

Materials Physics



Quantum Information Physics

Optical Physics

Yale Department of Applied Physics

OPEN HOUSE 2023

appliedphysics.yale.edu

Yale SCHOOL OF ENGINEERING
& APPLIED SCIENCE



Yale Department of Applied Physics Open House Agenda

March 19th - 21st, 2023

(Optional) Sunday, March 19th 5:30 PM - 7:30 PM Eastern Time

5:30 PM	Dinner at Zeneli Pizzeria (138 Wooster St, New Haven, CT 06511) <i>Lead contact: Rohin McIntosh (Tel: (203) 980-2839; rohin.mcintosh@yale.edu)</i>
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Monday, March 20th 9:00AM - 8:00PM Eastern Time

9:00 AM	Meet in the lobby of The Courtyard Marriot <i>Lead contact: Wenxin Li (Tel: 203 -907-6868; Email: wenxin.li@yale.edu)</i>
9:30 AM - 10:00 AM	Welcome Reception and Breakfast at the Mann Center (107 Dunham Laboratory, 10 Hillhouse Ave, New Haven, CT 06511) <ul style="list-style-type: none">• Handout agendas• Overview of Department
10:00 AM - 11:30 PM	Sub-Field Presentations (Hybrid) at the Mann Center <ul style="list-style-type: none">• Quantum Information• Condensed Matter• Optics <i>(Meeting ID: 913 6570 6428; Password: 299543)</i>
11:30 AM - 12:30 PM	<ul style="list-style-type: none">• Dissertation Defense by Zeyu Kuang, “Fundamental Limits of Nanophotonic Design” at the Mann Center
12:30 PM	Catered Lunch at the Mann Student Center
1:30 PM - 5:00 PM	Lab Tours (page 2)
5:00 PM - 6:00 PM	Alumni Career Panel Discussion (Hybrid) at the Mann Center <i>(Meeting ID: 940 8470 4311; Password: 498466)</i>
6:00 PM	Dinner and Poster Session at the Provost’s House (35 Hillhouse Ave, New Haven, CT 06511) <i>Lead contact: Lang Zhang (Tel: 617 -230-0353; Email: lang.zhang@yale.edu)</i>

Tuesday, March 21st 8:00 AM - 12:00 PM Eastern Time

8:00 AM	Continental Breakfast in Mann Center
10:00 AM -	Lab Tours (page 2) <ul style="list-style-type: none">• Lab tours end at 5:00PM• Please reach out to lab contacts to confirm meeting time

Lab Tour Schedule

Monday, March 20th 1:30PM - 5:00 PM Eastern Time

Group	Time	Location	Contact
Charles Ahn	1:30 PM - 5:00 PM	Becton 301	Kidae Shin email: kidae.shin@yale.edu Tel: (475) 414-8319
Hui Cao	3:30 PM - 5:00 PM	Becton ground floor (card access needed - contact Rohin)	Rohin McIntosh Email: rohin.mcintosh@yale.edu Tel: (203) 980-2839
Michel Devoret	Discuss with lab contact		Andy Ding Email: zhenghao.ding@yale.edu Tel: (309) 531-7157
Yu He	1:30 PM - 5:00 PM	Becton 326 (lab) Becton 323 (student office)	Wenxin Li Email: wenxin.li@yale.edu Tel: (203) 907-6868 Tyler Werner Email: tyler.werner@yale.edu Tel: (203) 275-5620
Owen Miller	1:30 PM - 5:00 PM	Discuss with lab contact	Lang Zhang Email: lang.zhang@yale.edu Tel: (617) 230-0353
Vidvuds Ozolins	Discuss with lab contact		Xiaowei Ou Email: xiaowei.ou@yale.edu Tel: (203) 392 - 4911
Shruti Puri	Discuss with lab contact		Kaavya Sahay Email: kaavya.sahay@yale.edu Tel: (475) 280 0671
Peter Rakich	1:30 PM - 5:00 PM	Becton 414	Naijun Jin Email: naijun.jin@yale.edu Tel: (203) 824 - 7505
Peter Schiffer	1:30 PM - 4:00 PM	Becton 212 (lab) Becton 221 (office)	Anthony Hurben Email: anthony.hurben@yale.edu Tel: (952) 288 - 7365
Rob Schoelkopf	Discuss with lab contact		Neel Thakur Email: neel.thakur@yale.edu Tel: (484) 889-1719 Yanhao Wang Email: yanhao.wang@yale.edu Tel: (475) 434 - 6932
Doug Stone	Discuss with lab contact		Ali Alhulaymi Email: alialhulaymi@gmail.com Tel: (475) 209 - 0785

Lab Tour Schedule

Tuesday, March 21th 10:00 AM - 5:00 PM Eastern Time

Group	Time	Location	Contact
Charles Ahn	10:00 AM - 5:00 PM	Becton 301	Kidae Shin <i>email: kidae.shin@yale.edu</i> <i>Tel: (475) 414-8319</i>
Hui Cao	10:00 AM - 2:30 PM	Becton ground floor (card access needed - contact Rohin)	Rohin McIntosh <i>Email: rohin.mcintosh@yale.edu</i> <i>Tel: (203) 980-2839</i>
Michel Devoret	Discuss with lab contact		Andy Ding <i>Email: zhenghao.ding@yale.edu</i> <i>Tel: (309) 531-7157</i>
Yu He	12:00 PM - 5:00 PM	Becton 326 (lab) Becton 323 (student office)	Wenxin Li <i>Email: wenxin.li@yale.edu</i> <i>Tel: (203) 907-6868</i> Tyler Werner <i>Email: tyler.werner@yale.edu</i> <i>Tel: (203) 275-5620</i>
Vidvuds Ozolins	Discuss with lab contact		Xiaowei Ou <i>Email: xiaowei.ou@yale.edu</i> <i>Tel: (203) 392 - 4911</i>
Shruti Puri	Discuss with lab contact		Kaavya Sahay <i>Email: kaavya.sahay@yale.edu</i> <i>Tel: (475) 280 0671</i>
Peter Rakich	10:00 AM - 4:00 PM	Becton 4th floor	Naijun Jin <i>Email: naijun.jin@yale.edu</i> <i>Tel: (203) 824 - 7505</i>
Peter Schiffer	12:00 PM - 4:00 PM	Becton 212 (lab) Becton 221 (office)	Anthony Hurben <i>Email: anthony.hurben@yale.edu</i> <i>Tel: (952) 288 - 7365</i>
Rob Schoelkopf	Discuss with lab contact		Neel Thakur <i>Email: neel.thakur@yale.edu</i> <i>Tel: (484) 889-1719</i> Yanhao Wang <i>Email: yanhao.wang@yale.edu</i> <i>Tel: (475) 434 - 6932</i>
Doug Stone	Discuss with lab contact		Ali Alhulaymi <i>Email: alialhulaymi@gmail.com</i> <i>Tel: (475) 209 - 0785</i>

Important Contacts & Key Information

COVID-19 Guidance

- Masking is optional in most spaces on campus
- All visitors should carry vaccination and booster documentation and be prepared to provide it if asked
- If an individual is feeling sick, immediately self isolate and contact Owen Miller, Shruti Puri, Yu He, or Logan Wright (contact information listed below)

Documents for Reimbursement

- Visitors who are U.S. citizens will need to fill out the W-9 form.
- International students, regardless of where they are attending school, need to fill out the W-8BEN and the International Information Form (IIF), and provide a copy of the passport face page and visa page.
- Please keep all itemized receipts received during your visit
- More detailed instructions will be given during the Welcome Reception

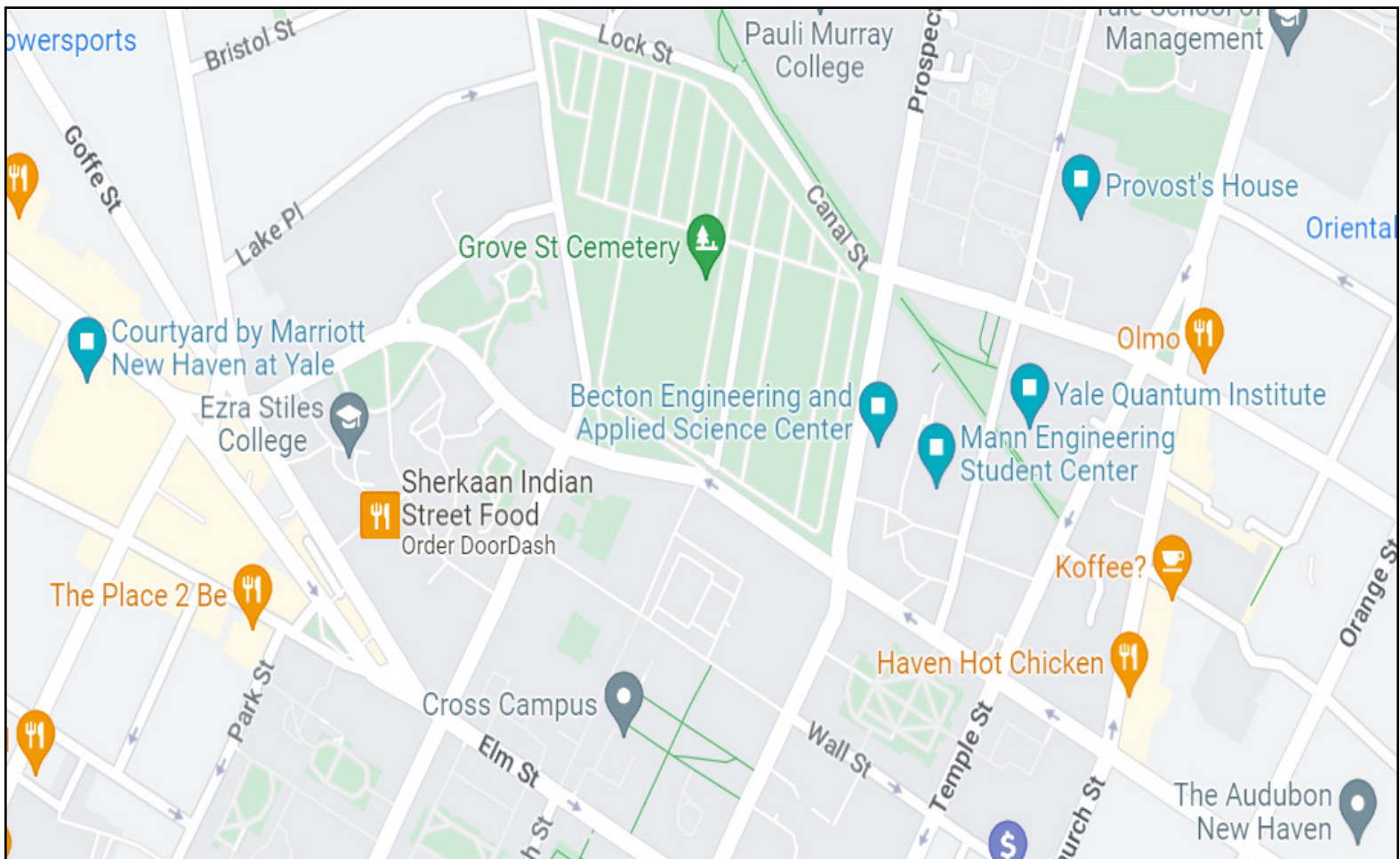
Important Contacts

Visitor Center/ Tour Guide	(203) 432-2300 or (203) 710-4902
COVID hotline (Monday-Friday 8:30AM- 5:00PM EST)	(203) 432-6604 (toll free at 866-924-9253)
Key Administrative Contact	
Alexander Bozzi	(203) 432-9842; alexander.bozzi@yale.edu
Faculty Hosts	
Yu He	yu.he@yale.edu
Owen Miller	owen.miller@yale.edu
Shruti Puri	shruti.puri@yale.edu
Logan Wright	logan.wright@yale.edu

In the event of an emergency, please dial 911

Relevant Addresses

- ***Mann Engineering Student Center (Mann Center)***
107 Dunham Laboratory, 10 Hillhouse Ave, New Haven, CT 06511
- ***Becton Engineering & Applied Science Center (BCT)***
15 Prospect St, New Haven, CT 06511
- ***Yale Quantum Institute (YQI)***
17 Hillhouse Ave, New Haven, CT 06511
- ***Yale Provost's House***
35 Hillhouse Ave, New Haven, CT 06511
- ***Zeneli's Pizzeria***
138 Wooster St, New Haven, CT 06511
- ***Courtyard Marriott at Yale***
30 Whalley Ave, New Haven, CT 06511



Faculty Directory

Faculty Member	Email	Office	Lab
Charles Ahn	charles.ahn@yale.edu	Becton 303	Becton 224, 226, 302, 304
Hui Cao	hui.cao@yale.edu	Becton 309	Becton 012, 014, 016
Yu He	yu.he@yale.edu	Becton 327	Becton 326
Sohrab Ismail-Beigi	sohrab.ismail-beigi@yale.edu	Becton 307	
Owen Miller	owen.miller@yale.edu	Becton 313	
Vidvuds Ozolins	vidvuds.ozolins@yale.edu	Out of office - please discuss with lab contact	
Shruti Puri	shruti.puri@yale.edu	YQI 407	
Peter Rakich	peter.rakich@yale.edu	Becton 407	Becton 018, 414
Peter Schiffer	peter.schiffer@yale.edu	Becton 329	
Robert Schoelkopf	robert.schoelkopf@yale.edu	Becton 423	Becton 412, 414, 418, 420, 422, 426
Douglas Stone	douglas.stone@yale.edu	YQI 436	
Logan Wright	logan.wright@yale.edu	Becton 305	

Graduate Student Volunteers

Materials			
Kidae Shin	(475) 414-8319		kidae.shin@yale.edu
Tyler Werner	(203) 275-5620		tyler.werner@yale.edu
Anthony Hurben	(952) 288 - 7365		anthony.hurben@yale.edu
Wenxin Li	(203) 907-6868		wenxin.li@yale.edu
Xiaowei Ou	(203) 392 - 4911		xiaowei.ou@yale.edu
Quantum Information			
Neel Thakur	(484) 889-1719		neel.thakur@yale.edu
Yanhao Wang	(475) 434 - 6932		yanhao.wang@yale.edu
Andy Ding	(309) 531-7157		zhenghao.ding@yale.edu
Kaavya Sahay	(475) 280 - 0671		kaavya.sahay@yale.edu
Optics			
Naijun Jin	(203) 824-7505		naijun.jin@yale.edu
Rohin McIntosh	(203) 980-2839		rohin.mcintosh@yale.edu
Ali Alhulaymi	(475) 209 - 0785		alialhulaymi@gmail.com
Lang Zhang	(617) 230-0353		lang.zhang@yale.edu

Poster Session Index

Monday, March 20th

1.	Lang Zhang, Miller Group <i>A General Theory of Near-field Radiative Heat Transfer (And all broadband scattering)</i>
2.	Anthony Hurben, Schiffer Group <i>Magnetic Frustration at the Nanoscale</i>
3.	Yizhi Luo, Rakich Group <i>Exploring phonon coherence for quantum acoustic applications</i>
4.	Yishu Zhou, Rakich Group <i>Ultra-wideband nonreciprocal acousto-optic modulators in silicon photonics</i>
5.	Kidae Shin, Ahn Group <i>Molecular beam epitaxy of rare-earth doped oxide thin films for quantum interconnects</i>
6.	Wenzheng Wei, Ahn Group <i>Solid state reduction of nickelate thin films</i>
7.	Tyler Werner, He Group <i>Illuminating Record High Temperature 2D Ferromagnetism with ARPES</i>
8	Stijn de Graaf, Schoelkopf Group <i>A high on-off ratio beamsplitter interaction for two-qubit gates on bosonic qubits</i>
9.	James Teoh, Schoelkopf Group <i>Robus quantum communication with lossy microwave links</i>
10.	Kaavya Sahay, Puri Group <i>High-threshold fault-tolerance in measurement-based error correction with tailored fusion circuits</i>
11.	Pei-Kai Tsai, Puri Group <i>Preparing the XY surface code with high threshold under biased noise</i>
12.	Rohin McIntosh, Cao Group <i>Depth-Targeted Energy Delivery Deep Inside Scattering Media</i>

Alumni Panelists



Stephen Albright

Program Manager, New York Academy of Sciences
Charles Ahn Group Alumni
Email: albright.stephen@gmail.com



Hanwen Zhang

Gibbs Assistant Professor (Applied Math), Yale University
Owen Miller Group Alumni
Email: hanwen.zhang@yale.edu



Wen Xiong

Optics Scientist, Meta Inc. then Bytedance
Hui Cao Group Alumni
Email: xiong.xuwen@gmail.com



Kevin Chou

Quantum Engineer, Quantum Circuits Inc.
Rob Schoelkopf Group Alumni
Email: chou@quantumcircuits.com

Dissertation Defense



Zeyu Kuang

Monday, March 20th
11:30 AM
Mann Student Center
or Via Zoom
(connection info below)

Fundamental Limits of Nanophotonic Design

Nanoscale fabrication techniques, computational inverse design, and fields from silicon photonics to metasurface optics are enabling transformative use of an unprecedented number of structural degrees of freedom in nanophotonics. A critical need is to understand the extreme limits to what is possible by engineering nanophotonic structures. This thesis establishes the first general theoretical framework identifying fundamental limits to light-matter interactions. It derives bounds for applications across nanophotonics, including far-field scattering, optimal wavefront shaping, optical beam switching, and wave communication, as well as the miniaturization of optical components, including perfect absorbers, linear optical analog computing units, resonant optical sensors, multilayered thin films, and high-NA metalenses.

The bounds emerge from an infinite set of physical constraints that have to be satisfied by polarization fields in response to an excitation. The constraints encode power conservation in single-scenario scattering and requisite field correlations in multi-scenario scattering. The framework developed in this thesis, encompassing general linear wave scattering dynamics, offers a new way to understand optimal designs and their fundamental limits, in nanophotonics and beyond.

Committee Members:

Owen Miller

A. Douglas Stone

Peter Rakich

Meeting ID: 210 394 6099

Password: OKLIvy

Zoom Link: <https://yale.zoom.us/j/2103946099?pwd=Rm1RUEIxdURINy->

Favorite New Haven Spots



East Rock Park

41 Cold Spring St, New Haven, CT 06511

East Rock was formed about 200 million years ago as the continents were in the process of moving away from each other.

Excerpt from <https://www.ctvisit.com/listings/east-rock-park>



Lighthouse Point Park

2 Lighthouse Rd, New Haven, CT 06512

Swimming, natural history displays, nature trails, picnic grove, bird sanctuary and an antique carousel are highlights of this 82-acre park on Long Island Sound. Season runs: April 1-November 1. Gates open 7 a.m.-sunset year round.

Excerpt from <https://www.ctvisit.com/listings/lighthouse-point-park>



Historic Grove Street Cemetery

227 Grove Street, New Haven CT 06511

The New Haven, Connecticut, burial ground, opened 1796, is the oldest cemetery in the nation designed as a “city of the dead,” with named avenues and cross streets. A National Historic Landmark, it is also the first chartered burial ground in the United States and the first to be arranged in family lots.

Excerpt from <https://www.grovestreetcemetery.org/>



Marsh Botanical Gardens

265 Mansfield Street, New Haven, CT 06511

Sitting on eight acres, with six greenhouses comprising around a third of an acre under glass, Marsh Botanical Garden offers support for researchers, faculty and students at Yale, as well as an informative and eye-catching experience for visitors. The outdoor and natural areas of the Garden is open from 7am to sunset everyday.

Excerpt from <https://marshbotanicalgarden.yale.edu/>

Favorite New Haven Spots



Yale University Art Gallery

1111 Chapel Street (at York Street) New Haven, Connecticut

Founded in 1832, the Gallery is the oldest university art museum in America. Today, it is a center for teaching, learning, and scholarship and is a preeminent cultural asset for Yale University, the wider academic community, and the public. The museum is open to all, free of charge.

Excerpt from <https://artgallery.yale.edu/>



The Beinecke Rare Book and Manuscript Library

121 Wall St, New Haven, CT 06511

The Beinecke Rare Book and Manuscript Library provides access to one of the world's largest collections of rare books, manuscripts, and related materials. Public visitors are welcome in the Beinecke Library exhibition hall on Monday and Tuesday, 9am – 7pm; Wednesday, 10am – 7pm; Thursday, 9am – 7pm; Friday, 9am – 5pm; and Saturday and Sunday, noon – 5pm

Excerpt from <https://beinecke.library.yale.edu/>



Edgerton Park

75 Cliff St, New Haven, CT 06511

A green space jewel on the Hamden/ New Haven border, Edgerton Park has been a part of the New Haven Parks system since 1965.

Excerpt from <http://www.edgertonpark.org/>



The Cushing Center

333 Cedar St, New Haven, CT 06510

The Cushing Brain Tumor registry is an immense archival collection of over 2,200 case studies which includes human whole brain specimens, tumor specimens, microscopic slides, notes, journal excerpts and over 15,000 photographic negatives dating from the late 1800's to 1936.

Excerpt from <https://library.medicine.yale.edu/cushingcenter>