UC SANTA BARBARA

Kavli Institute for Theoretical Physics

Newsletter

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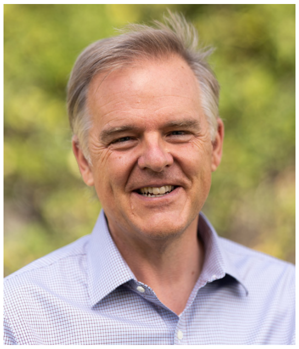
MIKHAIL KISELEV



MIA NIE

Lars Bildsten

The banner image is from our October 5, 2023 pre-picnic soccer match between the two programs that were in residence that day. The two tough 20-minute periods yielded a 6-3 victory for the "Quantum Materials With and Without Quasiparticles" program, which fielded a deep bench of players who were well coached by program coordinator Andrey Chubukov. A wonderful time for all, and, most importantly, no one was hurt!

All of our activities will continue apace, as we have received excellent news from the National Science Foundation that the grant which supports the programs, conferences and many of our staff at the KITP has been renewed! The five-year grant totaling $18.3 million represents an increase from our prior support. This is a testimony to the efforts of all here at the KITP to make this place so wonderfully unique. The anonymous peer reviews were a joy to read, and are evidence of the very strong support we have from the international physics community.

Fall represents the time of transitions for KITP's postdoctoral scholars. Here are the exciting destinations of the eight who have departed. Grant Remmen is now the James Arthur Postdoctoral Fellow in Cosmology & Particle Physics at New York University. Jennifer Barnes is a Senior Algorithm Engineer with 3M in Minneapolis, Minnesota and Chad Bustard is seeking an industry position in climate technology and data science. Many KITP postdocs have also accepted junior faculty positions across the country. Jong Yeon Lee will join the faculty at University of Illinois, Urbana-Champaign, Noah Mitchell is taking up a faculty position at University of Chicago in the spring of 2024, Ryan Thorngren is joining the faculty at UCLA, Meng-Xing Ye has joined the faculty at University of Utah, and Hang Yu just started his faculty position at Montana State University. We wish them all the best of luck!

Six new postdocs arrived this fall. Evan Anders is coming from Northwestern University and pursues astrophysics. In high energy physics, Misha Utasyuk comes from UC Berkeley and Brian Henning comes from the Swiss Federal Institute of Technology. In condensed matter physics, we have Yumi Bao and Tessa Cookmeyer from UC Berkeley. In gravitational physics, we have Tousif Islam from University of Massachusetts, Dartmouth. All are actively engaged in KITP programs and our "Locals" gatherings, where we all learn from each other through talks and conversations.

The article on page 2 highlights collaborative work underway between KITP and the faculty and graduate students of UCSB's physics department. This is an important element of KITP's success, as the physics department here is one of the most excellent in the world. In this case, KITP's Deputy Director Mark Bowick played an important role in this exciting research on the physics of embryo development. State of the art microscopy imaging, sophisticated computational modeling and ideas from condensed matter physics were all essential ingredients in making this collaborative endeavor successful.

KITP is known for drawing scholars from many different fields. Recently, KITP's reputation for engaging lectures inspired new humanities research. On page 4, UCSB Ph.D. graduate and theater studies scholar Cole Remmen shares his research of uncovering performance strategies within practices of science communication, informed by lectures he observed at KITP. He provides historical connections between science outreach and theater, as well as analyzes the function of performance within thought experiments.

We constantly work to bring art into our wonderful architectural spaces of Kohn Hall and the Munger Residence. On page 6, we tell the story of Joel Sansone, a local artist who generously provided a very large enamel piece for the Munger Residence. The story of how it was made is quite intriguing, as are the insights Joel provides about how he approaches his work.

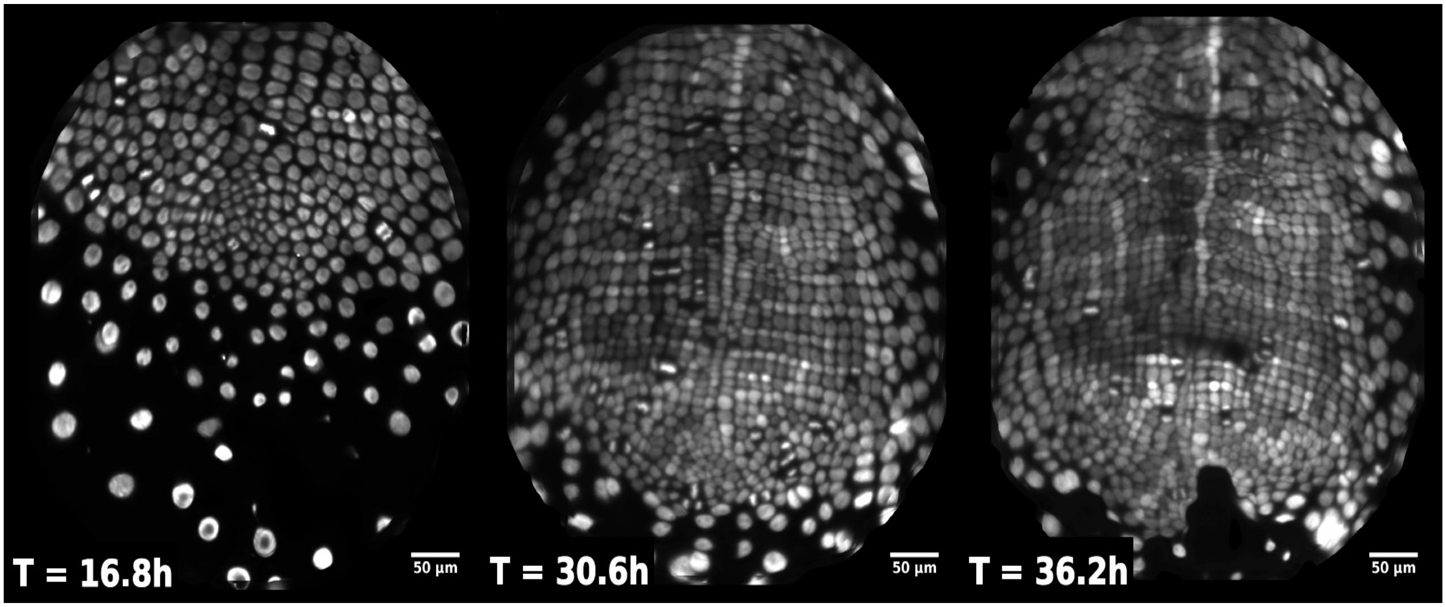
We close on page 7 with an article highlighting the impact of private philanthropy on the careers of early-career scientists during their time with us. As I noted at the beginning of this note, postdoctoral scholars are one group which thrives during their time with us. We also host visiting graduate students from around the world for an intense, collaborative, 6-month stay. KITP Graduate Fellows have gone on to excellent careers in academia and industry, and we thank all of our supporters who make these productive stays possible.

Please enjoy this Fall's Newsletter and I look forward to seeing you at one of our upcoming events.

- Lars Bildsten, KITP Director

Disorder lends robustness to the embryonic development of a tiny shrimp

STREICHAN LAB, UCSB



Light-sheet microscopy images of developing fourfold orientational order in Parhyale

Consider the crustacean Parhyale hawaiensis, a tiny crustacean with some interesting attributes.

"It's been called a 'living Swiss army knife,'" said Dillon Cislo, the lead author of a study that appears in Nature Physics. "It has numerous different appendages and each one is uniquely specifiable by its size and shape. Furthermore, each one of these limbs has a very specific function."

Their fascinating bodies and accessible growth conditions make these creatures a well-chosen model organism for developmental studies. But more than that, according to Cislo, KITP Deputy Director Mark Bowick and UCSB Physics Professor Sebastian Streichan, their embryos are a window into the world of tissue morphogenesis, a field that seeks to understand how a mass of embryonic cells becomes the complex body parts of an adult organism. As a "direct developer," or an organism that builds its adult form — albeit in miniature — as opposed to having a distinct larval form and undergoing metamorphosis, this crustacean is one to watch.

"You're going from this set of randomly ordered cells into all of those crazy, highly articulated appendages in the adult structure," said Cislo, a postdoctoral researcher at Rockefeller University who conducted research for this paper as a graduate student at UCSB under the guidance of theoretical physicists Bowick, KITP Permanent Member Boris Schraiman, as well as Streichan, who specializes in the physics of living matter. Until recently, most observations of embryogenesis involved taking several embryos of a model organism — say, a fruit fly — at different stages of development and "fixing" them in order to freeze them in time. From there, scientists can make calculations and inferences as to the sequence of events that go into the development of their bodies. But what has been less easy to observe is how the young cells find their places and positions at all.

Finding out how it all works together is a hot topic in biology. But it also falls into the realm of active matter physics, a field that is interested in the collective behavior of systems of multiple independent "agents" locally consuming energy. Examples of active matter are diverse, from murmurations of starlings to bacterial colonies to crowds of people. Active matter can also encompass non-biological situations where unit components are out of equilibrium, such as robot swarms.

ORDER FROM DISORDER

When embryonic cells divide, they do so in opposite directions along an axis, and then those daughter cells divide in opposite directions along their axes, and so on, though there is no reason why the division axis of a daughter must depend on the division axis of the parent. Which seems like it would complicate things for tissues whose structures and functions depend on the organization and orientation of their unit cells.

To see how P. hawaiensis' cells tackled the disorder that could be presented by their proliferation, the researchers followed the development of an embryo, three days after fertilization.

"It looks like a thin layer of cells on top of a spherical yolk," Cislo said. To better observe the process, they computationally flattened that curved set of cells into a plane "in a way that respected the three-dimensional geometry of the actual physical configuration," the paper explains, and tracked these cells as they divided and moved around, in the first-ever dynamic analysis of this particular stage of P. hawaiensis' early development.

Twelve hours after the observation start time, the growing population of cells had not only slightly more than doubled, they had arranged themselves into a grid, whose rows would correspond to the segments of the adult body. From there, the monolayer of cells, which roughly corresponds to the area of the belly of the crustacean, undergoes waves of cell division, starting from the midline and spreading laterally, dividing along the axis from the head to the tail of the animal-to-be.

The divisions weren't random, Cislo said. That is, rather than merely becoming a bigger mass of seemingly unordered cells, these cells would divide, then some daughters would reorient themselves by as much as 90 degrees before dividing again in order to maintain their alignment with the head-tail axis.

"As it undergoes its division choreography, you begin to see new rows inserted between rows, pushing the rows above and below apart," he said. "And this is very wild, because in a non-living physical system this is a very energetically expensive operation." In metals and crystals, this mechanism of reorganization would require the material to be heated to thousands of degrees in order to become feasible, Cislo said, "but here the shrimp is doing it at room temperature." To the best of the researchers' knowledge, the general axis of the cell division most likely has to do with a biological signal yet to be uncovered.

Though fragile and in some cases energetically expensive, fourfold orientation in the case of early stages of the crustacean's development is vital, according to the researchers.

"There are some ideas about how to interpret these results," Streichan said. "The basic line of thought involves the orientation of animal limbs. Like our hands or legs, these limbs have clear orientations… and as the body consists of multiple such limbs, proper body function requires a coordination of the orientations of these limbs.

"Imagine your left hand was rotated with respect to your right hand, say 180 degrees swapping the back of your hand and the palm," he added. "Daily tasks would become quite challenging!"

SHAKING THINGS UP

One thing that's important to remember is that this organization exists in a structured fluid state — not quite a fluid and not quite a solid, said Bowick. "From the physics point of view, the phase has the same form as a superfluid," he explained.

It turns out for all the order generated by the gridlike organization of the cells, the potential for disorder presented by the fluid state and the cell divisions is crucial for the flexibility needed for a biological system, Bowick added. "The cells are not just dividing, they're clearly exerting forces on each other as they do so," he said.

The researchers found that the cells, each with its own little motor and its own "clock" for autonomous division, created a certain amount of "noise"— variations and fluctuations — throughout the early cell proliferation stage and in a subsequent stage where cells continued to divide but the tissue itself was also elongating. This noise may at first seem counterproductive to forming a complex body with so many different appendages, but, according to the researchers, the noise itself is necessary for a robust process. Utilizing its fourfold orientation, the system occupies a "Goldilocks zone" between order and disorder: enough order to begin to build the creature, but still open-ended enough to absorb slight discrepancies in the process.

Through a series of simulations, they found that despite variations in timing, or in concentration of divisions (to a certain extent), or the presence of cells that didn't reorient themselves during proliferation, it was still possible to ultimately arrive at the same end result.

"The takeaway is that biology doesn't really have to control things terribly tightly to achieve the desired result," Cislo said — a finding that only a dynamic analysis could generate.

Bowick agrees. "Imagine that you want a system to reach some ordered state; if you're completely static, you'd never find it," he said. "But if you shake up the system, you might allow it to finally settle into a nice ordered state. And what seems to be going on here is that the cell divisions are shaking up the system, allowing it to finally settle into a subtle ordered state."

This study provides a fascinating peek into a rarely seen facet of developmental biology, one that operates along a geometric organizational principle, as seen by its fourfold orientation.

"The fruit fly, which is the hydrogen atom of developmental biology, organizes the segments of its body plan via a cascade of biochemical signals," Cislo explained. "This is something totally different."

"What is cool about Dillon's work is that the orientational order is found at the level of cell position, marking a mechanically observable ordered state," Streichan said. In contrast to the development of other animals whose embryonic cells rely on chemical signals for orientation, in P. hawaiensis the grid patterning is a mechanical event that spans two regions — one close to and one farther away from the head, allowing both regions to agree on the positions of their cells. The grid also guarantees the locations and orientations of the cells that become the limbs even before they develop.

"In many ways, Dillon's project has provided yet another example that biology finds ways of leveraging physics for its purposes," Streichan said.

"There could also be lessons for materials science," added Bowick. "If you want to build interesting materials, you may want to take lessons from biology and drive some of these materials systems out of equilibrium, and make wonderful structures this way."

by Sonia Fernandez
Senior Science Writer, UCSB Public Affairs

Performing Science: Conducting Theater Research at KITP

In my graduate career, I observed many KITP lectures and outreach events; however, my Ph.D. is not in Physics, but in Theater and Performance Studies. In my work, I examine the intersections of performance and scientific practice. Science outreach and communication has significant theatrical history, from the Lavoisiers' 1789 satirical mock trial in defense of their discovery of oxygen (culminating in a ritual burning of books on the competing theory of phlogiston), to Henri Robin's dazzlingly staged astronomical spectacles in nineteenth-century Paris, to public research lectures and press conferences made popular in the twentieth century: all ancestors in a long lineage leading to KITP's public lecture performances. In conducting my research, KITP's unique position as a world-class scientific institute with a legacy of public outreach (alongside rigorous archive-keeping) shaped my research immensely, leading to new conceptualizations of performance in scientific knowledge production.

One of the first research lectures I attended at Kohn Hall took place in the Simons Amphitheater. Arriving early, I entered the room prior to the start of the event. Even when devoid of human interaction within its vibrant salmon walls, it was clear to me that this space was designed for performance, centering the act of observation; indeed, architect Michael Graves drew on the semicircular arrangement of ancient Greek theaters in his design. As the audience of scientists entered, this theatrical space came alive with the human drama of Kohn Hall. The cozy auditorium grew warmer with conversation and literal temperature; the live, bodily co-presence of this ad hoc community of audience members — of scientists, physics students, and the speaker — was made palpable by the heat and humidity. Counter to the stereotype of the cold rationality of science, this coalescing community exemplified the vibrancy of science in action. Such gatherings, so dependent upon the live interaction of the lecture form, hint at how scientists depend upon means of performance in order to generate and share their findings.

My Ph.D. dissertation at UC Santa Barbara, The Act of Discovery: Tracing Performance in/of Scientific Knowledge Production, digs beneath the surface of these research talks, uncovering strategies within scientific epistemological practices that engage qualities of performance. I developed my conceptual framework through examining research lectures at KITP, identifying performance within the practice of thought experimentation and the cognitive processes of discovery. I further investigated how lay-oriented publications and outreach talks encourage audiences to enact discovery through engaging with thought experiments based on familiar experiences. Synthesizing scholarly conversations across humanities fields, my analysis highlights the heuristic and epistemological capacities of performance, drawing from contemporary lectures as well as archival cases including talks of Polchinski, Susskind, Shankar, and more.

Engaging performance-based means to prompt reenactments of discovery, thought experiments are a particularly distinctive practice in physics; as such, my dissertation focuses on thought experiments designed to share theories of physical laws, from

GARY SMABY

KITP Permanent Member David Gross and scientists in the Simons Amphitheater

Joseph Polchinski

Leonard Susskind

Galileo to Einstein to emerging theoretical physics. Drawing on these cases, I contend that scientific thought experiments stage imagined scenarios within the minds of the audience, allowing for a mentally enacted form of performance that translates new scientific concepts through recalled familiar embodied experiences. I further analyzed works of science-oriented theater from the Cold War, namely the plays Galileo and The Physicists, as well as the opera Einstein on the Beach, to highlight how theater can stage scientific discoveries. I highlight how science theater physicalizes thought experiments onstage to communicate key concepts of physics to a broad audience; in particular, in analyzing Einstein on the Beach (a title possibly inspired by a photograph of Einstein in Santa Barbara) I identify how the opera stages Einstein's famous thought experiments involving relativistic trains and frame-dependent simultaneous flashes of light through its avant-garde aesthetic, imparting a sensorial awareness of the physicist's theories to the audience.

Thought experiments, I argue, encode knowledge within quasi-dramas with engaging narratives and stock characters (Alice and Bob) through which one can perform a mental experiment within the theater of the mind. Through descriptive imagery and clear establishing parameters, a physicist "sets the stage" and encourages participation in the imagination. In subsequent narrated events akin to scripted stage direction, the audience is led to mentally carry out the described action. These events, whether mundane (riding an elevator) or fantastically impractical (falling into a black hole), recuperate and build upon familiar sensorial experience to transmit mathematical concepts in a clear, concise manner. In research talks, this is done in tandem with mathematical explanation; however, public outreach lectures rely considerably more on these performative, narrative-based approaches. Throughout, as I personally experienced in numerous talks, the audience is guided to recreate some sense of the cognitive breakthroughs of the researcher, reenacting the process of discovery for themselves. In uncovering such overlooked performance strategies that underlie processes of scientific discovery and communication, I bring together scholarship from performance studies, theater studies, science and technology studies, and the philosophy of science, working across disciplines to intervene in extant understandings of the production of scientific knowledge.

Theater scholar Bert O. States once noted that "scientists probably don't become scientists, or artists artists, to discover new things, but to perform the activity of discovery, which is one of the great pleasures of life." Pointing out the similarities of performance — specifically, that of the act of discovery — across disciplines, States contends that the joy found in the process of discovery is more compelling than the simple knowledge of the discovered fact. Though art and science may seem vastly different on the surface, this pleasure of discovery is shared by the two. Employing language that implies a theatrical metaphor and evokes action within discovery, States suggests performance as a key component of this unifying feature. My focus on the act of discovery builds upon States' supposition and bears interdisciplinary motivation.

As Joe Polchinski once quipped at his 2014 "Spacetime versus the Quantum" KITP outreach talk, displaying a slide with the Dirac equation, "I know… you're not supposed to have equations in a public lecture… so think about this as a piece of art." In my work, Polchinski's quote serves as a useful guiding metaphor. I take his remark as an imperative challenge, seeking to look beyond the equivalence Polchinski implored in order to probe a deeper connection: not simply an equation as art, but how scientific knowledge is, at times, communicated through means of performance. The framing of performance as a means of knowledge-making that functions within not only art, but scientific practice as well, is a common thread that links the case studies of my dissertation, many of which come from the lectures I observed at KITP.

KITP's status as a nexus of top physics research with a legacy of communicating science through invigorating, collaborative lectures and public talks made it a prime place to study performance within scientific practice. My experiences at KITP helped me to shape my research; the case studies that influenced my work stand as a testament to the institute's remarkable capacity for not only serving as an incubator for groundbreaking research in theoretical physics, but also for communicating this vital work to the public.

by Cole Remmen
UCSB, Ph.D. 2023

Artist Profile: Joel Sansone

We have had the pleasure of engaging many artists over time to enhance KITP's intellectual environment with their wonderfully inspirational pieces. One such artist is Joel Sansone, who, as a junior high school student, would doodle on the back of his history tests - "My test would always come back with a big fat F on the front, and a big A on the back," he recalls. He went on to major in art at Bowling Green State University, where he discovered enamel as a medium. In 1977, Sansone set up his studio with his wife, Pamela, at the Los Angeles Cultural Center, where he was the only enamellist. After exhibiting his work at galleries across Los Angeles, he and Pamela opened their own studio and gallery in Los Olivos in 1996. The Sansones have welcomed customers to their gallery from 24 countries and nearly every US state.

In addition to his own gallery, Sansone has exhibited his work at the LACMA, the Armand Hammer Museum, Pacific Design Center, the Riverside Museum of Art and the Long Beach Museum of Art. Joel came to our attention during the construction of the Munger Residence, and I had the pleasure of working with him and his wife Pamela to locate Stellarscape within the building (requiring the relocation of an internal wall!) and hang the piece with the craftsman Mason Mill of the Towbes Group.

We reached out to Joel with a few questions in Summer 2023 to learn more about his inspirations, technique and current work.

What inspired you to bring Stellarscape to KITP?

"Stellarscape was displayed on a wall in our studio/gallery for many years. The artwork was enjoyed by many people. It was the main attraction in the gallery. As the years passed, I realized that Stellarscape needed to be exhibited in the proper setting for public viewing. I had known that UCSB was well known for its Physics Department and through various channels, I reached out to Chancellor Yang with a photo, bio, and other information about myself. My intentions were to donate the artwork to the University.

Sometime afterward, I was contacted by the Development Department informing me of the acceptance of Stellarscape. I was also told afterwards that the Charles T. Munger Physics Residence was to be built and that Stellarcape was considered for that location. During the eighteen months of construction, the artwork was crated and stored until the installation day. I couldn't be more proud for Stellarscape to be displayed in such a beautiful environment."

Could you tell us briefly about how you made Stellarscape?

"Vitreous enamel is an especially formulated glass that will fuse to copper, gold or silver in a kiln at approximately 1500 degrees Fahrenheit (1100 K for the physicists!). Multiple applications and firings and coolings are required to achieve the desired results. The enamel is available in ground glass, threads, lumps and granules. The type used for Stellarscape is ground to a very fine state and sifted onto the copper.

Vitreous enamel is a glass, whether transparent, opalescent, opaque, black, white or colors. When this glass is pulverized, applied in the dry state to copper, and fused to the base at temperatures about 1500 degrees Fahrenheit, it is known as vitreous enamel. After a short cooling period, additional enamel is applied to the surface and the piece is returned to the kiln.

Each enamel layer may require multiple firings until the desired results are obtained. Stellarscape started out many years ago as a great enameling adventure. That adventure continued for 17 months to completion. The work is created from 45 geometrically cut sheets of copper, an unknown quantity of vitreous enamel (ground glass) and approximately 500 firings in a kiln at 1500 degrees Fahrenheit. Stellarscape represents nebulae. The total size is 8 feet in diameter and divided into 3 sections. Although the artwork can fit completely together, I chose to separate 3 sections for a design feature."

What are you working on now that relates to Stellarscape?

"During a conversation with a fellow artist a few years ago, I had mentioned that I had retired. He told me that artists don't retire, they transition. I did just that. I transitioned from an enamellist artist to a painter. Although I have paintings of various subject matter, astronomical images are my favorite. I have been painting my interpretation of nebulae, moons, stars, planets and galaxies on canvas. Recently I have been experimenting on rock slabs, oval and round cobble rocks. I'm currently working on a boulder size elongated rock. The plan is to paint a nebulae and develop it into a vertical sculpture supported with a cradle type iron stand. It's a thought process so far."

Joel and his wife Pam were kind enough to stop by the Residence this summer and share three of these painted cobble rocks. One is now proudly displayed in my Kohn Hall office, while the others are in the main office and custodial break room at the Residence. Joel continues to inspire us all and cause many new conversations!

by Lars Bildsten
KITP Director

Questions of the Universe

Support for KITP's early-career scientists

MIA NIE

Spring 2023 KITP Graduate Fellows

Emerging scientists come to KITP from a variety of sub-fields of theoretical physics with a shared purpose: to take advantage of KITP's unique environment, participate in research programs with leading scientists from around the world, find career mentors, and broaden their understanding of physics. Glenn Duval and Virginia Castagnola-Hunter are two of many stalwart supporters who focus their efforts on early-career scientists through the KITP Graduate Fellowship and KITP Postdoctoral Scholars Programs.

JOSH BELLER, MI BELLE PHOTOGRAPHERS

Glenn and Bettina Duval

"UC Santa Barbara gives scientists time and space to contemplate the largest and most powerful forces in the universe," said Glenn. "Our Pacific ocean, under crystal clear skies, creates a physical canvas that physicists can paint upon. There is no place in the world where people are free to collaborate in such a picturesque setting!"

Every year, the KITP Graduate Fellows Program offers a competitive opportunity for 16 outstanding graduate students from around the world to spend six months at KITP. Each graduate fellow is mentored and encouraged to participate in KITP programs and community talks. Their talent, combined with access to a world-class scientific community, has produced impressive results. Over half of KITP Graduate Fellows now serve in faculty positions, with the others employed in industry or at national labs.

Christopher O'Connor

Fall 2022 KITP Graduate Fellow Christopher O'Connor first learned about the opportunity from his doctoral advisor at Cornell University. An upcoming two-month program on white dwarf stars matched his research topic. When Chris received his acceptance, it felt like being accepted to college all over again—pure excitement for the future. At KITP, he worked closely with Director and Gluck Professor of Theoretical Physics Lars Bildsten.

"I learned how to use Modules for Experiments in Stellar Astrophysics (MESA), which is state-of-the-art software developed at KITP and now widely used by astrophysicists to simulate the structure and evolution of stars. I also experienced a variety of research styles differing from my own, which opened my mind to new approaches. The project I carried out laid a foundation for several others I will pursue as a postdoctoral scholar, including some in collaboration with scientists I met at KITP. It's clear that my experience will have a lasting positive impact on my academic career," said Christopher.

"I had a wonderful time working with Chris," said Bildsten. "Even before he arrived, he reached out to talk with me about the scientific work he was eager to undertake while at KITP. The work we did together to better understand how a star responds to the engulfment of a Jupiter sized planet pulled me in new directions I had never imagined. It was a joy to have an early-career scientist actively reset what I'm thinking about!"

The KITP Postdoctoral Scholars Program attracts about six new scholars out of 600 applicants each year. Here for three years, they join a cohort of 15-18 postdoctoral scholars in residence to broaden their perspective on theoretical physics and work closely with mentors. In addition to scientific advice, KITP and UCSB Physics Department faculty mentors provide relevant career advice and assistance in their subsequent job search. In turn, scholars hone their pedagogic skills by mentoring KITP Graduate Fellows, working with UC Santa Barbara Physics graduate students and engaging in outreach activities.


JEFF LIANG

Isabel Garcia Garcia

In 2017, Isabel Garcia Garcia spent six months visiting KITP during her last year as a graduate student at the University of Oxford. She had such a formative experience as a Graduate Fellow that she decided to reapply as a Postdoctoral Scholar, and was accepted as part of the 2018-2022 cohort.

"One of my most memorable experiences while at KITP was when I gave a public lecture as part of the Café KITP series. That was my first experience talking to a large non-scientific audience, and I had little confidence in my ability to pull it off. The reception from the audience was so amazing and, most surprisingly to me, I enjoyed it so much myself that it remains one of my happiest memories of my time at the KITP. The coaching and support from KITP staff in preparation for this event was really key in making this such an enjoyable experience. Since my Café KITP talk, I have been involved in a number of public lectures and similar outreach events, and this will no doubt continue to be the case going forward," said Isabel, who recently accepted a faculty position at the University of Washington.


MATT PERKO

Virginia Castagnola-Hunter

For Friends of KITP like Virginia "Ginnie" Castagnola-Hunter, this program is a chance to engage with a bright community of scholars while supporting its growth. Virginia's long-standing legacy at KITP can also be seen in the Castagnola-Hunter Tower Room of Kohn Hall, where many of these young scientists gather to work.

"This is an investment in the future," said Ginnie. "Private support of the endowment that sustains postdoctoral scholars ensures that KITP has the resources to train and launch them in perpetuity, independent of outside circumstances such as the changing funding landscape for science. Investigating and understanding the universe is the key to our future."

by Jillian Tempesta
Associate Director of Content Strategy, UCSB Development

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