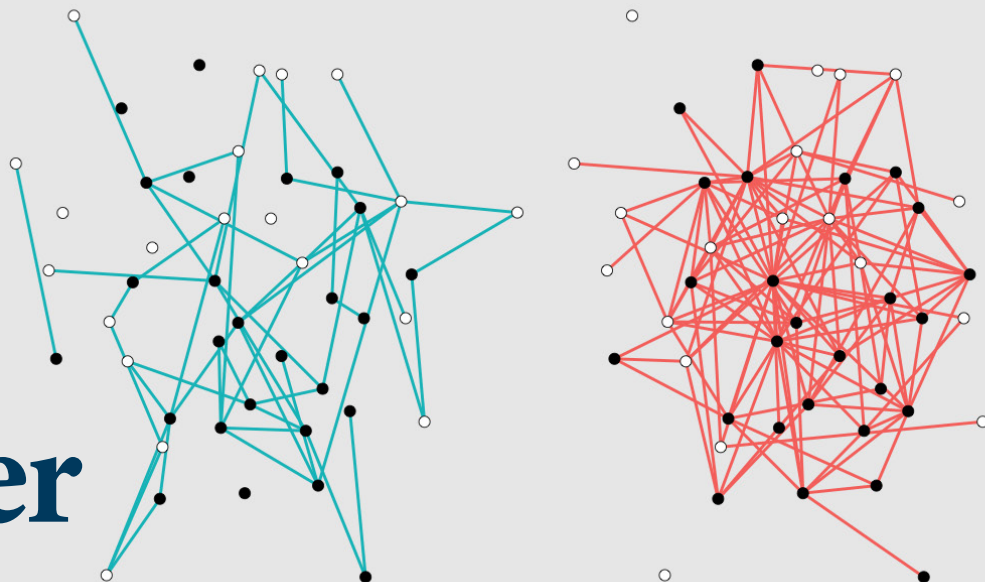


Newsletter

www.kitp.ucsb.edu | Summer 2024



Lars Bildsten

The banner image displays how KITP programs create collaboration networks. One of the institute's most important goals is curating events where scientists who would otherwise not have the chance to interact in a significant way can spend enough time together to form scientific connections. Each point represents a participant in a program that brought together biologists (open circles) and physicists (solid circles). The blue lines in the left-hand image shows the collaborations that existed prior to the event, whereas the red lines on the right-hand image show the new collaborations formed during the program. The increasing number of interactions is evident from the density of red lines, and you can also see that many are interdisciplinary. Across all of KITP's programs, we find that visitors form 2-3 collaborations during their visits. That leads to nearly a thousand new collaborations every year we operate!

On a more somber note, I am saddened to report that we lost a few of our long-term KITP friends and supporters over the last several months. Most recently, Jim Simons passed away. Jim and Marilyn Simons and the Simons Foundation have been strong supporters of KITP, and we celebrated their support a few years back when we named the Simons Amphitheater in their honor. Thankfully Jim, along with Marilyn, was able to visit KITP for this dedication event and enjoy interacting with our scientists. We are grateful that the Simons Foundation and Marilyn Simons continue to be steadfast supporters of KITP.

We also lost Glen Mitchel, Jr. and Charlie Munger. Both personal friends of mine, they contributed tremendously to KITP. The generosity and engagement they showed to me personally, and to the international physics community, was profound. Glen introduced me to Charlie, and that led to our collaborative effort to design and build what became the Charles T. Munger Physics Residence. I share that story on page 2.

With support from the National Science Foundation, we have been hosting a yearly conference for US high school teachers for over two decades. They come for one day of pure science talks

and interactions with KITP visitors. The most recent conference focused on the astronomical drama that occurs when a star in a nearby galaxy ventures too close to the central black hole and gets torn apart. These tidal disruption events are now a well-observed phenomenon that informs us about the fundamentals of accretion onto black holes and the formation of jets of material moving near the speed of light. As in all of our Teachers' Conferences, we take full advantage of KITP visitors to create and deliver the content. On page 5, you can read about the wonderful outcomes from this event.

I mentioned earlier the loss of several of our leading KITP friends and supporters. We also lost UCSB physics legend Jim Hartle in May 2023. Jim was one of the original "Gang of Four" UCSB physics faculty who wrote the founding proposal to the National Science Foundation in 1979 that created the institute. We were honored this year to host a conference commemorating Jim's scientific legacy, bringing together scientists from across the globe. The description of that event is on page 6.

KITP continues to benefit from the generosity of local philanthropists. On the back cover, we tell the story of Paul McEnroe. His spouse, Tina McEnroe, generously supported KITP Postdoctoral Scholars with a gift in his honor. In recognition of this investment, we have dedicated and named the Paul V. McEnroe Hall of Flags at the Charles T. Munger Physics Residence. He has quite a story of entrepreneurial adventures and remarkable impact. Just this year, he published his book *The Barcode: How a Team Created One of the World's most Ubiquitous Technologies* which tells the story of that invention and the impact it has had on society. Paul has been barnstorming on podcasts, interviews and YouTube, so if you want to hear it from him, just search "Paul McEnroe Barcode" and catch his story. It's quite an amazing journey that he has shared with all of us.

In closing, it continues to be a deep honor to lead an institution with such broad support from the international physics community, philanthropists, and the university. Most importantly, all of our achievements should be credited to KITP's most dedicated and effective faculty and staff. Looking forward to sharing more in our next Newsletter about our continued progress and impact!

- Lars Bildsten, KITP Director

Working with Charlie and Glen

Transforming the experience for KITP Visitors



Lars, Glen, and Charlie at the Mitchel Foyer dedication.

I had the distinct privilege of working closely with Glen Mitchel and Charlie Munger to design and build the Charles T. Munger Physics Residence. Now accommodating over 800 visiting physicists to the KITP every year, this facility provides tremendous value to the international physics community. With both their passing this year, I felt it was time to share some of the stories about how we accomplished this project and the impact it has had.

THE NEED

The institute has been operating at UC Santa Barbara since 1979, bringing physicists and their families for long stays that lead to interactions and new collaborations that push back at the frontiers of physics. We accommodated these visitors using a network of housing providers carefully curated by KITP staff member, Monica Curry. Not only was it a challenge, but it also meant that after a day in Kohn Hall they would scatter and stop interacting.

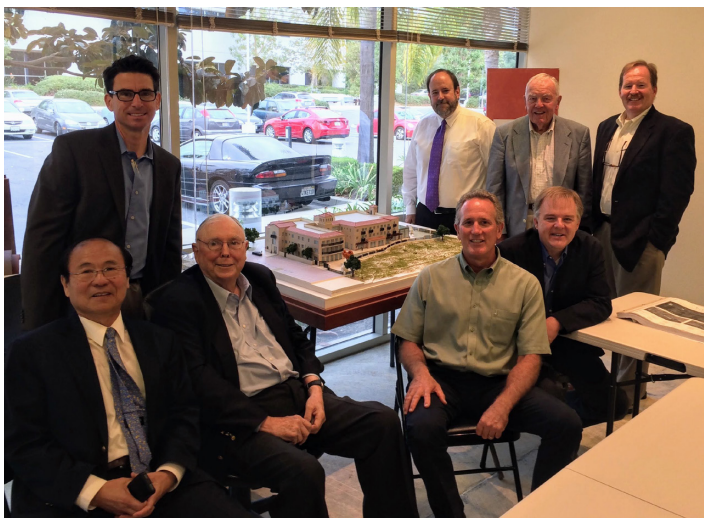
This was a far from optimal arrangement and motivated us to build a facility aimed at our specific need. Chancellor Henry Yang allocated a piece of property for our project, and the prior Director David Gross and I started preliminary planning and design in early 2012 to build the first purpose-built facility aimed at housing visiting physicists. The key project goals were to: (1) alleviate the stress and uncertainty for KITP visitors as they worked with us to find housing, (2) provide a great solution for those visiting with families, and (3) provide a new venue for science and social interactions to continue beyond the workday at Kohn Hall.

THE INTRODUCTION

As part of KITP's mission, we ask our visiting physicists to give lectures to the Santa Barbara public. It is through those events that I came to know Glen Mitchel. He would regularly come to our talks with a number of his close friends and, always eager to know more, would speak with me before and after. Right before I became Director in summer 2012, Glen approached me and asked, "So, what are you going to do when you become Director?" I explained our ambition for housing. Glen was excited to hear about it, thought it worthwhile, and encouraged me to give him all the materials I had available. He was about to go on a fishing trip with a friend who he thought might be interested in helping us achieve our goals. . .

After returning from the fishing trip, Glen called to let me know that his good friend Charlie Munger wanted to meet with me to better understand the project. The meeting was set: 8 AM on July 4, 2012. Charlie was joined by his son, Charles Munger, Jr., his grandson, also named Charles, and Glen. I had only been Director for 3 days!

The breakfast meeting went almost to lunch. Charlie had many questions about our plans and I did my best to answer them all. Thanks to Glen, he clearly understood KITP's mission of achieving science by bringing people together and giving them time and space to interact. All that remained now was sorting out the details of design and construction, as Charlie was clearly committed to making it happen, and Glen was ready to fully engage and bring his expertise to bear.



Charlie, Glen and Lars meeting with Towbes Group and UCSB administration before construction.

THE DESIGN

What ensued were two years of design meetings with Charlie and our KITP team, working with our architect, Murray Duncan. Charlie had many wonderful ideas that did not need any adjustment. For example, he already knew how to best build a structure and walls to avoid hearing your neighbors. Charlie felt strongly about having generously dimensioned spaces, both in the rooms and common areas. He knew very well that those spaces would lead to spontaneous beneficial interactions that he called “Elephant Bumping”.

Not only did Charlie know about construction and design, he also cared deeply about the furniture and the interior design of the facility. This led to the design of a new type of armoire, as well as a club chair the vendor for our project still carries in their production line. Charlie was also the source of an endless stream of on-target and humorous quotes. He was adamant about having a basement in the building, which has proven to be one of the most beloved common areas. However, it added a fair amount of extra construction, to which Charlie commented: “I welcome concrete, it’s one of the few things the Romans got right!”

THE CONSTRUCTION

Charlie had chosen Michael Towbes and his team for the construction, and they did an excellent job. Towbes Group and their head of construction, Derek Hansen, were well experienced and ready to collaborate with us in a unique approach of engagement through design and up to the bidding. Then ensued countless meeting with Charlie, Glen, me and our project manager Ray Aronson to sort through costs and schedules. Throughout that whole process, a clear directive from Charlie was that quality would never be spared.

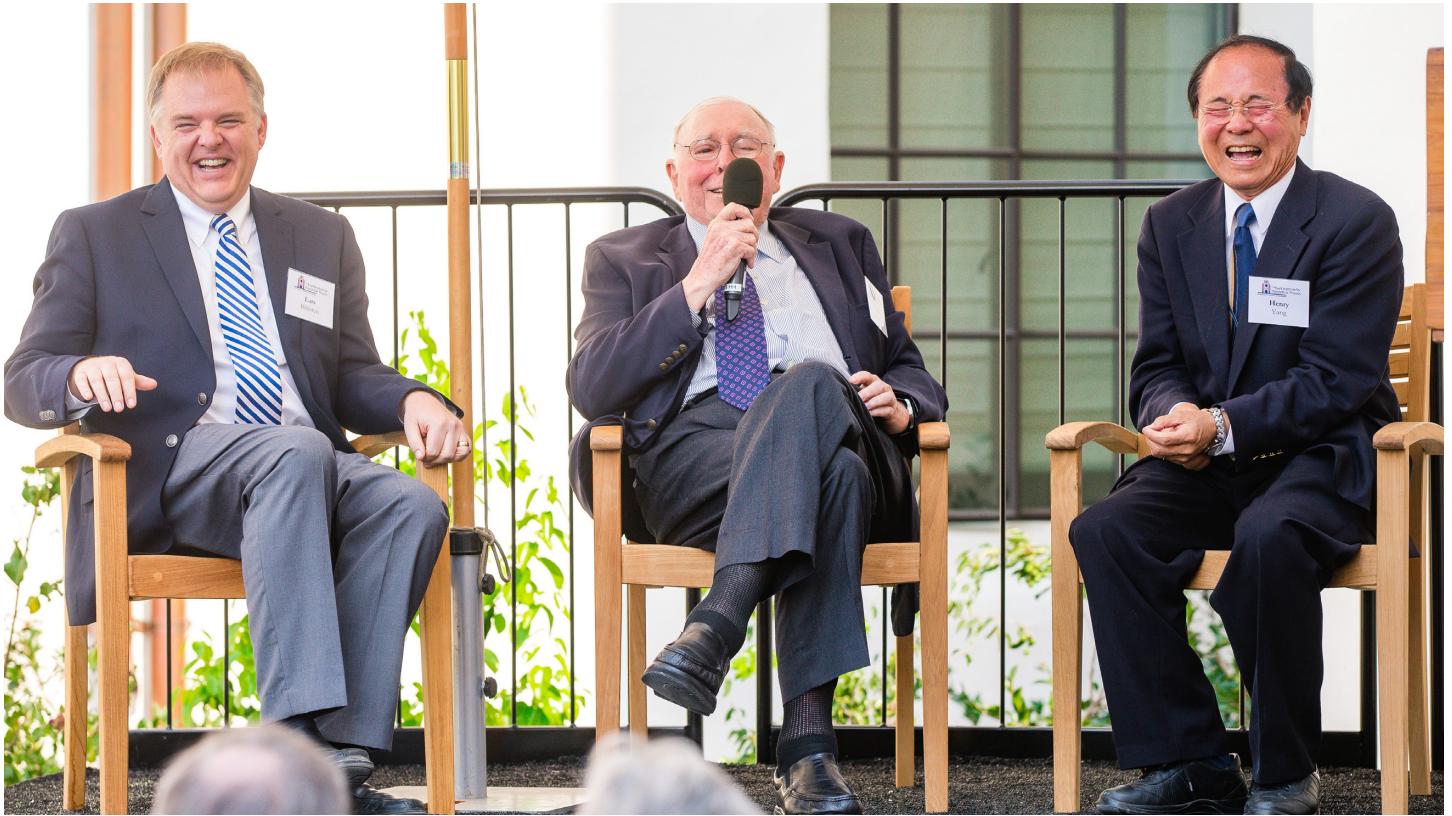
At this point, Glen’s role transitioned. He became famous for his inspections on the job site. He would lace up his boots, drive over and just show up--surprise! This would cause a shock wave on the job site, as Glen had such an eagle-eye for seeing what was happening and, in a very gentlemanly way, pointing it out. Over



Early stages of construction in 2015.



Glen and Lars signing the documents to donate the completed Residence to UCSB.



(Left to right) Lars Bildsten, Charlie Munger and Chancellor Yang at the Residence inauguration.

time, all members of the construction team came to embrace his arrivals, rising to the occasion to proudly show him the work they had done. By graciously sharing his passion for an excellent product that would last for the ages, he inspired all workers on site to do better, as they knew that their work would be recognized and appreciated by Glen. Charlie would also visit the site to assess progress, and even continued to do some last-minute design changes that we were able to accommodate. We opened the Residence for operations in January 2017. When I called the Chancellor to give him the news of completion on time and under budget, he responded, “I’ve never heard that before!”

THE IMPACT

All of our goals were met, and after seven years, the scientific impact of the Residence is evident. With over 13,000 nights a year, and the opportunity afforded for spontaneous and planned interactions, its existence is actively accelerating science. We have accumulated 100,000 nights of stays, and I’m confident the building will last to hit a million nights after many of us are gone. We are ensuring the longevity of the Munger Residence through a robust preventative maintenance program led by our Residence Manager Carlos Gutierrez and the team of custodial workers led by Arlene Contreras.

Every year we survey our visitors and ask a simple question: “What were the scientific benefits of staying at the Munger Residence?” Here are some answers: “I engaged in social activities with physicists I didn’t know from before,” “The residence offered fantastic facilities to entertain the children while having scientific discussions,” and “With excellent accommodations, conditions

were ideal to focus on science, and being housed together with other participants facilitated discussions as well as informal exchanges.”

Design matters, as attested here: “The residence has a perfect combination of comfort, solitude and networking,” “Overall, this is one of the best places I have ever stayed for a workshop or conference. I very much look forward to my next visit!” and “It’s an incredible facility - better than any similar residence for scientific visitors that I have stayed in anywhere in the world.”

And, the elephant bumping did occur, as this quote attests: “I ended up having interesting scientific conversations with people staying in the same suite as I was that I wouldn’t necessarily have spoken to at the KITP itself.”

IN CLOSING

At the Residence inauguration in summer 2017, Charlie was awarded the Santa Barbara Medal by Chancellor Yang. In response, Charlie said: “Thank you very much. That’s what I need is a medal. Really, the real pleasure here is not getting the medals, it’s working with good people. It is absolutely one of the main privileges of life to work together with good people, and you bond in a way that won’t occur in ordinary social life. If you want a great life, you’ve got to collaborate on something difficult with other good people. It’s a simple rule. When you get an opportunity to do it, it’s not a minor opportunity; it’s what life is all about.”

*by Lars Bildsten
KITP Director*

KITP Teacher's Conference

When the teacher becomes the student for a day

On April 27, 2024, KITP hosted the annual Teachers' Conference for high school teachers and 2-year college instructors. This unique conference is one day jam-packed with discussions, classroom demonstrations, networking, and the opportunity for physics educators to learn about the latest developments in the field from leading researchers. This year, the conference was titled *Supermassive Black Holes and their Destructive Tidal Forces*.



DEMI CAIN

The conference is coordinated by a visiting scientist who is also part of a concurrent KITP program on a similar topic. Assistant Professor Kate Alexander (University of Arizona) was this year's leader. "I've always found doing outreach to be

a lot of fun," says Alexander, "and it's actually part of the way I got interested in astronomy in the first place." Her father was a member of an amateur astronomy club, so she fondly remembers attending events like star parties that grew her curiosity and passion. In her view, people who are not professional scientists often have some of the best questions and most interesting perspectives. Talking about science with people outside of the academic research community pushes her to think about her work in new ways, which is why she was happy to take on the role.



DEMI CAIN

Teachers' Conference participants engaging with KITP Postdocs and local physics faculty during the lunch break.

Alexander selected speakers who research a variety of topics, and who have experience giving public talks or working with planetariums, schools, or other outreach initiatives. The first presentation was from Eric Coughlin, an Assistant Professor at Syracuse University who gave an overview of the physics involved in studying black holes. It was an energizing start to the day, and set the stage for Brenna Mockler, a postdoctoral fellow at Carnegie Observatories, to discuss tidal disruption events (TDEs) in greater depth.

TDEs occur when a star is ripped apart by the tidal gravity of a black hole. A portion of the star's mass gets bound to the black hole, which essentially eats the mass through a process called accretion—Mockler compares it to the way marbles would orbit a wishing well and eventually fall into its center. When the mass accretes, it produces a flare of light that scientists can observe and use to study the properties of black holes.

Conference talks by Decker French (University of Illinois Urbana-Champaign) and Adelle Goodwin (Curtin University, Australia) discussed the kinds of data that emerge from these observations, how they are analyzed, and what they teach us about TDEs and black holes. French's work concerns the visible light that results from accretion, while Goodwin studies radio emissions that come from materials moving away from a black hole instead of being consumed.

Most of the conference talks also demonstrate teaching tools or activities participants can take back to their students. Professor Kausik Das from University of Maryland Eastern Shore gave a mid-day demonstration with an online platform that prompted the audience to use their phones to answer questions about common misconceptions in physics. While a room full of students on their phones is a nightmare to most teachers, Das encouraged participants to use technology in the classroom to their advantage by exploring new ways for students to interact with material.



DEMI CAIN

Teachers using their phones for an activity led by Prof. Kausik Das.

Many educators at the conference are recurring visitors who have attended for multiple years. Maajida Murdock is a high school teacher and adjunct physics lecturer in Baltimore, Maryland who has attended so many times that she's lost count! Murdock's passion for science and education is evident. She has dedicated

much of her career to advocating for STEM education that reaches all youth in her community, and she has been extensively involved in efforts to provide after-school and summer STEM programming to youth throughout Maryland.

One of the biggest obstacles Murdock has faced during her time teaching is making physics relevant to her students. She emphasizes that students at any age or educational level must be able to apply what they learn to the world around them. Murdock encourages students to "think about physics not as physics, but simply as the laws of nature. Who can't relate to nature?" However, teachers are expected to follow a predefined curriculum which can add to the challenge. Alexander remembers learning about physics from outdated textbooks in high school that didn't teach her about the latest research or modern methods scientists were using. She appreciates the impact the conference can have by providing teachers with up-to-date knowledge and resources to engage their students more effectively. Educators like Murdock continue to attend the Teacher's Conference to learn about the new frontiers in physics and, most importantly, to learn how to empower their students and demystify the process of scientific inquiry.

*by Demi Cain
KITP Development Coordinator*

Physicists gather to remember the father of quantum cosmology



BABAK DOWLATSHAH

Jim Hartle provided a grounding, yet inspiring presence to his friends and colleagues.

Physicists from around the country converged at KITP from February 12-13, 2024, for two days of talks and camaraderie in memory of esteemed physicist Professor Jim Hartle, one of KITP's four cofounders who passed away in May 2023. The symposium celebrated his outsized work and legacy.

"The idea was to remember Jim's major contributions and talk about where they are now," said his good friend and colleague Professor Gary Horowitz, who helped organize the event.

"Jim was always available for advice and counsel here at KITP," said KITP Director Lars Bildsten. "He could always be counted on for wisdom with a dose of humor."

Hartle's work spanned at least three areas over the course of his career. In the early 1960s, he delved into the interface between general relativity and stellar structure. He worked closely with Nobel Laureate Kip Thorne, from Caltech, who kicked off the event with a talk on Hartle's astrophysical legacy. "It was a joyous time working together," Thorne said, adding that his colleague's research set the foundations for over a half century of work.

In the 1970s Hartle shifted his focus toward black holes, collaborating with physicist Stephen Hawking to develop the Hartle-Hawking state. This formula describes the quantum state of a black hole in thermal equilibrium, with the matter falling into it counterbalanced by the Hawking radiation it emits.

By the '80s Hartle had turned to cosmology, gaining a deep fascination with quantum mechanics shortly after the big bang, when the universe was small, hot and dense. During these brief moments, quantum effects ruled the cosmos. "Jim really devoted the rest of his life to understanding this quantum description of



HARRISON TASOFF

Former KITP Postdocs Sean Carroll and Daniel Holz catch up with Kip Thorne before dinner.

the universe. And he became known as the father of quantum cosmology," Horowitz said.

Perhaps Hartle's most famous paper came out in 1983. In collaboration with Hawking, he introduced a wavefunction to describe the entire universe. In theory, this is a weighted sum of all the ways that the universe could have expanded from an initial point. In practice, the two physicists had to drastically simplify the model. This publication has been cited nearly 2500 times in the published literature.

"It, of course, attracted a lot of attention. A lot of controversy. But

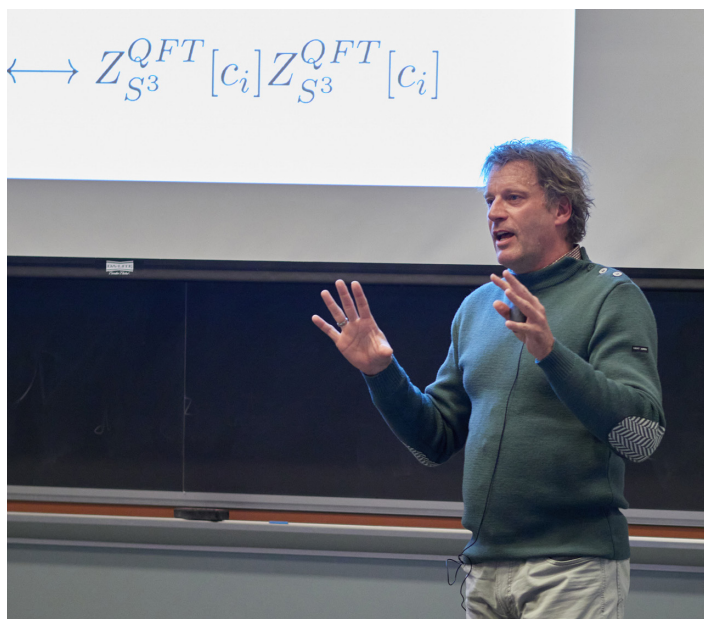
it has really stayed with us,” Horowitz said. “He viewed that as his most significant contribution to physics, and it led to a whole bunch of new questions.”

Standard formulations of quantum mechanics always assume there’s an outside observer measuring a quantum system from a classical frame of reference. “But when you’re talking about the whole universe, there are no outside observers,” Horowitz said. “So Jim embarked on a long-term program working with Murray Gell-Mann — another Nobel-Prize-winning physicist — and together they tried to extend quantum mechanics to systems like the universe as a whole, where there are no outside observers.”

It’s an approach that’s gaining interest as a metatheory to chip away at some of the arbitrary nature of the Copenhagen Interpretation of quantum mechanics. This formulation posits that particles and interactions have no definite existence until a measurement collapses their probabilistic nature into physical reality. “It’s a shortcut, but it’s clearly an approximation,” Horowitz said.

Hartle was one of the founders of KITP, initially called the Institute for Theoretical Physics (ITP). In the 1970s the National Science Foundation put out a call for proposals to establish a center for theoretical physics. Jim and three of his colleagues at UC Santa Barbara put together the winning proposal, and the institute opened in 1979. “That whole concept was the unity of theoretical physics — how it’s one discipline — and that was the founding idea of the ITP,” said Oxford professor John Cardy. Hartle served as its director from 1995 to 1997, hiring Nobel Laureate David Gross to take over his post.

The event’s attendees shared stories of Hartle’s brilliance, patience and humor. “There was a certain time of day, about five minutes before noon, when Jim would knock on my door and say, ‘Are you going to lunch?’” Cardy recalled. “He, himself, always brought his lunch in a brown bag that was labeled ‘brown bag.’”



Thomas Hertog (KU Leuven), one of Jim’s long-time collaborators, reflecting on their years of work together.



Juan Maldacena (IAS) discussing one of Jim’s most famous papers, “Wave function of the Universe.”



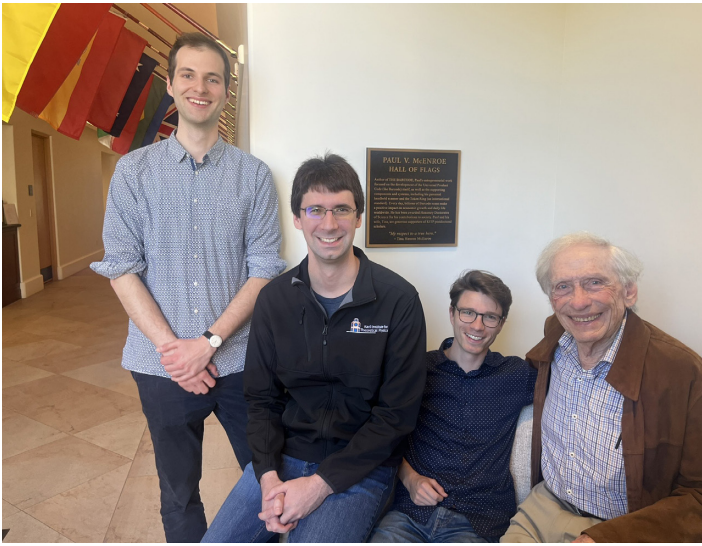
Netta Engelhardt (MIT), who knew Jim while she was a PhD student at UCSB, speaking about cryptographic censorship.

Everyone agreed, Hartle was a warm, caring and patient person who took a great interest in his students, postdocs and colleagues. “I’ve known him for over 40 years,” said Horowitz, whom Hartle brought to UCSB as a postdoc in 1979, and later as faculty in 1983. “Jim was my life-long mentor and colleague.”

“Jim loved the process of testing and refining theories in physics through interactions with other people,” said his wife, Mary Jo Hartle. “He would have been delighted to have brought you together to continue that.”

by Harrison Tasoff
Science Writer, UCSB Public Affairs

Dedicating the Paul V. McEnroe Hall of Flags at the Munger Residence



Paul McEnroe with KITP Postdocs (left to right: Urban Seifert, Logan Prust, Fridtjof Brauns) celebrating the Paul V. McEnroe Hall of Flags.

Earlier this year, longtime Friend of KITP and UCSB Foundation Trustee, Tina McEnroe, made a generous planned gift commitment to the institute in honor of her husband and esteemed engineer, Paul McEnroe. Tina's gift will support the KITP Postdoctoral Scholars Program, which is a unique, highly competitive opportunity for outstanding early career scientists to participate in KITP's diverse research programs and broaden their understanding of physics. KITP invites applications from the international physics community every year and, on average, receives more than 600 applicants for only four to six positions. Mentored by local faculty, KITP Postdoctoral Scholars are very productive — averaging three to four papers and five talks per year. The breadth and depth of exposure to all of physics and the global scientific community, combined with the freedom and stimulating, collaborative atmosphere at KITP that encourages risk taking and the formation of new ideas, affords a truly unique opportunity for our postdoctoral scholars.

In recognition of Tina's investment in KITP's early-career scientists, the institute was honored to dedicate and name the Paul V. McEnroe Hall of Flags at the Charles T. Munger Physics Residence. A beautiful bronze plaque now greets visitors as they enter the

Residence and see the impressive array of flags from around the world, each representing the countries from which all scientists staying at the Residence are coming. The plaque concludes with a heartfelt quote from Tina to her husband, "My respect to a true hero."

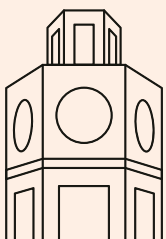


Tina McEnroe signing the documentation to make a gift to KITP Postdoctoral Scholars. (Left to right: Tina McEnroe, Lars Bildsten, Chris Pizzinat, Paul McEnroe)

Paul has always had a desire to make a difference in the world, and he has done just that. Author of *The Barcode*, Paul's entrepreneurial work focused on the development of the Universal Product Code (*the barcode*) itself, as well as the supporting components and systems, including his patented handheld scanner and the Token Ring (an international standard). Every day, billions of barcode scans make a positive impact on economic growth and daily life worldwide. He has been awarded Honorary Doctorates of Science for his contributions to society.

Today, Paul and Tina are the proud owners and operators of Rancho La Purisima, a 1,000-acre working cattle ranch in the Santa Ynez Valley. Tina and Paul founded The McEnroe Reading and Language Arts Clinic at UC Santa Barbara in 2011 and have been generous friends and supporters of KITP for many years. Tina's inspiring investment will have a lasting impact on the future of KITP and, more broadly, on the future of science across the world.

by Kristi Newton
KITP Senior Director of Development



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Kavli Institute for
Theoretical Physics

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