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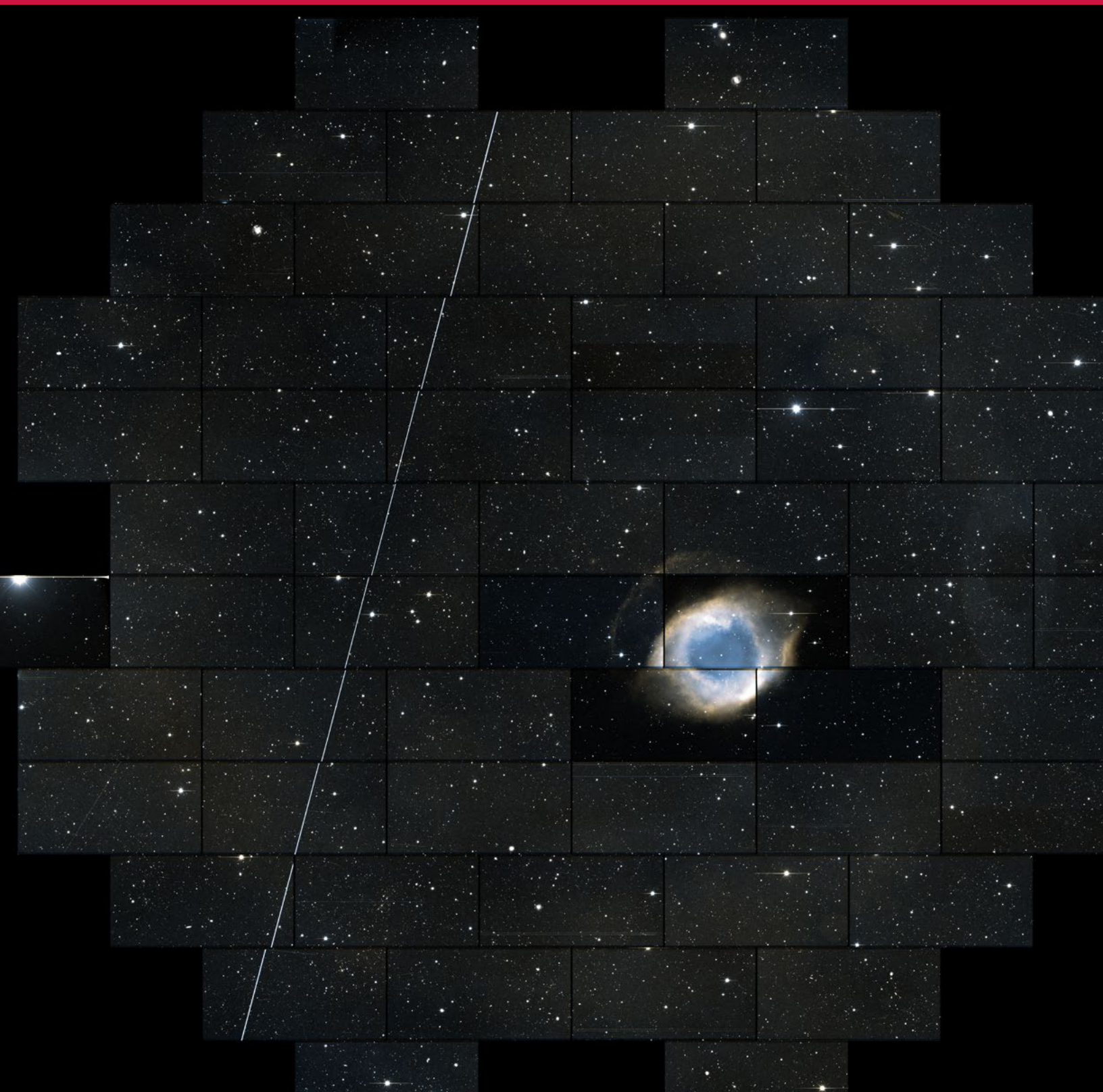

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***The Wisconsin Physicist* is the newsletter for alumni and friends of the:**
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All photos are from the Department of Physics, except:
Page 1: (left) Annual Review of Astronomy and Astrophysics; (center) Gabriel Pérez Diaz, IAC, and Marc-André Besel, CTAO
Page 6: (left) Colin Legg / Scott Lucchini
Page 7: (left) P. Marenfeld, NOAO/AURA/NSF; (right) Ralf Kaehler/SLAC National Accelerator Laboratory
Page 8: Deivid Ribeiro, Columbia University.
Page 14: (top) David Radice, Pennsylvania State University; (center) Emily Edwards, IQUIST

On the Cover

UW–Madison assistant professor of physics Keith Bechtol and graduate student Rob Morgan submitted this winning photo — one of 12 winning entries — to UW–Madison's 2020 Cool Science Images contest. This snapshot shows thousands of distant galaxies, each containing billions of stars. They were looking for the flash of the explosion of a single star, the potential source of a sub-atomic particle called a neutrino, spotted zipping through the Earth by the IceCube Neutrino Observatory at the South Pole. The distant galaxies, swirling billions of light years away, are all the harder to see because of nearby objects, like the pictured Helix Nebula.

Stay Connected!

Please continue to send us your professional and personal news! We will be happy to include updates from alumni and friends in *The Wisconsin Physicist*. Send updates to: info@physics.wisc.edu or fill out our online form at physics.wisc.edu/alumni-update

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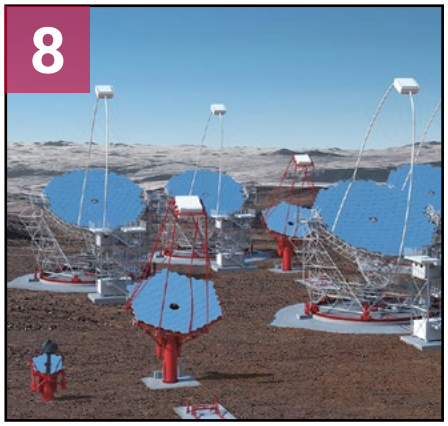


Greetings from the Chair

By Sridhara Dasu, Chair, Department of Physics

Dear Alumni and Friends,

The Physics Department continues to be a vibrant place for education, research and outreach in a wide range of areas, while facing the unprecedented conditions on the ground this year. This new edition of the Wisconsin Physicist will give you an opportunity to get a glimpse of our department in 2020.

I begin by thanking Associate Chair, Professor Mark Rzchowski, Director of Undergraduate Studies Dr. Jim Reardon, lecture demonstrations manager Mr. Steve Narf, teaching laboratories manager Mr. Brett Unks and undergraduate student services coordinator Ms. Allison Tredinnick, for their tireless efforts in transitioning from our traditional teaching program to online instruction. In the same vein I recognize that the tireless efforts of our Department Administrator Ms. Aimee Lefkow were pivotal in resuming our research program safely with appropriate safety measures. Mr. Dan Bradley made extraordinary efforts, whipping up technological solutions to facilitate the resumption of teaching and research activities in the department. Finally, I would like to thank the entire department for adhering to the guidelines and making the department a safe place to continue to work productively.

Please join me in congratulating Vilas and Van Vleck Professor Vernon Barger, who heads the Wisconsin Phenomenology Institute, for receiving the highest award from the American Physical Society in theoretical particle physics, the Sakurai Prize, for his many achievements in establishing the Standard Model of particle physics.

The department is fortunate in welcoming five new faculty this academic year. Dr. Jeffrey Parker, who works on computational plasma physics, joined us as an assistant professor in July 2020. Dr. Uwe Bergmann will join us as the first endowed Martin L Perl Professor in Physics in December 2020. He is a world-renowned researcher in the area of ultrafast science exploiting X-ray free electron lasers and related technologies. Theoretical and computational cosmologist Dr. Moritz Muenchmeyer, multi-messenger astrophysicist Dr. Ke Fang and particle astrophysicist Dr. Lu Lu, will be joining us in January 2021.

Robert E. Fassnacht and Vilas Professor Susan Coppersmith has announced her retirement. On behalf of the department I would like to express our gratitude to Prof. Coppersmith, who was a pioneer in our department's efforts in the emerging area of quantum information. She also led the department as its chair and built up the department's strength broadly in the previous decade. She will continue to work with her colleagues in the department from her new home in Australia.

The department received generous gifts from the Durand family and the Board of Visitors, which, when matched by a gift from UW alumni John and Tashia Morgridge, allowed us to endow the Bernice Durand Faculty Fellowship. Earlier in the year, the department received a gift from alumnus Dr. Dunson Cheng to establish its second named professorship, the Dunson K. Cheng Professorship in Physics. Finally, in the fall of 2020, the department received a generous gift from alumnus and Board member Carl Anderson and his wife Brynn, to endow the Carl J. and Brynn B. Anderson Professorship in Physics. This gift was made in partnership with matching funds from John and Tashia Morgridge. We look forward to awarding these prized awards in the coming years.

The university is taking austerity measures to manage its budget shortfalls and increased expenses to handle the pandemic. Therefore, faculty hiring is presently on hold. Following the department strategic plan, we are hoping to hire faculty in the area of quantum information theory and experiment as soon as we are able to do so.

The department again welcomed a diverse graduate class in Fall 2020. The sustained efforts of the graduate student coordinator Ms. Michelle Holland, the admissions committee, and the climate and diversity committee, with the enthusiastic support of the new Physics Graduate Student Council (PGSC), the Gender Minorities and Women in Physics group (GMaWiP), and the Board of Visitors, have paid off very well. The department is also welcoming the second cohort of students in the Quantum Computing professional master's program (MSPQC). Several deferrals and delays in arrival of international students had to be mitigated with special accommodations. Admissions processes have been adjusted to recruit a strong cohort for Fall 2021.

The Physics Department Board of Visitors met twice in 2020, albeit it had to do so remotely. The Board of Visitors continues to help us in a number of ways, by providing feedback to the Department in its goal to rise up in rankings amongst the top physics programs worldwide, recruiting of graduate students, and not the least with fundraising. We are particularly grateful this year for the Board coming through with substantial funds in establishing the Bernice Durand Fellowship.

The Physics Department annual award and graduation ceremonies have been conducted remotely. We thank our alumni and the Board for their generous support which enabled the awards. The list of awardees is published in a latter section of this booklet. The department recognition for the distinguished alumni, Dr. Nancy Brickhouse and Dr. Geoff Fox, has been postponed to the next occasion when we can welcome them back to the campus to address us in person. We have also recognized the success of 66 undergraduate Physics and AMEP students, 23 Ph.D. students, and six MSPQC students this year in virtual graduation ceremonies in Spring and Summer.

The increased efforts in communication about department productivity in all its areas: prominent publications, innovative outreach, etc. are made possible by the addition of Director of Communications, Dr. Sarah Perdue, to our staff last year. We hope that you are able to enjoy her stories in her frequent postings on our department website, social media posts, quarterly e-newsletter and this annual newsletter.

I would like to close with my thanks to the department in trusting me with chairing it the past few years. I learned much about the many hidden gems in the department and feel honored to have served. When I complete my term this Spring, I hope to leave the department in good shape to tackle the unprecedented challenges we continue to face due to this pandemic.

Sridhara Dasu – Department Chair

Department of Physics Climate and Diversity Update

By Kevin Black and Justin Vandenbroucke, Climate and Diversity Committee Faculty Co-Chairs

In June 2020, the Department of Physics joined with the university, the city, the country, and the entire world to denounce racism and affirm our support for our Black and Indigenous colleagues and colleagues of color. We said then, "We earnestly hope that we are seeing the beginning of a shift towards a more just society, in which all people are respected for their humanity, and resolve to do our part in that change."

As faculty co-chairs of the department's Climate and Diversity Committee, we want to ensure those words are not just a statement, but a call to action. We acknowledge we have much work to do as a department to establish, maintain, and improve an open-minded and supportive community in which all members can work, teach and learn.

A few of the actions we took in 2020 include:

- Supporting participation the Strike for Black Lives #ShutdownScience on June 9, and holding a department Town Hall that day to discuss diversity, equity and inclusion in Physics
- Completing our first comprehensive Diversity Plan
- Actively recruiting Black physics professors through UW–Madison's Target of Opportunity (TOP) faculty diversity program
- Beginning to develop proposals for two Bridge programs — one for Physics, and one for physical sciences across campus
- Removing the GRE requirement for applicants to our 2021 graduate programs
- Converting one bathroom in Chamberlin Hall to an all-gender one
- Organizing a math/physics club at the Simpson Street Free Press, led by students from the Physics Learning Center

We know these actions represent a small start to the work that needs to be done. We invite our alumni and friends to get involved and hold us accountable. Please visit physics.wisc.edu/department/climate-diversity for more info.

Welcome, Professor Jeff Parker!

Assistant Professor Jeff Parker joined the department on July 1. Most recently, he was a Staff Scientist at Lawrence Livermore National Lab.

What are the main topics or projects that you will focus your research on?

My immediate research program has two main directions. One area of research is going to be in plasma astrophysics and astrophysical fluid dynamics. This concerns plasmas in space or in the universe, like in the sun, or the origin of magnetic fields in the cosmos and how they shape what we see in the universe. I will be investigating angular momentum transport by magnetic fields, which can occur in stars, accretion disks around black holes, and planetary interiors.

Another area is topological phases of matter in plasma physics, related to the 2016 Nobel Prize on topological insulators, which came out of condensed matter physics. I am applying these ideas for the first time to plasma physics and plasma waves. This is a brand-new field in plasmas and I'm just getting into it, but I think it's really, really interesting.

You're in Madison now, and you're getting started with your research. What is the first thing you're doing?

One particular project I'm very interested in is the astrophysical fluid dynamics involving angular momentum transport due to magnetic fields. I have developed theory on something that I call magnetic eddy viscosity, which could be important where there are magnetic fields and rotation. This can occur in astrophysical objects like stars or accretion disks or planets. And so where I studied this was in a pretty idealized system, and I'd really like to extend this into more realistic models that are closer to reality that would help us say something more about real object like stars or accretion disks, or potentially could be measured in the laboratory. So, there are these experiments, Prof. Forest has one, and there are other experiments throughout the country or the world that have rotating plasmas or liquid metals. This effect could potentially be seen in those experiments as well, and that is something I'd love to do right away.

Your work is primarily theory and computation. Do you see your work as predicting ideas that would be tested with collaborators in the department?

That is one thing I do hope to do. But I do also enjoy developing theory to better understand plasmas, even if those theories cannot be tested immediately in an experiment. I'm a theoretical physicist at heart, but there are so many great plasma physics experiments at Madison, which enable a close collaboration of theory and experiment. Progress is truly made when you can measure, observe, analyze, and use theory to understand what you see.

What's one thing you hope students who take a class with you will come away with?

I want students to take away how plasma physics is everywhere, how most of the universe is plasma, and so if we want to understand the universe, we need to understand plasma physics.

What is your favorite element and/or elementary particle?

For elementary particle, I'll say the neutrino because it's so mysterious, and mysterious is good for physics. For favorite element, hydrogen and its isotopes because they're what's important for fusion.

What hobbies/other interests do you have?

I like to hike, run, and travel.

For full profiles, please visit:
go.wisc.edu/j9h27f (Parker)
go.wisc.edu/dcxkc3 (Bergmann)

Welcome, Professor Uwe Bergmann!

Uwe Bergmann, the Martin L. Perl Professor in Ultrafast X-Ray Science, joined the department on December 1. Most recently, he was a Scientist at SLAC.

What is an overview of your research, and what techniques do you use?

My research is developing and applying x-ray methods to solve problems. And these problems can be uncovering hidden writings in ancient books or the chemical elements buried in fossils to reveal the color in the original animal; studying photosynthetic water splitting to understanding the structure of liquid water; and making movies of a molecule carrying out specific work.

We use x-ray spectroscopy and sometimes x-ray scattering and diffraction. Diffraction and scattering look at the geometric structure — where are the atoms? — and spectroscopy looks at the chemical structure — where are the electrons? We also use x-ray fluorescence, which is a very powerful imaging technique for creating elemental maps showing the chemical composition of fossils for example. Recently we have started to use powerful new x-ray lasers, where you can make ultrafast movies showing how chemical bonds are changing in real time.

Once your lab is up and running in Madison, what big projects will you focus on first?

I want to set up a new x-UV laser system able to make movies of fast chemical reactions. You first expose a material to a light pulse and then watch in real time how the excited electrons rearrange. This is important for the next generation of advanced materials and a famous example is the water splitting reaction in plants to make O_2. We still do not exactly know the mechanism of how these two water molecules are brought in, split up, and forced to make the bond to form O_2.

Another exciting project we are working on is an x-ray laser oscillator. There are currently five very big hard x-ray free electron lasers around the world, but they operate in a single pass, which means they are not very stable. Our idea is to use a train of pulses from one of these big x-ray lasers — those are the not-so-clean pulses — to pump our gain medium. After the first pulse creates amplified spontaneous emission, we guide the emitted beam through a cavity back to the gain medium to meet up with the next pump pulse from the train. Doing this again and again and again lets us crank up the emission until we have a perfect, clean and stable x-ray laser pulse, and at that point we will send it out of the cavity. This is similar to how most optical lasers work. We described the idea in PNAS earlier this year, and now we have a lot of work ahead to turn it into reality.

What attracted you to UW–Madison?

For some time, I have been thinking whether it would be possible one day to combine my research activities with teaching at a university. The ultrafast x-ray science chair in the Department of Physics was a perfect opportunity and an excellent fit to the research I have been pursuing my entire career. Still, it wasn't until my visit to Madison, experiencing the wonderful interaction with the students, faculty and staff, and feeling the energy on this beautiful campus, that I fell in love with the idea of joining UW–Madison.

What is your favorite element and/or elementary particle?

Manganese is my favorite element, because it has so many amazing properties. It's chemically very important as it has all these different oxidation states, ranging from +2 to +7. And it's at the heart of the tiny little machine driven by sun light that nature uses to split water into oxygen, which I think is the most important reaction on the planet. Without it, there would only be primitive bacterial life on earth. For the elementary particle, I feel almost ashamed but, of course, it has to be the electron, because it does all the work. Nuclei hardly notice any chemical change, but electrons do all the bonding, all the rearrangements that make the world run; they are the worker bees of nature.

What hobbies/other interests do you have?

I love nature, animals, music, and outdoor activities, especially in and around water.

Research Highlights

Compiled from Department of Physics, University Communications, and UW Physics/SLAC news stories

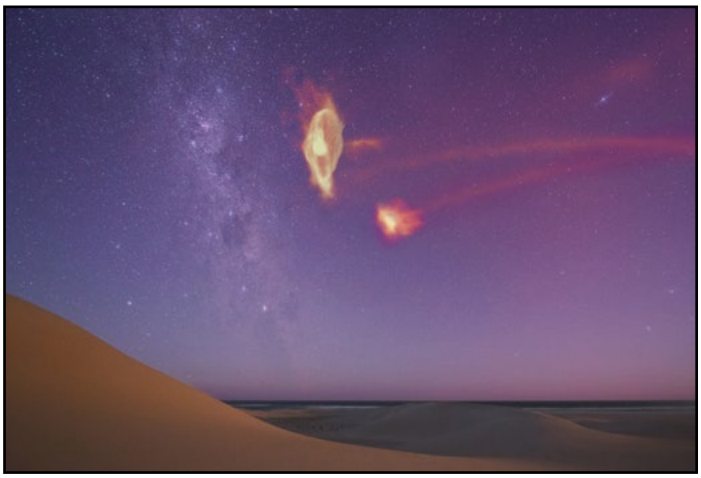
Massive halo finally explains stream of gas swirling around the Milky Way

The Milky Way is not alone in its neighborhood. It has captured smaller galaxies in its orbit, and the two largest are known as the Small and Large Magellanic Clouds, visible as twin dusty smears in the Southern Hemisphere.

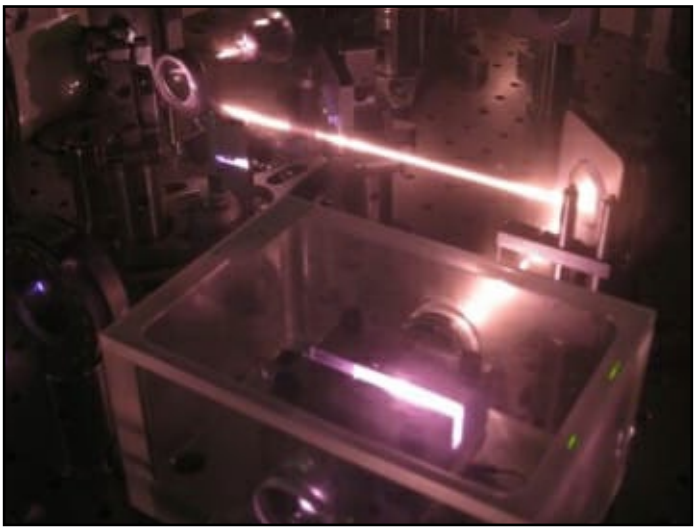
As the Magellanic Clouds began circling the Milky Way billions of years ago, an enormous stream of gas known as the Magellanic Stream was ripped from them. The stream now stretches across more than half of the night sky. But astronomers have been at a loss to explain how the stream became as massive at it is, over a billion times the mass of the sun.

In a study published in the journal Nature, physics graduate student and first author Scott Lucchini, affiliate professor Elena D'Onghia (Astronomy), and other colleagues have discovered that a halo of warm gas surrounding the Magellanic Clouds likely acts as a protective cocoon, shielding the dwarf galaxies from the Milky Way's own halo and contributing most of the Magellanic Stream's mass. As the smaller galaxies entered the sphere of the Milky Way's influence, parts of this halo were stretched and dispersed to form the Magellanic Stream.

Read the full story: go.wisc.edu/f29212



A view of the gas in the Magellanic System as it would appear in the night sky. This image, taken directly from the numerical simulations, has been modified slightly for aesthetics.



A group of rubidium ions is immobilized by laser-cooling them to just slightly above absolute zero.

Surprising communication between atoms could improve quantum computing

While physically-distant conversations have become part of pandemic life, it turns out an atomic version of Zoom has always been part of the quantum world — and scientists are learning how to log in to it.

Prof. Deniz Yavuz and colleagues identified conditions under which relatively distant atoms communicate with each other in ways that had previously only been seen in atoms closer together.

The findings, published in the journal Physical Review A, open up new prospects for generating entangled atoms, the term given to atoms that share information at large distances, which are important for quantum communications and the development of quantum computers.

"Building a quantum computer is very tough, so one approach is that you build smaller modules that can talk to each other," Yavuz says. "This effect we're seeing could be used to increase the communication between these modules."

Read the full story: go.wisc.edu/tlu15b

A better understanding of astrophysical plasma dynamics

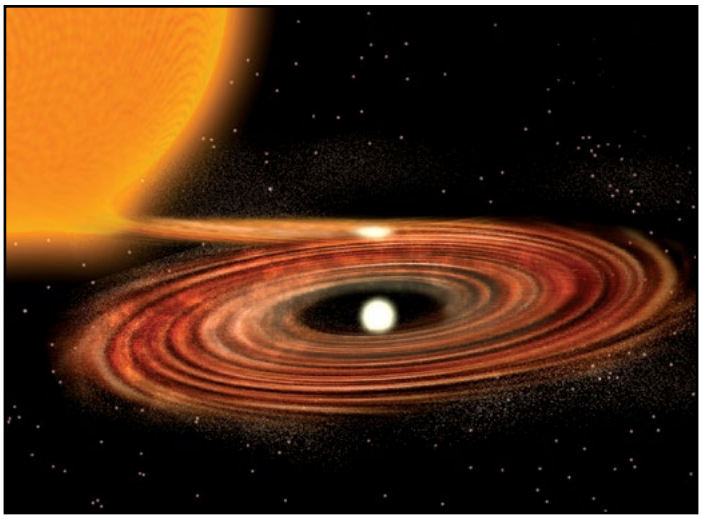
Stars, solar systems, and even entire galaxies form when astrophysical plasma — the flowing, molten mix of ions and electrons that makes up 99% of the universe — orbits around a dense object and attaches, or accretes, on to it. Physicists have developed models to explain the dynamics of this process, but in the absence of sending probes to developing stars, the experimental confirmation has been hard to come by.

In a study published in Physical Review Letters, physicists — including lead author Ken Flanagan and senior author Cary Forest — recreated an astrophysical plasma in the lab, allowing them to investigate the plasma dynamics that explain the accretion disk formation. They found that electrons, not the momentum-carrying ions, dominate the magnetic field dynamics in less dense plasmas, a broad category that includes nearly all laboratory astrophysical plasma experiments.

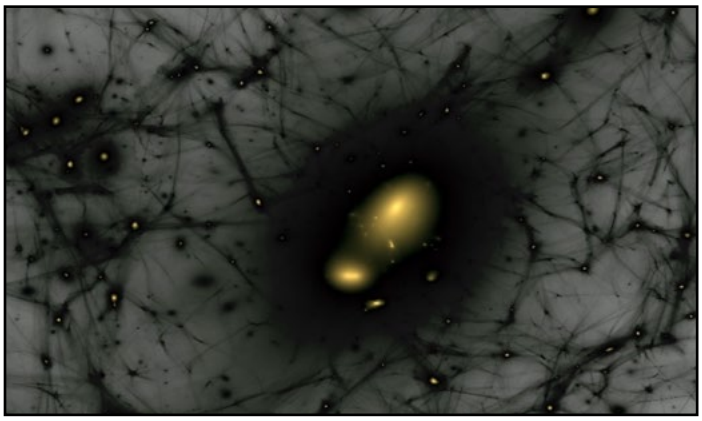
Like water swirling around and down an open drain, plasma in an accretion disk spins faster nearer the heavy object in the center than further away. As the plasma falls inward, it loses angular momentum. A basic physics principle says that angular momentum needs to be conserved, so the faster rotating plasma must be transferring its momentum away from the center.

But no one had explained how the angular momentum was transported in an accretion disk. A model developed by theoretical physicists posits that turbulence, or the chaotic changes in plasma flow speeds, can explain the phenomenon on a realistic time scale. In the study, Flanagan and colleagues determine from where the turbulence comes.

Read the full story: go.wisc.edu/22m364



An artist's conception of the accretion disk.



A stillframe from a DES simulation of the formation of dark matter structures from the early universe until today.

Dark Energy Survey studies advance the search for Dark Matter

Prof. Keith Bechtol was busy in 2020, publishing two major studies followed by significant results in a third, pre-print study, all with the Dark Energy Survey (DES). The first two companion studies were published in the Astrophysical Journal and are part of a larger effort to understand how dark matter works on scales smaller than our galaxy. Dark matter is an invisible form of matter that provides most of the mass within galaxies.

"The ultra-faint galaxies that orbit the Milky Way are small clouds of dark matter with just enough stars to see that they exist. They are nearly invisible, but if spotted, they make excellent natural laboratories to study dark matter," Bechtol says. "We hope to learn what dark matter is made of, how it was produced in the early Universe, and what relationship it has to the known particle species."

Bechtol's group, including graduate student Mitch McNanna, was prominently involved in compressing the raw data collected from telescopes, and searching through the resultant catalogs of astronomical objects to identify the ultra-faint galaxies. DES is using that data to address several questions, including how much dark matter it takes to form a galaxy, how many satellite galaxies we should expect to find around the Milky Way, and whether galaxies can bring their own satellites into orbit around our own — a key prediction of the most popular model of dark matter.

A few months later, DES published follow-up results in a pre-print that used the ultra-faint galaxy census published in the first two studies to probe the nature of dark matter. These new measurements provide information about what the dark matter can and cannot be made of. In particular, the new results constrain the minimum mass of the dark matter particles, as well as the strength of interactions between dark matter and normal matter.

Read the full story: go.wisc.edu/747hk2

Winter at the Whipple Observatory

By Madeleine O'Keefe, WIPAC

While Wisconsinites endured another Midwestern fall and winter—one that, while relatively mild, included a snowstorm on Halloween—University of Wisconsin–Madison graduate student Leslie Taylor was basking in the Arizona sun. Her research group needed her to lead commissioning and other hands-on work with the prototype Schwarzschild-Couder telescope (pSCT) at the Fred Lawrence Whipple Observatory on Mount Hopkins, 35 miles south of Tucson. So Taylor got to escape the harsh Madison weather and head to the Southwest, where she lived and worked from September 2019 to January 2020.

"I love working out there. It's warmer than Madison; it's exciting," says Taylor. "I like hands-on hardware stuff, so it's perfect, being on-site."

The pSCT is a prototype medium-sized telescope for the Cherenkov Telescope Array (CTA) project, an array that will be made up of 118 small-, medium-, and large-sized telescopes across two sites: one near Paranal, Chile, and one on the island of La Palma in the Canary Islands.

Professor Justin Vandenbroucke leads the CTA group at UW–Madison's Wisconsin IceCube Particle Astrophysics Center (WIPAC). For the last seven years, the WIPAC CTA team has worked, along with collaborators, on the construction and integration of the pSCT's high-speed camera—which is the size of a golf cart, weighs 800 pounds, and is capable of recording movies at a billion frames per second. Assembly and testing of the camera was completed in their Madison lab in early May 2018, and it was shipped to Mount Hopkins and installed on the pSCT at the end of that month.

Taylor has worked with Vandenbroucke for three years now, so this trip wasn't her first time at the Whipple Observatory; she has been there on and off for a couple of weeks at a time, including in January 2019 when she recorded "first light" and first particle showers with the telescope a few days after its inauguration. The camera recorded these first particle-induced air showers within seconds of being powered on for the first time with the telescope's mirrors uncovered.

While Taylor was stationed at Whipple last fall, she worked three different shifts: day, swing, or night. Day shift was mostly hardware work or analysis work, like a typical "office job." Swing shift involved doing things like testing the camera to make sure that software was running properly or that it was collecting data for analysis, which required waiting until it got dark outside. Night shift work was actually taking data.

Justin Vandenbroucke and Leslie Taylor next to the prototype Schwarzschild-Couder telescope at the Whipple Observatory on Arizona's Mount Hopkins.

For the first two months, Taylor did mostly commissioning work: preparing, fixing, and verifying things were working as well as coordinating with the optics team to align the mirrors. She also did an observing shift for VERITAS (Very Energetic Radiation Imaging Telescope Array System)—an existing array of four single-mirror telescopes at the Whipple Observatory—to learn about how they do their shift operations in order to help establish one for the pSCT.

The latter two months involved more commissioning and testing as well as the first routine data-taking campaigns with the pSCT pointing at the Crab Nebula.

The Crab Nebula is the gold standard for very high energy gamma-ray observations. This supernova remnant—the cosmic gas and dust left over after a star has exploded almost a thousand years ago, leaving behind a neutron star—is a bright and constant source of such gamma rays. It's usually the first object that very high energy gamma-ray telescopes look toward because, if the telescope detects it, scientists know that all aspects of the telescope are working properly.

Taylor presenting at Space Drafts.

Using data recorded between January and March 2020, the pSCT detected the Crab Nebula with 8.3-sigma statistical significance. Vandenbroucke announced the detection on behalf of the CTA Consortium at the 236th Meeting of the American Astronomical Society.

The pSCT's observations of the Crab Nebula were coordinated with VERITAS, which enables powerful comparisons between VERITAS's proven and well-characterized technology and the novel technology of the pSCT. This includes estimating the gamma-ray energy threshold of the new telescope and using VERITAS to tag events as "gamma-like" or "hadron-like." This trains and validates the pSCT's gamma-hadron separation. "Hadron showers look a bit like gamma-ray showers, so it's important to effectively differentiate between them in order to say that we saw a gamma ray," says Taylor.

Other milestones from Taylor's on-site work include the installation of a new LED flasher, restructuring and simplification of data-taking software, characterization and understanding of temperatures and rates, and the installation and initial testing of a GPS time-tagging system.

Taylor also did some outreach, giving a public talk on the basics of gamma-ray astrophysics and telescopes at "Space Drafts," a local chapter of Astronomy on Tap, at a local bar and brewery.

In addition, while at the Whipple Observatory, Taylor established the observing procedure for the pSCT and then helped train other observers, who continued taking data until the observatory shut down in March due to the COVID-19 pandemic.

According to Vandenbroucke, "Leslie's work during her four months on-site as well as her previous trips to the observatory and her work integrating and testing the camera in the lab on campus were essential to achieving routine operations of the pSCT, which led to the major milestone of detecting the Crab Nebula with this new type of telescope."

Taylor returned to Madison in January where, ideally, she will continue spending most of her time. "Especially now that we have done initial observations, I am shifting away from hardware stuff and more toward analysis and writing my thesis," she says.

To read the WIPAC news story about the Crab Nebula detection presented at the AAS meeting earlier this year, please visit go.wisc.edu/5ehiy8

Shining a light on physics and art

By Sarah Perdue, Department of Physics

One month into the new school year, Aurora, a fifth grader at Henderson Elementary School in Madison and an aspiring obstetrician, was taking the highs with the lows when it comes to virtual learning.

"Now that I know this COVID is not safe at all, it's a good thing (we're not in school), and I have all my stuff here and it's easier to find," Aurora says. "But sometimes — no, probably like all the time — my computer acts up."

Aurora's teacher, Amber Fiene, knows that there can be some positives to virtual learning, but she is concerned with how much screen time school requires this year.

"Every assignment is electronic, everything is on screens, and (the students) do not have the tangible manipulatives," Fiene says.

For a week in mid-October, Aurora and nearly 80 other Henderson fifth-grade students took breaks from all-electronic assignments. Instead, they got to work with a series of take-home kits that let them explore the physics of light while creating art that plays off of concepts in physics. The motivation behind the kits comes from University of Wisconsin–Madison physics graduate student and artist Aedan Gardill. Gardill has been illustrating physics concepts with art for years, such as through his Instagram account, where he shares ink drawings.

Earlier this year, he applied for a grant from the Madison Arts Commission to create hidden portraits of women in the physical sciences that could only be revealed by using polarized lenses (above photo). He also planned to visit local schools to explain the concept behind his art and help students make their own images based on his technique.

By the time Gardill learned he had been awarded the grant, the pandemic was in full force, and his plans had to change. While he could still present his portraits at the Wisconsin Science Festival, school visits were no longer in the cards.

"With the realization this summer that school was going to most likely be online in the fall, I had to rethink how I was going to use the funding from the grant," Gardill explains. "And that has morphed into providing at-home, hands-on learning experiences that we'll lead virtually."

Gardill enlisted the help of several graduate students in the physics department, including Abby Bishop, Praful Gagrani, Jimena Gonzalez, Ben Harpt, Preston Huft, Brent Mode, Bryan Rubio Perez, Susan Sorensen, and Jessie Thwaites. They worked over the summer to develop four days of activities that illustrate the physics of light. They wrote worksheets in English and Spanish to go with each activity, and used the funding to order items like

mirrors, lenses and laser pointers to be included in take-home kits for students.

"For example, in the first kit, the students will look at how light acts like a wave and a particle, which is a really unique property of light," Gardill says. "They're going to work with polarizers which utilize that wavelike behavior, and one activity has them make an art piece based off of what I'm doing with the portraits. We're also using glow-in-the-dark paint and different light sources to mimic the photoelectric effect, which is a significant experiment in physics that first showed that light acts like a particle."

Physics graduate student Praful Gagrani leads students in Amber Fiene's class in lessons about how light functions in a kaleidoscope.

Other activities included learning about angles of reflection by using mirrors and building kaleidoscopes and demonstrating the differences between white light — which can be diffracted through a prism to show a rainbow of colors — and single-color lasers.

Over the course of four sessions, a physics graduate student worked with a Henderson teacher and a smaller group of students, leading demos that the students could participate in with their kits over Zoom. Before the week began, Fiene had heard from parents and other teachers that they were excited about the opportunity. Aurora and many of her classmates were just as pumped for the chance at a real hands-on experience in the midst of a virtual school year.

"I would say (Aedan) picked really good kits — they're amazing. The kaleidoscope is my favorite because it's kind of challenging at first, but at the end you notice that you made something really cool and it's your own design," Aurora says. And she is especially excited to learn science because, "I know you have to do science to go to med school, and I do really want to be an OB doctor."

The at-home physics kits featured lessons on light, such as how it functions as both a particle and a wave, and how light changes as it passes through a prism.

Find more of Aedan's art on the web at aedangardill.com or on Instagram @aedangardillart

Faculty Awards & Honors

In 2020, many of our faculty were honored as leaders in their fields

Professional Society Honors

Vernon Barger, J. J. Sakurai Prize for Theoretical Particle Physics

The American Physical Society's (APS) J.J. Sakurai Prize is considered one of the most prestigious annual prizes in the field of theoretical high energy physics. Barger, who joined the UW–Madison faculty in 1965, is a world leader in theoretical particle physics where theory meets experiment. He is one of the founders of collider phenomenology as it is practiced today. APS recognized him "For pioneering work in collider physics contributing to the discovery and characterization of the W boson, top quark, and Higgs boson, and for the development of incisive strategies to test theoretical ideas with experiments."

Robert McDermott, American Physical Society Fellow

McDermott was elected for seminal contributions to quantum computing with superconducting qubits, including elucidating the origins of decoherence mechanisms, and development of new qubit control and readout methods. He was nominated by the Division of Quantum Information. Each year, no more than one half of one percent of the Society membership is recognized by their peers for election to the status of Fellow.

Jim Lawler, American Astronomical Society Fellow

Lawler was named as one of 200 Legacy Fellows to the first class of Fellows of the American Astronomical Society (AAS). The AAS Fellows program was established in 2019 to recognize AAS members for their contributions toward the Society's mission of enhancing and sharing humanity's scientific understanding of the universe. Fellows may be cited for original research and publication, innovative contributions to astronomical techniques or instrumentation, significant contributions to education and public outreach, and noteworthy service to astronomy and to the Society itself.

Other External Honors

Kevin Black, Co-Coordinator of LHC Physics Center at Fermilab

Black was named one of the co-coordinators of the LHC (Large Hadron Collider) Physics Center at Fermilab (LPC at FNAL). His appointment started this fall and lasts for two years. As co-coordinator, Black's roles will include leading the several hundred physicists who are residents or visit the LPC for research on CMS, managing the distinguished research program, and leading the training of students and young physicists at FNAL.

Shimon Kolkowitz and Mark Saffman, Innovare Accelerator

The Innovare Advancement Center's "Million Dollar International Quantum U Tech Accelerator" competition awarded a total of $1.35 million to 18 teams in a "shark tank-like" competition. The winning teams, including Kolkowitz and Saffman's, each earned $75,000 toward their proposed research. The competition attracted nearly 250 proposals from teams across the world in the areas of quantum timing, sensing, computing and communications, and 36 teams were invited to present at a live virtual event.

UW–Madison Awards & Honors

Mark Eriksson, WARF Professorship

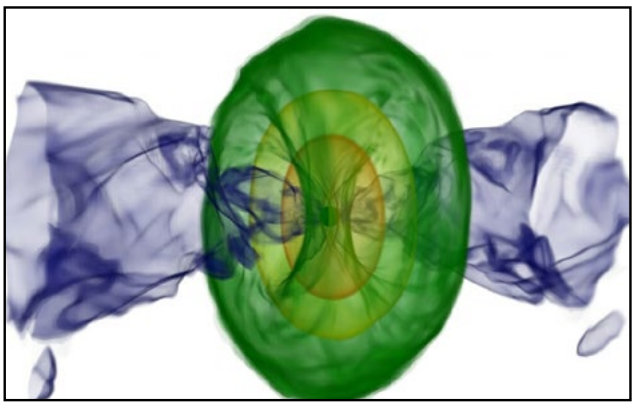
Eriksson was named the John Bardeen Professor of Physics, through the Wisconsin Alumni Research Foundation (WARF) named professorship program. The program provides recognition for distinguished research contributions of the UW–Madison faculty. Recipients are asked to choose the name of their professorship. Eriksson, who graduated with a B.S. in physics and mathematics from UW–Madison in 1992, chose fellow alum John Bardeen — a scientist who has the unique honor of being the only person to receive the Nobel Prize in Physics twice.

UW2020 Awards

The goal of UW2020, a program funded by the Office of the Vice Chancellor for Research and Graduate Education and the Wisconsin Alumni Research Foundation, is to stimulate and support cutting-edge, highly innovative and groundbreaking research at UW–Madison and to support acquisition of shared instruments or equipment that will foster significant advances in research. The three selected projects that include physics faculty are listed below. All projects are led by a multidisciplinary team of scientists; in addition to the names below, these projects all have several other investigators from across campus and, in some cases, from industry partners as well.

- **Acquisition of a cryogen-free magnetransport system for characterization of quantum materials and devices**
  Co-Investigator: Mark Eriksson
- **Cracking the structure of ice: establishing a cryogenic electron backscatter diffraction and Raman capability at UW–Madison**
  Co-PI: Justin Vandenbroucke
- **Interdisciplinary engineering of quantum information systems**
  PI: Robert McDermott and Co-PI Mark Eriksson

New Funded Centers

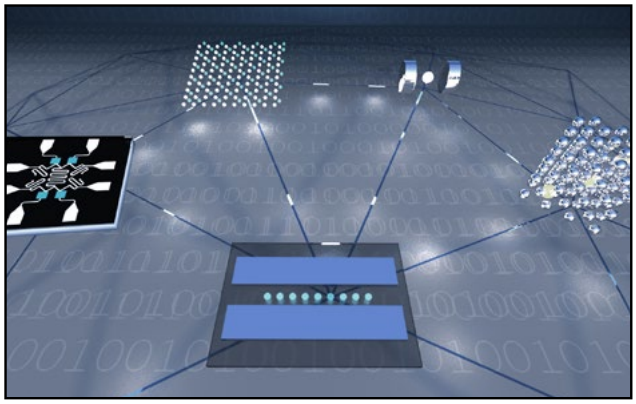


NSF Physics Frontier Center: The Network for Neutrinos, Nuclear Astrophysics, and Symmetries (N3AS)

A group of universities, including UW–Madison, was named the newest Physics Frontier Center, The Network for Neutrinos, Nuclear Astrophysics, and Symmetries (N3AS). N3AS expands the reach and depth of existing capabilities in modeling some of the most violent events known in the universe: the mergers of neutron stars and their explosive aftermath.

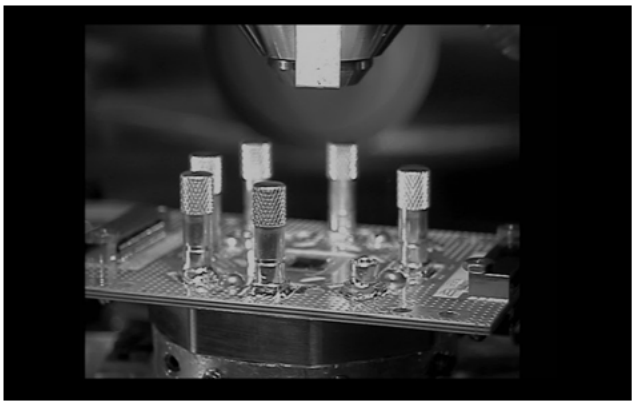
N3AS is already an established hub of eight institutions, including UW–Madison, that uses the most extreme environments found in astrophysics — the Big Bang, supernovae, and neutron star and black hole mergers — as laboratories for testing fundamental physics under conditions beyond the reach of Earth-based labs. The upgrade to a Physics Frontier Center adds five institutions, provides $10.9 million in funding for postdoctoral fellowships and allows members to cover an expanded scope of research. Professor A. Baha Balantekin is one of the principal investigators for N3AS. *For more details, please see* go.wisc.edu/swh340

NSF Quantum Leap Challenge Institute: Hybrid Quantum Architectures and Networks



As joint members of a Midwest quantum science collaboration, the University of Wisconsin–Madison, the University of Illinois at Urbana–Champaign and the University of Chicago have been named partners in a National Science Foundation Quantum Leap Challenge Institute.

The five-year, $25 million NSF Quantum Leap Challenge Institute for Hybrid Quantum Architectures and Networks (HQAN) was one of three institutes formed in this first round of NSF Quantum Leap funding and helps establish the region as a major hub of quantum science. Professor Mark Saffman is a co-Principal Investigator, and Professor Shimon Kolkowitz is leading the quantum science outreach, education and corporate partnerships focus. *For more details, please see* go.wisc.edu/42129u



DOE Quantum Information Science Research Center: Q-NEXT

UW–Madison then solidified its standing as a leader in the field of quantum information science when the U.S. Department of Energy announced the Q-NEXT collaboration as a funded Quantum Information Science Research Center through the National Quantum Initiative Act. The five-year, $115 million collaboration was one of five Centers awarded funding.

Q-NEXT, a next-generation quantum science and engineering collaboration led by the DOE's Argonne National Laboratory, brings together nearly 100 world-class researchers from three national laboratories, 10 universities including UW–Madison, and 10 leading U.S. technology companies to develop the science and technology to control and distribute quantum information. Professor Mark Eriksson is leading the Q-NEXT thrust on Materials and Integration. *For more details, please see* go.wisc.edu/fhj3q5

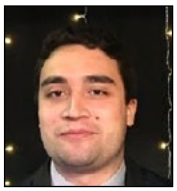
Welcome, Graduate Class of 2020!

Ph.D. Program


Michael Campanella


Elise Chavez


Anna Cooleybeck


Rene Flores


Sergey Gitalov


Paul Gradney


David Guevel


Emily Joseph


Yurii Kvasiuk


Shivani Lomte

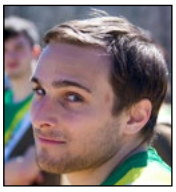

Piotr Marciniec

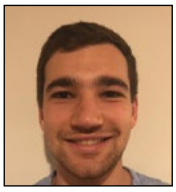

Eunji Oh


Sanghyeok Park


Shravan Patel


Sanket Patil


Jon Pizzo


Luca Riitano


Kunal Sanwalka


Jack Schroeder


Arjav Sharma


Jessie Thwaites


Avani Vivrekar


Winnie Wang


Yiting Wang


Jacky Yip

Learn more about our students, their interests and their motivations for choosing UW–Madison Physics for graduate school at:
Ph.D. | go.wisc.edu/4ku0cb
MSPQC | go.wisc.edu/7i8k23

MSPQC Program


Rafael Alapisco


Kevin Davis


Carter Dewey

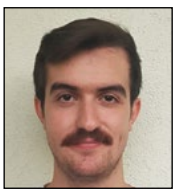

Swagat Kumar


Jacob Lenz


Fengguang Liu


Linipun Phuttitarn


Jack Riley


Utku Saglam


Bradley Shrader


Richard Toohey

Four endowed faculty positions propel us into 2021

By Bob Joynt, Associate Chair for Alumni Relations, Department of Physics & Mae Saul, Associate Director of Development, Wisconsin Foundation and Alumni Association

Over the past few years, the Department of Physics has focused much of its fundraising efforts on securing funds for endowed faculty positions. Endowed chairs, professorships and fellowships allow departments to attract top talent and provide well-deserved recognition to help us retain the talent we already have.

We are excited to announce that we now have four such endowed positions. Our first-ever endowed professorship, the Martin L. Perl Professorship in Ultrafast X-ray Science, was awarded to Professor Uwe Bergmann (see page 5 to learn more about his research). We are grateful to an anonymous donor — a friend and colleague of Perl, after whom the position is named — for making this excellent addition to our faculty possible.

Early in 2020, we received a generous donation from Dunson Cheng which was matched by funds from John and Tashia Morgridge, allowing us to announce our second endowed professorship. We will begin a search for the Dunson Cheng Professor of Physics next year. Dunson Cheng is a graduate of the department who went on to a very distinguished career in banking.

In the fall of 2020, we added a third endowed Professorship through the generosity of Carl and Brynn Anderson and matching funds from John and Tashia Morgridge. We will be excited to award the Carl J. and Brynn B. Anderson Professorship to an experimental physicist in the near future. Carl Anderson is a graduate of the department and a member of our Board of Visitors. Carl has also received an honorary degree from UW-Madison.

The Bernice Durand Faculty Fellowship

And finally, we are very excited to announce that the Bernice Durand Faculty Fellowship has been funded! As many of you know, UW Professor Emeritus Bernice Durand was one of the first two women professors in the UW–Madison Department of Physics, and we have been wanting to honor her with an endowed faculty position for several years now.

While at UW–Madison, Durand was a theoretical physicist who specialized in particle theory and mathematical physics. Her research was on symmetry relations in algebra and physics, plus the phenomenology of high-energy interactions at large particle accelerators. As the first Associate Vice Chancellor for Diversity & Climate, Professor Durand provided leadership to ensure that faculty, staff, and student diversity issues including race, ethnicity, gender, sexual preference, and classroom and general campus workplace climate issues be addressed, and that search committees for non-classified staff be trained in broadening the pool of applicants and eliminating implicit bias.

Professor Emeritus Bernice Durand

Durand co-directed a grant from the Alfred P. Sloan Foundation to the UW System designed to create more equity, flexibility and career options for faculty and academic staff. She was also a member of the leadership team of the Women in Science and Engineering Leadership Institute sponsored by the National Science Foundation to increase the participation and status of women in science. A recipient of the Chancellor's Award for Outstanding Teaching, Professor Durand taught courses at all levels, from modern physics for non-scientists ("Physics for Poets") to a specialized course she developed for advanced graduate students in the use of topology and algebra in quantum field theory. In the mid 1990s, she used technological and pedagogical techniques in her teaching, such as broadcasting her modern physics for non-scientists course on public television with web-based coursework, and pioneering one of two early versions of MOOCs (massive open online courses) on campus.

We are proud that her name will be associated with this Faculty Fellowship for years to come, and the Department plans to use the Durand Faculty Fellowship to support a professor in the department who will expand our efforts to create a more diversified faculty.

The Fellowship was conceived by our Board of Visitors, who spearheaded the ultimately-successful fundraising drive. The department cannot express our gratitude enough to the board for the role they played in helping us secure the matching funds and create this Faculty Fellowship. It was truly their enthusiasm for and understanding of the significance of both an endowed position and one named for Bernice Durand that brought this funding over the finish line. In the future, we hope to secure donations that will convert the Fellowship into a named chair.

The department particularly thanks board members Lloyd Hackel, Roger Hagengruber, Paul Hatchell, Craig Heberer, and Tom Holley for the role in making this Faculty Fellowship possible. Lastly, we thank Professor Emeritus Randy Durand for his generous donation to this fellowship honoring his wife.

Into 2021, and beyond

We are so grateful for the support we received in 2020 that helped us achieve remarkable success with these endowed positions, and we certainly hope we can secure more in the future — they signal to the UW–Madison and greater Physics communities that our department values great research.

The remainder of the academic year will bring new and unknown challenges, but we are confident in our ability to meet them and, with your support, continue to push the University of Wisconsin Forward. In the uncertain year ahead, donations to the department's discretionary fund, the Newton Fund, will be more important than ever. Donations to this fund will help the department respond to critical needs as they arise and ensure that the department is able to direct funding to the areas of highest need. We ask our alumni and friends to consider a donation to the Newton Fund, and help us navigate the year ahead. Unrestricted funds are needed more than ever now to help us maintain, and exceed, the quality and output of our research, teaching, and outreach — the core missions of the department — this year and beyond.

Giving to The Newton Fund

Please visit
go.wisc.edu/4hp4z0
or mail in the form in the back of this newsletter.

Physics Board of Visitors: Updates and Priorities

By Craig Heberer, Chair, Physics Board of Visitors

Fundraising

The Board is very happy that the Bernice Durand Faculty Fellowship, conceived by the Board, is now a reality. The establishment of this fund is a very visible indication of the entire Board's continued and enthusiastic support of the Department of Physics. The Fellowship was made possible by matching funds from John and Tashia Morgridge and with support from UW Professor Emeritus, Randy Durand.

I just recently learned that a few days after this milestone was reached, the department added another endowed Professorship; the Carl J. and Brynn B. Anderson Professorship, through the generosity of board member Carl Anderson, Brynn Anderson and matching funds from John and Tashia Morgridge.

The department now has four endowed positions, a truly impressive accomplishment!

Next year will be met with unforeseen and unpredictable challenges. Fundraising activities will focus on discretionary, unrestricted funds; the "dry powder" necessary for the department to both navigate the challenges ahead and fulfill a strategy of pursuing key opportunities as they arise. These funds empower the department to deploy resources quickly to rapidly developing areas and areas that need critical support. The Board is joining with the department in promoting the Newton Fund, the department's primary discretionary fund, as a priority philanthropy need in 2021.

Fall 2020 Board Meeting

The Board had its fall meeting in October. The Board and department are developing specific ways it can more effectively assist the department in accomplishing its goals. We look forward to having our joint efforts yield positive results.

The Board of Visitors

The web page, https://www.physics.wisc.edu/people/board-of-visitors/ gives a good summary of our charter and a list of current members. Please contact me (craig.heberer@gmail.com) or Bob Joynt (rjjoynt@wisc.edu) if you would like to learn more about the Board of Visitors.

2020 Physics Awards and Scholarships

The 2020 Awards Ceremony looked a little different than usual this year due to the pandemic. Though we could not gather for a banquet, we still honored these very deserving students at a virtual ceremony held in May.

UNDERGRADUATE AWARDS

Fay Ajzenberg-Selove Award: Yitong Liu

This award is presented to undergraduate women majoring in Physics, Astronomy, or Physics/Astronomy to encourage them to continue their careers in science. The late Dr. Ajzenberg-Selove was a distinguished nuclear physicist who received her Ph.D. in Physics at UW in 1952 and spent most of her career as Professor at the University of Pennsylvania. Yitong Liu was chosen for her contributions to research with Profs. Kevin Black and Kim Palladino and for her outreach with the Physics Fair and Ingersoll Museum of Physics. Yitong graduated in May 2020.

Dr. Maritza Irene Stapanian Crabtree Award: Haley Stueber

This fund was established by William Crabtree to honor his wife, Dr. Maritza Crabtree, who graduated with a Physics degree in 1917. This annual award benefits undergraduate students in Physics based equally on merit and need. Haley Stueber conducts research in Prof. Dan McCammon's X-ray astronomy research group, and she volunteers at physics events such as the Physics Major Open House and with the Morgridge Center for Public Service.

Henry & Eleanor Firminhac Scholarship: David Szymulewski

This award was established by former UW graduate, the late Ralph Firminhac (BS '41, MS '42). He created this scholarship in memory of his parents, Henry and Eleanor Firminhac. David Szymulewski is a Physics/Mathematics/Astronomy-Physics major conducting research with Prof. Mathieu in Astronomy.

Hagengruber Scholarship: Calvin Osinga

This scholarship was established by Roger Hagengruber, for a Wisconsin resident undergraduate Physics student who shows exceptional promise for a future in Physics. Calvin Osinga, from Brookfield, WI, is a Physics/Mathematics/Astronomy-Physics major with a certificate in Computer Sciences. He worked on several research projects with Prof. Timbie and completed his senior honors thesis with Prof. D'Onghia in Astronomy. He served as the University Physics Club president in 2019-20 and has tutored for the Center for Academic Excellence. He graduated in May 2020.

Liebenberg Family Scholarship: Gage Siebert

This scholarship is awarded to Physics, AMEP or Astronomy/Physics majors. This scholarship opportunity was initiated by the Liebenberg family for the purpose of promoting undergraduate summer research opportunities. Gage Siebert conducts research in Prof. Timbie's group and participated in a Research Experience for Undergraduates at the Arecibo Observatory in summer 2019.

GRADUATE AWARDS

Charles Elwood Mendenhall Award: Alex Pizzuto

This award was made possible through the generosity of the Charles Elwood Mendenhall estate. Mendenhall received his Ph.D from Johns Hopkins in 1898. He was a faculty member in the Department of Physics from 1901 until his passing in 1935. Alex Pizzuto works with Prof. Vandenbroucke on the Search for Astrophysics Transients with IceCube. He is very involved in science communication, mentoring, outreach and graduate program activities. He is a regular contributor to Astrobites, a WIPAC high school volunteer, and a Physics Graduate Student Peer Mentor.

Phyllis Jane Fleming Award: Joelle Corrigan

This award is made possible through the generosity of Linda B. Miller and Dr. Fleming. Phyllis received her Ph.D. in 1955 under Professor Dillinger. This fund provides support for a female Ph.D. candidate in physics. Joelle Corrigan works with Prof. Eriksson on Si/SiGe quantum dot qubit measurement and fabrication, and has co-authored three papers. She serves as president of GMaWiP, has played a key role in increasing the number of female graduate students joining the department, and takes undergraduates to the Conference for Undergraduate Women in Physics each year.

Hallet H. and Mary F. Germond Award: Ibrahim Safa

This award provides support for graduate students in the Department. Hallet Hung Germond received his Ph.D. in mathematical physics from UW in 1927. Ibrahim Safa works with Prof. Halzen at IceCube, and his research focuses on the origins and properties of astrophysics neutrinos and possible connections with dark matter.

Van Vleck Award: Yue Hu

This award provides support to graduate students in the department and is made in honor of John Hasbrouck Van Vleck, one of three recipients of the Nobel Prize in Physics in 1977. Yue Hu works with Prof. Lazarian on modeling delicate 3-D galactic magnetic fields. He has significantly advanced the area of magnetic field studies by advancing the revolutionary new technique of magnetic field tracing, the Velocity Gradient Technique, which he was instrumental in developing. In his first two years as a graduate student, he has published nine first-author papers, and co-authored five others.

Karl Guthe Jansky & Alice Knapp Jansky Award: Scott Lucchini

This award alternates annually between an outstanding graduate student in Physics and one in Astronomy. Karl Guthe Jansky received a BA and MA in physics in 1927 and 1936, respectively. Scott Lucchini works with Prof. D'Onghia on N-body simulations of the origin of the Magellenic Stream. He is a skilled computational astrophysicist and he published his work as first author in Nature this year — all while also being an outstanding TA (see below).

DEPARTMENT TA AWARDS

Joseph R. Dillinger Award for Teaching Excellence: Michael Cervia

Best TA Spring 2019: Greg Loges

Best TA Fall 2019: Scott Lucchini

Rookie of the Year: Abigail Bishop

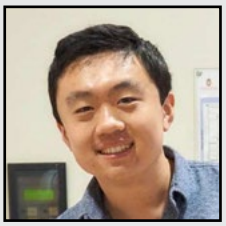
OTHER STUDENT AWARDS & HONORS

NSF Graduate Research Fellowship: Sarah McCarthy

The National Science Foundation's Graduate Research Fellowship Program recognizes and supports outstanding graduate students in NSF-supported STEM disciplines who are pursuing research-based master's and doctoral degrees at accredited US institutions.. The fellowship offers three years of financial support.

QISE-NET Graduate Fellowship: Xiaoyu Jiang (left) and Abigail Shearrow

The Quantum Information Science and Engineering Network (QISE-NET) provides selected students with up to three years of funding. Students benefit from the mentorship of both an academic advisor and one from a leading technology company or national laboratory. Xiaoyu Jiang's mentoring partnership is with Argonne National Laboratory and Abigail Shearrow's is with Google.



Kohler Fellow: Aedan Gardill

Marie Christine Kohler Fellows at the Wisconsin Institute for Discovery (WID) are graduate or professional students selected on the strength of their commitment and abilities to contribute to interdisciplinary thought. Kohler Fellows work and collaborate within WID, connecting graduate students across campus through a range of stimulating events. Aedan Gardill was selected as a 2020 Kohler Art Fellow and plans to incorporate his research on precision measurements with nitrogen-vacancy centers in diamonds into his fellowship.

College of Letters & Sciences Teaching Fellow: Ariel Rock

Each year, the College of Letters & Sciences selects a cohort of Teaching Fellows through a competitive process. Fellows work with a group of incoming TAs and with the L&S Teaching Assistant Training Team to convey crucial information to and work on pedagogical skill development with incoming TAs.

Early Excellence in Teaching: Alleta Maier

To recognize the excellence of the over 2,100 TAs across campus, the Graduate School supports the College of Letters & Science in administering campus-wide Teaching Assistant Awards. Alleta Maier was nominated by the Department of Physics and earned one of four Early Excellence in Teaching Awards. Alleta is passionate about equity in physics and empowering minoritized students to see themselves as physicists.

Hilldale Undergraduate Research Fellowships: Owen Rafferty, Yanlin Wu, and Yan Qian

The Hilldale Undergraduate/Faculty Research Fellowship provides research training and support to undergraduates at UW–Madison. Students have the opportunity to undertake their own research project in collaboration with UW–Madison faculty or research/instructional academic staff. Approximately 100 Hilldale awards are available each year.

Congrats to all the award recipients!

Visit our awards archive: physics.wisc.edu/department/awards

UW–Madison Physics Degrees Awarded

Undergraduate Degrees

Fall 2019

Nelli Aydinyan
Andrew Christensen
Andrew Froemming
Nathaniel Hilliard
Ian Norwood
Kiichi Okubo
Alexander Pearl
Nathan Rose
Nikolaj Reiser
Jakob Anthony Scholze
Benny Tock
Justin Twardowski

Spring 2020

Matthew Beede
Nicholas Bertschinger
Jessica Bosch
Jonas Brown
Zixiu Cai
Isabel Coff
Keegan Downham
Jack Eiden
Kyle Fruhling
Jack Gage
Orennia Goetzinger
Aaron Goodwin
Jo Hadera
Michael Hall
Oliver Hitchcock
Kelsey Jacobus
Lyndon Janowiak
Nikaan Koupaei Abyazani
Gabe LaFond
Diana Li
Shubo Lin
Jay Linton
Dong Liu
Alexander Mahnke
Cameron McDowell
Mari R McPheron
Bradley Nordin
Nikki Noughani
Samuel Olson
Calvin Osinga
Alex Pigarelli
Brandon Radzom
Ahmad Nasirudin Bin Rosli
Matthew Ruffner
Sam Smith
Bangzheng Sun
Cameren Swiggum
Morgan Turville-Heitz
Tyler Walters
Lexie Wang
Rou Wen
Dongxia Wu
Qin Xu
Jin Zhang
Shawn Zhou
Qiusheng Zhu

Summer 2020

Jacob Dwinell
Evan Petre

Master's Degrees

Steven Casper
Rishabh Khandelwal
Neil Leonard
Rachel Myers
Naveen

M.S. Physics – Quantum Computing Degrees (August 2020)

Ryan Ming Yun Leong
David John Morser
Carlos J. Owens
Jacques Van Damme
Delano Yoder

Doctoral Degrees

Fall 2019

Josh Karpel
Advisor: Yavuz

Ethan Peterson
Advisor: Forest

Vickram Premakumar
Advisor: Joynt

Justin Walker
Advisor: Boldyrev

Spring 2020

Julian Irwin
Advisor: Rzchowski

Emily Lichko
Advisor: Egedal

Ming-Yuan Lu
Advisor: Karle

Daniel Thrasher
Advisor: Walker

Summer 2020

Shaun Alsum
Advisor: Palladino

Zachary Buckholtz
Advisor: Yavuz

Chad Bustard
Advisor: Forest

Alex Cole
Advisor: Shiu

Diptaranjan Das
Advisor: Yavuz

Ken Flanagan
Advisor: Forest

Adrian Fraser
Advisors: Terry, Zweibel

David Gold
Advisor: Yavuz

Dahan Kim
Advisor: Johnson

Jason Milhone
Advisor: Forest

Kit Newton
Advisors: Li, Everett

Joseph Olson
Advisor: Egedal

Alexander Opremcak
Advisor: McDermott

A. Baris Ozguler
Advisor: Vavilov

Austin Schneider
Advisor: Karle

Alumni Updates

John F. Holzrichter B.S. '64, Ph.D., wrote to let us know that after graduating, he completed a Fulbright fellowship in Germany, then attended Stanford where he earned his doctorate in physics. He went on to develop high power lasers at the Naval Research Laboratory in Washington, D.C. and played a major technical and leadership role in developing laser systems, including the National Ignition Facility. He then had an opportunity to join Lawrence Livermore National Lab and to develop an internal R&D program. In 2000, he became President of the Fannie and John Hertz Foundation, which he accepted at the same time he retired from LLNL. He is now "mostly retired."

Joe Trueblood B.S. '84, who worked with Converse (Connie) Blanchard as an undergraduate, is now Superintendent of the Sheboygan Water Utility. He completed 22 years as superintendent, with projects including the implementation of the largest drinking water UV disinfection system in the state.

James T. Dobbins, Ph.D. '85, is president-elect of the American Association of Physicists in Medicine and will serve as president in 2021. He is professor of radiology, biomedical engineering, and physics at Duke University, and was the founding director of the medical physics graduate program at Duke. He has also just completed a five-year term as Associate Vice Provost of the university, overseeing the academic and programmatic aspects of Duke's joint venture university in Kunshan, China. While at UW, he worked with John R. Cameron and Charles Mistretta.

Sally Laurent-Muehleisen B.S. '88 sent in an update that she is a Senior Lecturer at the Illinois Institute of Technology. Prof. Laurent completed her tenure as the Associate Chair of the Physics Department at Illinois Tech and stepped down on June 1, 2020. She also runs the department's program for Astrophysics majors and is looking forward to spending more time in the classroom and less time being an administrator. As an undergraduate, she worked with Dan McCammon.

Kyle Mandli '04, PhD, wrote to update us that he is currently an Associate Professor of Applied Physics and Applied Mathematics at Columbia University. While an undergrad at UW–Madison, Kyle worked with Cary Forest and AMANDA/IceCube.

Thanks to everyone who shared an update with us! Do you have an update you would like to see in The Wisconsin Physicist? Please fill out our online form at physics.wisc.edu/alumni-update, or email us at news@physics.wisc.edu

GIFT GIVING GUIDE

The department relies on donors to help address critical needs now and prepare for the future. In these uncertain times, discretionary dollars are more important than ever and will help the department continue to achieve excellence in research and teaching. Donations to the department's Newton Fund continue to be a critical source of support and are used to address the current needs of students, faculty and staff and help us respond to the most pressing needs of the department.

PRIORITY FUNDS

Physics Newton Fund

Administered by the Department Chair, this general, unrestricted fund aids the department in its research, teaching, and public service roles. Donations to this fund provide a crucial flexible arm of support as they help the department address urgent and present funding needs.

Physics Alumni Graduate Award Fund

Provides support to incoming graduate students who hold Teaching Assistant appointments in the department.

Physics Board of Visitors Undergraduate Research Fund

Provides funding for awards that will assist directed study projects in pure and applied physics; multidisciplinary projects linking physics to such fields as biology, engineering, business, and creative expression; and, when possible, participation in related conferences.

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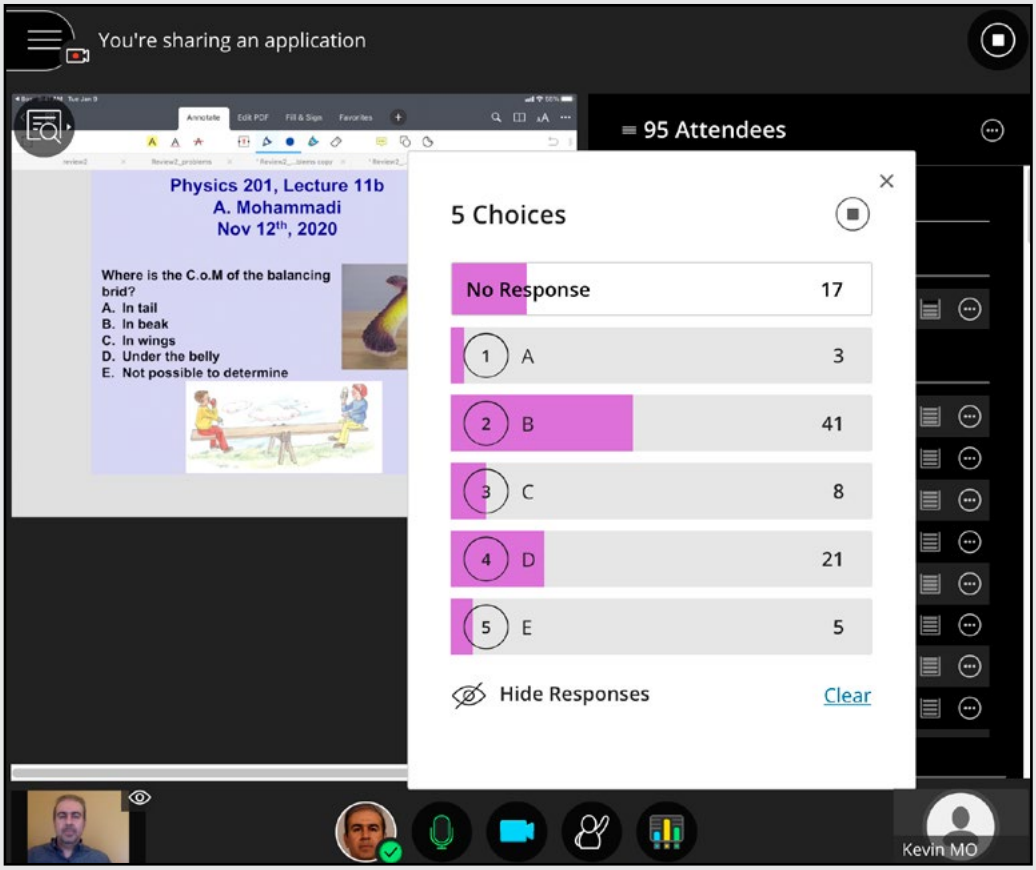
Physics Instruction, Then and Now

Physics lectures have certainly changed a lot in the past several decades. In the ca. 1938-1940 photo (above), from the UW–Madison Archives Collection, a line of professors sit at the front of Sterling 113. The final exam was even held in June that year! Fall 2020 Physics 201 lecturer Dr. Abdollah Mohammadi took this screenshot (below) of how he currently holds remote lectures on Blackboard Collaborate. We'll have to revisit these photos in 80 years to see what else changes!



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