LIGO team awarded Breakthrough Prize in Fundamental Physics

This article was originally published online at caltech.edu.

The Selection Committee of the Breakthrough Prize in Fundamental Physics has announced a Special Breakthrough Prize in Fundamental Physics recognizing the scientists and engineers who contributed to the detection of gravitational waves by the Laser Interferometer Gravitational-Wave Observatories (LIGO).

The $3 million award is being shared between two groups of laureates. The three founders of LIGO — Caltech’s Ronald W. P. Drever, professor of physics, emeritus, and Kip S. Thorne, the Richard P. Feynman Professor of Theoretical Physics, emeritus, and MIT’s Rainer Weiss, professor of physics, emeritus — will share $1 million equally. In addition, 1,012 contributors will equally share $2 million; of these, 1,003 are the authors of the paper from the LIGO and Virgo collaborations, while the remaining seven are scientists who “made important contributions to the success of LIGO.” This group of seven includes Caltech’s Mark Scheel, senior research associate in physics, and Rochus E. Vogt, the R. Stanton Avery Distinguished Service Professor at the Kavli Institute for Theoretical Physics, emeritus, and Emeritus.

In announcing the special prize, Yuri Milner, one of the founders of the Breakthrough Prizes, said, “The creative powers of a unique genius, many great scientists and the universe itself have come together in a perfect science story.”

For more about Caltech’s Breakthrough Prize in Fundamental Physics laureates, read “Glitz and Quilts” in the current issue of Caltech’s Alumni Review. The Prize in Fundamental Physics section begins on page 12, where you’ll find stories about black holes and galaxies to seashells and coils of DNA.

Facilities holds campus-wide meeting for Bechtel Residence

On May 13, members of the Caltech community were able to attend a presentation on the current plans for the new Bechtel Residence. The presenters were Jim Cowell, assistant vice president for facilities; Hall P. Duly, director of government relations; Doug O’Neil, senior director for capital projects, modernization, planning, design and construction; and Brian Kenworthy, associate partner at ZGF Architects.

Caltech’s master plan for how it will use its land will be up for review in 2019. The discretionary review and design approval for Bechtel began in 2007. The institution is currently entitled to build up to 600,000 square feet in eight phases, with Caltech’s other two sides, except for a one-story section for the dining hall, which will face Moore Walk.

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News briefs from around the globe

A brief list of events from the past week, compiled by the editors

HALO Trust to remove landmines around church near Jordan River

5,000 landmines near land marked as Jesus’ baptism site to be cleared by world’s largest humanitarian landmine removal organization [CNN]

Colombian police seize record size domestic haul of illegal drugs

8 tons of cocaine hidden on a banana plantation found by authorities [BBC]

Ex-CIA agent Donald Rickard reveals tip-off led to Mandela arrest in Durban, South Africa

1962 arrest landed Mandela, who was wanted for alleged ties to a terrorist organization, in jail for 27 years [BBC]

Brazilian Senate votes to begin impeachment trial of President Dilma Rousseff

55 vote in favor of, 22 against impeachment; Rousseff formally accused of borrowing from state banks to conceal deficit [NYT]

Andre Brahic, one of discoverers of Neptune’s rings, passes away

73-year-old was a key figure in increasing public awareness of research into space [BBC]
The Caltech Y Column serves to inform students of upcoming events and volunteer opportunities. The list is compiled by Neera Shah from information given by the Caltech Y student leaders.

Founded by students in 1916, the Y was organized to provide extracurricular activities planned and implemented by students as an opportunity to learn leadership skills and discover themselves. The mission of today’s Y remains the same—to provide opportunities that will prepare students to become engaged, responsible citizens of the world. The Y seeks to broaden students’ workloads, raise social, ethical, and cultural awareness through teamwork, community engagement, and academic and professional leadership. More information about the Caltech Y and its programs can be found at http://caltechy.org. The office is located at 505 S. Wilson Avenue.

Upcoming Events


Thursday | May 19th | 3:00 to 4:30 p.m. | Sign Up at: http://goo.gl/forms/P9MmYVsKXKv (priority will be given to students)

Dr. E. William Colglazier is a Diravor-in-Chief of Science & Diplomacy and Senior Scholar in the Center for Science Diplomacy at the American Association for the Advancement of Science (AAAS). He is also co-chair of the committee appointed by the U.N. Secretary General for advising on the role of science, technology, and innovation for achieving the United Nations Sustainable Development Goals (SDGs).

He served as the fourth Science and Technology Adviser to the Secretary of State from 2011 to 2014, first under Secretary Clinton and then under Secretary Kerry, providing scientific and technical expertise and advice in support of the development and implementation of U.S. foreign policy.

From 1994 to 2011, he was Executive Officer of the U.N. National Academy of Sciences (NAS) and the National Research Council (NRC) where he helped to oversee the studies that provide independent, objective scientific advice on domestic and international public policy issues.

He received his Ph.D. in theoretical physics from Caltech in 1977, and prior to 1994 worked at the Stanford Linear Accelerator Center, the Institute for Advanced Study in Princeton, the Center for Science and International affairs at Harvard’s Kennedy School of Government, and the University of Tennessee. While at Harvard, he also served as Associate Director of the Program in Science, Technology, and humanism of the Aspen Institute. He is past chair of the Forum on Physics and Society of the American Physical Society (APS) and a Fellow of the AAAS and APS.

The Caltech Y Science Policy Series provides an opportunity for students to explore the intersection of science and policy to promote informed, engaged citizenship.

2. Education inequality and social justice: a conversation with Miles Corwin

Monday, May 23rd | 12:00-1:00 p.m. | Location TBD | To Sign Up Visit: http://goo.gl/forms/F5CqLZtI7E

Miles Corwin spent a year with two gifted high school students from disadvantaged communities in L.A. Corwin chronicled their journeys as they faced the greatest challenges of their academic and personal lives in his book, And Still We Rise. The book won the PEN West award for nonfiction and was a Los Angeles Times Best Book of the Year. On May 23rd, Corwin will come to Caltech to discuss his unique perspective on the challenges facing students in disadvantaged communities.

Praise for the book:

"An exuberant tale of South-Central kids...On every page, their voice ring as clear as church bells and make even a jaded reader feel inspired."

San Francisco Chronicle

Corwin Bio: Miles Corwin is a former Reuters reporter at the Los Angeles Times (LAT), where he wrote about the LAPD, homicide in South-Central Los Angeles, prisons, and the criminal justice system. A native of Los Angeles, he graduated from University of California, Santa Barbara and received an M.A. at the University of Missouri School of Journalism. Corwin is the author of three nonfiction books: The Killing Season, a national bestseller; And Still We Rise, the winner of the PEN West award for nonfiction and a Los Angeles Times Best Book of the Year; and Homicide Special, a Los Angeles Times bestseller. Kind of Blue, his first novel, was named one of Booklist’s Top Ten First Crime Novels of 2010. His next book in the Ash Levine series, Midnight Alley, was released in April 2012. Corwin teaches literary journalism at the University of California, Irvine.

3. Food and Shopping for a Sustainable World

Friday | May 20th | 12:00-1:00 p.m. | Winnette Lounge

Sustainable Works, an educational organization that promotes sustainable actions to foster a safe, healthy and equitable world, will lead a seminar about how you can make your lifestyle more sustainable. This workshop will give perspective on shopping, consumer goods, organic food and how they influence the environment. Come learn how your actions can make a difference.

Students, staff, and faculty are all welcome.

Lunch provided on first come first served basis. The Sustainable Living Series is coordinated by Amanda Shing - Graduate Student and 2015-16 Caltech Y ACT Award Recipient - and is made possible with generous support from The Caltech Employees Federal Credit Union and the Caltech Y.

4. Hathaway Sycamores

Wednesday | 5:30-8:00 p.m. | Highland Park

Volunteer at Hathaway-Sycamores, a group that supports local underprivileged 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.
Leaves and MIT: Peering into another institution

ANDRE COMELLA
Contributing Writer

There’s an old belief that of all the combinations of words in the English language, there is none more beautiful than “cellar door.” Maybe that’s true for linguists, but to people who live in California, the most beautiful words are “peer institutions.” Peer institutions are the universities we compare ourselves to, either to celebrate our strengths or to point out that we are not quite as good as the others. It’s where you make a university worth comparing ourselves to, or when such comparisons are deemed appropriate. There has been a trend to use our peers as justification for unpopular decisions, as a way to create a mandate to cite “Caltech’s uniqueness” when nobody wants to copy policies of other institutions.

A few weeks ago, MIT released a 34-page report (available at http://web.mit.edu/acadinfo/cap/about/report.pdf) on its policies governing leave and return for undergraduate students. It is truly an incredible read, and I recommend that everyone check it out. The report came at the request of the chancellor (roughly analogous to our vice president of student affairs), who organized a committee of students, staff and faculty to investigate current leave and return policies (members of the committee were from student affairs), who organized a committee of students, staff and faculty to investigate current leave and return policies, and then asked the committee to make recommendations and assertions. The report makes a series of bold recommendations and assertions. It calls for financial support for students dependent on financial aid going on leave — to a total of half a million dollars a year. It also recommends offering MIT health insurance to all students on leave (currently only those on medical leave are covered, when continuing to use MIT insurance). The report continues with many more changes, but the most striking aspect was the assertion, all throughout, that “all undergraduate students, once admitted by MIT, remain members of the MIT community,” and were entitled to MIT’s policies. “MIT still expects the student to return if (s)he chooses and finish the degree.” This is astounding — MIT is voluntarily taking on more responsibility for students who go on leave. As an institute, MIT stands in sharp contrast to Caltech, which is pushing students on leave away, hoping they transfer, or at the very least, never come back. After reading the report, MIT held a town hall run by some of the staff and faculty who crafted the recommendations. It was a rare opportunity for formerly or currently on leave students to come and ask questions and speak about their experiences. It was a wonderful, relaxed and variedly crucifying. They described the experiences of going on leave at MIT, as well as the process of going back to a tale of a student who was on leave for five years working to earn enough money to take a gap year. The student had to be allowed to return. I heard from a young woman asking why she was required to take classes while on leave. She was supposed to fit them with four or five doctors visit a week, I sat next to a friend as she spoke about going on leave for four years, and the difficulties that came from incompetence and misinformation from those in administration making these decisions.

Most uplifting was seeing how MIT made great efforts to address all the major issues presented by the leave and return process. Most of those heart-wrenching stories dealt with problems that had been d i r e c t l y addressed in the report. See, MIT’s policies were already impressive, but now the people there are putting substantial effort into making them even better. For example, into letting students know that they are always welcome and always a part of their community. Into supporting students even when it means more costs, more work and more liability. Caltech stands in juxtaposition with no support for students on leave, no avenues of communication and significant effort to push students on leave away from the Institute. It was hard to keep from seeing to much pain and struggle borne by some incredible people.

It would be a mistake to assume that such stories are unique to MIT; rather, other schools are often just as bad or even worse. We can sit around hypothesizing about what a set of policies will lead to or what an experience would be like, but that is nothing compared to the raw emotion of meeting people so deeply affected. To understand, to truly know, we must learn from those who have gained understanding through experience. These are human problems and cannot be solved with any mathematical rigor. Many things happen in human experience, and human input. And here we return to Caltech’s fondness for emulation. If there is ever a time to follow the example of a peer, it is now. We have an opportunity now to follow a path already traveled, and not have to do the hard work, the research, the policy crafting. We can use that and perhaps even build upon it. We can take up the challenge set before us, to elevate the needs and well-being of our students above all.

We can learn from our peers, from emulating what works best; it is not time for our Institute to do likewise.

We “can take up the challenge set before us, to elevate the needs and well-being of our students above all other institutions.”

TOM SHERIDAN
Contributing Writer

Personally and professionally, master's degrees as well as the policy crafting. We can use that experience to inform any incoming project interacting with a complicated power grid. The efficiency of power distribution is increasing at an exponential rate. According to a study released in 2011, carbon emissions from electricity generation has been cut in half since 1970, while the number of homes using renewable energy has jumped from less than 1% in 1970 to over 34% today. This is due in large part to advances in energy storage technologies, which have made it possible to store excess energy generated by solar and wind farms.

In the context of the Caltech way — people not time for our Institute to do likewise.

Endurance, self-discipline and consistency are key to him both in his research and in his life. But to Wierman, these activities are less about comparisons and more about connections. When he says, “This is part of the Caltech way — people in different areas knowing each other well enough to find connections.”

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“In a recent data release, Wierman presented a statistical analysis
Professor Wierman uses split interests to inform research

Continued from page 3 of the various flaws of the CMS department as it was — with the flood of new CS majors, the number of faculty and the number of possible specializations were simply not up to the task. Class sizes have ballooned, and solutions will have to be applied over years.

As someone who has taught numerous classes, including a mixed CS/economics class on algorithmic game theory, Wierman has a direct perspective on these issues. “There’s a tension in designing an undergraduate CS program,” he said. “You don’t want to teach a watered-down version of algorithms just because they’re not CS majors; you want to teach them algorithms!”

Five additional faculty members are already planned for the next five to seven years to alleviate the mounting enrollment pressure that high-level classes in CS are facing. Wierman hopes to repeat a statistical analysis of the CS major using data from this year, and many of his thoughts on computer science and sustainability are readily available at his blog, Rigor + Relevance.

Being a specialist in networking and interdisciplinary efforts, it is not surprising that Wierman is an expert in the collaboration that allows computer science to have influence in many different subjects. This includes communication with undergraduates as the executive officer of the CMS department, prompt back-and-forths with graduate students and showing the outside world the potential of his research. He is determined to bring this powerful combination of interdisciplinary knowledge and smooth collaboration to a task that will test them to their limits — forging a network that will make data centers cleaner around the world.


Community enjoys dance, music and food at OASIS Annual Show

Continued from page 3

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Women's tennis finishes sixth at SCIACs, best since 2007

GOCALTECH.COM
Actual Sports Content Editor

CLAREMONT, Calif. (May 8, 2016) – The Caltech women's tennis team recorded its best finish at the SCIAC Championships since 2005, placing sixth with a 6-0 victory over Chapman University sandwiched between defeats to national No. 4 and eventual SCIAC Champions, Claremont-Mudd-Scripps Colleges and the University of La Verne.

*seed Caltech 0, #2 No. 4 CMS 5*

With rain already having shunted start times across the conference, the Beavers and Athenas elected to start singles first and play to decision in an attempt to beat the weather. Although a short delay mid-match proved inevitable, CMS soon claimed the victory with wins at all but #1, where sophomore Vinci Chen had played. For CMS, No. 6 Katie Kusman to a 6-3 #1 set and taken another two games in the second. Freshman Julia Reisler also won a pair of games in each set at #2.

*Caltech 7, #6 Princeton 4*

Having fallen to the Panthers in the regular season during the absence of junior Sophia Chen due to injury, the Beavers were eager to reach this matchup. It showed from the outset as Caltech took both #2 (8-6) and #3 (8-2) doubles, then claimed the first set in four singles matches. Chapman claimed #1 to level the match, but sophomore Erin Winston and freshman Cecilia Andrews pulled the Beavers across two days due to multiple defeats to Whittier College Occidental College sandwiched betweenSCIAC Championships since 2005, the team recorded its best finish at the SCIAC Championships since 2007.

*GOCALTECH.COM*
Actual Sports Content Editor

BRADLEY and the Ramsathwick Pathireddy and Li each registered victories at #3 (6-3, 6-3), #4 (6-1, 6-2), #5 (6-7, 7-6) and #6 (6-2, 6-3). Head Coach Mandy Gamble’s squad finishes the season with an even 10-10 record, the program’s best finish since 2005, and recorded a good portion of the recorded books. Li outpaced the previous single-season record for singles victories (14), besting Lebby’s 12 set in 2014, while also setting the previous season record for singles victories (14), besting Pathireddy and Nguyen again won 9-7, Senior R a s h i k e b Joshi and Li quickly closed out victory with a #3 win and #6 for the win and chance to play for fifth place the following day.

*Caltech 4, #8 Occidental 5*

Just an hour ahead at #3 final singles match versus Whittier had ended, the Beavers were tasked with dispatching Occidental for the second time this season and were more than up to the challenge. Despite the potential for fatigue and fatigue and being the program’s first national ranking, the Beavers proved too much for #2 (7-5, 6-0) and #4 (6-3, 6-1). Head Coach Mandy Gamble’s squad finishes the season with an even 10-10 record, the program’s best finish since 2005, and recorded a good portion of the recorded books. Li outpaced the previous single-season record for singles victories (14), besting Lebby’s 12 set in 2014, while also setting the previous season record for singles victories (14), besting Pathireddy and Nguyen again won 9-7, Senior R a s h i k e b Joshi and Li quickly closed out victory with a #3 win and #6 for the win and chance to play for fifth place the following day.

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Men’s tennis finishes sixth at SCIACs, best since 2005

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ASCIT Minutes
Meetings are every week in SAC 13

ASCIT Meeting 5.12.16

Officers: Serena Delgadillo, Sakthi Vetrivel, Robin Brown, Tim Liu, Kalyn Chang
Others: Chris Dosen, Vaishnavi Shrivastava, Olivia Hindera

Start: 12:12pm
I. President Updates: Serena
A. New board! Yay!
B. Midnight donuts is the 18th
C. Fire and ice event went well
D. Transition dinner is on the 30th (Memorial Day)
E. Performing and Visual Arts is having a concert off campus on the 21st
F. Appoint a secretary soon (sign-ups go up next Monday (5/16) and interviews are the following Sunday)

II. ARC Chair updates: Tim
A. ASCIT teaching awards picked out last Sunday
   1. There will be an Ath dinner for the winners, their nominators, and a few ARC members
B. Committee appointment this Sunday for academic faculty committees

III. Director of Ops Updates: Sakthi
A. Projector will be set up
B. Rethink how yearbook is done (electronic yearbooks?)
   1. People didn’t pick up the yearbooks
   2. Come out after people have already left campus

IV. Treasurer Updates: Kalyn
A. Ordering senior boxes (tentatively to be delivered on the 23rd of May)

V. Social Director Updates: Robin
A. Movie on Friday went well
B. Looking at possible events for the rest of term

VI. Other
A. Passing resolution to make senior class co-president election during third term
   1. Currently, they are elected after ditch day and this doesn’t give much time
B. Tim moves to amend the ASCIT Resolution I Section 1 to “Elections for Senior Class Co-Presidents shall be held using the procedures established in Article VII during third term of their junior year
   1. Serena seconds
   2. Vote passes 5-0-0

Ends: 12:28pm
Bottomless Pit: Death Grips, the condensed version

NAILEN MATSCHKE
Contributing Writer

Just six years into its career, it seems all but certain that Death Grips will be immortalized as one of the great subversive acts in the canon of popular music. Despite the wealth of experimental hip-hop released this decade, no artist has come close to the mixture of aggression, noise, social commentary and catchy hooks that the group continues to refine with every record. This alone is remarkable, but when one considers that the band has already put out four critically acclaimed studio albums in under four years, not including any mixtapes or instrumental releases, the competition really starts to fade away. Of course, the group’s members have done their share to stay in the public eye as well, from announcing their breakup several albums ago to missing tour dates with no explanation, to various online antics utilizing social media, producing a rabid and decidedly passionate fanbase. Having finally satiated cries for Jenny Death, the second half of double album The Powers That B, the band was left with a clearer slate than it had had in years for Bottomless Pit, released on May 6. Accordingly, the album doesn’t quite fit into the progression of its predecessors, but rather it combines their most distinguishable elements into an intense collection of hits that you’ll want to play again and again.

The two tracks that bookend Bottomless Pit, “Giving Bad People Good Ideas” and “Bottomless Pit,” are those which most closely resemble the guitar-driven sound that Death Grips had been working with on Jenny Death. The distortion through the roof, easily causing audio clipping, while Zach Hill plays drums like a madman and MC Ride yells more or less unintelligibly. On the surface, this is what we’ve come to expect from the band in recent years, but the focus on the hook in these two tracks stands out, especially in the case of the opener, featuring a descending female vocal line repeating the song title. This attention to pop sensibility is a large part of what made 2012’s The Money Store such a successful debut, and though Death Grips has dialed it back ever since, it’s back in full force on Bottomless Pit. Apart from the aforementioned first and last tracks, the album is heavily electronic, and just about every song has the well-defined sense of structure and melody that one expects from a single. Each one brings something to love, making it difficult to pick favorites, but many are among the catchiest songs the group has ever written. “Spikes” features a downright moshable chorus to complement high-tension verses about “skidding out” of control, while “Houdini” is a hanger lampooning mindless music fans with a hilarious bridge I can’t repeat in print. “Three Bedrooms in a Good Neighborhood” has a convoluted three-part chorus, all of which will manage to get stuck in your head. Oddly enough, “Hot Head,” the lead single, is arguably the least like the others given its extreme variation in dynamics and tone, but it still holds its own in the track listing. Another pair that sticks out on aesthetic alone is “Eh” and “Trash” with slick but low-key instrumentals that allow MC Ride’s wit to shine through. The former has him raving about how trifling naive fans and his competition are, until it takes a dark turn as the attitude of “Eh” swallows up all, with MC Ride telling us, “I’m way too loose, like / catch me hanging from my noose like eh,” the last syllable thrillingly drawn out with a digital effect. “Trash,” on the other hand, laments the virtual garbage heaps of online content cluttering our daily lives, “be it Motel 6 to vogue vino trash,” supported by a two-note drone that I suspect is the repeatedly layered sound of a floppy drive spinning up. Bottomless Pit displays an impressive breadth of topics and aesthetics, and with 13 tracks clocking in at just under 40 minutes, nothing overstays its welcome. Since the album doesn’t delve much into unexplored territory for the band, I was a bit concerned at first that the material would rely on rehashing that of previous albums. However, especially after going back and listening to Death Grips’ other projects, it’s clear to me that Bottomless Pit applies all of the skills and techniques the group has acquired over the past few years, and the songwriting is truly one of the great subversive acts as much as Jenny Death, it fits in so well that the songs that do could almost be off a punk record. Bottomless Pit has by far the best production of any Death Grips album, and MC Ride more than lives up to the standard he has set for himself. Though it may lack innovation, it is a perfect amalgamation of the Death Grips catalog thus far, standing both on its own and in context as a testament to the talent and absurd work ethic of one of this decade’s most important acts.
Sanity Considered
Harmful $p$-adic Larson

Def. A topology $T$ is finer than a topology $U$ if $U$ is a refinement of $T$.
Ex. Let $T$ be the trivial topology on $\mathbb{R}$.
Def. A number $a$ is a limit point of a topology $T$ if $a$ is very fine if it is finer than $T$.
Ex. Let $T = (\mathbb{R}, B, (D))$ be the $D$-topology where $D$ is a very fine topology.

Billy had heard of DEI references hidden in circuit boards and other places, but this was the first instance of Avery propaganda he had seen.

Monday Punday

This picture represents a common phrase, title, or person.

Thank you know the answer? Take a guess at mondaysunday.com/117

the trains chat
definitely not jon cotler

Answers to current crossword (p. 7)

http://puzzlechoice.com