younger Spiropulu; the slogan is unmistakably a mindset that she applies to her own life.

A fragrant aroma fills the house as Spiropulu whirls around the kitchen making lunch. The shelves in the kitchen are impeccably

organized; little jars filled with spices resemble specimen in a biology lab. Some of the dried mushrooms, which she adds to the simmering sauce, were brought from Greece when her parents last visited. She remains in close touch with her family. Her brother, she says, is a world class sailor, who heads sailing expeditions all over the world. He has a deep interest in marine ecology and has sailed for the Greek national team. During one of the trips she joined him on they sailed from Palma, in the south of France to Malaga, Spain—birthplace of Picasso. She laughs at being sea sick and says that she prefers to have her feet on solid ground.

Spiropulu was approached by Caltech in 2006 but it wasn't until 2009 that she became a full-time professor. Harvey Newman, a fellow professor of physics on the CMS project, works closely with her. He had been at Caltech for more than 20 years when she was hired. Newman remembers the conversations he and his colleagues had while mulling over her candidacy: the hiring committee was impressed by her creativity and the scope of her work. He recalls that Barry Barish, who was the director of the laser interferometry gravitational wave observatory (LIGO), was impressed by her because he had "never encountered someone who had read so much" or someone outside LIGO who knew so much about the field.

Spiropulu says that one of the reasons she came to Caltech was the easy accessibility to exceptional scientists and notable students, who work on a broad range of research problems. She enjoys reading about and talking to people outside her own domain of expertise to draw inspiration for her work and to marvel at their discoveries. Throughout her career, she has kept the youthful curiosity that she says drew her to the library in West Macedonia all those years ago. The books scattered around the house today reflect the diverse topics that she's currently interested in—many of which relate to machine learning, a growing field in computer science research dedicated to giving "computers the ability to learn without being explicitly programmed." This has become an area of focus for her group as they are pushing the development of machine learning algorithms to parse through the enormous amount of data generated at the LHC.

Dr. Cristián Peña, one of Spiropulu's former grad students who is now a postdoc in her group, describes the challenge. As the energies of the particles are getting higher and higher, the amount of data being collected is growing. Machine learning allows them to search for a better way to "discern signals from the background". He admits that there is still skepticism in the community about its usefulness but as in any other endeavor, change is not always a

welcome agent. Peña says that in the five and a half years as a grad student working with Spiropulu, she has never shied away from taking risks, "Every time we talk, she has a new idea or suggestion that may sound crazy at first but actually many of them end up working." He appreciates the way that Spiropulu understands her students, playing to their strengths and always challenging them and pushing them to succeed. Peña goes on, "There are two Marias: the scientist and the person". The scientist is brilliant, exciting, motivation, and full of energy. "The person", he says, "is very supportive" and is constantly making sure that her students are doing well in their personal lives. She's very perceptive but not at all intrusive. Peña, the father of a six-month old baby, says that Spiropulu was very understanding when his child was born, giving him time off. He laughs that she "feels like part of the family."

Spiropulu says that "the most important part of my work is my students" and her devotion to them extends beyond advising graduate students. She's also a favorite among undergraduates. Newman says that since Spiropulu arrived at Caltech, the number of undergraduates in the high energy physics experiment group has ballooned to about a dozen students a year.

Aashrita Mangu, an undergraduate student who worked with Spiropulu for a full year after graduating from Caltech and who is headed to Berkeley for graduate school next year, credits Spiropulu for guiding her scientific career. She admires Spiropulu's "no bullshit attitude" and her willingness to learn new things. On top of her scientific prowess, Mangu also praises Spiropulu's amazing ability to connect, "She really listens and cares." Not coincidentally, when Spiropulu was asked what superpower she would choose to possess, she responded "My superpower is that I listen."

Her students agree that what sets Spiropulu apart is not only her innate passion for science but also her fearlessness when tackling big problems. One could argue that her gender also makes her stick out. At weekly physics colloquia, her presence shatters the old boys club aura that dominates the front rows of the lecture hall where all the professors congregate. Reflective, Spiropulu says that while she's always been aware of the lack of women in physics, she's never seen it as an excuse or barrier. "I just bury my head and work very hard." She shrugs. Actually, she does much more. Spiropulu says that as a member of the hiring committee she's actively recruiting the best female faculty. She still experiences pushback from more traditional factions but like every other aspect of her life, it doesn't faze her.

Nowadays, she always has an eye out for female physicists who cross paths with her. Ann Wang, a former Caltech undergraduate and

now a second year graduate student at Harvard, credits Spiropulu with guiding and supporting her passion for physics. Wang says that she decided quite late in her time at Caltech to switch to physics from bioengineering but that "Maria saw no problem with my background and encouraged me to try [high energy physics research]." Wang remembers that Spiropulu "always made time for me and welcomed us to present at group meeting. I felt like a part of the group, even as an undergrad." Her experience at Caltech has inspired her to pursue high energy physics research at Harvard.

Unsurprisingly, Spiropulu's schedule is busy. In between running her own research group—which entails coordinating meetings in three time zones, she serves as the chair of Physics Advisory Committee at Fermilab as well as member of the High Energy Physics Advisory Panel. She is also the chair of the Forum of International Physics of the American Physical Society and serves on the Advisory Panel of the High Energy Physics Forum for Computational Excellence and is a member of the Aspen Center for Physics. On May 3 she represented the field of high energy physics when she testified before the Energy and Water Appropriations Subcommittee of Congress to request funding for fiscal year 2018. Though Spiropulu's official duties keep her busy and out of the office for days at a time, she is still intimately connected to the physics.

The search for new physics continues to be a challenging and exciting frontier. Since Spiropulu's career in particle physics started at Harvard, the original theory of supersymmetry that she had been chasing has been proven to be false and the Higgs boson—which is in Spiropulu's words, "the necessary component that validates the Standard Model of elementary particles as a 'blueprint' for the real universe"—has been discovered. Nevertheless, the work is not over. She sets out the agenda for high energy physics, "We still have to measure the Higgs [boson] precisely. Now that we haven't found supersymmetry it's becoming more urgent for us to understand the quantum corrections. We need to understand the deviations from the Standard Model. We're also working on dark matter detection, both direct and indirect [through particle astrophysics]."

Even as outsiders have heralded the end of high energy particle physics, Spiropulu shoots down these claims. Spiropulu says her only regret is something even physics can't alter: she's "bounded by the time in a day."

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ASCIT Minutes

Meetings are every week in SAC 13

ASCIT Board of Directors Meeting

Minutes for June 2, 2017. Taken by Dana He.

Officers Present: Sakthi Vetrivel, Kavya Sreedhar, Rachael Morton, Sarah Crucilla, Alice Zhai, Dana He

Guests: None

Call to Order: 1:32 pm

President's Report (Sakthi):

- Had lunch with Deans today. Proposal to have "Frosh Camp" for sophomores and possibly other grades as well.
- Would like to map out routes students take at night so security knows what areas to patrol and possibly put more lights in those areas.
- Many students still unsure about the Good Samaritan Policy and are hesitant to call security for help. Will write a *Tech* article to clear this up.
- Proposition to bring back freshman dinners. Could have some sort of assigned seating to increase interaction between houses and/or be just between two houses that don't interact as much.

Officer's Reports:

V.P. of Academic Affairs (Kavya):

- ASCIT teaching awards happened last night. Suggestion to change location from the Athenaeum to decrease costs in future years.
- Committee appointments due soon.

V.P. of Non-Academic Affairs (Rachael):

- IHC retreat happening this weekend.
- Bechtel focus groups are currently in action.
- Looking for an IHC faculty advisor.
- IHC planning for rotation is going well.
- Not all IHC committee appointments are filled, will put more sign-ups under the Ricketts-Fleming arches.

Director of Operations (Sara):

- Ruddock would like equipment from Fleming for Ruddock Frosh Party.
- Proposition to buy an aux cable for the ASCIT screening room, probably around \$10 - \$20.

Treasurer (Sarah):

- A lot of money requests in the past week. The only new request was \$1,000 for ASCIT teaching awards. Also a request for money from the IHC budget for Bechtel surveys.

- Have a good amount of money left over (~\$45,000, not including new requests), which could roll over to next year or be put in savings account. Uncertain about accuracy of record-keeping from last year. Will send out email with deadline to turn in receipts for reimbursement.

Social Director (Alice):

- Dodgers game happening next Friday. Buses will leave at 6 pm, and the game will begin at 7 pm. Tickets will be given to the first 50 people who sign up.

Secretary (Dana):

- Will update Olive Walk display case with new ASCIT Board of Directors.

If anyone has any questions or concerns about a section of the minutes please email the appropriate officer. We are happy to answer any questions.

Meeting Adjourned: 1:57 pm

Crossword

Across

- Communities
- Young girl
- Solemn promise
- Concur
- Reverberation
- Jumping insect
- Unvarnished
- Level
- Typeface
- Infected
- Move with sudden speed
- Garden tool
- Space in a ship for cargo
- Send on
- Swung below shoulder level
- Armed conflict
- Rise rapidly
- Ooze
- Large vertical steel tower
- Make a mistake
- Terrace
- Wonderment
- Slanderous defamation
- Small indefinite quantity
- Lubricates
- Parking area
- Sudden violent disturbance
- Large feline
- River deposit

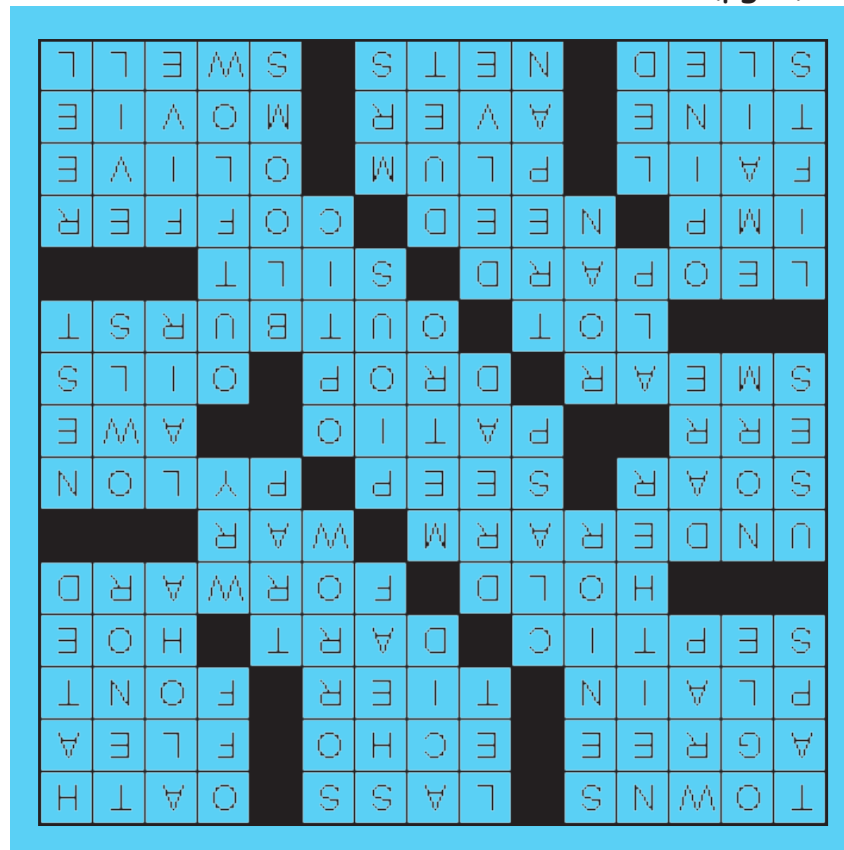
- Mischievous fairy
- Anything necessary but lacking
- Chest for storing valuables
- Be unsuccessful
- Small oval fruit
- Mediterranean fruit tree
- Prong
- Affirm
- Motion picture
- Sleigh
- Fish traps
- Crestless wave

Down

- Military signal for lights-out
- Look at amorously
- Enfold
- Not one or the other
- Elder
- Allow
- Corrosive substance
- Package of several things tied together
- Grief
- Not in operation
- Hawaiian greeting
- Singing voice
- Detested
- Fastener
- Snare
- Apprehension
- Ironic
- Employs
- Average
- Challenge
- Subway system
- Devout
- Den
- Nocturnal birds
- Bird shelter
- Eye
- Any large mountain
- Horse with brownish coat sprinkled with white or gray
- Leakage
- Surgical instrument
- Flowers
- Elevates
- Electronic communication
- Speak up
- Dig
- Song for two
- Square root of twenty-five
- Iniquity
- Spool
- Guided
- Form of address for a married woman

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Answers to current crossword (pg 7)

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