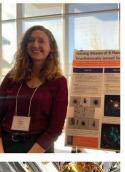
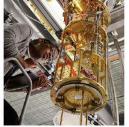


## **Department Welcome 2020**











Academic Year 2020-2021

Karsten Heeger, Chair



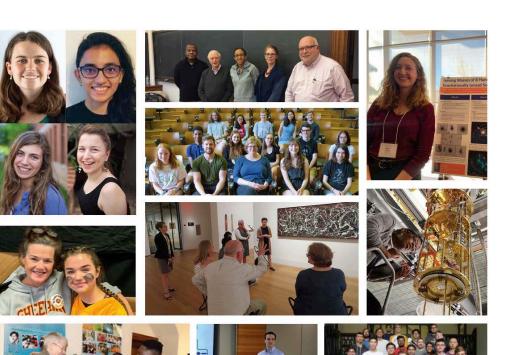








## **Department Welcome 2020**



Our Physics Community



## Physics in 2020



## **Outline**



**Our Community** 

New faculty and students

Physics by the Numbers

News and Honors

Institute and Facilities

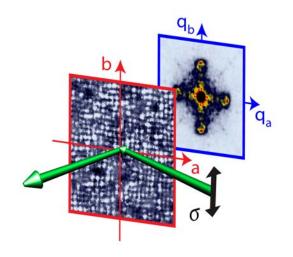
Science Initiatives



## **Welcome to our New Faculty**



Eduardo Da Silva Neto, Ph.D. Assistant Professor of Physics



E. H. da Silva Neto, *et al.* **Science** 343, 393 (2014).

Experimental studies of quantum materials with advanced spectroscopic techniques targeting the discovery and investigation of emergent electronic quantum states of matter

https://dasilvaneto.faculty.ucdavis.edu



## Welcome to our Inaugural Mossman Fellow

## 2020 Yale Mossman Postdoctoral Fellowship

in elementary particle theory

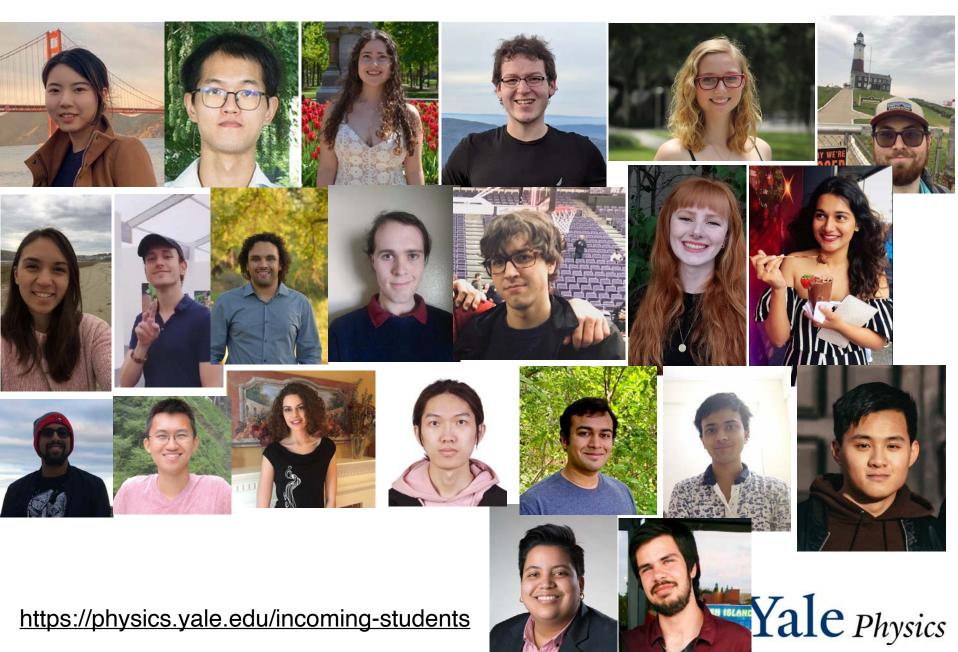


### Yuan Xin

- Ph.D. in Physics, 2020 (Boston University)
- Research focused on strongly-coupled quantum field theory and quantum gravity
- Previous research topics include non-planar scattering amplitudes, modular bootstrap for 2d conformal field theories, Hamiltonian truncation methods, and quantum simulation
- Enjoys running and biking



## **Welcome to our 2020 Graduate Students**



https://physics.yale.edu/incoming-students

## **Recent Yale Physics Alumni** (selected)



Supraja Balasubramanian Bonnie Fleming

**Postdoc** FNAL

**Consultant**Boston Consulting Group



Estella Barbosa de Souza Reina Maruyama



<u>Joshua Burt</u> John Murray

**Postdoc** Yale



Shany Danieli Pieter van Dokkum

NASA Hubble Fellow. Postdoc



Scott Jensen
Yoram Alhassid



William Sweeney

A. Douglas Stone

**Data Scientist** VideaHealth

Follow our alumni at

https://physics.yale.edu/people/alumni



## Welcome to New Graduate/Undergraduate Program Teams

### **Graduate Program**



**Stacey Watts**Graduate Registrar

Rona Ramos Graduate Program Coordinator





**Bonnie Fleming** DGS

### **Undergraduate Program**



**Daphne Klemme**Undergraduate Registrar



**Nikhil Padmanabhan** DUS



## **Staff Recognitions**



Karen de Felice

Retired in July 2020 from her operations manager after 44 years of service to Yale

Congratulations!



**Daphne Klemme** 

15 years of service



**Catherine Barabas** 

15 years of service

Thanks to all staff for your support!



## **Yale Physics by the Numbers**



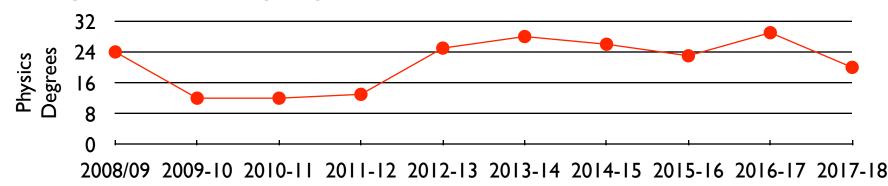
## **People**

faculty (primary) faculty (secondary) faculty (total)	34 16 69
research scientist postdocs grad students (physics)	25 31 133
grad student alumni (1976-present)	302



## **Yale Physics - Undergraduate Program**

### **BA/BS Degrees Awarded By Major**



	2008/09	2009-10	2010-11	2011-12	2012-13	2013-1 4	2014-15	2015-16	2016-17	2017-18
Physics	24	12	12	13	25	28	26	23	29	20
Physics & Geosciences	0	0	0	0	0	0	1	0	1	0
Physics & Philosophy	1	1	1	1	1	1	1	0	0	1
Astronomy & Physics	4	5	5	1	3	2	1	1	1	0

healthy and robust undergraduate degree program

Yale Physics

## **Yale Physics - Graduate Program**

### **PhD Enrollment**

2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
97	97	102	106	113	123	118	127	117	121

### Healthy graduate program

Physics students have diverse interests!

A lot of student entering the Physics program seek interdisciplinary opportunities

An opportunity and a challenge

	Count	% of total
1st year Physics		20
2 <sup>nd</sup> year Physics		14
Applied Physics		19
Astronomy		2
Cell bio		1
G&G		1
MCDB		2
Physics		39
Psychiatry		2
SEAS		2
	133	100

>3rd year not in Physics: 41% Yale Physics

## **Yale Physics Graduate Class 2020**

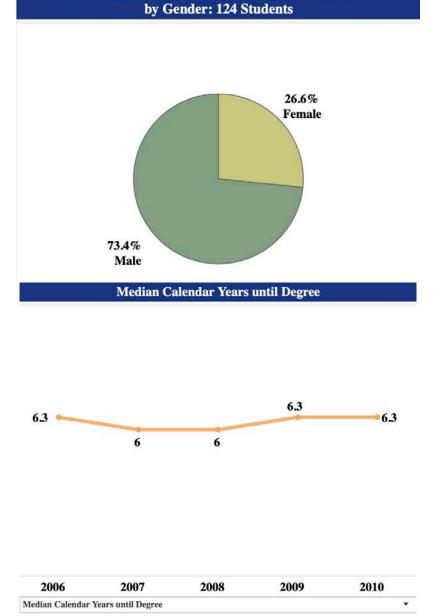
- Received our highest number of applicants, 480, during the 2019-20 admission cycle
- Largest class 32 accepted, 5 are currently deferred and 1 withdrew (19 male, 13 female, 4 URM students)

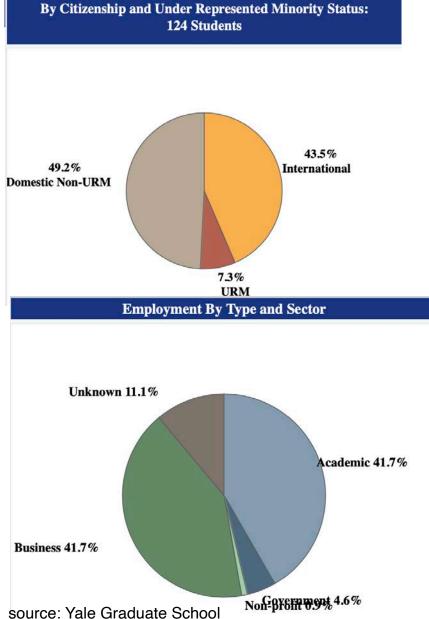
Subfield	Overall	Class of 2020
Astrophysics/Cosmology	17	2
Atomic & Optical Physics	17	2
Biological Physics	14	2
Condensed Matter Experiment	11	3
Condensed Matter Theory	16	5
Nuclear Experiment	11	3
Nuclear Theory	2	1
Particle Experiment	19	5
Particle Theory	8	1
Quantum Information Physics	6	1
Undecided (Physics)	1	1
<b>Currently Active Students</b>	122	26



## **Yale Physics - Graduate Program**

Enrolled Students in 2018-19 as of October 2018





## **Research Areas**

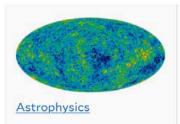
traditional and emerging research areas

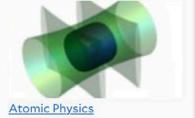
graduate student interests reflect the interdisciplinary nature of physics

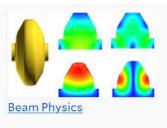
research portfolio of department is evolving

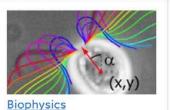
expect some reorganization and alignment with emerging areas

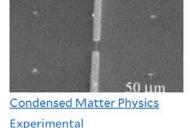








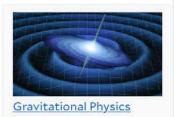






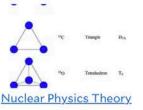
Physics Theory

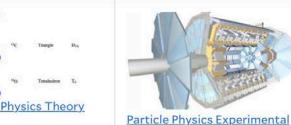
Experimental





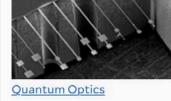












**Ouantum Information Physics** 

Particle Physics Theory

## **Yale Physics Ranking & Priorities**



### **Physics**

### **Program and Specialty rankings**

#12 in Physics

#5 in Nuclear (tie)

#12 in Atomic / Molecular / Optical (tie)

#10 in Quantum (tie)

#10 in Elementary Particles / Field / String
Theory (tie)

Diversity, inclusion, mentoring, and excellence are amongst our top priorities.



## 2019-2020 Honors and Awards - Faculty

Charles Ahn – appointed the John C. Malone Professor of Applied Physics

Eduardo da Silva Neto - 2019 Sloan Research Fellowship and 2019 NSF CAREER Award

**Sarah Demers** - Organizing Committee for the American Physical Society Conference for Undergraduate Women in Physics 2020

Shelly Lesher - Yale Presidential Visiting Scholar 2019-2020

Ben Machta - named a Simons Investigator

Reina Maruyama - Chair of the Woman Faculty Forum (2020-2021)

Nir Navon - NSF CAREER Award

Nikhil Padmanabhan - DUS for 2020-21

Nick Read - Fellow of the Royal Society (of London)

**Peter Schiffer** – named the Frederick W. Beinecke Professor of Applied Physics

R. Shankar – appointed the J.W. Gibbs Professor of Physics

Adriane Steinacker – 2019 Poorvu Family Fund for Academic Innovation

John Tully - 2020 Award for Scientific Achievement in Chemical Sciences from the National Academy of Sciences

**Meg Urry** – Inducted into The Johns Hopkins University Society of Scholars and named an inaugural American Astronomical Society Fellow

**Sarah Veatch** - Yale Presidential Visiting Scholar 2019-2020



## 2019-2020 Honors and Awards - Research Staff

Danielle Speller - Assistant Professor at Johns Hopkins University

Shruti Puri - Assistant Professor in Applied Physics at Yale University

**Thomas Langford** – 2019 Sambamurti Memorial Lectureship at Brookhaven National Lab

Mislav Balokovic - YCAA Fellow starting August 2020

Victor Robles Sanchez - YCAA Fellow started January 2020

**Zachary Raines** - Yale Prize Postdoctoral Fellow started September 2019 **Pavlo Sukhachov** - Yale Prize Postdoctoral Fellow starting September 2020

**Yuan Xin** - Inaugural Mossman Fellow starting September 2020



## 2019-2020 Honors and Awards - Graduate Students

Hannah Bossi – NSF Graduate Research Fellowship

**Shany Danieli** – 2019 Price Prize in Cosmology and Astrophysics and 2020 NASA Hubble Fellowship

**Sumita Ghosh** (Applied Physics Student) - accepted into the triplet program of the Quantum Information Science and Engineering Network (QISE-NET)

Ryan Mescall – 2019 Leigh Page Prize

**Samantha Pagan** – 2019 Dean's Emerging Scholars Fellowship and NSF Graduate Research Fellowship

Alex Reda – 2019 Leigh Page Prize

**Brooke Russell** – 2019 Gertrude Scharff-Goldhaber Prize

Joseph Shomar - Ford Foundation Graduate Fellowship

Ben Siegel - NSF Graduate Research Fellowship Honorable Mention

Arina Telles – 2019 Leigh Page Prize and NSF Graduate Research Fellowship



## 2019-2020 Honors and Awards - Undergraduates

Howard L. Schultz and DeForest Pioneer Prize recipients for Yale College Class of 2020



Top left to bottom right: Sam Borden, Tim Foldy-Porto, Stuart Nicholls, and Elizabeth Ruddy. No photo Lukas Baker and PJ Tuckman



## 2019 Physics Students in the News

## **YaleNews**

**EXPLORE TOPICS** ▼

Elizabeth Ruddy's dance with physics and a world of possibilities





https://news.yale.edu/2020/05/12/elizabethruddys-dance-physics-and-world-possibilities



## **2019 Hoodie Ceremony**

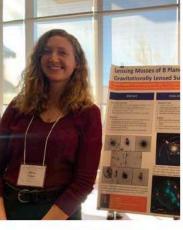


## **Our Physics Community**

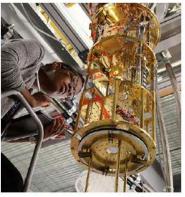






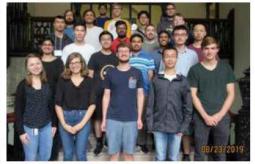












## Statement of Principles

## Respect

We continually strive to make our department a place that respects people with **diverse** backgrounds and values each others' **creativity**.

## Well-being

We commit to actively engage in creating a **supportive** and **safe environment**. Criticism and praise are professional and constructive.

## Integrity

We carry out our work with **honesty** and with the **highest standards**. We shall not commit scientific or academic misconduct, defined as plagiarism, fabrication, or falsification.

## Community

Our community actively **includes all**, enhancing **collaboration** and promoting our common mission to advance the frontiers of knowledge.



## **Climate and Diversity Committee**

#### **Mission**

To support the Department's goals to provide a safe, supportive, and inclusive environment for every member of our community. We are committed to creating a work place whose core principles are based on diversity, equity, and inclusion for every staff member, student and faculty as we strive to obtain our goals of excellence in research, teaching, and mentoring.



chair: Prof. Helen Caines



### Diversity, Equity, and Inclusion

Yale Physics is committed to fostering an environment of diversity, equity, and inclusion for every member of our department community as we strive for excellence in research, teaching, and mentoring.

Yale Physics is leading a variety of efforts to create a more inclusive, equitable, and welcoming department community, including the undergraduate <a href="Women in Physics (WiP)">Women in Physics (WiP)</a> and graduate <a href="Women in Physics+(WiP+)">Women in Physics+(WiP+)</a>; QuARK (Queer Affiliated fRiends of physiks); and outreach with <a href="Girls-Science Investigations">Girls-Science Investigations</a>. Yale Physics is now also an active member in the <a href="APS-IDEA network">APS-IDEA network</a>. Some of our initiatives are highlighted below; please explore the links for more information. There are many ways to get involved.



Research & Discovery



Community & Belonging



News & Honors



Education



Outreach



Get Involved



Shared Leadership



Advocacy



egacy

#### In Memory of George Floyd

On May 31, 2020, Peter Salovey, the President of Yale University, sent a letter to the Yale community, <u>in</u> memory of George Floyd.

#### APS Statement Condemning Racism

On June 1, 2020 the American
Physical Society released a statement
condemning racism. For a full text of
the statement, please see here.

#### Diversity & Inclusion

#### In the Physics Department

- □ Diversity & Inclusion Home
- Statement of Principles (coming soon)
- ☐ Yale Physics APS-IDEA
- □ Climate & Diversity Committee
- Student Organizations
- □ Internal Opportunities
- □ External Fellowships
- □ State of the Department

#### **Campus Resources**

- □ Belonging at Yale
- Office for Graduate Student
   Development & Diversity
- □ Graduate School of Arts and Sciences Student Resources
- Office for Equal Opportunity
   Programs
- Office of Public Safety
- Sexual Harassment and Assault

## A web portal to various DEI activities



### Diversity, Equity, and Inclusion

Yale Physics is committed to fostering an environment of diversity, equity, and inclusion for every member of our department community as we strive for excellence in research, teaching, and mentoring.

Yale Physics is leading a variety of efforts to create a more inclusive, equitable, and welcoming department community, including the undergraduate <a href="Women in Physics (WiP)">Women in Physics (WiP)</a> and graduate <a href="Women in Physics+ (WiP+)">Women in Physics+ (WiP+)</a>; QuARK (Queer Affiliated fRiends of physiKs); and outreach with <a href="Girls-Science Investigations">Girls-Science Investigations</a>. Yale Physics is now also an active member in the <a href="APS-IDEA network">APS-IDEA network</a>. Some of our initiatives are highlighted below; please explore the links for more information. There are many ways to get involved.



On May 31, 2020, Peter Salovey, the President of Yale University, sent a letter to the Yale community, <u>In memory of George Floyd</u>.

A web portal to various DEI activities

#### APS Statement Condemning Racism

On June 1, 2020 the American
Physical Society released a statement
condemning racism. For a full text of
the statement, please see here.

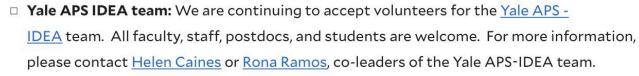


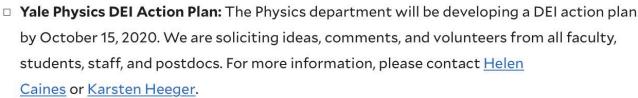
Research & Discovery





### **New Initiatives**







Education



Outrea

Commi



Advocacy



Legacy

- Office for Graduate Student
   Development & Diversity
- Graduate School of Arts and
   Sciences Student Resources
- Office for Equal Opportunity
  Programs
- Office of Public Safety
- Sexual Harassment and Assault



## Joined Newly Established APS-IDEA Network



We are not alone!

National community to share success stories and ask for advice

Yale Physics, is now part of the American Physical Society Inclusion, Diversity, and Equity Alliance (APS-IDEA), Its mission is to empower and support physics departments, laboratories, and other organizations to identify and enact strategies for improving equity, diversity, and inclusion (EDI). It will do so by establishing a community of transformation.

Team consists of Faculty, Postdocs, Graduate Students, Undergraduate Students and Staff

Early focus on establishing **shared** leadership

Building off of department's Climate and Diversity Committee (started in 2014)



## **Towards Shared Leadership**

### **Graduate Student Advisory Committee**

https://physics.yale.edu/academic/graduate-studies/GSAC

Graduate Student Advisory Committee (GSAC)

#### About GSAC

The Graduate Student Advisory Committee serves as a point of communication between the graduate students and the administration of the department. The committee advises the Chair, the DGS, and other faculty on matters related to graduate students and the graduate program, including (but not limited to) helping plan and organize annually scheduled departmental events. The committee members also advocate on behalf of graduate students with the Chair and DGS.

Committee members meet with the Chair and DGS once a month. The committee also meets internally once a month while regularly soliciting feedback from other students in their cohorts.

## **Undergraduate Student Advisory Committee**

being formed

For a full list of Physics committees <a href="https://physics.yale.edu/about/committees-officers">https://physics.yale.edu/about/committees-officers</a>



## **Undergraduate Women in Physics**



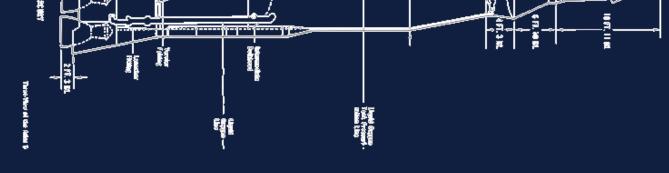
faculty advisor: Prof. Sarah Demers

## **WIP family trees**

- Connecting undergraduates and graduate students to promote exposure to the department, mentorship, and community
- Any students or faculty interested in getting involved: let us know!



## **CUWIP 2020**



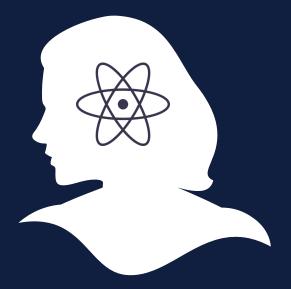
APS CONFERENCE FOR UNDERGRADUATE

ary

ount C €-fissio

Count Count

## **WOMEN IN PHYSICS**



JANUARY 17-19, 2020 | NEW HAVEN, CT YALE UNIVERSITY cuwip.yale.edu

Apply by Friday, October 4th 2019

Pine Graves

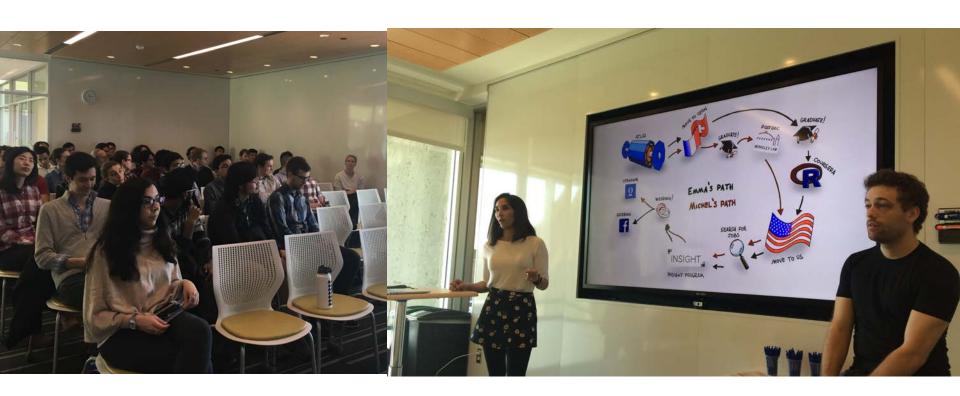


## **CUWIP 2020**



## Yale Physics Professional Development Organization

Expose physics PhDs and PhD candidates to a wide range of career opportunities, mostly non-academic, and provide professionalization resources.



https://yppdo.yale.edu/



## Yale Physics Alumni Start Peer Mentoring Program



## JOIN SU(5)

A peer mentorship and support initiative for 1st year physics & astro students



We are a peer mentorship program for 1st year grad students in physics & astro. For many students, the transition from undergrad to grad school can be difficult. We are a group of graduate students who are working together to make this transition easier.

During the fall, students meet every two weeks online in groups of four, and each group is assigned a senior graduate student as a mentor.

We are free and open to all students. We especially encourage underrepresented students to apply. PhD, Master's, and postbaccalaureate students are all welcome.

Interested students can sign up at www.su5.group/join

DEADLINE: Aug. 31st, 2020













### https://www.su5.group

The SU(5) founders and current leadership team are:

- Cady van Assendelft, Stanford
- George Iskander, UChicago
- □ Ridge Liu, Yale
- John Martyn, MIT
- Nick Rolston, Stanford
- <u>Bárbara Cruvinel Santiago</u>, Columbia



# Yale Physics Olympics

October 2019

42 teams from 32 schools
168 contestants with coaches.
~25 volunteers from Yale (staff, grad students, post docs, faculty, researchers)

5 original events including a fermi quiz Demonstration show Awards Ceremony with prizes





Yale Physics

# **Girls Science Investigations**

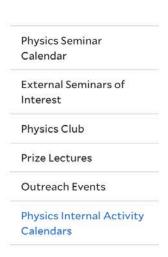


#### **Yale Physics Activity Calendar**

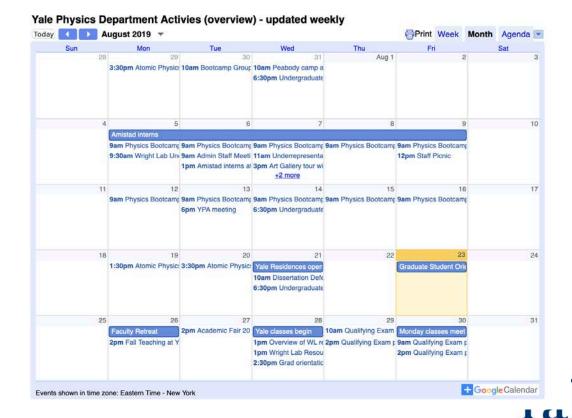
# Department of Physics

Home News Research People Calendar Academics Employment Links Contact Us!

HOME » CALENDAR » PHYSICS INTERNAL ACTIVITY CALENDARS



#### Physics Internal Activity Calendars



## Suggestions welcome!

# Department of Physics

Home News Research People Calendar Academics Employment About Outreach

**HOME** » COMMENTS AND SUGGESTIONS

### Comments and Suggestions

We welcome your comments, feedback and any suggestions regarding the Yale Physics

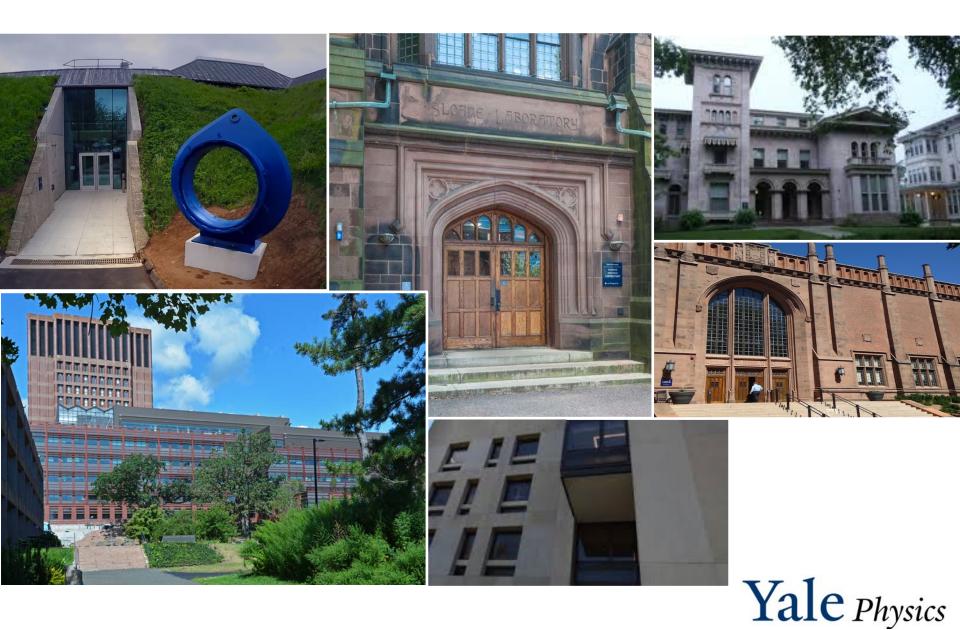
Department. Information submitted through this form is confidential and will be received by the

Chair's office. Name and contact information are optional if you wish to remain anonymous.

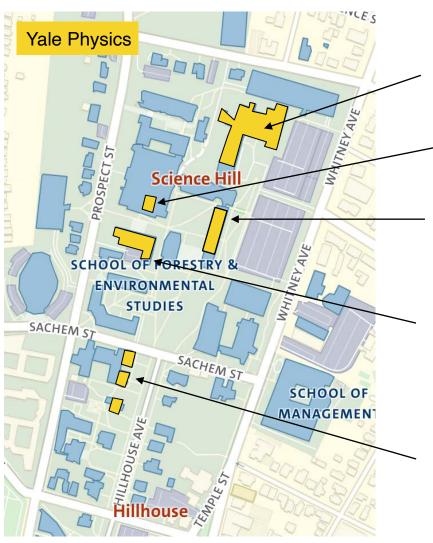
This question is for testing whether or not you are a human visitor and to prevent

Comments: *	
Name:	
E-mail address	
САРТСНА	

# Yale Physics on Science Hill (and West Campus)



#### Yale Physics Department (on central campus)



#### **Wright Laboratory** (WL)

- experimental laboratories and facilities
- nuclear, particle, astrophysics

**Teaching Laboratories** (SCL)

#### Yale Science Building (YSB)

- biological physics

#### **Sloan Physics Building (SPL)**

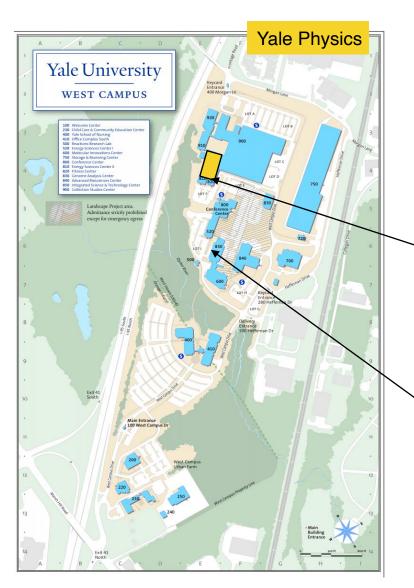
- lectures
- central office
- AMO, bio, condensed matter
- theory

#### Hill House (HH)

- particle physics
- astrophysics
- astronomy



### Yale Physics Department (on west campus)





**Energy Sciences Institute** (ESI)

Eduardo da Silva Neto Steve Konezny

**Systems Biology Institute** 

Ben Machta





## Yale Physics Research in Affiliated Centers



Yale Quantum Institute



Quantitative Biology Institute [QBio]



Yale's Integrated Graduate Program In PHYSICAL and ENGINEERING BIOLOGY



Systems Biology Institute



**Energy Science Institute** 







Advance understanding of the physical world, from the smallest particles to the evolution of the Universe, by engaging in fundamental research, developing novel applications, training future leaders in research and development, educating scholars, and enabling discovery.

#### **Yale Center for Astronomy and Astrophysics**

# Joint Astro Activities of Physics and Astronomy Departments

Created in 2001 (Meg Urry, founding Director)

Keck, Palomar 200", Simons Obs Keck since 2007

Institutional membership in SDSS III, IV, V surveys

Joint colloquia, journal clubs, seminars





YCAA Prize Postdoctoral Fellowship (~170-300 app/yr)



The Quantum Institute facilitates the research and teaching of quantum science on the Yale campus. YQI performs outreach in the form of seminars, workshops, and by hosting leading scientists from around the world.

- · Capitalize on Yale's lead in the area of quantum information.
- Build a reputation for excellence at Yale in a 21<sup>st</sup> century growth area in basic and applied physical science.
- Ensure that Yale becomes the intellectual epicenter in the future of quantum information science and technology.
- Leverage the advantage in this area to help Yale excel in other related and emerging areas of science. (infrastructure!)
- Attract and train the next generation's leaders to carry out the quantum information revolution.

Meng Cheng
Steve Girvin
Jack Harris
Sean Barrett
David deMille
Leonid Glazman
Reina Maruyama
Nir Navon
David Moore
Nicholas Read
Ramamurti Shankar
Karsten Heeger

#### The latest addition



# Yale

Report of the University Science Strategy Committee



# **Topics of interest to Physics**

priority areas

data science

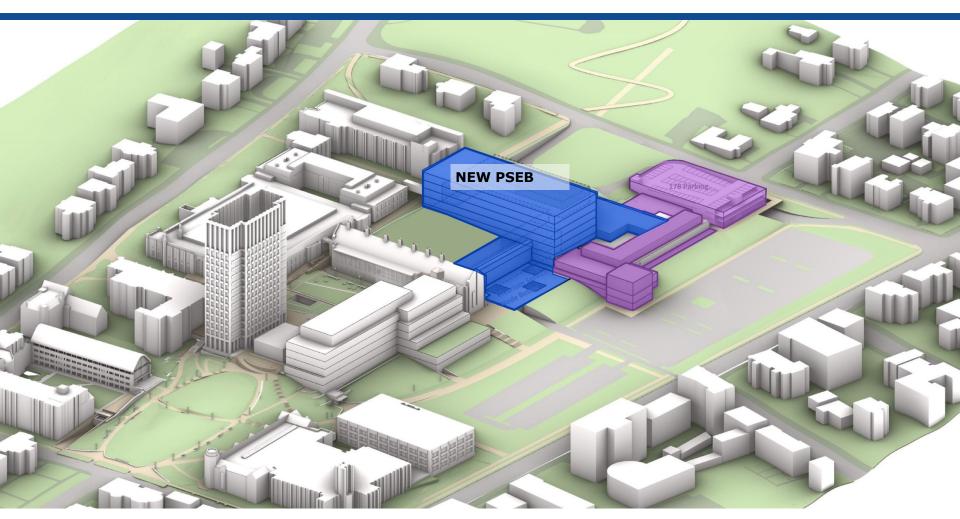
quantum science

cross-cutting initiatives

instrumentation

diversity

#### New Physical Sciences & Engineering Building



• Build new Physical Sciences & Engineering Building and new service area (including chemical safety facility).

from PSEB Town Hall 2/25/20

#### The Opportunity

#### Program for the Physical Science and Engineering Building (PSEB)

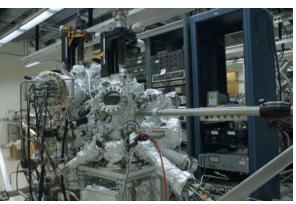
- Intellectual hub for the Quantum Science, Engineering and Materials initiative (USSC)
- Expansion of an Instrument Creation Center (USSC)
- Goal of opening building in 2026
- Expanded and upgraded core facilities
- Space to accommodate approximately 45 faculty and research labs
- Anticipated departments include MEMS, EE, CEE, CS, Applied Physics, and Physics

from PSEB Town Hall 2/25/20

#### Connecting the Campus Community

#### **Recent AIDC workshop**

https://instrumentation.yale.edu/ideation-workshop

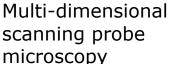


power supply / chiller polarizer (fluence control camera lens

Laser ablation micro Aniko Bezur sampling device **IPCH** 

scanning probe microscopy

Eric Altman **Udo Schwarz** CEE, ME

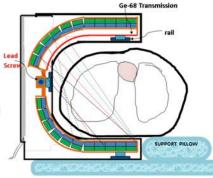


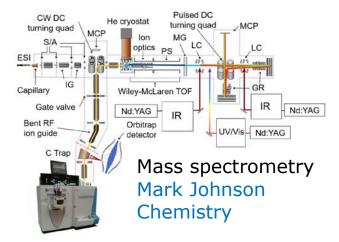
**DE-SPECT** 

Lung molecular imager

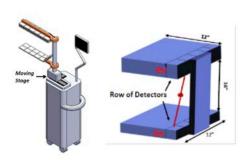
Al Sinusas Y-TRIC

+Prescient Imaging







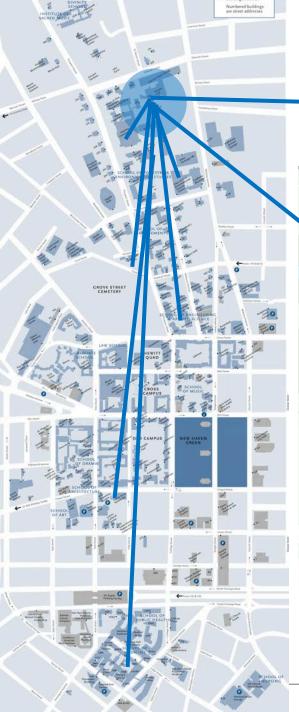


Multiple campus communities (west campus, med school, engineering and basic sciences) have identified common needs

# Connecting the Campus Community

+ Beyond











Leveraging collaborations and regional partnerships to crate a unique role for Yale



in 2020-21

Building our physics community!

Planning for future buildings!

Implementing the science priorities!

Have a great and productive year!