Department of Applied Physics
Yale University

Graduate Studies Program

Department of Applied Physics
Yale School of Engineering & Applied Science
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https://appliedphysics.yale.edu/

Yale

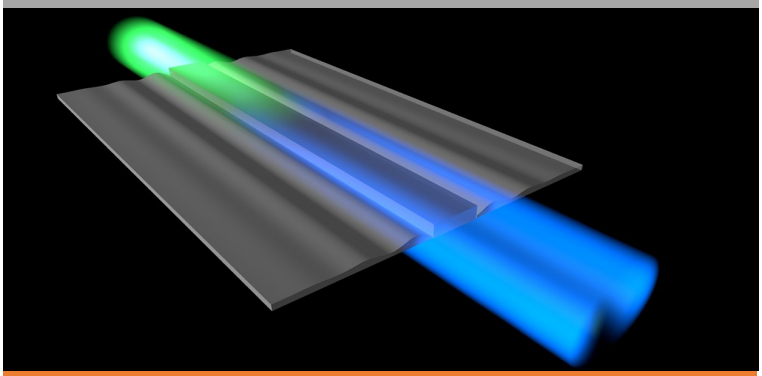
Applied Physics at Yale

Contemporary science and engineering are becoming increasingly interdisciplinary.

Traditional boundaries between fields have blurred, and new areas, such as nanotechnology and artificially structured materials, are constantly emerging. Applied Physics combines understanding the laws of nature at a fundamental level with a focus on technological applications to provide solutions to important societal problems. As such, it provides an essential link between physics and engineering. The range of phenomena, materials, devices and systems benefiting from research in applied physics is unmatched in its scope and importance.

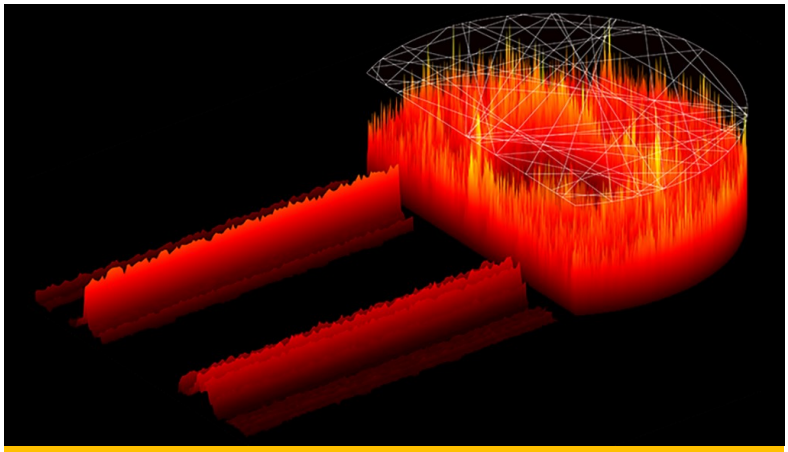
Research in Applied Physics spans three broad areas of interest: novel materials, optical and nanophotonic physics, and quantum information processing, emphasizing both fundamental issues and the practical application of these concepts and techniques to technology. Graduate students develop their own course of study and research with the guidance and advice of faculty members in the areas of their research interests. The balance between fundamental science and application makes our program highly inter-disciplinary, having strong collaborations with Physics and Chemistry, as well as Electrical, Mechanical, Chemical, and Biomedical Engineering. Our graduates have become leaders in a wide variety of fields spanning academia, industry, and government service.

For an overview of the Applied Physics Department at Yale, see:
https://www.youtube.com/watch?v=22QSgjw2oSU



Cooling sound waves with light involves converting acoustic energy into optical energy, which blueshifts the light.
(Image credit: Eric Kittlaus, Ph. D. and Nils Otterstrom — Rakich Group)

Array of transmons and resonators by Chris Axline, Ph. D., from Schoelkopf Group



Stable emission from a D-Shaped semiconductor laser - Hui Cao Group

The Applied Physics faculty are engaged in a broad range of research programs, including quantum computing, superconducting devices, complex materials and new devices based on them, nonlinear optics, nano and micro-optical devices, as well as theoretical studies of novel materials, phenomena and optical microsystems.

Several Applied Physics faculty are members of the Center for Research on Interface Structures and Phenomena (CRISP), an interdisciplinary materials research center funded by the National Science Foundation.

Applied Physics faculty are also central to the new Yale Quantum Institute (YQI), which facilitates research and teaching of quantum science on campus and hosts seminars, workshops and visitors from around the world, to ensure that Yale is an intellectual hub of the coming quantum information revolution. Our faculty also play a central role in the Yale Institute for Nanoscience and Quantum Engineering (YINQE), a key thrust of which is to bring together researchers in the physical sciences and engineering with those in the medical and biological research communities through nanoscale research and applications.

Additionally, we have faculty appointed in the Energy Sciences Institute, a Yale West Campus institute focusing on the emerging challenges facing the environment and energy sectors, through new materials for energy production and storage as well as innovations in solar energy and alternative fuels.

Recent department highlights:

- Physicists can predict the jumps of Schrödinger's cat
- Yale scientists make a borophene breakthrough
- Making sound "chill out"
- Charles Ahn among four Yale faculty members named AAAS fellows
- Dan Prober receives 2018 IEEE Council on Superconductivity award
- The cure for chaotic lasers? More chaos, of course
- BoSS v1.0 released: slave-boson software
- Yale scientists to help lead national quantum center
- New laser makes silicon "sing"

Read more at appliedphysics.yale.edu/news

PH.D. REQUIREMENTS AND HIGHLIGHTS

Course requirements: At least 9 course units are required, including up to two terms of "Special Investigation" research in an Applied Physics group during the first year. All graduate students in Applied Physics are strongly encouraged to take core courses in Quantum Mechanics, Electrodynamics, and Condensed Matter Physics. There is no general qualifying examination and no foreign language requirement.

First year fellowships: All first year Ph.D. students are financially supported by the department. During the first year, a student typically will take "Special Investigation" research courses to explore research areas and thesis topics.

Teaching: Teaching experience is regarded as an integral part of the graduate training program at Yale University. All Applied Physics students are required to serve as a Teaching Fellow (TF) for one semester, typically during year two, and have opportunities for further teaching if desired.

Area Examination: By the third academic year, students must pass an Area Examination whose purpose is to ensure that the student has achieved both the breadth and depth of knowledge appropriate to a Yale Ph.D. The exam is administered by the student's Research Committee, including at least two faculty members in addition to the research advisor, who acts as chair.

For more information contact:
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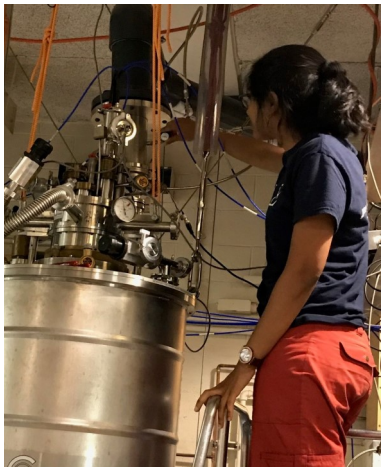
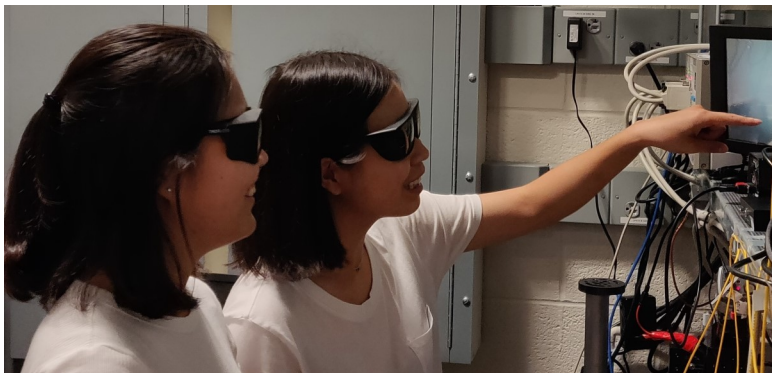
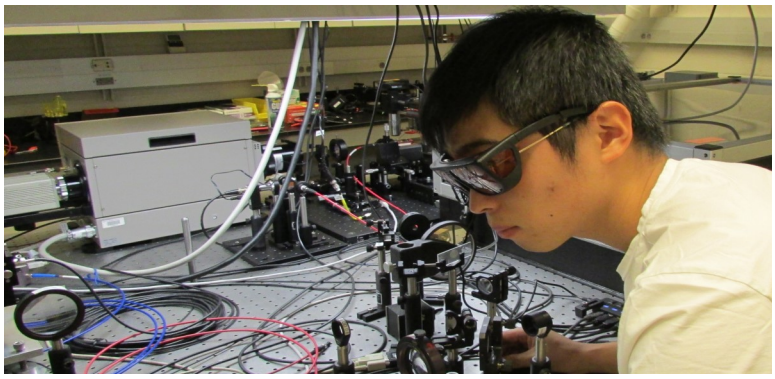


Ph.D. students have access to extensive cleanroom facilities and characterization tools.





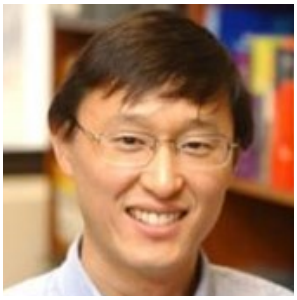
NOTABLE ALUMNI

Irfan Siddiqi

Professor of Physics at the Quantum Nanoscience Laboratory and the Department of Physics at the University of California Berkeley. He is also the director of the Quantum Systems Accelerator.

Professor Siddiqi earned his Ph.D. in Applied Physics from Yale University. His doctoral advisor was Professor Daniel Prober.

APPLIED PHYSICS FACULTY



Charles Ahn
John C. Malone Professor of Applied Physics and Professor of Mechanical Engineering and of Physics

Hui Cao
John C. Malone Professor of Applied Physics and Physics

Michel Devoret
Frederick W. Beinecke Professor of Applied Physics

Yu He
Assistant Professor

Sohrab Ismail-Beigi
Professor of Applied Physics, Physics, and Mechanical Engineering and Materials Science

Owen Miller
Assistant Professor

Simon G. Mochrie
Professor of Physics and Applied Physics

Vidvuds Ozolins
Tom Steyer and Kat Taylor Professor of Clean Energy Solutions
Chair of the Department

Daniel E. Prober
Professor of Applied Physics, of Electrical Engineering & of Physics
Director of Undergraduate Studies

Shruti Puri
Assistant Professor

Peter T. Rakich
Associate Professor

Nicholas Read
Henry Ford II Professor of Physics, Applied Physics, and Mathematics

Peter Schiffer
Frederick W. Beinecke Professor of Applied Physics & Physics
Director of Graduate Studies

Robert J. Schoelkopf
Sterling Professor of Applied Physics and Professor

A. Douglas Stone
Carl A. Morse Professor of Applied Physics and Professor of Physics