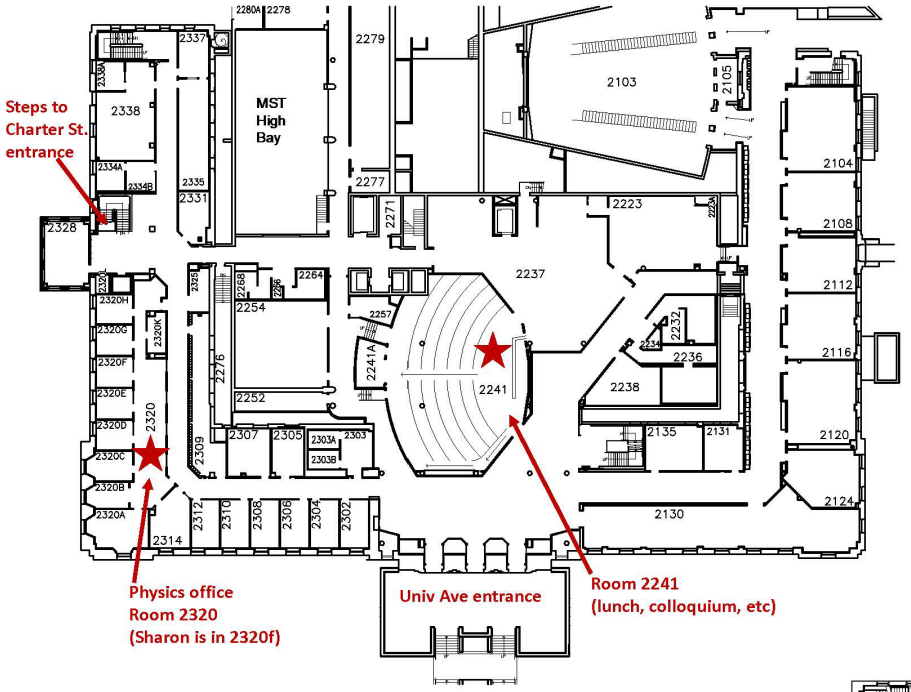
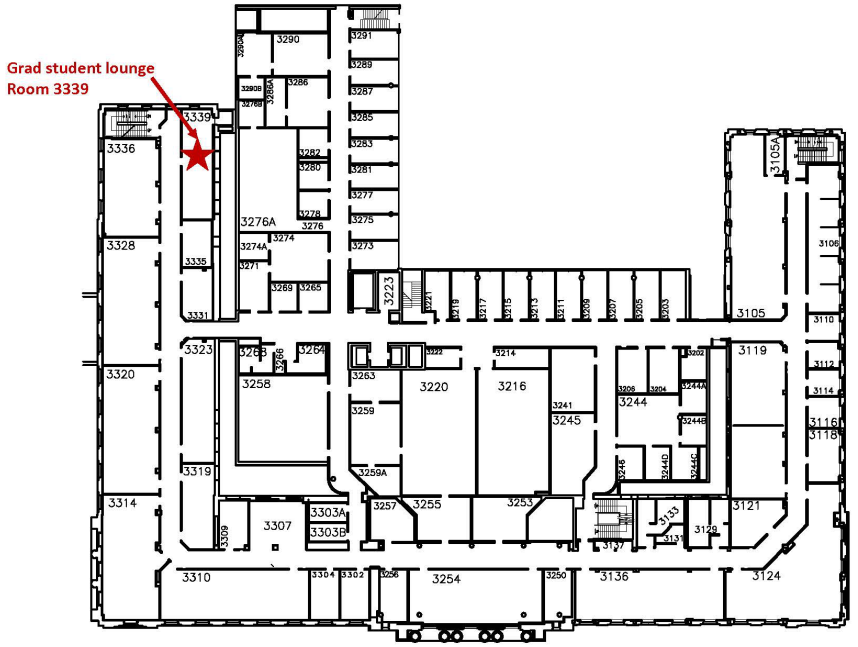
Department of Physics

COLLEGE OF LETTERS & SCIENCES

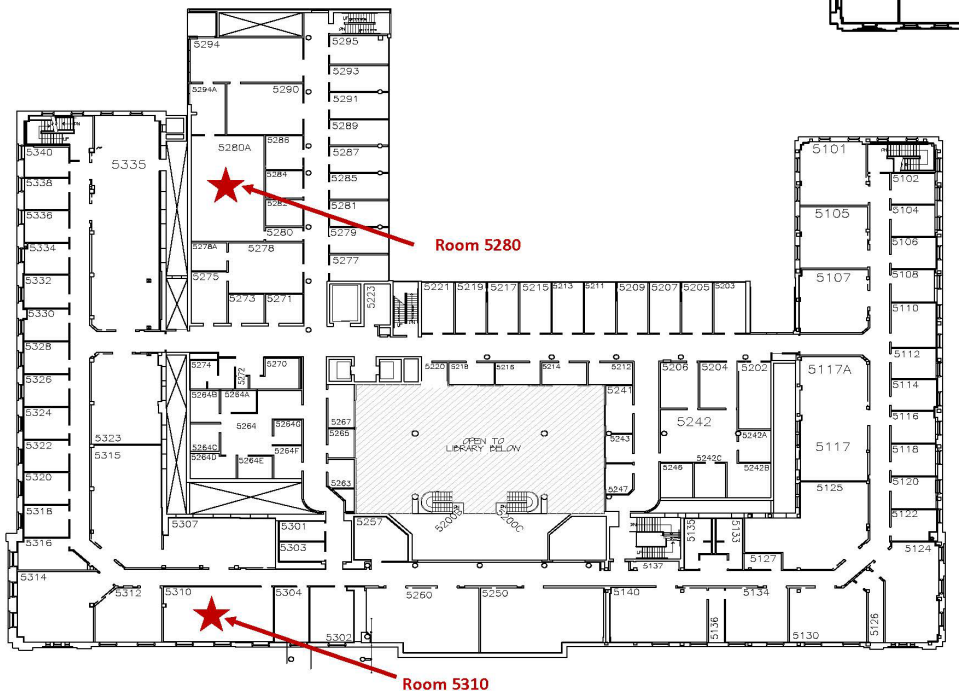
UNIVERSITY OF WISCONSIN–MADISON



Chamberlin Hall: 2nd Floor

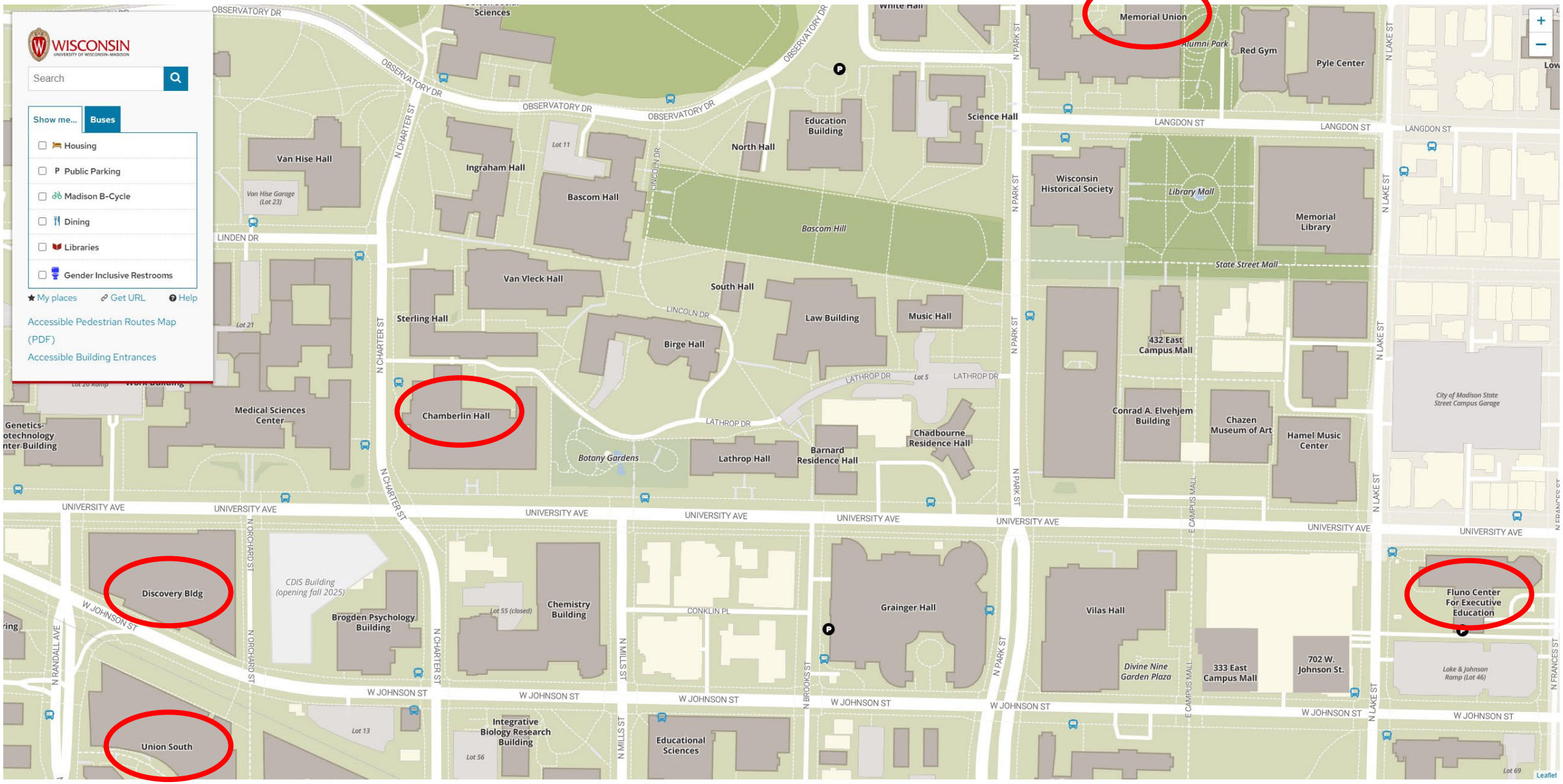


Chamberlin Hall: 3rd Floor



Chamberlin Hall: 5th Floor

Room numbers:
1st digit tells you which floor
2nd digit tells you 1-East; 2-Center; 3-West


WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON
Search
Show me...
Buses
Housing
Public Parking
Madison B-Cycle
Dining
Libraries
Gender Inclusive Restrooms
My places
Get URL
Help
Accessible Pedestrian Routes Map (PDF)
Accessible Building Entrances
Memorial Union
Alumni Park
Red Gym
Pyle Center
Science Hall
Education Building
North Hall
Ingraham Hall
Van Hise Hall
Bascom Hall
Bascom Hill
Wisconsin Historical Society
Library Mall
Memorial Library
State Street Mall
Van Vleck Hall
South Hall
Sterling Hall
Birge Hall
Law Building
Music Hall
Chamberlin Hall
Medical Sciences Center
Botany Gardens
Lathrop Hall
Barnard Residence Hall
Chadbourne Residence Hall
432 East Campus Mall
Conrad A. Elvehjem Building
Chazen Museum of Art
Hamel Music Center
City of Madison State Street Campus Garage
Discovery Bldg
CDIS Building (opening fall 2025)
Brogden Psychology Building
Chemistry Building
Grainger Hall
Vilas Hall
Divine Nine Garden Plaza
333 East Campus Mall
702 W. Johnson St.
Fluno Center For Executive Education
Lake & Johnson Ramp (Lot 46)
Union South
Integrative Biology Research Building
Educational Sciences
LANGDON ST
OBSERVATORY DR
LINDEN DR
LINCOLN DR
LATHROP DR
UNIVERSITY AVE
CONKLIN PL
W JOHNSON ST
N CHARTER ST
N PARK ST
N LAKE ST
E CAMPUS MALL
N ORCHARD ST
N RANDALL AVE
N MILLS ST
N BROOKS ST
Leaflet

Notes/Advice for your visit

- Learn, absorb, pay attention to your reactions
- ASK, ASK, ASK
  - What brings you to/keeps you at UW?
  - Tell me about your research
- Take breaks with currents students in the grad lounge (3339 CH)
- Get outside!
- FOOD
  - 5310 through the morning
  - Lunch outside 2241
  - Snacks in the grad lounge (3339) all afternoon
  - Dinner/reception at Discovery (meet at 2241 ~4:45 or meet there)
- Saturday airport shuttle – bus/van from Fluno at (INSERT TIMING)
  - (otherwise, uber or Madison Metro!)





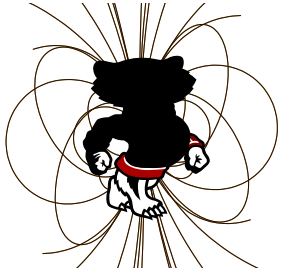
WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

Kevin Black

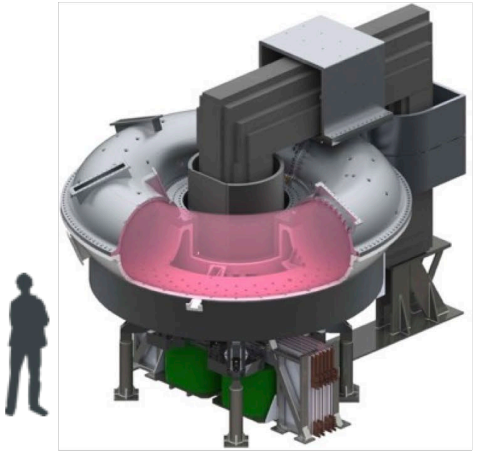
Department Chair

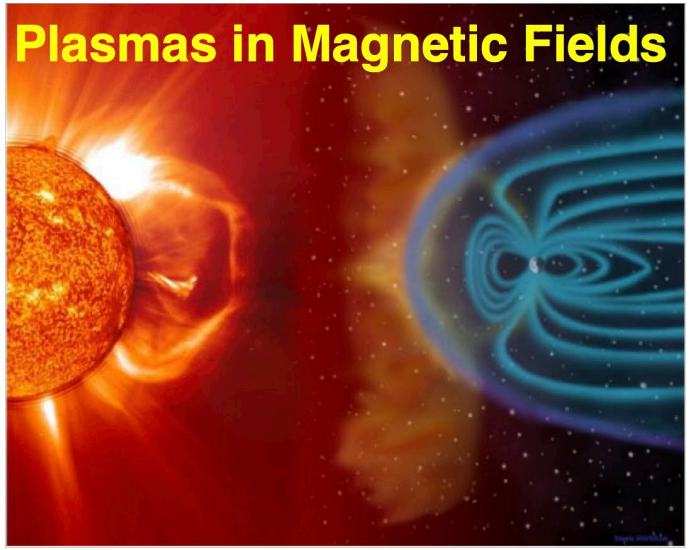
Plasma Physics

The fourth state of matter: from understanding the magnetized plasma universe to fusion energy on Earth

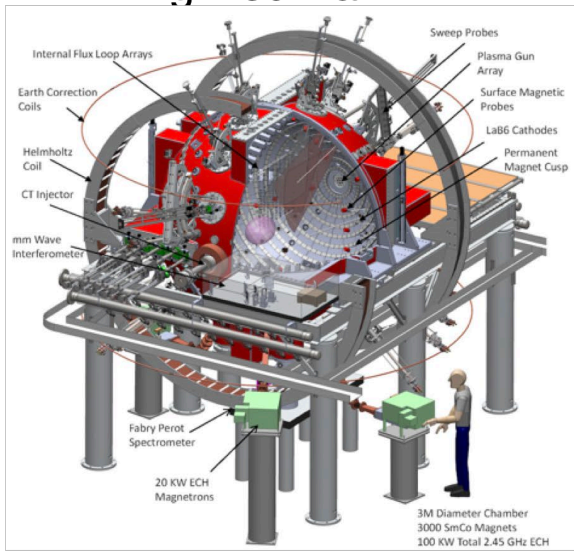


Madison Symmetric Torus

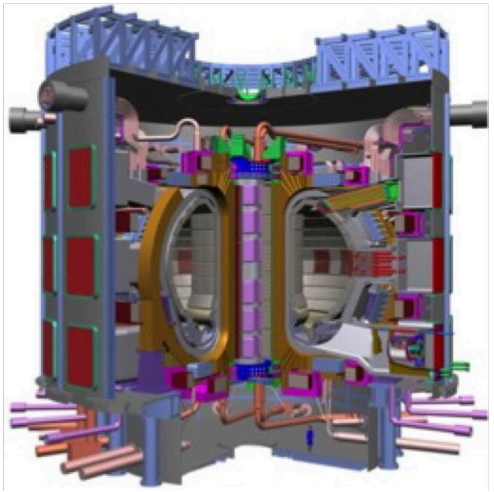




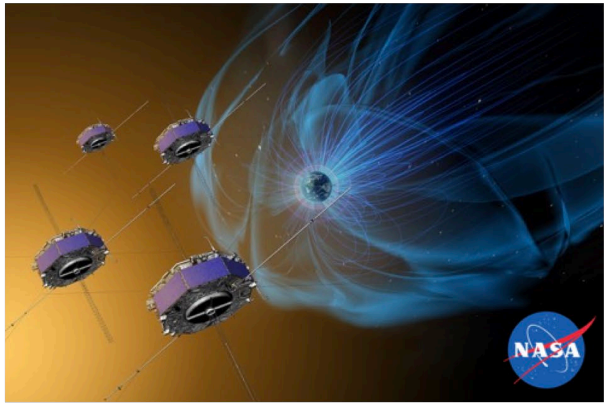
Big Red Ball



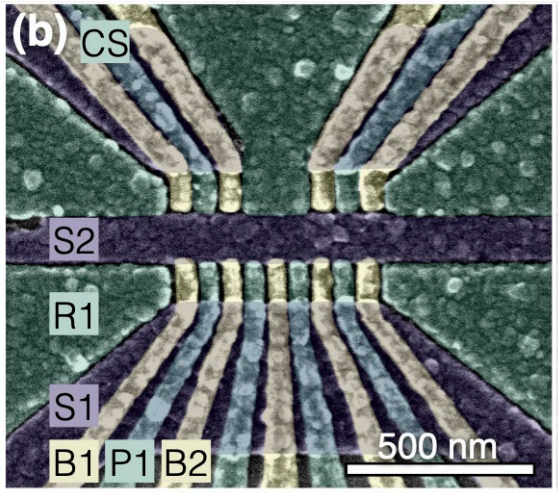
ITER



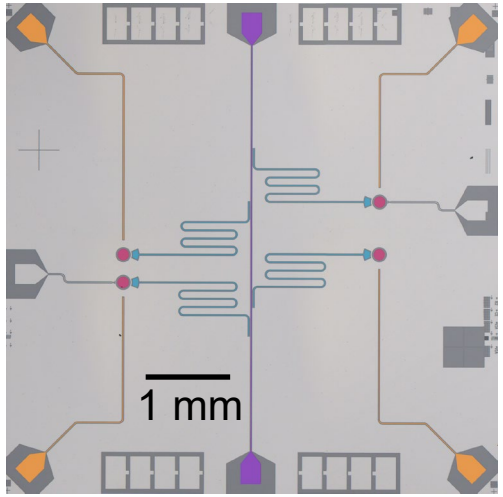
Magnetospheric Multiscale Mission



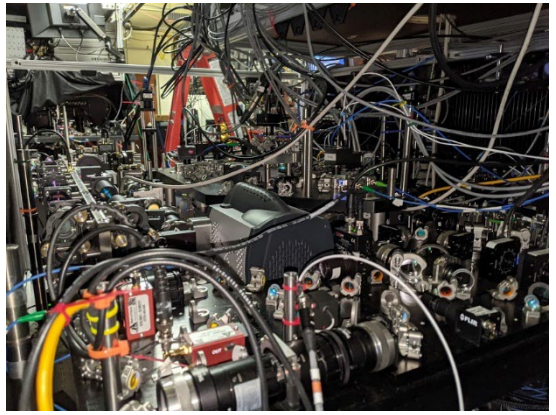
Quantum Science



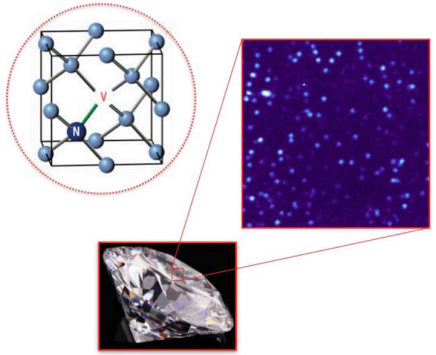
Silicon-based quantum dot qubits

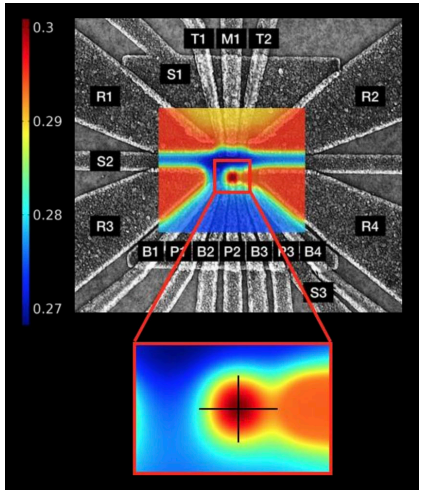


Superconducting qubits

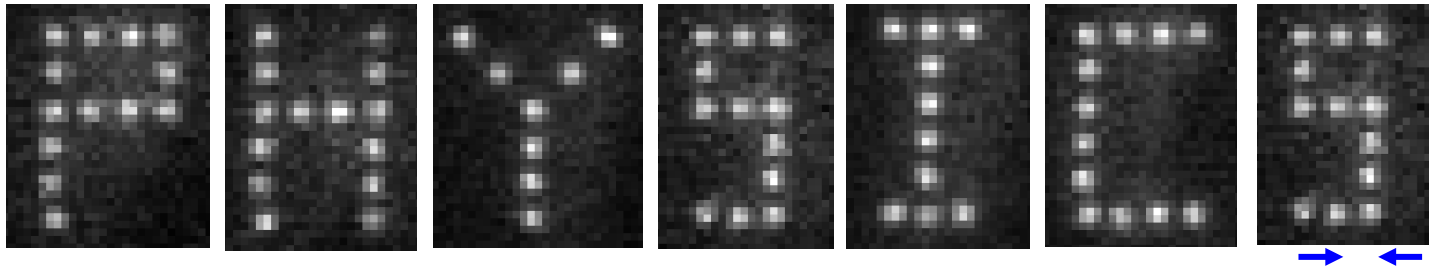


Neutral-atom qubits

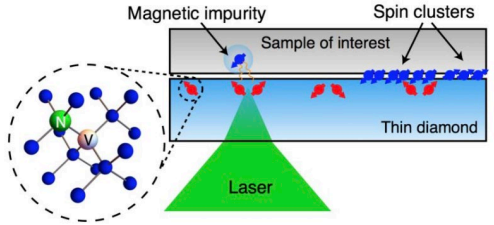




Theory and simulation

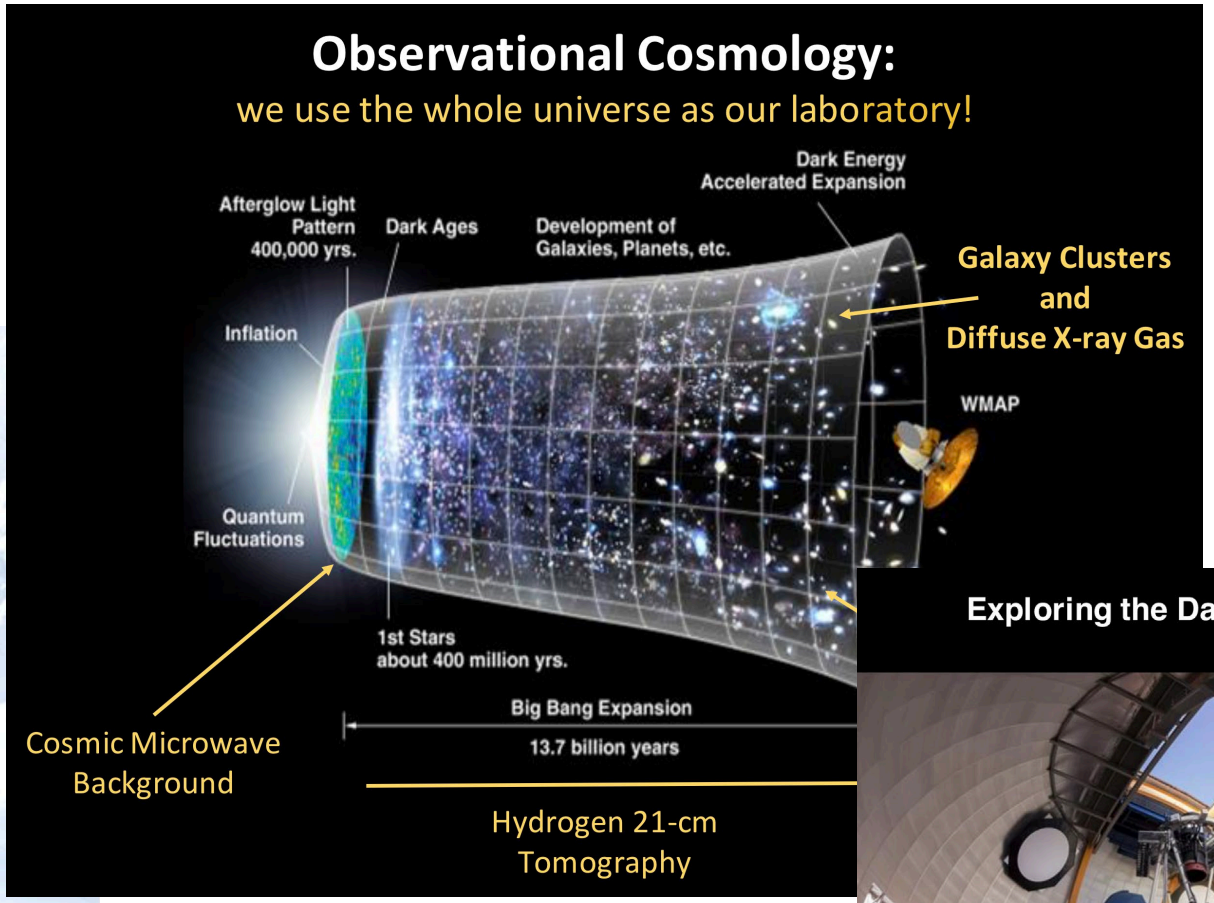


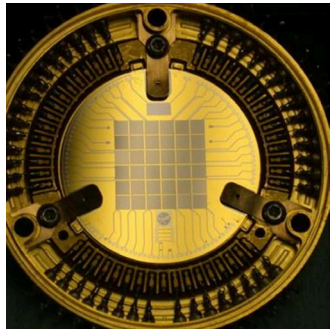
Individual Cs atoms: cooled, arranged, and trapped by light



NV-center qubits

Astrophysics





Astroparticle Physics

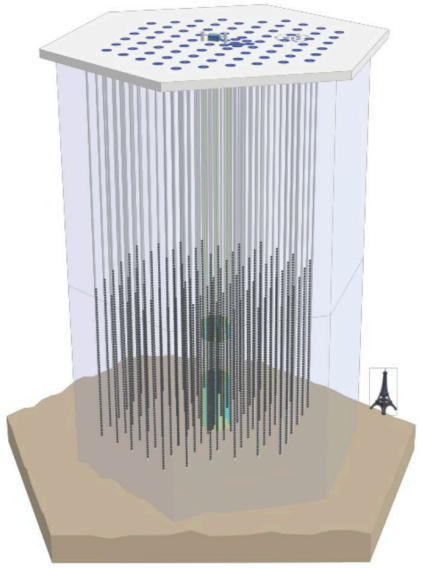
IceCube

Fermi Gamma-ray Space Telescope

ARA

cta cherenkov telescope array

The IceCube Neutrino Observatory

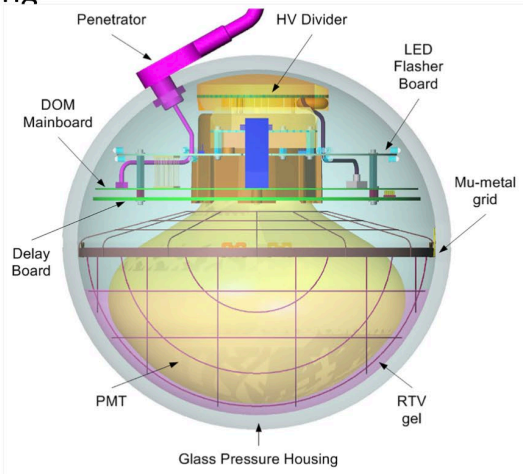


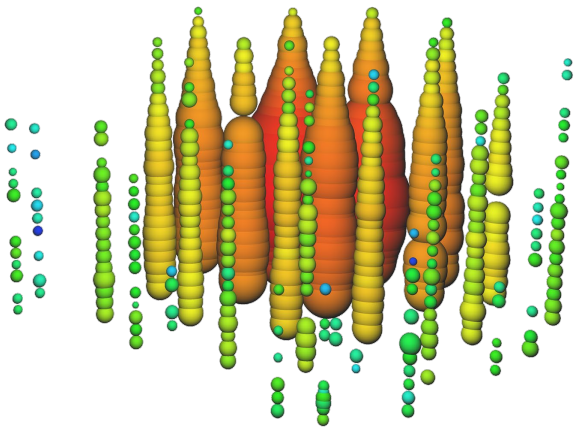
IceTop (surface array): 81 stations

IceCube: 86 strings
5160 optical sensors over 1 km³ volume
17 m vertical spacing
125 m horizontal spacing

Highly stable operation.
Since 2016: livetime > 99.5%

DeepCore (low energy threshold)



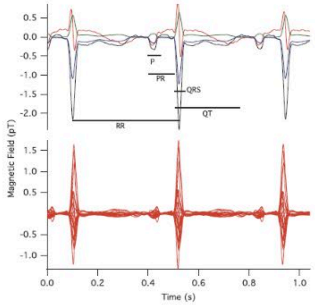


W boson resonance,
nuebar 6.3 PeV
IceCube, 2021
Energy beyond reach of
manmade accelerators

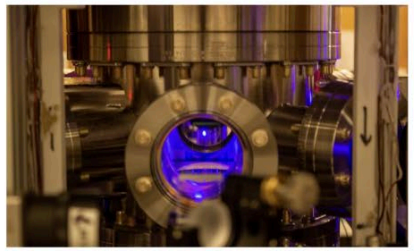
Nature **591,** 220–224 (2021)

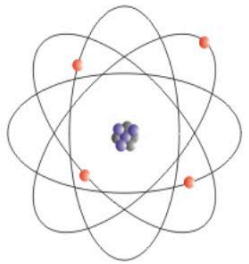
AMO Physics

Sensing

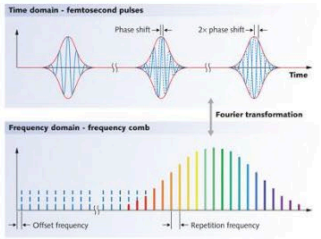


Laser cooling



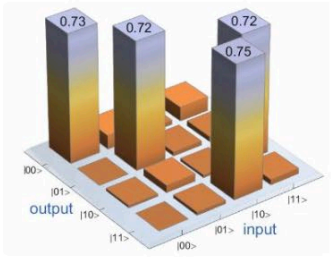


Ultrafast lasers

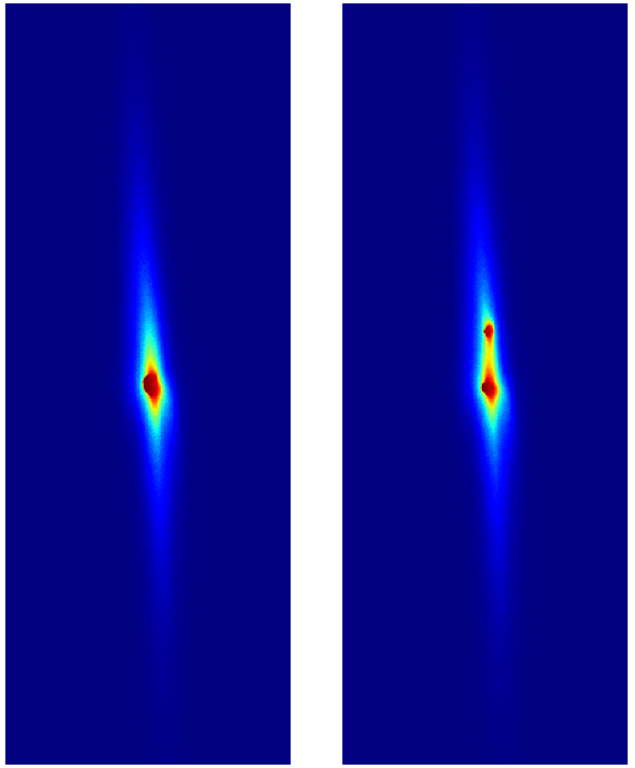


Atomic clocks

Laboratory astrophysics



Quantum information



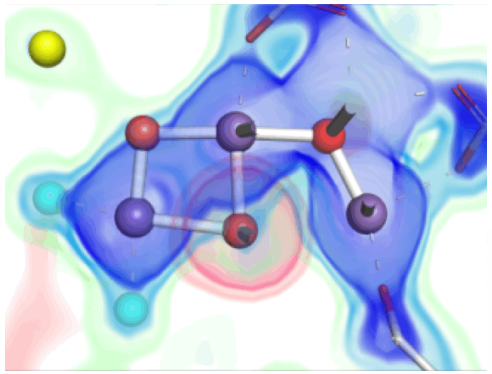
[Ultraprecise atomic clock poised for new physics discoveries]

University of Wisconsin–Madison physicists have made one of the highest performance atomic clocks ever, they announced Feb. 16 in the journal Nature. Their instrument, known as an optical lattice atomic clock, can measure differences in ...

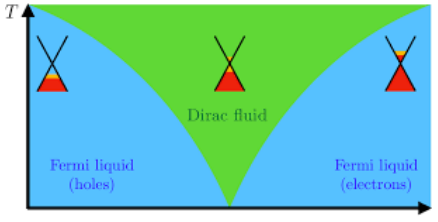
February 16, 2022

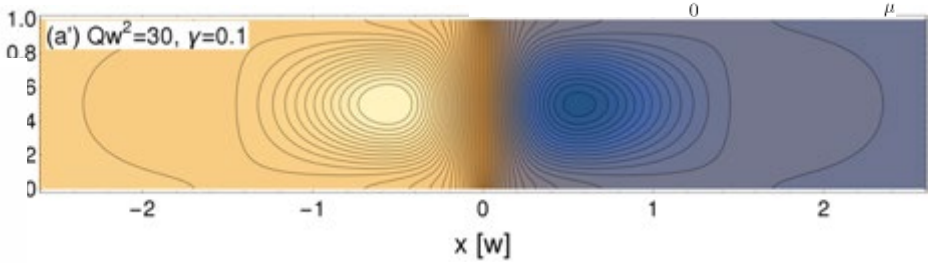
Condensed Matter Physics and Biophysics

Follow Chemical Reactions and Structural Changes in Real Time

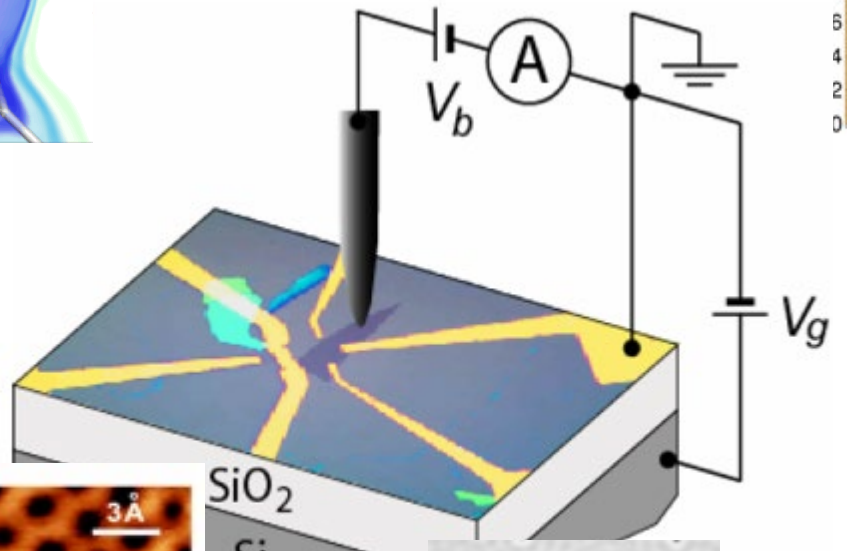


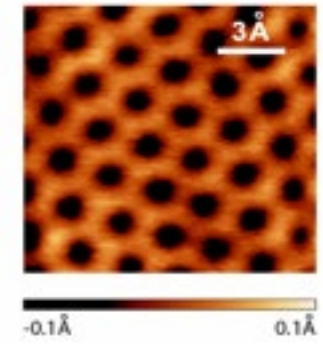
Dirac fluids, Eddy flows, and electron hydrodynamics

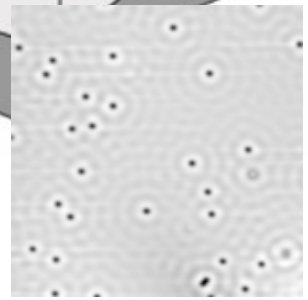




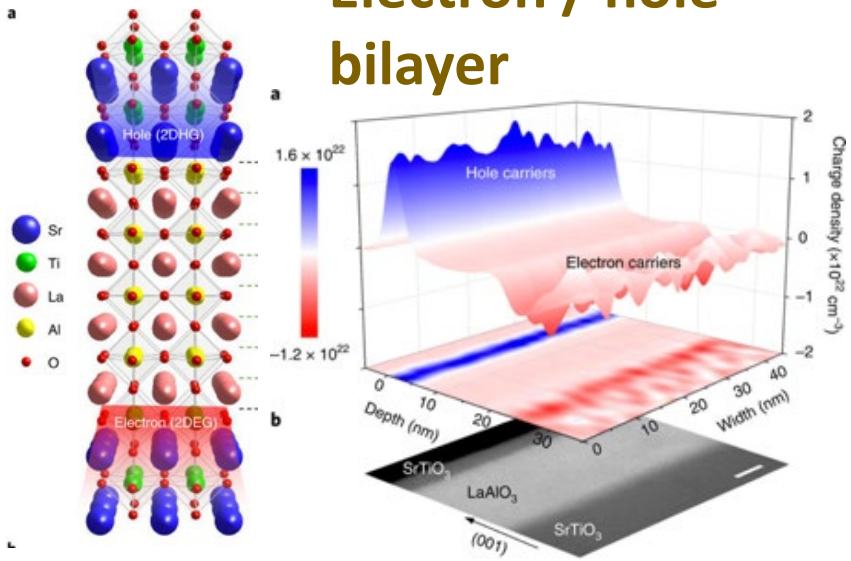
Biomineralization





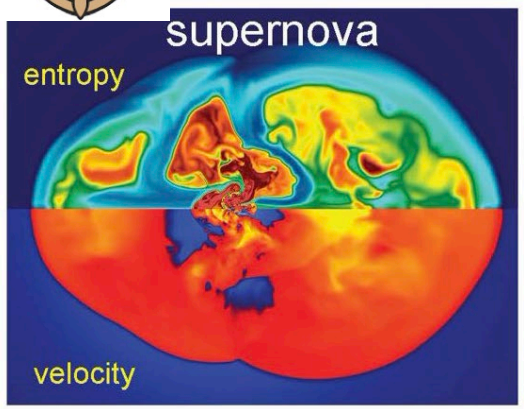


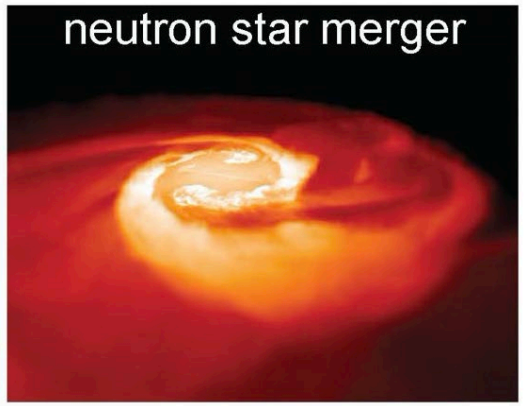
Electron / hole bilayer



High Energy Physics

Theory





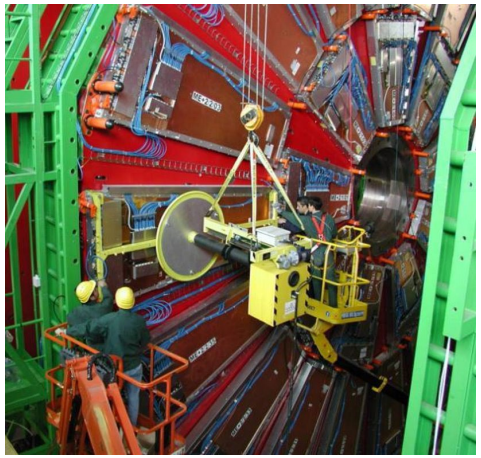
Supersymmetry model building and phenomenology

- String theory models and scenarios of BSM particle physics.
- Cosmological models, in particular, inflationary universe, from string theory.
- Signatures of these ideas and scenarios.

Physics ∩ ML

a virtual hub at the interface of theoretical physics and deep learning.

http://www.physicsmeetsml.org



Experiment: hardware, trigger system, physics analysis

Endcap Disks (EMU)
- 6 disks ~3500 tons
- UW Design & Contract

Chamber Installation
- 400 EMU Chambers & infrastructure
- Gas, Power, Cooling & Signal Cables

Calorimeter Trigger
- 19 Crates, 2000 boards
- Custom ASICs
- Sorts objects w/coords

Tier-2 Compute Center
- Large UW Investment
- Leverages GLOW (Grid Laboratory of Wisconsin)

CMS Software
- Collaboration with UW Condor group to develop CMS Grid Tools

WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

Summer School for Quantum Science

@ University of Wisconsin-Madison | May 28-30, 2025

A summer school on quantum materials, quantum information, and quantum sensing designed for senior undergraduate students and junior graduate students.

Limited travel funds for external participants will be available.

Application deadline: April 15, 2025

Topics and Speakers:

- Semiconductor qubits *(Profs. Eriksson and Woods)*
- Quantum information in atomic and optical physics *(Profs. Saffmann and Otten)*
- Quantum defects and quantum sensing *(Profs. Ping and Choy)*
- The quantum industry and superconducting qubits *(QOLAB Quantum startup: Profs. Martinis, McDermott or Plourde)*

organization: Profs. Esterlis, König, Levchenko, Song

Outreach @ UW–Madison Physics

Department's commitment to outreach excellence, started by **Wonders of Physics** program and **Ingersoll Physics Museum**, continues with three staff

Cierra Atkinson
Outreach Program Manager

Sarah Parker
Quantum Outreach Program Manager

Haddie McLean
Outreach Program Manager

Examples of Outreach Activities

- Wonders of Physics (WoP) traveling show has brought physics to 18,000+ people across Wisconsin since Fall 2021
- Development of affordable, at-home quantum science (and general physics!) experiment kits
- Physics of Climate Change Initiative (grant-awarded)
- Expansion of TeachQuantum Program to UW–Madison to help high school teachers bring quantum science into their classrooms
- Docent-led tours of the Ingersoll Physics Museum

Wonders of Physics Outreach Fellows

- Open to first-year graduate students in the PhD program who are interested in and committed to conducting physics outreach (~30 hours total commitment in one year)
- Receive mentoring and training in outreach and participate in one or more outreach events over the course of the year
- Following completion of the fellowship, Fellows' names and activities will be posted on the Fellows website
- It is expected that this program is an excellent part of preparation for an NSF GRFP application

WISCONSIN

UNIVERSITY OF WISCONSIN–MADISON

Contact info

gradoffice@physics.wisc.edu

[Resources for Student Life, Wellness, Professional Development, etc.]

Keith Bechtol

Associate Professor, Associate Chair for Graduate Program

kbechtol@wisc.edu
(608) 265-5815
6203 Chamberlin Hall
Website: Observational Cosmology

Sharon Kahn

Graduate Program Manager

smkahn@wisc.edu
(608) 262-9678
2320 F Chamberlin Hall

UW Physics Graduate Program at a Glance

UW Madison has been awarding PhDs in physics since 1899

~205 Graduate Students in Astrophysics, Cosmology, AMO, Condensed Matter, High Energy, Nuclear Theory, Plasma, Quantum Computing, X-ray imaging and Spectroscopy and Biophysics

Consistently ranked in the top 20 programs in the nation

Guaranteed 5 year of financial support

THE GUIDE TO GRADUATE STUDENT LIFE

HOUSING AND TRANSPORTATION

The first thing on your mind as a new student might be: where am I going to live? This section provides details on different housing options, Madison's neighborhoods, and tips when renting an apartment. Then, learn about the different ways to get around in Madison, including eco-friendly biking and low-cost bus options for students.

LIVING IN MADISON

There's a lot to explore on and around campus, whether it's getting involved in local government or finding your favorite hobby. See what other graduate students have recommended for go-to activities in the city. If you're feeling adventurous, check out some of the places outside Madison that show Wisconsin's natural beauty.

STUDYING AT UW

What is a graduate assistantship and how do you find one for yourself? How do you make the most of library resources for studying and research? Explore this section for tips and explainers on the nuts and bolts – tuition, fees, enrollment, and finances – plus, a list of the best study spots outside the libraries.

BEING A BADGER

The UW–Madison experience is built on excellence in research and scholarship, but it goes further than that. It's about a community here on campus. Learn about student organizations for grad students, taking care of yourself with University Health Services, and getting involved in other community activities at UW.

THRIVING IN GRAD SCHOOL

It's no secret: Graduate school has its challenges. It's important to learn how to balance your life as a graduate student with your own well-being and with other responsibilities such as a partner or family. These tips will help you think about managing stress, balancing responsibilities, and finding support when you need it.

FOR INTERNATIONAL STUDENTS

Almost a third of graduate students at UW–Madison are from outside the U.S., and campus has a number of services geared to help international students navigate immigration regulations, work requirements, and the transition to a new cultural environment. This section includes tips for adjusting and living in Madison as an international student.

https://gradlife.wisc.edu/

Overview

- Median time to graduation 5.8 years
- ~65% domestic, ~35% international students
- ~30% identify as women
- ~8% Under-represented students of color
- UW Madison is
  #1 in PhDs awarded nationally
- #5 in federal support of graduate students

Year 1	Year 2	Year 3	Year 4 and beyond	Year 5 or 6
Fall: • **Intro Seminar** • **Core coursework*** • **Qualifying Exam# (1/4)**	Fall: • Qualifying Exam (3/4) • 1-2 core courses • Elective/minor course • Research with PI	Fall: • Complete coursework • Prepare for Preliminary Exam • Research with PI	Fall (DISSERTATOR): • Research with PI -	• Most students finish in this timeframe. • Dissertators enroll n 3 credits each semester. • Deposit dissertation digitally to the Graduate School.
Spring: • **Core coursework** • **Qualifying Exam (2/4)** • **Elective/minor** course** • **Select major professor.**	Spring: • Complete Qualifying Exam • Finish core coursework • Research with PI	Spring • Complete Preliminary Exam • Research with PI	Spring (DISSERTATOR) • Research with PI	
Summer: • **Research with PI (or prospective PI)**	Summer: • Research with PI	Summer (DISSERTATOR): • Research with PI	Summer (DISSERTATOR): • Research with PI	

*Core Coursework

- PHYSICS 711: Theoretical Physics - Dynamics
- PHYSICS 715: Statistical Mechanics
- PHYSICS 721: Theoretical Physics - Electrodynamics
- PHYSICS 731/732: Quantum Mechanics

#Qualifying Exam

- 4 sections (Classical Mechanics, Statistical Mechanics, E&M, Quantum Mechanics)
- 4 tries over 4 semesters to complete all 4 sections
- Offered in week prior to each fall/spring semester

**Minor

- 9 credits of coursework outside of Physics

OR

- 9 credits of coursework, Physics 500-level or above (outside main area of research)

Seminars and Colloquia

- Physics Department Colloquium *(Fridays at 3:30pm)*
- Area-specific seminars:
  - Atomic Physics Seminars
  - Chaos and Complex Systems Seminars
  - Condensed Matter Theory Seminars
  - HEP Seminars
  - HEP Cosmology/Theory Seminars
  - Neutrinos, Nuclear and Astrophysics Seminars
  - Plasma Physics Seminars
  - Herb Condensed Matter Experiment Seminars

Title: Point Defects in Crystals: Trapped Atoms for Quantum Technologies

Date: TODAY! (Friday, March 14, 2025)

Time: 3:30 pm

Place: DeLuca Forum, Discovery Building

Speaker: Kai-Mei Fu, University of Washington

Abstract: Point defects in crystals are the solid-state analog to trapped ions. Thus these “quantum defects”, which can be integrated into solid-state devices, have gained interest as quantum sensors and qubit candidates for scalable quantum networks. In this talk, I will introduce some of the basic quantum defect properties desirable for quantum technologies. I will highlight my own group’s efforts at understanding and controlling the properties of defects in diamond including (1) synthesis, frequency and emission control of deep-level vacancy complexes in diamond and (2) properties of shallow-level donors in ZnO, including single donors and intentionally synthesized donors in ZnO.

This event starts at 3:30pm with refreshments, followed at 3:45pm by a short presentation titled "Atom-by-atom engineering of impurity energy levels on semiconductor surfaces", by Keenan Smith (Brar group). The invited presentation starts at 4pm.

Host: Mark Saffman

Climate and Diversity

Learn more at
physics.wisc.edu/climate-diversity

Our Mission

The Physics Department strives to establish, maintain, and improve an open-minded and supportive community in which to work, teach and learn. In accordance with these goals, the Physics Department affirms that all community members are to be treated with dignity and respect and that discrimination and harassment will not be tolerated.

Climate and Diversity Committee

The Physics Department Climate and Diversity committee is committed to fulfilling our diversity mission. The C&D committee has hosted events and trainings (like those focused on access in the classroom and mental health), supported diverse student groups (like GMaWiP), and worked meet the needs of students based on the 2021-22 department climate survey.

Campus Resources

The UW-Madison campus is committed to ensuring that all students feel welcome on campus. UW-Madison believes that A diverse liberal arts community is beneficial and essential to our goal of sustaining a community of free inquiry, in which everyone has a voice. We welcome students and faculty from across a wide spectrum of society, and consider diversity and inclusion as fundamental to our mission.

WISCONSIN

UNIVERSITY OF WISCONSIN–MADISON

What is your support guarantee?

What is your support guarantee?

All incoming students in Fall 2025 have a support guarantee for 10 (consecutive) fall/spring semesters. This guarantee includes tuition remission and health insurance. It also includes a 50% TA position (should you need one).

What is a TA position?

What is a TA position?

“TA” = Teaching Assistant. TA’s lead discussions and/or labs. Most UW Physics TA positions are in large, introductory courses populated by non-physics majors, and include both discussions and labs. “Large” means one to three faculty, three to 12 TAs, and 150 to 700 students.

Have you been involved in a “large” course?

Have you been involved in a “large” course?

Most large, introductory courses fit in this standard model:

	Algebra-based	Calculus-based for engineers	Calculus-based for bioscience majors
Mechanics and heat	103	201	207
EM and optics	104	202	208

TAs also work with:

- Physics 107 (Ideas of Modern Physics)
- Physics 109 (Physics in the Arts)
- Physics 115 (Energy)
- Physics 247/248/249 (introductory physics for physics majors)
- Physics 307 (Junior Laboratory)
- Physics 311 (Mechanics)
- Physics 321 (Electronics Lab)
- Physics 322 (Electromagnetic Fields)
- Physics 325 (Optics)

All 50% TA positions nominally entail 360 hours of work over the semester. The breakdown of hours varies. Examples include:

Course	# of sections of students	Each section meets for discussion:	Each section meets for laboratory:	Total hours classroom time:
103, 104	3	2 hours/week	2 hours/week	12 hours/week
201, 202, 207, 208	2	2 hours/week	2 hours/week	10 hours/week

From your offer letter . . . .

We are pleased to offer you a guarantee of financial support while you work toward your **doctorate** in the **Physics Department**. You have an excellent academic record, and this guarantee of funding is offered only to the most highly qualified applicants. This guarantee will provide support for a period of **five** continuous academic years. This support includes a stipend, eligibility for comprehensive health care coverage, and full remission of resident or non-resident tuition (students must still pay applicable fees, including: segregated fees each term, which were **$780.74** for a graduate student carrying 8 or more credits in **Spring 2025**, a one-time official document fee, and International Student fees).In the College of Letters & Science, several types of support are available to fulfill this guarantee. The type of support you receive may change over the course of your graduate career, but while under this guarantee you will be supported at least at the level of **50%**.

Several types of support and their **2025-26** 50% appointment stipend rates are listed below. The amount of time you are expected to work is reflected in the percentage of time of your appointment, with 50% corresponding to 20 hours of work.

- 50% Teaching assistantship (9-month): $**29,157**
    - 50% Teaching assistantship (Summer only – 2 months): $6479
- 50% Research assistantship(12-month): **$38,900**
    - 50% Research assistantship (Summer only – 3 months : **$9725**

Health insurance:
$56/month (single)

Full Remission of Tuition:
Resident - $5363/semester
Non-resident - $12,027/semester

From your offer letter . . . .

We are pleased to offer you a guarantee of financial support while you work toward your **doctorate** in the **Physics Department**. You have an excellent academic record, and this guarantee of funding is offered only to the most highly qualified applicants. This guarantee will provide support for a period of **five** continuous academic years. This support includes a stipend, eligibility for comprehensive health care coverage, and full remission of resident or non-resident tuition (students must still pay applicable fees, including: segregated fees each term, which were **$780.74** for a graduate student carrying 8 or more credits in **Spring 2025**, a one-time official document fee, and International Student fees) In the College of Letters & Science, several types of support are available to fulfill this guarantee. The type of support you receive may change over the course of your graduate career, but while under this guarantee you will be supported at least at the level of **50%**.

Several types of support and their **2025-26** 50% appointment stipend rates are listed below. The amount of time you are expected to work is reflected in the percentage of time of your appointment, with 50% corresponding to 20 hours of work.

- 50% Teaching assistantship (9-month): $**29,157**
    - 50% Teaching assistantship (Summer only – 2 months): $6479
- 50% Research assistantship(12-month): **$38,900**
    - 50% Research assistantship (Summer only – 3 months : **$9725**

Monthly Stipend = $3241/month

Segregated fees:
(these pay for your bus pass, access to athletic facilities, discounted campus events, etc.)
8+ cr - $780/semester

SATURDAY

8-10am	Breakfast at Fluno or with GMaWiP
10:30 am - noon	Current student presentations/panel

10:15am - noon — Meet with individual faculty in 25-minute meetings to learn more about their research and their role in the Department *(see individual meeting schedule for location)*.

10:15 – 11:00 am — Research Area Discussions

Xray and Biophysics	Pupa Gilbert and Uwe Bergmann	5310 Chamberlin
Astroparticle Physics	Albrecht Karle	5280 Chamberlin

11:15am - Noon — Research Area Discussions

Atomic, Molecular and Optical Physics	Mark Saffman, Deniz Yavuz	5310 Chamberlin
Astrophysics	Keith Bechtol, Dan McCammon, Moritz Muenchmeyer, Peter Timbie	5280 Chamberlin

1:15-2pm — Research Area Discussions

Quantum Information	Matt Otten	5310 Chamberlin
High Energy Physics	Sridhara Dasu	5280 Chamberlin

2:15 – 3pm — Research Area Discussions

Condensed Matter Physics	Tiancheng Song and Victor Brar	5310 Chamberlin
Plasma Physics	Rogerio Jorge, Vladimir Zhdankin, Tony Qian	5280 Chamberlin

3:30 – 4:30 pm	The Department of Physics traditionally gathers on Friday afternoons for Department Colloquium in 2241 Chamberlin Hall. (Coffee and cookies at 3pm) On March 7, we will welcome Zeeshan Ahmed, SLAC National Accelerator Laboratory. His talk is titled, "Investigating cosmic origin and evolution with the oldest photo"
4:45pm	Meet in lobby outside of 2241 Chamberlin to walk to the Physics Reception.
5:00-7:00 pm	Reception with faculty and graduate student volunteers (*Wisconsin Institute for Discovery*)
7:30 – 9:00 pm	Board games with current graduate students (optional) *Walk over to Chamberlin (room 5310) from the reception at Discovery.*