
 COLUMBIA | QUANTUM INITIATIVE
IMPACT REPORT
Academic Year 2025-2026

 COLUMBIA | QUANTUM INITIATIVE
CREATING THE QUANTUM FUTURE
WITH MATERIALS & LIGHT

Explore the quantum frontier with new physics and new materials

Build the foundations for new quantum devices

Deliver new quantum technologies

The rules of quantum mechanics are more than just a curiosity: they're becoming the foundation of real-world technologies, like ultra-powerful computers, perfectly secure communication systems, and ultra-capable sensors, that go far beyond what today's technologies can do.

Columbia scientists are making this new quantum future a reality.

Building this future requires systems that behave in uniquely quantum ways, like materials that can conduct electricity with no resistance, sense tiny changes in magnetic fields, and combine with light itself.

At Columbia, we are exploring entirely new kinds of matter and devising new devices that will enable the next generation of breakthroughs—from curing diseases to securing global communications to tackling climate change...and more.

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OUR PEOPLE

37

core faculty members with expertise in quantum physics and chemistry, photonics, materials science and engineering, and quantum computing

3

New
Hires



Zhenjie Yan,
Physics



Zhaoyou Wang,
Electrical Engineering



Diptarka Hait,
Chemistry

The Next Generation

+ **39** PhD students graduated + **42** students enrolled in Columbia's Quantum Science & Technology Masters Program + **Dozens** of postdoctoral fellows advancing quantum research + **Hundreds** of students from Columbia, Barnard, and those elected to undergraduate research experience programs have been exposed to the latest quantum science

Awards & Honors

John Bardeen and Heike Kamerlingh Onnes Awards for contributions to superconductivity research
+New NSF CAREER Awards, Brown Investigators, Sloan Fellowships, and more...

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OUR RESEARCH

Quantum Research Themes



Theory &
Modeling



Atoms &
Molecules



Materials &
Nanoscience



Optics &
Electronics



Computing &
Simulation

266 research papers
published

6 new patents
filed

31 active research awards
totaling **~\$62** million

3 start-ups
launched

Columbia Quantum Centers Include:

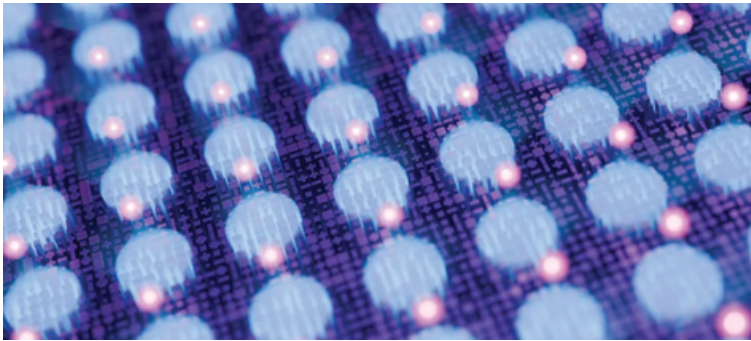
- Department of Energy Energy Frontier Research Center on Programmable Quantum Materials
- Max Planck-New York Center on Non-Equilibrium Quantum Phenomena
- National Science Foundation Material Research and Science Engineering Center on Precision-Assembled Quantum Materials
- National Science Foundation National Virtual Quantum Laboratory
- Columbia Center for Computational Electrochemistry

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NEWS HIGHLIGHTS

Neutral-Atom Arrays Are A Rapidly Emerging Quantum Computing Platform. Columbia Researchers Know How to Make the Biggest Arrays Yet

They combined optical tweezers with metasurfaces to trap over 1000 atoms—with the potential to capture hundreds of thousands more.



Columbia Connected to New York Quantum Network

Entangled photons will soon make their way instantaneously across the growing network, which now extends 70 miles from Long Island to Morningside Heights.

Columbia Makes the Case for Quantum on Capitol Hill

Universities will be critical to keeping America at the forefront of this rapidly advancing field, says research panel.

There's a Range of Magic Angles to Study Superconductivity in a Twisted 2D Semiconductor

New research confirms that tungsten diselenide (WSe₂) is a reproducible platform to explore the origins of frictionless flow.

Columbia Researchers Find Coherent Ferrons

The observed polarization waves advance the emerging field of ferronics, with implications from quantum technologies to telecommunications.

The Playbook for Perfect Polaritons

Columbia chemists identify the rules for creating quasiparticles that can power optical computers and quantum devices.

Consider the Chemistry of Your Quantum Materials

Atomic orbitals, not just crystal lattices, can yield frustrated materials with quantum results.

Matching Vibrations Is All It Takes to Modify Materials

Quantum fluctuations from the vacuum of a 2D material can drastically change the properties of a nearby crystal.

Superfluids are Supposed to Flow Indefinitely. Physicists Just Watched One Stop Moving

Signs point towards the first observation of a supersolid, an enigmatic quantum version of a classical solid.

Columbia Engineers Introduce Metasurfaces to 2D Materials

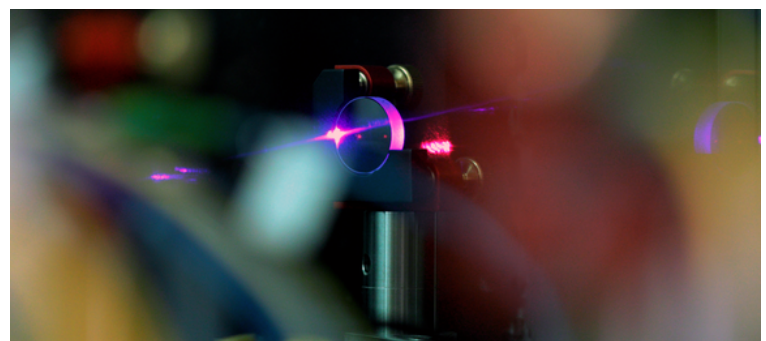
A simple new technique enhances nonlinear optical properties, and the potential to create entangled photons, without sacrificing size.

Taking the Temperature of Integrated Photonics

A thin resistor routinely used in photonic devices can also act as a thermometer—a simple feature that could help integrated photonics reach its full potential.

Columbia Physicists Observe Ultracold Molecular Droplets

They open up a new world of quantum physics that researchers can uniquely control.



100 Years of Quantum at Columbia

2025 marked a century of quantum science research. Learn about Columbia's central role in that history.

Columbia Engineers Prototype New 2D Qubit

Atom-thin materials expand the options for constructing quantum computer chips while simultaneously shrinking their size.