YQ

YALE QUANTUM INSTITUTE
ANNUAL REPORT

2025

Participating Partner

INTERNATIONAL YEAR OF
Quantum Science
and Technology


home of everything
quantum at Yale

On the cover

State of lights in a superconducting qubit devices, engraved on a copper place. Artwork by Serena Scapagnini, YQI Artist-in-Residence

Welcome

Welcome to the Yale Quantum Institute's Annual Report for 2025.

This year is particularly momentous as it marks the International Year of Quantum Science and Technology, proclaimed by the United Nations and UNESCO, recognizing 100 years since the initial development of quantum mechanics. We are proud to be an active participant in this global initiative and are looking forward to celebrate the advancements and potential of quantum technologies, highlighting their transformative impact on various sectors and their promise for the future.

At the Yale Quantum Institute, we continue to drive forward our mission to advance quantum research, foster interdisciplinary collaboration, and educate the next generation of quantum scientists. Our institute is a hub of innovation and discovery where pioneering research and groundbreaking experiments are shaping the future of quantum science.

In this annual report, you will find highlights of our key achievements, research breakthroughs, and community engagement efforts from the past year. We are excited to share the progress we have made and the inspiring stories from our vibrant community of quantum scientists and enthusiasts.

As we celebrate the International Year of Quantum Science and Technology, we remain committed to pushing the boundaries of what is possible and inspiring innovation that will benefit society as a whole. Thank you for your continued support and for being a part of our journey.

Organizational Structure

The Quantum Institute is run by the executive team and advised by a board of faculty members from five departements at Yale. This year, we welcomed Amy Badner as our new Events Coordinator, replacing our long time collaborator Racquel Miller who took a position at the Yale School of the Environment.

Robert Schoelkopf

Institute Director

Rob is Sterling Professor of Applied Physics and Physics and the Co-Founder of Quantum Circuits Inc and its Chief Scientist. He is widely known as one of the founders of the superconducting quantum computing field.

Florian Carle

Managing Director

French rocket scientist with a theatre background turned quantum science manager, he develops science outreach programing mixing art and science to make quantum physics accessible to all.

A. Douglas Stone

Deputy Director

Doug is the Carl Morse Professor of Applied Physics and Physics at Yale University. He is the author of the book Einstein and the Quantum: The Quest of the Valiant Swabian.

Amy Badner

Events Coordinator

After working at the Center for Business and the Environment at Yale, and the Yale Nanobiology Institute, Amy is leaving behind the world of life sciences to join the dark side of inert physics!

Advisory Board

The committee provides persepective and advice about the Yale Quantum Institute to the Yale Quantum Institute director and to the provost.

Committee Members

Charles Brown
Michael Crair
Yongshan Ding
Steve Girvin
Jack Harris
Karsten Heeger
Sohrab Ismail-Beigi
Shruti Puri
Nicholas Read
Robert Schoelkopf
Daniel Spielman
Douglas Stone
Hongxing Tang

About the Institute

Life as we now know it would not be possible without several profound scientific and technological revolutions over the last century: the Industrial Revolution, the internal combustion engine, the telephone, and, most recently, the Digital Revolution which ushered in computers, cellular phones, and the Internet.

This transformative period was made possible by quantum theory, developed in the first half of the 20th century, which explained the fundamental laws of the atom and of light. At the onset of the 21st century, we are on the brink of a new quantum revolution – and Yale is paving the way. Our faculty members, spanning the departments of Physics, Applied Physics, Computer Science, and Electrical and Mechanical Engineering, are making scientific breakthroughs that would have been unimaginable only a few decades ago. The Yale Quantum Institute was formed in 2015 to advance the progress in fundamental and applied quantum science at Yale and in the broader community of researchers across the globe. Yale has particular expertise in the theoretical and experimental development of new technologies to store and process quantum information. Our goal is to better understand the fundamental quantum laws that govern our universe, and to harness the unique features of quantum mechanics for novel sensors, secure communications, and, eventually, the realization of large-scale quantum computers. We now know that by employing a kind of massive parallel processing, computers based on “quantum bits” can address problems that would otherwise remain forever beyond the reach of our current computers. These problems include basic algorithms underlying secure communication on the internet as well as quantum simulations of new materials, complex optimization problems, and improved machine learning. As with conventional computers, the true scope of their utility will only be discovered once they are built. Beginning with pioneering work on macroscopic quantum coherence in the 80’s, to the realization of today’s quantum information processors, Yale professors are renowned for their leadership in the Quantum Revolution. In the past fifteen years, under the leadership of Devoret, Girvin, and Schoelkopf, the Yale superconducting science and technology team, comprising more than fifty researchers, has demonstrated several milestones in quantum computing including the development of the first solid state quantum information processors based on superconducting electronics. Together, the members of YQI are pursuing the collective goal of turning quantum physics into practical technologies and advancing our fundamental understanding of quantum science and engineering. We welcome researchers from around the world to visit and participate in this intellectual adventure.

Institute Mandate

Quantum sience is seen as a particularly difficult and intimidating subject. At YQI, we work to make it accessible to all.

EXCELLENCE IN RESEARCH AND OUTREACH GO HAND IN HAND

All the programming and outreach activities performed by YQI is only possible thanks to the excellence of the research performed in the quantum laboratories. For more than 20 years, Yale has been at the forefront of quantum research, developing systems, theories, algorithms, tools, and techniques that have been widely adopted by the industry and tech giants, and training graduate students and postdocs who became an invaluable workforce: researchers and leaders in industry and national laboratories, lecturers, and associate and full professors in academia. YQI's programming and outreach activities are made possible by the excellence of quantum research performed at Yale.

30
RESEARCH GROUP

169
PUBLICATIONS

21,039
CITATIONS

90
EVENTS

In 2024 - Data: Scopus Dec 2024

DIVERSITY, EQUITY, AND INCLUSION

The Yale Quantum Institute is committed to fostering an environment of diversity, equity, and inclusion for every member of our community as we strive for excellence in research, teaching, and mentoring. We have established programs encouraging a welcoming environment that respects groups and their individual members: Physics Open Mic empowers students and postdocs by giving them a platform to voice their ideas; and the speakers for our outreach programs are invited with gender parity and racial diversity in mind to give attendees a correct representation of the field as well as challenge unconscious bias.

5
DEPARTMENTS

125
GRAD STUDENTS

54
POSTDOCS & ARS

2
STAFF

Mission and Programing

The Yale Quantum Institute was founded to enhance Yale's leadership in the field of quantum science and technology. It serves as a forum to bring together experimental and theoretical researchers at Yale in the fields of quantum information science and engineering, quantum control, quantum measurement, and quantum many-body physics and chemistry. The Institute also runs an active visitors program to bring in quantum scientists from leading institutions worldwide, and hosts conferences and workshops in sub-fields relating to its core mission. The past two decades have seen breakthroughs in both the theory and practice of quantum science. The properties of superposition and entanglement, once thought of as paradoxical and counter intuitive, are understood now as unique resources. Recent progress in the laboratory allows unprecedented control over individual quantum objects, whether they are naturally occurring microscopic systems like atoms, or macroscopic man-made systems with engineered properties. These advances may soon enable us to: perform otherwise intractable computations, ensure privacy in communications, better understand and design novel states of matter, and develop new types of sensors and measurement devices. Today, a new discipline is emerging which combines physics, chemistry, electrical engineering, mathematics, and computer science to further the basic understanding of the quantum world, and to develop novel information processing devices and other quantum-enabled measurement and sensing technologies.

COLLOQUIA & SEMINARS

Every academic year, the Institute presents an exciting series of technical seminars and colloquia from experts in the fields of quantum information science, quantum control, quantum measurement, and quantum many-body physics. Speakers are proposed by members of the Yale Quantum Institute community and approved by a selection committee. The talks are attended by a diverse cross section of the university ranging from undergraduates to emeritus professors.

YQI POSTDOCTORAL FELLOWSHIP

In keeping with the mission of the institute, YQI offer an annual postdoctoral fellowship. These Fellowships support research in the field of quantum science for recent Ph.D. recipients in the group of any of the YQI faculty members. All our YQI Fellows have demonstrated excellent research ability in their prior work and exceptional promise for future leadership in their field of interest. We welcomed 10 Fellows since the program creation in 2018. Applications for the 2026 YQI Fellowship opens August 2025. **QuantumInstitute.yale.edu/apply**

ART & SCIENCE OUTREACH PROGRAM

The institute runs an active outreach program mixing humanities and sciences, including a non-technical talk series and an Artist-in-Residence program. More information about these program scan be found starting page 20.

VISITOR PROGRAM

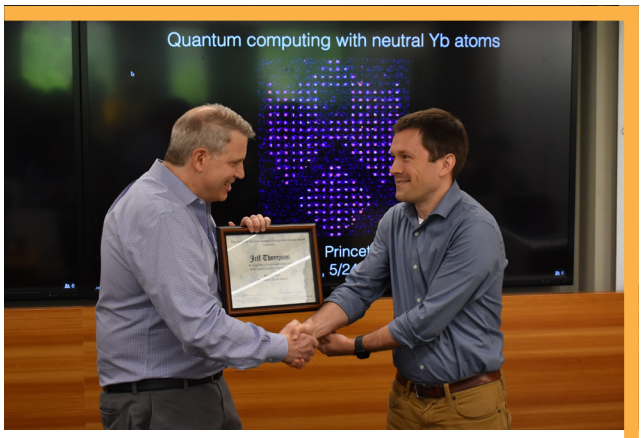
The Yale Quantum Institute opens its doors to world leaders in quantum information science for visits on the Yale campus. The visiting scientists can focus on their research in close proximity to YQI researchers (faculty members and students) to enable fruitful long term collaborations. This year we welcomed Nathan Wiebe from University of Toronto, Canada for the summer, amd Iivari Pietikäinen and Cernotik Ondrej from Palacký University Olomouc, Czechia this Fall.

VENUE FOR QUANTUM EVENTS

The Institute hosts many seminars, presentations, group meetings and other events in the field of quantum information science and engineering. This year, YQI hosted CircuitQED@20: A celebration of the 20 years of circuit quantum electrodynamics, the second Quantum Computer Cybersecurity Symposium hosted by Jakub Szefer, and the NSF Workshop on Quantum Operating Systems and Real-Time Control hosted by Yongshan Ding. And coming up in 2025, we will host Helgoland2025: 100 years of quantum mechanics in June, and QEC25: 7th International Conference on Quantum Error Correction in August.

QUANTUM HUB

Over the years, YQI became the portal for everything quantum at Yale. The institute plays a leadership role in the QuantumCT initiative.



DISTINGUISHED LECTURER SERIES

To recognize a researcher whose work significantly advances quantum science, YQI awards the title of Distinguished Lecturer, with emphasis on the areas of mesoscopic physics, nanoscience, quantum information, quantum computing and related theoretical and mathematical topics. Annually, a Distinguished Lecturer is invited to visit the Yale Quantum Institute to deliver one or more lectures about their work and how it has advanced our understanding of quantum science. This year, our 2024 YQI Distinguished Lecturer is Monica Schleier-Smith from Stanford University.

PROFESSIONAL DEVELOPMENT SERIES

We offer a selection of presentations to help students and postdocs with career development, job searching, and networking. Speakers in this series have included noted scientists, industry leaders, and peer-reviewed journal editors.

News from the Community

MICHEL DEVORET AND ROBERT SCHOELKOPF AWARDED COMSTOCK PRIZE IN PHYSICS FOR QUANTUM ADVANCES

The National Academy of Sciences (NAS) has awarded the prestigious Comstock Prize in Physics to Yale researchers Michel Devoret and Robert Schoelkopf for their groundbreaking work in quantum information processing and related fields. The Comstock Prize is awarded once every five years to one or more North American physicists whose recent work includes an innovative discovery or investigation in electricity, magnetism, or radiant energy. Many previous recipients of the prize, first awarded in 1913, have gone on to become Nobel laureates. Devoret and Schoelkopf were recognized for their development and practical application of “Circuit QED” (circuit quantum electrodynamics), which allows quantum information to be distributed by microwave signals on wires. The strong coupling of quantum data (qubits) and photons in Circuit QED paved the way for a growing number of applications in quantum computing and sensing.

FLORIAN CARLE RECEIVES CT SCIENCE CENTER 2024 STEM ACHIEVEMENT AWARD

The Connecticut Science Center’s annual gala on October 5, 2024, featured the theme “Close Encounters of the STEM Kind” and celebrated exceptional contributions to STEM. Among the honorees was Florian Carle, Managing Director of the Yale Quantum Institute. Since 2016, Florian has pioneered innovative outreach programs, integrating science and humanities through installations, exhibitions, live shows, music, and web applications to make quantum science accessible and engaging. His efforts aim to spark public interest and demystify quantum physics.

New YQI members

In 2024, we welcomed as YQI Members four faculty who recently join Yale.

Michael Hatridge

Associate Professor of Applied Physics

Michael Hatridge's research focuses on the use of superconducting microwave circuits as a quantum information platform. In particular, his group will focus on the use of microwave photons as quantum information carriers. They will develop techniques to create, manipulate, and measure microwave light and use it to entangle larger quantum systems.

Aleksander Kubica

Assistant Professor of Applied Physics

Aleksander is theorist interested in quantum information science, in particular the theory of fault tolerance and quantum error correction, and its intersection with quantum many-body physics.

Konrad Lehnert

Professor of Physics

Konrad Lehnert's group build electrical and electromechanical machines and coax them into exhibiting quantum behavior. They are motivated by asking: "what is the largest and most tangible object that can be in two places at once?" In addition, they seek to use these machines to store, process, and transmit information in an essentially quantum way. Finally, they develop measurement tools for sensing feeble forces and electrical signals at the limits imposed by quantum mechanics.

John Sous

Assistant Professor of Applied Physics

John is a theorist who works at the interfaces between condensed matter and quantum simulation. His research aims to develop methods to understand the behavior of static systems with large degrees of freedom such as quantum solids and artificial quantum simulators as well as dynamical systems such as nonlinearly driven optical materials and neural networks.

Reshaping Yale for a new wave of quantum physics, engineering, and materials

The Upper Science Hill Building Complex will transform Yale's quantum and engineering programs with new research labs, convening space — and a geothermal plant.

Future generations of Yale quantum scientists, engineers, and physicists likely won't know the details of the monumental effort underway today to reshape the upper slope of Science Hill on campus. But they — and society at large — will reap the benefits.

Excerpt of an article by Jim Shelton for Yale News and photography by Mara Lavitt

As university leaders and state and local officials gathered Sept. 30 for a ceremonial groundbreaking of the new Physical Sciences and Engineering Building (PSEB) — the centerpiece of the new Upper Science Hill Building Complex — they described a future manifesting in plain sight, with construction cranes and excavators briefly paused just yards away.

"As you can see, all around us, Science Hill is being transformed," said Yale President Maurie McInnis. "This building we're breaking ground on today will be the crown jewel of the Upper Science Hill Development. It is fundamental to the work we are doing to accelerate science and engineering at Yale."

The overall project is vast, covering 16 acres — or nearly half — of Science Hill. It will transform research programs, help attract more of the best scientists and students, lower Yale's energy use, and accelerate discoveries across a range of fields, from quantum computing and materials science to electrical engineering and high energy physics. It may ultimately help grow the state and local economies, as well. The new buildings, Strobel said, will not only propel Yale's leadership in quantum science — which has the potential to translate a knowledge of the complexities of quantum mechanics into a host of new materials, sensors, and devices — but will also offer superior instrumentation and fabrication facilities to researchers in other disciplines, such as astronomy and chemistry.

"Yale must lead the future of science and engineering," he said. "We must continue to drive innovation and train future leaders in the burgeoning quantum revolution. And we must use our expertise and convening power to help create a robust quantum tech ecosystem for New Haven and Connecticut."

The groundbreaking was followed by a reception on the 14th floor of Kline Tower, where the group also celebrated the 10th anniversary of the Yale Quantum Institute.

Excerpt of an article by Jim Shelton for Yale News.

Yale's quantum computing journey — 20 years and counting

Yale's Robert Schoelkopf, Michel Devoret, and Steven Girvin reflect on their trailblazing approach to quantum computing research.

Yale's quest to build the world's first, fully useful quantum computer is also the story of a small-town kid's obsession with short-wave radios, a Parisian's fond boyhood memories of America, and a high school student from the New York suburbs who soaked up Saturday morning science programs at Yale's Becton Center.

It is the story of three physicists — Robert Schoelkopf, Michel Devoret, and Steven Girvin — who converged at Yale and helped shape the way scientists worldwide approach the emerging field of quantum computing. Together, they and their Yale colleagues have imagined and built the scientific infrastructure for a new generation of technology, and elements of these discoveries now inform the research being done in labs around the world and most of the quantum computing products now in development.

CircuitQED@20 gathered in January 2024 local and international colleagues on campus for a three-day conference to commemorate the 20th anniversary of the Yale scientists' first published studies in what would be called Circuit QED (which stands for quantum electrodynamics), their trailblazing approach to quantum computing. Their approach has generated hundreds of academic papers and been cited by other researchers more than 100,000 times.

It has also helped make Yale a seedbed for tech industry talent in quantum computing, with graduate students and postdoctoral researchers moving on to positions at IBM, Google, and Silicon Valley start-ups, and at academic institutions around the globe.

And Schoelkopf, Devoret, and Girvin, who will play starring roles in this week's conference, have been at the center of it all. All three have joint appointments at the Yale School of Engineering & Applied Science (SEAS) and Yale's Faculty of Arts and Sciences (FAS).

Their vision? They wanted to create the "architecture" for a superconducting electrical circuit that harnesses the most curious features of quantum physics, such as the way quantum particles exist in multiple states at once (a phenomenon known as "superposition") and the way these particles can become inextricably linked even when they are physically separated (described as "entanglement"). In this system, electrical signals propagating through the circuit would play the role of particles.

In doing so, it holds the promise of helping deliver historic advances in medicine, clean energy,

and chemical engineering in a fraction of the time currently needed, not to mention providing revolutionary benefits in cybersecurity, traffic control, and artificial intelligence.

"Usually in physics, we think of our contributions to society as being indirect," said Schoelkopf, Sterling Professor of Applied Physics at Yale School of Engineering & Applied Science with a secondary appointment in Physics in Yale's Faculty of Arts and Sciences, and at age 59, the youngest of the trio. "You might be able to change the lives of your grandchildren. But this work offers a real opportunity to change things within our own lifetime."

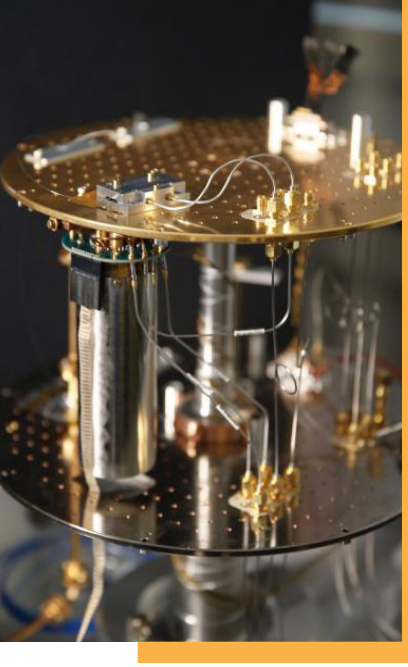
While these innovations have put Yale at the forefront of quantum computing, the researchers recognize that much work remains before a truly useful quantum computer is ready.

The lifespan of a qubit needs to be longer — much longer. Error correction must be expanded and refined. Furthermore, every concept and feature Yale has pioneered will benefit from further simplification to be applied for practical use.

Yale's quantum team is actively involved in each of those pursuits, Schoelkopf said.

In the meantime, Yale researchers continue to provide national leadership — and help create jobs in quantum technology.

"We've had a lot of good science over the years, but there are always exciting new ideas just ahead," Rob Schoelkopf said. "We want to take it the last mile and see the technology succeed in changing people's lives."



Article by William Weir for Yale SEAS

New superconducting device could boost quantum tech

Superconducting circuits, which conduct electricity without resistance, are among the most promising technologies for quantum computing and ultrafast logic circuits. However, finding a practical way to work with these materials that require extremely cold temperatures has been a challenge.

Superconducting circuits, which conduct electricity without resistance, are among the most promising technologies for quantum computing and ultrafast logic circuits. However, finding a practical way to work with these materials that require extremely cold temperatures has been a challenge.

In a step toward that goal, a team of researchers led by Prof. Hong Tang developed and successfully demonstrated a device that presents a viable solution in transferring a very weak signal from a computing device stored at cryogenic temperatures to room temperature electronics to achieve a fast data transfer with very low energy consumption. The results are published in Nature Photonics.

The practical use of superconducting circuits requires connecting them to room temperature electronics. But doing so has largely relied on coaxial cables, which have a limited bandwidth and limited thermal conductivity – two factors that negate the benefits of superconducting circuits.

Fiber optic links offer a promising alternative since they have both a high bandwidth and a low thermal load. However, their ability to use photons to read signals is stifled by the stringent requirements of superconducting circuits. To overcome this hurdle, the researchers came up with an innovative solution that combines the best of existing technologies.

"We built this device, which we call a superconducting electro-optical modulator," said Mohan Shen, lead author of the study and a Ph.D. student in Tang's lab. "Using this, we performed, to the best of our knowledge, the first ever pure optical readout of a particular type of superconducting circuit known as a rapid single-flux-quantum device."

Tang, the Llewellyn West Jones, Jr. Professor of Electrical Engineering, Applied Physics & Physics, noted that for now, this is a demonstration of the hardware to prove that it works. Now that they've done that, the researchers are setting their sights on directly advancing quantum computing. The next step will be to use the technology to interface with qubits, the quantum bits that store information.

"We hope we can use this device to take the quantum information out from the temperatures of quantum computers to a classical network," Tang said.

The research was funded by the U.S. Department of Energy (DoE) and the Intelligence Advanced Research Projects Activity (IARPA). Other authors are Jiacheng Xie, Yuntao Xu, Sihao Wang, Risheng Cheng, Wei Fu, Yiyu Zhou.

‘Significant strides’ for Center for Quantum Dynamics on Modular Quantum Devices

There is currently a huge gap between the problems for which a quantum computer could be useful in chemistry – including studies of quantum reaction dynamics and spectroscopy – and what can actually be simulated today with quantum computers, even with the largest and most impressive qubit platforms from IBM, Google, or Rigetti. The challenge is that most well-known quantum computing (QC) algorithms have hardware requirements and circuit depths that far exceed the current scale by several orders of magnitude.

Closing the so-called ‘QC gap’ is essential to make QC technology finally available to chemistry, beyond the rather simple proof-of-concept applications that so far have been developed. One approach is to find platforms for efficient realizations at the hardware level of the molecular problems of interest, and that is the vision of the Center for Quantum Dynamics on Modular Quantum Devices. “The Center is making significant strides in the realm of quantum simulations for complex chemical systems, utilizing cutting-edge programmable Kerr-cat and conventional quantum computing platforms,” said Victor S. Batista, the John Gamble Kirkwood Professor of Chemistry and director of the Center.

“This pioneering research aims to showcase the exceptional potential of bosonic modular devices in the quantum simulation of chemical dynamics,” he explains. “By focusing on the creation of modular 3D circuit quantum electrodynamics (cQED) platforms, and the formulation of novel algorithms for these systems, the Center is poised to offer transformative approaches to advance our understanding of photoinduced quantum reaction dynamics, vibronic interactions, quantum chemical dynamics and quantum machine learning methods.”

The Center, funded by the National Science Foundation, is comprised of 80 researchers and collaborators from Yale and other institutions.

Roberts Innovation Fund to Support Data-Centric Quantum Computing

The 2024 Roberts Innovation Fund Awards, providing $1 million in accelerator funding to support 10 new inventions led by faculty from Yale’s School of Engineering & Applied Science. Prof. Yongshan Ding with Shifan Xu proposed to develop data-centric quantum computing. While quantum processing units (QPUs) have advanced significantly, the challenge of efficiently translating classical data into a format compatible with QPUs hinders the deployment of quantum applications in data-driven fields like machine learning, optimization, and scientific computing. Yongshan Ding has created a solution that provides user-friendly access to cutting-edge quantum random access memory (QRAM) - a technology that’s pivotal for converting classical data into quantum data, a crucial but challenging step for practical quantum computing. This unique platform serves as a valuable testing ground to explore the commercial potential of various quantum applications.

Science Outreach

FOR WORLD QUANTUM DAY 2024, THE YALE QUANTUM INSTITUTE KICKED OFF THE FIRST EDITION OF YQUANTUM, A 24-HOUR QUANTUM CHALLENGE

With nearly 40 teams and 135 hackers, spanning undergraduates, graduates, and even high schoolers, the hackathon showcased a dynamic community eager to tackle quantum computing challenges posed by companies like QuEra Computing, Classiq Technologies, IBM Quantum, SandboxAQ, Quantinuum, and DoraHacks, all within a 24-hour timeframe, demanding remarkable dedication and innovation.

The two-day schedule blended workshops and lab tours with networking opportunities for the participants, allowing them to work on their projects while benefiting from Yale's extensive resources in quantum information science and quantum engineering.

YQuantum 2024 featured six exciting challenges ranging from condensed matter physics to quantum applications in healthcare and finance.

Learn about about the challenges, check out the source codes, or get ready to participate to the 2025 edition, visit YQuantum website.

YQuantum.info

Visual artist Serena Scapagnini joins YQI as 4th Artist in Residence

Since 2017, the Yale Quantum Institute (YQI) Artist-in-Residence (AiR) program has welcomed artists for year-long residencies in our laboratories. During their time with us, these artists create collaborative quantum science-based artwork, participate in a series of public talks to explain both their work and the science behind it, and bridge the gap between the humanities and the sciences. This year, YQI continues its commitment to the intersection of art and science by welcoming Italian Visual Artist and Art Historian Serena Scapagnini as our 4th AiR for the 2024–2025 academic year.

Serena at YQI setting up the display case with her work in progress

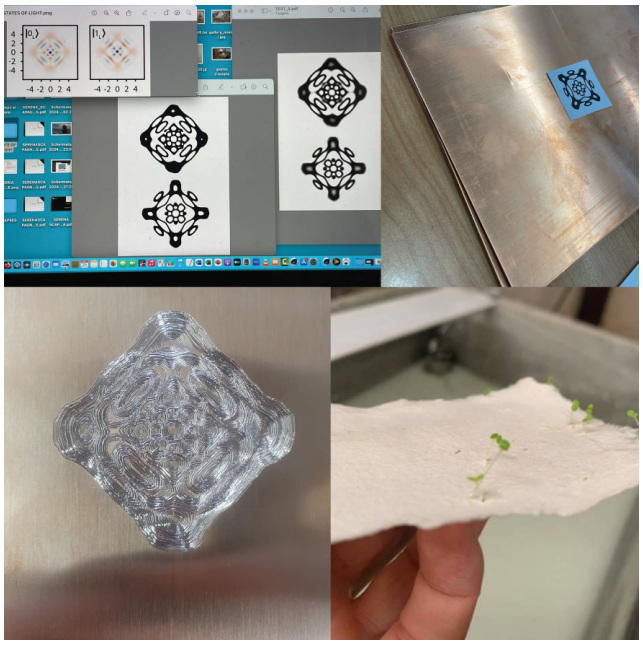
Serena Scapagnini's work is deeply rooted in interdisciplinary collaboration. For the past decade, she has focused her artistic research on neurons, working closely with Professor Michael Higley, a neuroscientist at Yale School of Medicine, on a project titled SYNAPSES, dedicated to exploring the mind. Using fluorescent neuroimaging techniques to visualize neurons, Serena creates media works that define an internal landscape, following the flow of neurons like the tributaries of a river, connecting through synapses to form the shapes of our thoughts. Her body of work spans painting, drawing, video art, and installations.

In her exploration of the osmotic relationships between cells—and more broadly, between structure and space—Serena creates spatial works supported by delicate copper cables, forming complex systemic organizations. These compositions suggest a rhythm that runs through overlapping papers, echoing natural dynamics. The proportions, order, and quality of these works evoke the geometric structures underlying various forms in nature. Paper, Serena's preferred medium, is transformed as dense

layers of paint on one part of the picture gradually evolve into ethereal forms, allowing the dendritic branches to dissolve into the white surface of the paper. Transparencies and the rarefaction of neurons on the empty white spaces create an environment where images rest, and perception unfolds into silence, as if thoughts could extend into a moment of transcendence.

Earlier this summer, Serena delivered a public talk at YQI titled “The Shape of Thoughts: Down the Flowing River of Tributary Neurons,” as part of our non-technical talk series, where she shared insights into her work and practice. Serena holds a master’s degree in Medieval Art History, Iconography, and Iconology from the University of Siena. Her art education began at Université Paris VIII and continued in New York, where she completed a Master’s program in Painting and Mixed Media at the School of Visual Arts. Her work has been exhibited and collected in the United States, China, India, Sweden, Hungary, Spain, and Italy. Her latest artwork, Hemispheres, is currently on display in the Pio Monte della Misericordia Church in Naples, Italy, alongside Caravaggio’s masterpiece The Seven Works of Mercy.

Devotion *Mixed Media on Paper, on Plexiglas Gallery Art Positive, New Delhi*



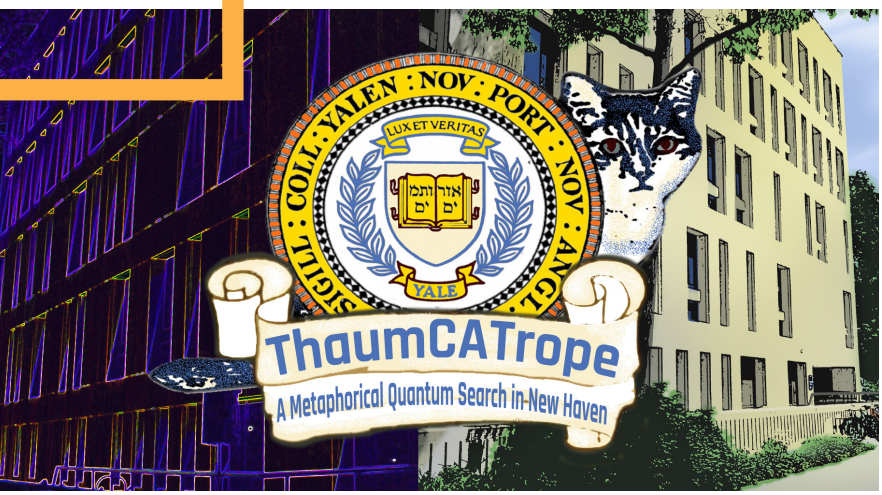
The state of lights are engraved on coper and gold plates, and enclosed in custom made paper

We are thrilled to welcome Serena as our Artist-in-Residence. In this role, she will engage with our faculty, researchers, and students, attend our colloquia and events, and create artwork inspired by and in collaboration with YQI researchers.

Serena in the wake of her work dedicated to memory processes, investigates quantum memory, recorded by the states of light.

Congratulations!
You found Handsome Eli, our quantum cat, who was hidding in the pages of this annual report!

ThaumCATrope: a metaphorical quantum search in New Haven



The Yale Quantum Institute, Yale Library Digital Humanities Lab and Juego Studio invite you to experience the art & quantum science application "ThaumCATrope", the latest collaboration between Florian Carle and 1st YQI AiR Martha W. Lewis.

This educational experience will demonstrate how quantum computers will speed up computations, learn more about quantum science, and will give you the opportunity to discover some of New Haven's hidden secrets!

The app is divided in two parts: a classical search where you will have to use classical logic, you will have to visit locations one after the other (like a binary system, left OR right, 0 OR 1...) until you find the cat. Once you find the cat in this mode, you will enter a second part the quantum search, where all the locations are entangled and in superposition of state (left AND right at the same time, and everything in between, 0 AND 1...), allowing you a much fast search for the cat as you can see all locations at once.

The application launched at the 2024 edition of the International Festival of Arts & Ideas, and the app has been played by more than 700 userss so far!

Everytime you hear about quantum physics, you can be certain someone will mention a cat in a box... Intrigued by the cat metaphor, you decide to attempt the experiment yourself.

You take your best box and approach your cat, Handsome Eli.

You throw Eli's favorite treat in the box, and he jumps in. You close the lid with haste before realizing you did not give him a little pet on the head! You open the box to pet Eli, but the box is empty... where's the cat?!

Eli is nowhere to be found...

BEGIN THE SEARCH!

We recommend using a larger screen for a better reading comfort

Landscape mode - Sound on

SPOOKY ACTION

A TYPEFACE BY STEWART SMITH

Spooky Action was first drawn during 3rd YQI AiR Stewart Smith's artist residency while designing the site-specific public art piece, "Beneath the Green, the Quantum", exhibited on the New Haven Green for the International Festival of Arts and Ideas in 2023. Our artwork interleaved the inviting strangeness of quantum computing with the eerie history of the Green itself. (This Green-inspired typeface was one of several smaller, satellite pursuits of his residency.)

> "In ascribing a moniker to this typeface, I broke a cardinal rule among quantum practitioners with more knowledge and refinement than I'll achieve: Never utter the word "spooky." Albert Einstein's one-time withering description of quantum physics as "spooky action at a distance" continues to haunt the field through its misinterpretation, and frequent deployment in poorly researched pop-science pulp." - STEWART SMITH

You can learn more about the typeface creation on our website and use it for your most spooky applications! **art.QuantumInstitute.yale.edu**

(The font is free for all YQI researchers and students, ask Florian for the typeface).

ABCDEFG
HIJKLMNOP
QRSTUV
WXYZ
0123456789

International Year of Quantum Science and Technology

2025

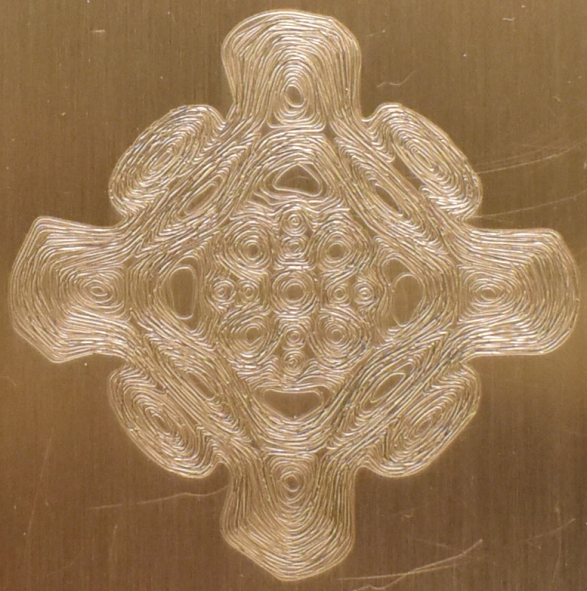
Events to be hosted by YQI, an official participating partners of IYQ

On June 7, 2024, the United Nations proclaimed 2025 as the International Year of Quantum Science and Technology as it recognizes 100 years since the initial development of quantum mechanics. This year-long worldwide initiative is aimed at increasing public awareness of the importance of quantum science and its applications.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Exhibition "The Quantum Revolution" shown in N.C. A&T State University											
YQI quantum artworks shown at the IYQ Launch at the UNESCO Headquarters											
			Quantum Week at Yale								
					Helgoland 2025: 100 years of Quantum Mechanics						
						Serena Scapagnini at the Arts & Ideas Festival					
QEC25: 7th Intl. Conference on Quantum Error Correction											
Production of the play "Copenhagen" produced by YQI & UConn											

Outreach events open to all Scientific events

Founded in 2014 and spanning 30 research groups, the Yale Quantum Institute serves as a forum to bring together experimental and theoretical researchers and students in the field of Quantum information Science on campus.



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