



UC SANTA BARBARA
Kavli Institute for
Theoretical Physics

KITP Postdoctoral Scholars Annual Report 2024-2025

Launching the next generation of physicists

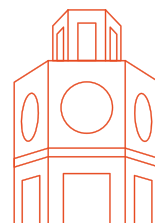
The collaborations and lifelong connections forged by KITP Postdoctoral Scholars shape the institutions they join, the research they lead, the students they mentor, and even the industries they influence. At KITP, they learn to ask bold questions, recognize patterns, take intellectual risks, and work across disciplines—skills essential not only to their careers, but to the future of physics itself.

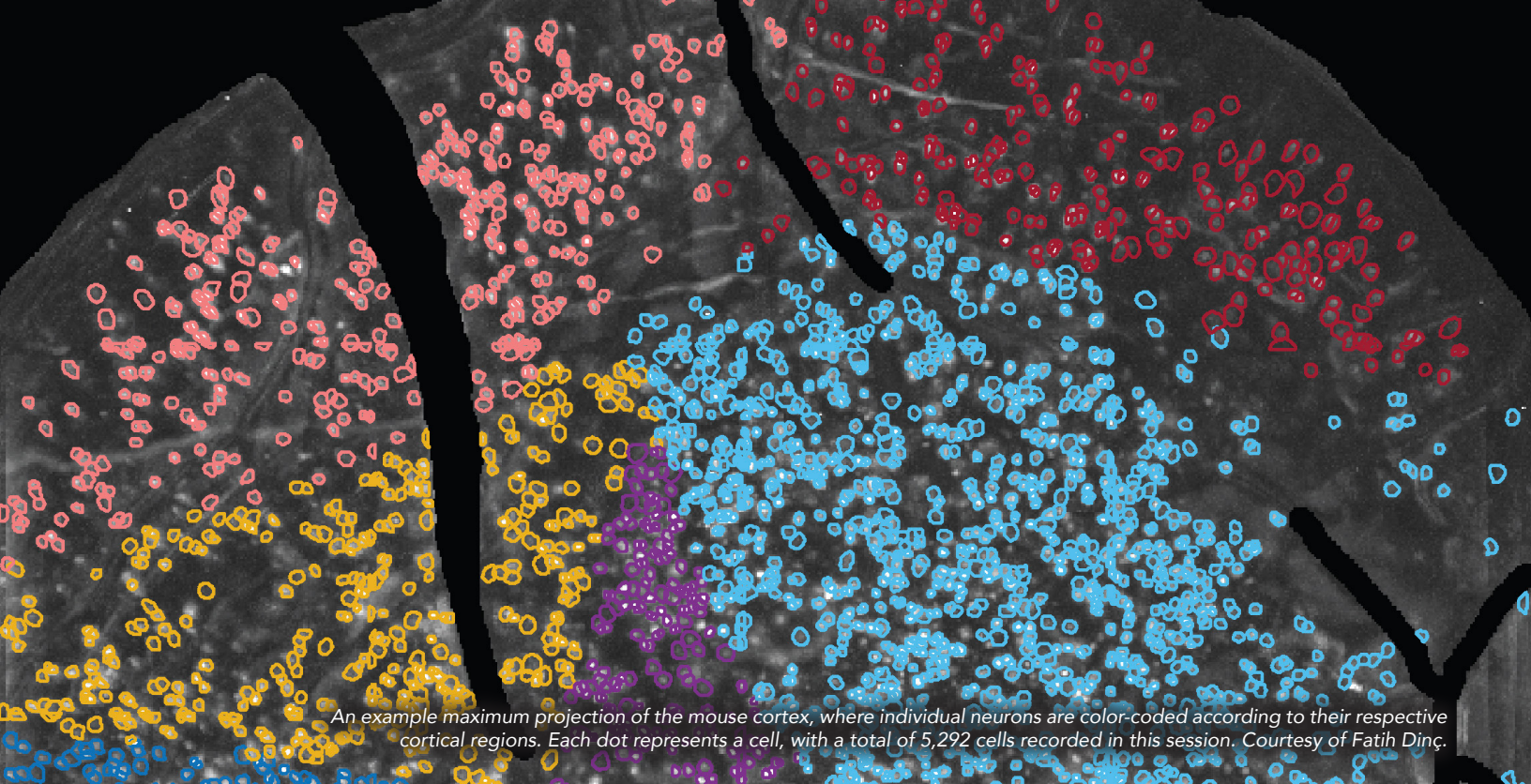
To ensure the long-term excellence and impact of the KITP Postdoctoral Scholars Program, we established an endowment dedicated to their professional development. **This fund enables postdocs to acquire essential computing tools, host visiting collaborators, and participate in conferences around the world where they present discoveries and spark new research directions.**

KITP received a \$1 million anonymous gift commitment to create the Mitchel Postdoctoral Scholars Career Development Endowment in honor of Glen Henry Mitchel, Jr. in late 2024. Glen was a longtime Friend of KITP, a devoted champion of early-career scientists, and a key contributor to the realization of the Charles T. Munger Physics Residence.

To magnify the community's investment in KITP Postdocs—and to create a meaningful tribute to Glen—the anonymous donor offered a dollar-for-dollar match for all gifts and pledges made by fall 2025. **Thanks to the extraordinary generosity of Glen's family, friends, and fellow Friends of KITP, we met the challenge and achieved our \$2 million goal.**

We look forward to building on this momentum, growing this transformative resource, and expanding the support we provide to KITP Postdoctoral Scholars.





An example maximum projection of the mouse cortex, where individual neurons are color-coded according to their respective cortical regions. Each dot represents a cell, with a total of 5,292 cells recorded in this session. Courtesy of Fatih Dinc.

Science Highlights

Fatih Dinc and collaborators developed analytical and computational frameworks revealing how neural and physical systems learn, represent, and self-organize. They identified a “ghost” mechanism explaining how recurrent networks acquire memories during learning through abrupt transitions, designed trainable reaction-diffusion models of morphogenesis in diffusive media, and formulated a theory of parameter identifiability and preserved dynamics for training in silico digital twins of the brain.

Amalia Madden and collaborators are proposing a new detector to search for dark matter, the mysterious substance that makes up most of the universe’s mass. Their design uses thin glass sheets where dark matter particles could convert into sound waves, read out by ultra-sensitive quantum sensors. This approach aims to reveal dark matter particles’ microscopic properties, including their mass and possible tiny electromagnetic interactions with ordinary matter.

Wen Wang and collaborators employed state-of-the-art, large-scale determinantal quantum Monte Carlo to advance understanding of correlated quantum materials. She identified ordering in flat-band systems arising from nesting in the wave-function and linked it to quantum geometry. She also quantified pseudogap signatures in the Hubbard model consistent with experiment, illustrating how scalable numerics sharpen mechanisms and clarify novel electronic behavior.



“KITP has proven to be a dynamic and exciting research environment. The programs, conferences and visitors coming for extended stays provide a continuous influx of new ideas from all over the world. Over the past year, this has led to multiple collaborations as well as informal conversations that have widened my perspective on my own work.”

Thomas Kiely • Current KITP Postdoc

Mentorship

KITP Postdoctoral Scholar Yimu Bao observed a need for early-career scientists in quantum information science and condensed matter physics—especially graduate students—to connect without an active collaboration in progress. The field is rapidly developing so there are new findings to review constantly, but due to KITP’s interdisciplinary nature, there may not always be related programs taking place.

This led Yimu to the idea of starting a journal club for grad students, postdocs, and sometimes UCSB or KITP faculty to discuss recent papers together and brainstorm new research directions inspired by them. Since May 2025, the group has met weekly to review papers in arXiv (an online archive of research papers in numerous disciplines). Meetings include a seminar in which a presenter leads an in-depth discussion focusing on just one paper.

The club has grown to around 20 grad students and postdocs, some of whom didn’t know each other beforehand. Yimu keeps them connected through a free messaging platform where they continue to share papers, online talks, and other resources that enable physics discussions to emerge organically.

“It is a good mentoring experience for me. It is great to see this journal club let us read new papers seriously, generate random thoughts, and talk to other people. It confirms to me that science is a collective effort, and we need to talk to each other to be productive.”

Departing Postdoctoral Scholars

In Fall 2025, six KITP Postdocs advanced to new positions in industry and academia. **Utkarsh Agrawal** started his own company, DigitalFence. **Fridtjof Brauns** left to become a Junior Group Leader at the Max Planck Institute for Physics of Complex Systems in Dresden, and **Alex Homrich** is now a Burke Fellow at Caltech. **Ali Lavasani** took a science position at Quantinuum, while **Chris Ni** is now a Quantitative Researcher at Citadel Securities and **Logan Prust** is a Flatiron Research Fellow at the Center for Computational Astrophysics in Manhattan.

This Year, By the Numbers



4 scientific papers
published by each postdoc

Less than **1/2** co-authored
by UCSB or KITP faculty



5 scientific talks
given, on average, at
conferences around the
world by each postdoc



5 UCSB undergraduates
mentored
30 UCSB graduate students
mentored

“KITP is truly a unique place to be a postdoc. It places you at the center of a vast scientific world. I’ve had the pleasure of connecting with scientists across many disciplines for prolonged periods. This cross-disciplinary access has significantly advanced my career. During my time organizing a KITP program, I have gotten to appreciate all the expertise and effort by the permanent members and staff to seamlessly foster these dialogues. These connections wouldn’t be possible without this institutional support.”

Jessica Howard • Current KITP Postdoc





KITP House: A dedicated space for early-career scientists and long-term visitors

At any given time, KITP employs 15-20 Postdoctoral Scholars who typically spend three years at the institute. Postdocs are challenged to find suitable housing in the local market, which has very limited vacancy and high rental rates. Following the success of the Charles T. Munger Physics Residence, KITP is now establishing a new shared living facility to house longer-term scholars in close proximity to Kohn Hall as well as the Residence. KITP House will provide certainty in housing for our postdocs and grad fellows while allowing for more continuous collaboration between short-term and long-term scholars.

Looking Ahead

With our \$2M Mitchel Career Development Fund matching goal achieved, our top priority remains building an endowment to fully support the salaries and benefits of all KITP Postdoctoral Scholars. Postdocs at KITP pursue bold ideas, forge global networks, and advance theoretical physics.

This report highlights how KITP Postdoctoral Scholars are leveraging this unparalleled opportunity to advance their research and build impactful careers. KITP continues to improve the program by inviting feedback from former scholars who consistently tell us that their time at KITP remains one of the most formative and productive stages of their professional lives.

If you share our passion for curiosity-driven, collaborative science, we invite you to help us reach our \$30M endowment goal. We are deeply grateful to those who have already invested nearly \$7M toward this vision, ensuring stable support for the future of scientific discovery. With your support, KITP will continue exploring new frontiers and launching the next generation of leaders in science.

As we build the KITP Postdoctoral Scholars endowment, we are enormously grateful to the Gordon & Betty Moore Foundation and the Simons Foundation for their generous support of this program.

To learn more, please contact:

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