On the surface, the declining number of journal subscriptions and books entering circulation is cause for alarm, especially for researchers who rely on timely access to scientific literature. However, in engineering and the sciences, where journal articles are not prioritized over books, the number of prominent journals, faculty are coping with the loss of journal subscriptions.

Professor Victor Tsai, a geophysicist who sits on the Faculty Library Committee, notes that the "vast majority of the stuff we use in Caltech is already available in the library. This is a better situation still when I was an undergrad at Caltech in the 1970s!"

However, for researchers who come to Caltech from other institutions with more robust collections, the loss of journals seems jarring. Moving from Harvard to Caltech in 2008, Professor of History Sarah Reiman found the library's journal subscriptions notably lacking. Her many complaints, she says, laughing, led to her nomination for the Faculty Library Committee. She believes that part of the problem is simply Caltech's small size: Libraries at "other large universities have a certain fixed cost to have a basic set of collections." However, she appreciates how well the library staff, led by University Librarian Kristin Antelman, has dealt with the many challenges it faces. "Kristin and her team deserve a ton of credit," she says, "for thinking very carefully about the resources we need to have on campus." Now that Antelman has been appointed to the Caltech idiosyncrasies, she says, "I’ve never felt that our library system has kept pace with doing what I want to do, or doing it at the pace I want to do it.

It is a different story, however, for humanities and social sciences faculty. HSS departments at Caltech are small and specialized. Each faculty member requires a wide variety of literature specific to her or his particular field. Recent cuts aside, “they have never been able to support what we need,” says an assistant professor of small research needs, Antelman notes. For these researchers, the library’s current struggles have even further exacerbated a persisting problem. Their heavy use of the library and dependence on physical collections has intensified how they feel the cuts.

The funding woes experienced by the Caltech library may appear sharper in comparison to the massive reduction of the ever changing $2.8 million Breakthrough Campaign. But the story is more complicated — Caltech is not as inundated with subscriptions in the campaign’s target disciplines as other institutions are. Kristin Antelman estimates to have eroded over half of the library's purchasing power in the past decade. For scientists, understanding existing work is a fundamental part of research, necessitating access to journals. How much of a difference would be made to such a researcher if the university were to move to a purely open access model? "Open access will be a better perch. "Open access will be a better way to do science. Publishers would be cheaper for research institutions, requiring less money from libraries to subscribe to journals than they don’t want in order to get the ones they do. These companies charge libraries for the right to read articles, as well as the scientists for the right to publish the research. Despite its low profile, the scientific journal business is very profitable. Elsevier, one of the largest publishers, boasts nearly a billion dollars in 37% profit margin in 2016. The library's concomitant reduction in journal subscriptions is accompanied by a wider embrace of DocuServe, Caltech's on-demand online document delivery service. In fact, over the past two years, use of DocuServe has doubled. However, through DocuServe, access to articles is no longer instantaneous, but is delayed until the request can be processed during the business day, about twenty-four hours on average. Rush service, which can deliver articles in less than half an hour, is also available, but at a higher cost to the library and with some restrictions for the user. But thanks to licenses purchased by anyone, free of restriction. That is the open access movement offers a potential counter to the oligopoly run by a handful of profitable publishing firms. "Open access is becoming prevalent and that’s generally a good thing," says Tsai, "but someone’s paying." Instead of the seemingly daunting challenge of making resources available upon request, the open access movement is a passionate celebration by those who have both expertise in the library and passion for publishing.

As for the future, a new publishing model, open access, offers a way for researchers to publish their work without any financial burden to the libraries that provide them.

This is just a spectacular day," says Lindsay Cleary, the subject librarian for the library’s purchasing power. In engineering and the sciences, where journal subscriptions are a fundamental part of research, the open access movement offers a potential counter to the oligopoly run by a handful of profitable publishing firms. "Open access is becoming prevalent and that’s generally a good thing," says Tsai, "but someone’s paying." Instead of the seemingly daunting challenge of making resources available upon request, the open access movement is a passionate celebration by those who have both expertise in the library and passion for publishing.

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As for the future, a new publishing model, open access, offers a way for researchers to publish their work without any financial burden to the libraries that provide them.
The Caltech Y Column serves to inform students about upcoming events and volunteer opportunities. The list is compiled by Katherine Guo from information given by the Caltech Y and its student leaders.

Founded by students in 1916, the Caltech Y was organized to provide extracurricular activities planned and implemented by students as an opportunity to learn leadership skills and to discover themselves. The mission of today’s Y remains the same—to provide opportunities that will prepare students to become engaged and responsible citizens of the world.

The Y seeks to broaden students’ worldviews, raise social, ethical, and cultural awareness through teamwork, community engagement, and leadership. More information about the Caltech Y and its programs can be found at https://caltechy.org. The office is located at 505 S. Wilson Avenue.

Upcoming Events

**Pinnacles National Park Camping Trip**

October 13th - 15th | Sign up at the Caltech Y | Cost $85 due on sign up

Camping trip to Pinnacles National Park with the Caltech Y! Pinnacles was born from a lava field split by the San Andreas Fault, and thus supports diverse terrain and wildlife. We’ll be completing a 9-mile loop around the park to High Peaks and Balconies Cave, as well as a shorter stint to Bear Gulch Reservoir.

The trip departs Friday, October 13th at 9 am and returns Sunday, October 15th by 8 am. Transportation, campsites, and most meals are included. All experience levels are welcome. For more information on Pinnacles National Park, visit the National Park website at https://www.nps.gov/pinn/index.htm.

To secure your spot on this trip you must sign up and pay the fee ($85) in person at the Caltech Y (505 S. Wilson the house, just north of the Credit Union). Spaces are limited. Priority may be given to those who can drive to the trip.

**Kids Reading to Succeed**

Kids Reading to Succeed (KRS) works with the youth of Pasadena to encourage a love of reading and to improve literacy skills. The first hour (9:00 to 10:00) focuses on individualized and targeted reading, in preparation for the fun second hour focusing on group work and activities in our program.

The service trip includes about 40 minutes of travel time and 1.5 hours of tutoring. The service trip includes about 40 minutes of travel time and 1.5 hours of tutoring. For more info and to apply go to https://caltechy.org/programs_services/tutoring/Resources/index.php.

**Rise Tutoring Program**

The Rise Tutoring Program is a great way to give back to the community and work with local school students to help them succeed in math and science. For more info and to apply go to https://caltechy.org/programs_services/tutoring/Resources/index.php.

**Hathaway Sycamores**

Volunteer at Hathaway Sycamores, a group that supports local underprivileged but motivated high school students. There are a variety of programs and subjects being tutored. The service trip includes about 40 minutes of travel time and 1.5 hours of tutoring. Transportation is included.

For more info and to RSVP email Elisabeth at egallmei@caltech.edu. Eligible for Federal Work Study.

**Beyond the Y**

Join STARs in PUSD Resource Centers

STARS (Scholars Transitioning and Realizing Success) needs volunteers for Foster Resource Centers in four Pasadena Unified School District schools to strengthen students’ educational success and provide them with access to foster youth resources.

The drop-in Centers are currently open one day per week for 30 to 90 minutes. Volunteers will assist by leading activities such as cooking, building games; making presentations on careers or other topics of interest; helping students complete homework and college essays and forms; or assisting staff with College Information Days. To volunteer, contact: info@fosteruiproject.org.

Join us for an exploration into Science Policy in the nation’s capital! Our five day trip includes lodging and most meals; flights — if you choose; educational discussion sessions, and of course the opportunity to see Washington, DC landmarks like the White House, the Memorials, Smithsonian Museum, the National Archives, and the Capital. Discussion sessions include those who have played a role in setting and implementing science policy for the United States including: Academics, Lobbyists, Scientists, Politicians, and Caltech Alumni. Past figures included: Vice President Gore’s Science Advisor, Science Advisor to Secretaries of State Clinton and Kerry, the Director of DARPA, the Director of the NSF, one of the Directors at the NIH, science advisors at the White House Office OSTP, and more. Don’t miss this opportunity!

The Washington, DC Science Policy Trip is coordinated by the Caltech Y with generous support from the George Housner Fund. Questions and applications may be directed to caltechy@caltech.edu. Please visit: https://www.caltechy.org/programs_services/areas/dc/ for more info and applications.

**Lily Cal Chinese Dance Company**

“Elegant, innovative and captivating, the company melds ancient Chinese forms with modern dance in an artistic and inventive marriage of styles.”

—Broadway World
Barish received the call from the Nobel committee this morning at 2:45 a.m. Pacific Time. He says, “I am humbled and honored to receive this award,” says Barish. “The detection of gravitational waves is truly a triumph of experimental physics and collaboration.”

Over several decades, our teams at Caltech and MIT developed LIGO into the incredibly powerful instrument that scientists around the world have been using to both identify the candidate event within minutes and perform the detailed analysis that convincingly demonstrated that gravitational waves exist.”

An Idea That Began Decades Ago

In 1960, Einstein predicted that gravitational waves would exist, but thought they too weak to be detected. By the 1960s, technological advances such as the laser and new insights into possible gravitational signatures made it conceivable that Einstein was wrong and that gravitational waves might actually be detectable.

The first person to build a gravitational-wave detector was a prolific inventor, Charles Western of Pennsylvania University. Weber’s detectors, built in the 1960s, used large aluminum mirrors suspended by thin wires, which “ride” the oscillations, moving apart and together ever so slightly. This mirror motion is measured with laser light using a technique called interferometry.

In the late 1960s, Weiss began laying conceptual foundations for these instruments, collaborating with his students and postdocs at Caltech, worked to improve the theory of gravitational waves, and estimated the details, strengths, and frequencies of the waves that would be produced by objects in our universe such as black holes, neutron stars, and supernovas.

The Nobel Prize recognizes Weiss, Barish, and Thorne for their “decisive contributions to the fundamental understanding and the observation of gravitational waves.”

“I am delighted and honored to congratulate Kip and Barry, as well as Rai Weiss of MIT, on the award this morning for the 2017 Nobel Prize in Physics,” says Caltech president Thomas F. Rosenbaum, the Ronald and Maxine Linde Professor of Physics and chair of the physics department. “This is a remarkable achievement by the Caltech team that has won the Nobel Prize this year and that has already earned us the award of a New Era in Astrophysics.”

Caltech's award-winning research has been crucial to the development of new tools and techniques to detect and analyze gravitational waves. The team’s work has opened up a new window into the universe, allowing us to see phenomena that were previously hidden from our view.

The Nobel Prize in Physics was awarded to three scientists—Barry Barish, Rainer Weiss, and Kip Thorne—for their decisive contributions to the fundamental understanding and the observation of gravitational waves.

The detections ushered in a new era of gravitational wave astronomy. Gravitational waves allow us to explore objects in space that cannot be observed using light, such as black holes and neutron stars. By detecting gravitational waves, we can learn about these objects and test the theory of general relativity, which predicts their existence.

The Nobel Prize in Physics recognizes the pioneering work of Barish, Weiss, and Thorne in developing the technology and methods to detect and analyze gravitational waves. Their work has led to the detection of gravitational waves from black hole mergers and the confirmation of Einstein’s theory of general relativity.

Barish, Weiss, and Thorne have made groundbreaking contributions to the field of gravitational wave astronomy. Their work has opened up a new window into the universe, allowing us to see phenomena that were previously hidden from our view. Their discoveries have not only expanded our understanding of the universe but also inspired new areas of research and technology.

The Nobel Prize in Physics is awarded annually by the Swedish Academy of Sciences to recognize outstanding contributions to the field of physics. The award is one of the highest honors in science and is considered one of the most prestigious awards in the world.

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The awarding of the 2017 Nobel Prize in Physics is a testament to the importance of scientific research and discovery. It serves as a reminder of the power of collaboration and the potential of science to unlock the mysteries of the universe.

Continued on page 7
Procrastination workshop
A 1-hour workshop offered 2 times this term:

- **Friday, October 13th, 4:00 - 5:00**
- **Friday, November 3rd, 4:00 - 5:00**

326 Sherman Fairchild Library

- Learn tools for coping with procrastination and work avoidance.
- Learn practical, behavioral strategies for responding differently to old habits.
- Respond differently to unhelpful thoughts like “I can just get up early and do this tomorrow.”
- Optional text-based reminder system to keep the lessons fresh in the week after the workshop is over!

More information: counseling.caltech.edu

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EMOTIONAL INTELLIGENCE TOOLKIT

- **3 modules / 2 weeks each / 1 awesome skillset**

**Emotional Awareness**
Get better at knowing what you’re feeling, and see how your thoughts and feelings affect each other. **October 9th and 16th**

**Open-Mindedness**
Learn how to be more flexible in the way you see the world! **October 23rd and 30th**

**Face The Fear**
Learn how to hang in there with difficult situations and emotions without having to avoid them. **November 6th and 13th**

Just show up!
Mondays 4:00 - 5:00

326 Sherman Fairchild Library
counseling.caltech.edu

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Join the Meditation Mob!

**Tuesdays, 12:00 - 12:50**
Want to learn more about mindfulness meditation? It’s a great way to improve your attention and to become more grounded in the present moment.

There’s no religious component. We use secular, evidence-based meditation techniques.

We meet in the study room on the 9th floor of Millikan Library.
All students are welcome, from total beginners to experienced meditators.

Mailing list and MP3 archive: counseling.caltech.edu/students/meditation
Men and Women Trend Up in Pomona

GOCALTECH.COM Actual Sports Content Editor

PASADENA (Oct. 12, 2017) – Freshman Netra Ravishankar (Fremont, Calif. / American) and the Caltech women’s soccer team won for a second time this season when they took down visiting La Sierra University, 1-0, on Thursday afternoon.

The Beavers had done well with controlling possession against the Golden Eagles, who entered Wednesday’s nonleague clash 1-10, before Ravishankar took a pass from fellow freshman Rachel Sun (Tustin, Calif. / Beckman) and buried the ball in the back of the net from about 25 yards out. The goal came on beautiful arc that landed out of the net from about 25 yards out. The Golden Eagles tallied many more shots than the ones that found a path to the net, but sound play keep her side on top. The Golden Eagles sealed them a second victory in the last three games.

“Our team brought the grit and determination necessary to come away with the victory,” Head Coach Taylor Houck said. “It was about coming together as a group of 11, realizing what we had in front of us and a matter of wanting it bad enough to make it a reality. I thought our players did a tremendous job in tightening up as the game went on.”

After the Beavers outshot the Golden Eagles 6-4 in the first half, the visitors came out firing in the second half and refused to go down without a fight. A solid showing from freshman goalkeeper Kali Drango (Lake Oswego, Ore. / Lake Oswego) was necessary for the Beavers in maintaining their lead. Drango totaled five saves but made her three most important stops in the second half to keep her side on top. The Golden Eagles tallied many more shots than the ones that found a path to the net, but sound play from defenders Nayla Alney (Sewell, N.J. / Deptford Township), Maquelle Tiffany (Los Alamitos, Calif. / Los Alamitos) and Gabriella Chan (Colleyville, Texas / School for the Talented and Gifted) vastly limited the visitors’ attacking opportunities, particularly early to help set up the Ravishankar goal.

Meanwhile, the Beavers offense had opportunities to pad the lead. Freshman midfielder Kristyn Brown (Lake Forest, Calif. / Trabuco Hills) put two shots on goal, one of which caught the bottom of the cross bar and angled down to land just in front of the goal line. Sophomore midfielder Noelle Davis (Fort Worth, Texas / Texas Acad. of Math & Science) also had two shots on goal.

Seniors Caroline Ayres (Parkland, Fla. / Marjory Stoneman Douglas) and Gabby Tender (Bethesda, Md. / Walt Whitman) were honored for their achievements on the form before competing at the SCIAC Duals to finish second again for the Beavers and 30th overall (23:58.77). Freshman Krystal Borsdok (Redmond, Wash. / Redmond) finished third among Beavers and 63rd overall (24:57.16). Sophomore Skye Reese (Concord, N.H. / Concord) finished the 6K course in 25:33.57, 30 seconds off a personal best set two weeks ago at La Mirada but finished fourth among Caltech runners for the first time in her career. Junior Melissa Hu (Palo Alto, Calif. / El Rancho) ran close behind Reese and finished just four seconds off her sophomore counterpart.

The conditions warmed up for the women’s race with temperatures in the low-50s. Comparison to last week finished about as expected in the context of the women’s field and Raphelson believes the women’s side of the program has a lot to look forward to in the coming weeks.

“We had some bad luck in a few cases in the women’s race but the fact that others stepped up and helped deliver a strong team result really reflects well on this group,” Raphelson said. “They’re really motivated for the remainder of the season.”

Raphealson and the Beavers will have two weeks to rest up and fine tune their form before competing at the SCIAC Championships on Saturday, Oct. 28.

Head Coach Ben Raphelson said. “Just about everyone stepped up with their best race of the season so far. We’re confident that we can build on this going forward.”

The women’s team opened an equally positive rate of play for the remainder of the game, which ultimately sealed them a second victory in the last three games.

“Coming into today we were pleased with how our training had progressed and were optimistic about our ability to compete well,” Head Coach Ben Raphelson said. “Just about everyone stepped up with their best race of the season so far. We’re confident that we can build on this going forward.”

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**VICE PROVOST 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 Fall Term 2017:**

- **10/19/17** Thursday 11:00 a.m.-12:00 p.m.
- **10/26/17** Thursday 10:00-11:00 A.M.
- **11/1/17** Wednesday 11:00 A.M.-12:00 P.M.
- **11/7/17** Tuesday 9:00-10:00 A.M.
- **11/14/17** Thursday 11:00 A.M.-12:00 P.M.
- **11/21/17** Tuesday 10:00-11:00 A.M.
- **11/28/17** Monday 10:00-11:00 A.M.
LIGO. He also oversaw the development of technologies for reducing unwanted movements in LIGO's mirrors, caused by earthquakes, passing trucks, and other ground vibrations.

"In the initial phase of LIGO, in order to isolate vibrations from the earth's motion, we used a suspension system that consisted of test-mass mirrors hung by piano wire and used a multiple-stage set of passive shock absorbers similar to those in a commercial car. We knew this probably would not be good enough to detect gravitational waves, so we, in the LIGO Laboratory, developed an ambitious program for Advanced LIGO that incorporated a new suspension system to stabilize the mirrors and an active seismic isolation system to sense and correct for ground motions," says Barish.

The active seismic isolation system developed for Advanced LIGO works in a similar fashion to noise-canceling headphones, except it can measure and cancel out ground vibrations coming from many directions. In conjunction with this system, a new "quicker" way to suspend LIGO's mirrors was developed with the help of the Glasgow group, which involved hanging the mirrors with a four-stage pendulum. The combination of these two advances gave LIGO a huge improvement in sensitivity to lower frequencies of gravitational waves, which was ultimately what was needed to detect the crashing of two black holes.

Barish also created the LIGO of today: a collaboration of more than 2,000 scientists and 100 institutions in 19 nations called the LIGO Scientific Collaboration (LSC).

"In addition to picking the right technologies and developing them, and securing funding, we needed to build a collaboration of the absolute best people possible for this almost impossible project," says Barish. "Forming an international collaboration, the LSC, enabled this. We attracted the best people from other universities and countries, creating an 'equal opportunity' collaboration, where there was no advantage to being at Caltech or MIT. The LSC conducted the scientific searches and analysis that allowed the LIGO discovery. While this experimental work was taking place, theorists outside Caltech, MIT, and the LIGO project were developing computer codes to simulate the massive collisions of black holes and other sources of gravitational waves that LIGO might detect. These simulations are essential to LIGO; by comparing the shapes of the waves that LIGO observes with the simulations' predicted wave shapes, LIGO scientists can figure out what produces the observed waves. In the early 2000s, Thorne became alarmed at the slow progress on simulations and so then-Caltech physicist Lee Lindblom, he created a research group in collaboration in a group with a Cornell University led by his former student Saul Teukolsky (PhD '74), who is now jointly the Robinson Professor of Theoretical Astrophysics at Caltech and Hans A. Bethe Professor of Physics and Astrophysics at Cornell University. By 2015, this SXS (Simulating eXtreme Spacetimes) project was simulating the collisions of black holes with ease, as were several other research groups.

On September 14, 2015, just after the Advanced LIGO interferometers began their first search for gravitational waves, they captured a strong signal. Comparison with the SXS simulations revealed that the signal was from the collision of two hefty black holes 29 and 36 times more massive than the sun and located 1.3 billion light-years from Earth. The waves carried away as much energy as would be produced by annihilating 500,000 suns in a second.

Barish was born on January 27, 1936, in Omaha, Nebraska, and spent his childhood in Los Angeles. He received his BA in physics in 1957 and his PhD in experimental particle physics in 1962, both from UC Berkeley. In 1963, he joined Caltech as a research fellow. He became an associate professor in 1969, and a professor of physics in 1972. He was named the Ronald and Maxine Linde Professor of Physics in 1991 and Linde Professor, Emeritus, in 2005. He is a member of the National Academy of Sciences, and a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the American Physical Society, the latter of which he served as president. In 2002, he received the Kloosteg Memorial Lecture Award from the American Association of Physics Teachers and, in 2016, he received the Enrico Fermi Prize from the Italian Physical Society. He won the Henry Draper Medal in 2017 with Whitcomb.

Thorne was born on June 1, 1940, in Logan, Utah. He received a bachelor's degree in physics from Caltech in 1962 and a PhD in physics from Princeton University in 1965. He joined Caltech as a research fellow in 1966, and joined the faculty in 1967 as an associate professor of theoretical physics. In 1970, he became a professor of theoretical physics. In 1991, he was named the Richard P. Feynman Professor of Theoretical Physics. He retired in 2009. Thorne has authored or coauthored several books, including Black Holes and Time Wars: Einstein's Outrageous Legacy, published in 1994. He served as an executive producer and science adviser for the 2014 film Interstellar. He is a member of the National Academy of Sciences, the American Physical Society, the American Academy of Arts and Sciences, and the American Philosophical Society. On October 11, 2017, Thorne will publish the textbook Modern Classical Physics, coauthored with Roger Blandford.
ASCIT Minutes
Meetings are every week in SAC 13

ASCIT Board of Directors Meeting
Minutes for 13 October 2017. Taken by Dana He.

Officers Present: Sakthi Vetivel, Kayya Sreedhar, Rachael Morton, Sarah Crucilla, Alice Zhai, Dana He

Guests: Sarah Cai

Call to Order: 10:08 am

President’s Report (Sakthi):
• Signed form for taxes.
• ASCIT retreat to beach house, date to be determined.

Officer’s Reports:

V.P. of Academic Affairs (Kavya):
• Selecting freshman ARC reps this weekend.
• Launching course capture starting next week.
• A list of course concerns regarding Ma 2, though getting better now that Nets Katz has returned.
• Add cards due today.

V.P. of Non-Academic Affairs (Rachael):
• Multi-house events will be done through ASCIT proposals instead of having a separate multi-house event fund.
• Rotation went well.

Director of Operations (Sara):
• Not in attendance.

Treasurer (Sarah):
• Still no contact person for reimbursements, so can do transfers to club or Bursar’s accounts. Will talk to Tom Mannion about this.
• Sara needs to send out club funding form to schedule meetings.
• Page lent tools to Lloyd, which was broken into and the tools stolen. Request for $880 to replace tools approved.
• Members of Bechtel Committee are presenting to Board of Trustees soon regarding outcomes of focus groups.

Social Director (Alice):
• Trivia Night booked for October 19th and November 16th at Chouse.
• ASCIT movie night (Thor) will be on October 3rd.
• Could possibly get second movie night for Justice League depending on spending.
• Working on compiling a calendar of all house social events.

Answers to current crossword (pg 7)

http://puzzlechoice.com