

PHYSICS

AUTUMN 2015

LEADING THE WAY IN
**FEARLESS, VISIONARY,
COLLABORATIVE
PROBLEM-SOLVING**



DEPARTMENT OF PHYSICS
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THE OHIO STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES

THE ANNUAL ALPHEUS SMITH LECTURE
Nov. 18, 2015:

THE RETURN ENGAGEMENT OF LEGENDARY PHYSICIST KIP THORNE



PHOTO BY JON ROU

Twenty years ago, Kip Thorne, Cal Tech Feynman Professor of Theoretical Physics, gave the 1995 Smith Lecture, *Space-Time Warps and the Quantum: A Glimpse into the Future*

In November, Thorne returned to present the 53rd Smith Lecture, *Black Holes, Gravitational Waves, and Interstellar: Celebrating the Centennial of Einstein's Theory of Relativity*.

Our packed-house audience got a preview of the lecture Thorne was invited to present at Freie Universität Berlin on November 25 – exactly 100 years to the day after Einstein introduced the theory of general relativity in the Prussian Academy of Sciences in Berlin.

Thorne, scientific consultant and an executive producer of the 2014 blockbuster, *Interstellar*, illuminated

the stranger-than-fiction-science of General Relativity that is the movie's underpinning.

For decades, Thorne, one of the world's leading experts on the astrophysical implications of Einstein's general theory of relativity—has imagined, reinvented and changed the ways prominent physicists and just plain folks think about the workings of the universe.

The Annual Alpheus Smith Lecture has brought leading-edge work of Nobel Laureates and other prominent physicists to the community since 1960. The free, public lecture series is endowed by Robert Smith to honor his father, Physics Professor Alpheus W. Smith.

IN MEMORIAM

We regret to announce the passing of these extraordinary long-time faculty and staff members:

Emeritus professors
Katsumi Tanaka
Hershel Hausman
Kurt Reibel
(2015)

Staff member
Bob Wells
(2014)

Go to u.osu.edu/memoriam to read more about these remarkable individuals.

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THE VIEW FROM THE CHAIR'S OFFICE



Dear Friends of Ohio State Physics

As the chair of this vibrant department, it is my great pleasure to share some of the excitement it generates on so many levels.

It is difficult to believe that it's been 10 years since we moved into the Physics Research Building. The opportunities this amazing facility provide have an impact on both research productivity and quality of life for everyone inhabiting what we call the PRB. Weekly colloquia and seminars, and college and university meetings fill the Smith Seminar Room daily. The atrium and commons buzz with activity; collaboration spaces are rarely empty of students.

Our cover tells the story of becoming increasingly collaborative with colleagues in arts and sciences, across campus and beyond our state and nation's borders.

Our accomplished faculty, staff and students continue to win major university and national awards; we attract the country's brightest young minds; our work is recognized around the world. Our alumni need not fear that the value of their physics education will ever diminish.

Making News That Matters gives a glimpse of people, programs and initiatives being noticed in many places, such as our Bridge Program, now a model for the nation.

Outreach continues to be a top priority as we explore new ways to provide meaningful outreach activities, particularly for women and under-represented minorities. A great example is Professor Amy Connolly building on the success of (GRASP), our day-camp for middle-school girls, to offer programming for high-school girls, aptly named ASPIRE.

And, we've jumped into the social media pool: posting daily to Facebook, Twitter and Instagram. Stay connected. Follow us on one or all; link to our LinkedIn page and become a valuable resource for our students and fellow alumni.

Finally, stop by the PRB when you're in the area. See first-hand how Ohio State physics is making a difference — everywhere.

Jim Beatty
Professor/Chair

FACULTY SUPERSTARS



2015 DISTINGUISHED UNIVERSITY PROFESSOR: ULRICH HEINZ, PROFESSOR OF PHYSICS

The title of Distinguished University Professor (DUP), a permanent designation conferred by the Board of Trustees, is the highest honor Ohio State bestows on a senior

faculty member. To date, only 53 faculty members across the university have received this honor, which includes automatic membership in the President's and Provost's Advisory Committee and a one-time cash award of \$30,000 for scholarly work. Heinz, a leading world-figure in the theory of relativistic heavy ion collisions, has played a major role in the field's evolution since its inception in the 1980s. Colleagues say, "He has had a huge impact on discovering and understanding the quark gluon plasma — a novel state of matter formed when nuclei are heated to trillions of degrees in a collider. With his students and postdocs, he developed key theoretical tools to define this matter and his approach is definitive, world-wide." Heinz, at CERN from 1998-2000, served on the original LHC planning/advisory committee. The author or coauthor of more than 270 publications, he is one of the world's most highly-cited nuclear theorists. He received the University Distinguished Scholar Award in 2007.



2015 AMERICAN ACADEMY OF ARTS AND SCIENCES FELLOW: TIN-LUN (JASON) HO, DISTINGUISHED PROFESSOR OF MATHEMATICAL AND PHYSICAL SCIENCES AND PROFESSOR OF PHYSICS

joins an elite group of some of the world's most accomplished scholars,

scientists, writers, and artists; and civic, business and philanthropic leaders. Internationally recognized for work in the areas of Condensed Matter Theory and Ultra-cold Quantum Gases, Ho has received several top awards and honors for that work. He was one of only 27 researchers nationwide to receive the Simon Foundation's inaugural Simons Fellowships in Theoretical Physics in 2012, which allowed him to focus solely on research for a full year.



2015 SIMONS FOUNDATION FELLOW: NANDINI TRIVEDI, PROFESSOR, PHYSICS, was

named one of only 14 Simons Fellows nationwide to receive research support in 2015. Trivedi studies effects of strong interactions in condensed matter systems and ultracold atoms in optical lattices. She

co-leads one of three powerful Interdisciplinary Research Groups at the Center for Emergent Materials, Spin-Orbit Coupling in Correlated Materials: Novel Phases and Phenomena, a group with a proven record of successful collaboration that has established fundamentals for understanding and prediction in this area. They aim to design a new class of tailored quantum materials with tunable magnetic and electric properties impacting technology and society.

AWARD-WINNING FACULTY:
Continuing to win top awards and honors in all categories — a few of the most recent:



2014 HELEN B. WARNER PRIZE: CHRISTOPHER HIRATA, PROFESSOR OF ASTRONOMY AND PHYSICS, received the American Astronomical Society's premier award for young astronomers who are rising stars in the field of observational or theoretical research. The selection committee cited

the "remarkable cosmological studies, particularly his observational and theoretical work on weak gravitational lensing, one of the most important tools for assessing the distribution of mass in the universe. His work on cosmological recombination, structure formation, and dark energy and cosmic acceleration, and the extraordinary depth of understanding he brings to these subjects is facilitating the next generation of important cosmological experiments."

FEARLESS, VISIONARY, COLLABORATIVE PROBLEM-SOLVING

... THE FOCUS IS ON ADVENTUROUS,
FOUNDATIONAL RESEARCH THAT ENABLES
FAR-REACHING TECHNOLOGIES.



The Center for Emergent Materials (CEM), an NSF MRSEC, (Materials Research Science Engineering Center) led by **P. Christopher Hammel**, Ohio Eminent Scholar and physics professor, is the preeminent hub of collaborative materials research on the Ohio State campus — one of just a handful throughout the country — funded to do high-risk, high-impact research. In December 2014, it received a six-year \$17.9 million NSF grant renewal to fund long-term studies of forward-looking new materials.

Hammel said, “This is not about short-term funding with clearly-defined achievable goals. Rather, the focus is on adventurous, foundational research that enables far-reaching technologies.

“These NSF Flagship institutions form a national network of top materials research programs capable of performing complex and ambitious multi-disciplinary sciences at such top research institutions as Princeton, Harvard, MIT, Ohio State.

“The driving idea behind the MRSEC program is to identify and fund collaborative materials research by teams of researchers from multiple disciplines with the ability to address difficult, fundamental problems in science and engineering.

“The main challenge is to enhance technology and improve energy efficiency through discovery of new materials and novel phases of matter.”

The NSF grant renewal funds three powerful Interdisciplinary Research Groups led by Ohio State researchers with diverse experts around the country poised to make breakthrough discoveries, in:

- *Spin-Orbit Coupling in Correlated Materials: Novel Phases and Phenomena*, co-led by physicist Nandini Trivedi and chemist Patrick Woodward.
- *Control of 2D and 1D Electronic Structure by Surface Functionalization of Group-IV Graphane Analogues*, co-led by chemist Joshua Goldberger and physicist Roland Kawakami.
- *Nonlinear Interactions between Spin Flux and Engineered Magnetic Textures*, co-led by Jos Heremans, mechanical/aerospace engineering and physics; and physicist Fengyuan Yang.

CEM also works to increase quantity, quality and diversity of scientists and engineers prepared to lead research, development and commercialization in materials-related fields.

LEARN MORE: cem.osu.edu

A world with increasingly complex problems demands extraordinarily nimble, creative, collaborative, visionary problem-solvers.

The interdisciplinary, concerted approaches Ohio State physicists are taking tackle difficult problems head-on.

In this issue, we offer evidence of our leadership in finding viable answers through partnerships with colleagues on campus, across the nation, in Ohio, around the world. Here, are three such concentrations of extraordinary expertise.

CCAPP (Center for Cosmology and AstroParticle Physics), led by **John Beacom**, professor, physics and astronomy, is a dynamic collaboration between two of the country's leading physics and astronomy departments, focused on research, mentoring and outreach, supported in part by more than \$5million in endowments.

The heart of audacious astrophysics inquiry, CCAPP faculty take internationally visible roles in the quest to answer profound questions about the universe and its amazing contents — dark matter holding galaxies together, dark energy accelerating them apart, high-energy sources in those galaxies and more.

It is a training ground fostering innovative, independent research by the nation's most promising young postdocs and students: Ohio State is a leading producer of students awarded top postdoctoral fellowships, such as

the Hubble; in 2014 alone, 12 CCAPP alumni were hired into permanent-track academic positions.

CCAPP is a leader in communicating exciting results and their importance to the public: hosting public lectures; interacting with Ohio State's Planetarium, STEAM Factory, COSI and more; and mastering social media.

Beacom said, "CCAPP works scientifically because our great people co-operate to attack problems that are big, broad and novel. We take the same approach we use for research and apply it to training the next generation of scientists and to sharing our results with the public. Our students and postdocs are in demand around the world for skills in both cutting-edge research and in science communication.

"CCAPP's successes include recent hires in the astrophysics group in physics: Professor Chris Hirata, Ohio State's only Simons Foundation Investigator; Associate Professor Amy Connolly, an NSF CAREER awardee; and Assistant Professor Annika Peter, who just attracted a fully-paid NASA Einstein Postdoctoral Fellow, Tim Linden, to Ohio State.

"Together with faculty in high-energy physics and in astronomy, CCAPP continues to build world-leading groups working on dark matter, dark energy, high-energy astrophysics, supernovae and more."

LEARN MORE: ccapp.osu.edu

... OUR GREAT PEOPLE
COOPERATE TO ATTACK
PROBLEMS THAT ARE BIG,
BROAD AND NOVEL.



FEARLESS, VISIONARY, COLLABORATIVE PROBLEM-SOLVING

continued



COMBINING DIFFERENT
PEOPLE'S SKILLS TO SOLVE
A SCIENTIFIC QUESTION IS
INHERENTLY EXCITING...

... THE IMPACT IS NOT ADDITIVE
— IT IS MULTIPLICATIVE.

The Biophysics Group: A dynamic group of biophysicists using the tools of physics to address fundamentally important biological problems:

- Professor **Ralf Bundschuh** applies statistical physics methods to solve problems of biological relevance; develops quantitative computable models
- Professor **Ciriyam Jayaprakash** models the innate immune response to pathogens and ecological systems.
- Assistant Professor **Comert Kural** studies live cells in their native environment using advanced live-cell imaging techniques to analyze intracellular events in real-time
- Associate Professor **Michael Poirier** investigates the molecular and biophysical properties of the human genome with single molecule methodologies.
- Professor **R. Sooryakumar** exploits designed micro-magnetic fields to probe living cells, organisms and biomolecules.
- Robert Smith Professor **Dongping Zhong** examines the relation of dynamics and structures to functions of fundamental biological systems with state-of-the-art femtosecond lasers and molecular biology techniques

Biophysics is a model of interdisciplinary, collaborative efforts, cutting across departments and colleges at Ohio State, in the community, nationally and internationally.

Poirier said, “Our collaborations involve physicists, medical doctors, chemists and biochemists, molecular geneticists, pharmacists—one of my collaborators is a mechanical/aerospace engineer.

“Although the field is vast in scope, the underlying theme is to use physical principles to develop and apply new techniques to provide important, new biological insight.

“Here, we focus on medically-relevant research, which while not always immediately applicable, is fundamentally important.

“Developing and applying quantitative science in living organisms is where the field is going, which is extremely challenging.

“For example, Comert studies the import of molecules into cells within living fruit flies. He even set up a fly room—actually, this may be one of the very few physics departments in the country with a fly room!

“Combining different people’s skills to solve a scientific question is inherently exciting. You have to learn both language and culture of different fields, read the seminal papers—in genetics, for example—because you need to understand context. But once you are willing to work outside your comfort zone, the impact is not additive—it is multiplicative. You can do things you could never do on your own. And, the payoffs are incredibly worth it.”

NEW FACULTY

Two outstanding additions to our faculty bring the high-levels of energy, enthusiasm, expertise and passion for discovery and collaboration that our department embraces and supports. They share what drew them to Ohio State physics, their research goals, and life beyond physics.



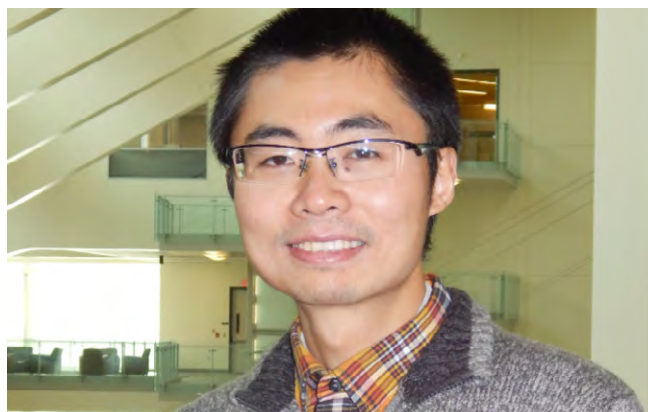
DANIEL GAUTHIER

Professor of Physics

PhD: University of Rochester

Previous Position:

Robert C. Richardson Professor of Physics and Professor of Electrical and Computer Engineering, Duke University.



YUAN-MING LU

Assistant Professor of Physics

PhD: Boston College

Previous Position:

Postdoctoral Fellow, Lawrence Berkeley National Laboratory

Research: Gauthier studies fundamental properties of quantum mechanics enabling new methods for transmitting and processing information with potential to outperform standard approaches. He also studies complex systems, such as network behavior, that may overlap faculty interests in mathematics and electrical engineering. He's interested in the dynamics (time-dependent behavior) of networks — abstractions of biological or human-made system of nodes that process and transmit incoming information to other nodes via links: the power grid, the brain's neuronal networks, social networks.

Why Ohio? *The physics department's excellent research facilities; large, diverse group of outstanding faculty and students, and climate that fosters a free exchange of ideas will enhance opportunities to expand my research program. The size and scope of faculty expertise at Ohio State offer many possibilities for collaborations, in my current research and beyond. Also, I look forward to teaching at a public university.*

Life beyond physics? *I've been a tinkerer all of my life. I grew up in a small New Hampshire town, and learned how to use lasers in high school when a teacher received laser parts; we did experiments, including 3D images via holograms. It was very cool to be working with such recently-invented gizmos. I enjoy cooking, puttering around our house, making beer when there's time and rock climbing.*

Research: Lu studies properties of solid state materials using quantum mechanics and statistical physics to better understand how electrons organize themselves in complicated material, which may predict new materials with interesting behaviors and functionalities. He is looking at a class of novel materials with exotic "topological" properties — sharp experimental signatures that can withstand perturbations and are independent of material complications. Recently discovered topological insulators hosting robust metallic-surface states despite an insulating bulk may be important in spintronics and quantum information.

I hope to make our department and Ohio State an even better place by my research, teaching, mentoring and outreach activities.

Why Ohio? *Ohio State is a great school with a great physics department. I had a really amazing first impression of our department during my job interview, in spite of the freezing weather in January 2014. All colleagues in our department are super warm. I felt at home. How could I resist a department that makes you feel at home, and a football team that consistently wins championships?*

Life beyond physics: *I'm originally from Chengdu, Sichuan province in southwestern China — the hometown of giant pandas and Sichuan food famous for how spicy and delicious it is, and quite popular in the United States. I first got interested in physics during primary school, doing string telephone experiments. I like music, movies, reading and sports — especially soccer.*

MAKING NEWS THAT MATTERS

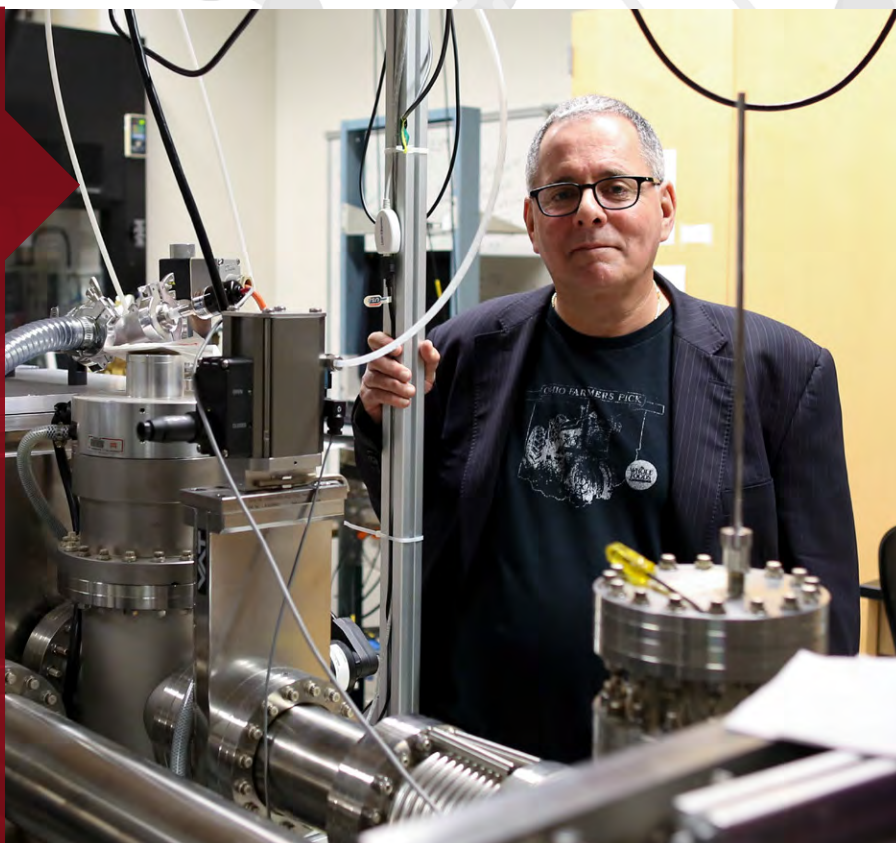
In research, teaching, outreach and engagement, we are innovators, leaders, explorers, collaborators; we are changing the landscape on all fronts.

Adventurous, foundational, collaborative research

In December 2014, the Center for Emergent Materials (CEM), an NSF-funded MRSEC, NSF, received a highly competitive six-year, \$17.9 million NSF grant renewal. U.S. Senator from Ohio, Sherrod Brown, gave it a shout-out in his newsletter, saying, in part “(CEM) is a prime example of how collaborative partnerships can bolster manufacturing.” go.osu.edu/sherrod-brown-cem

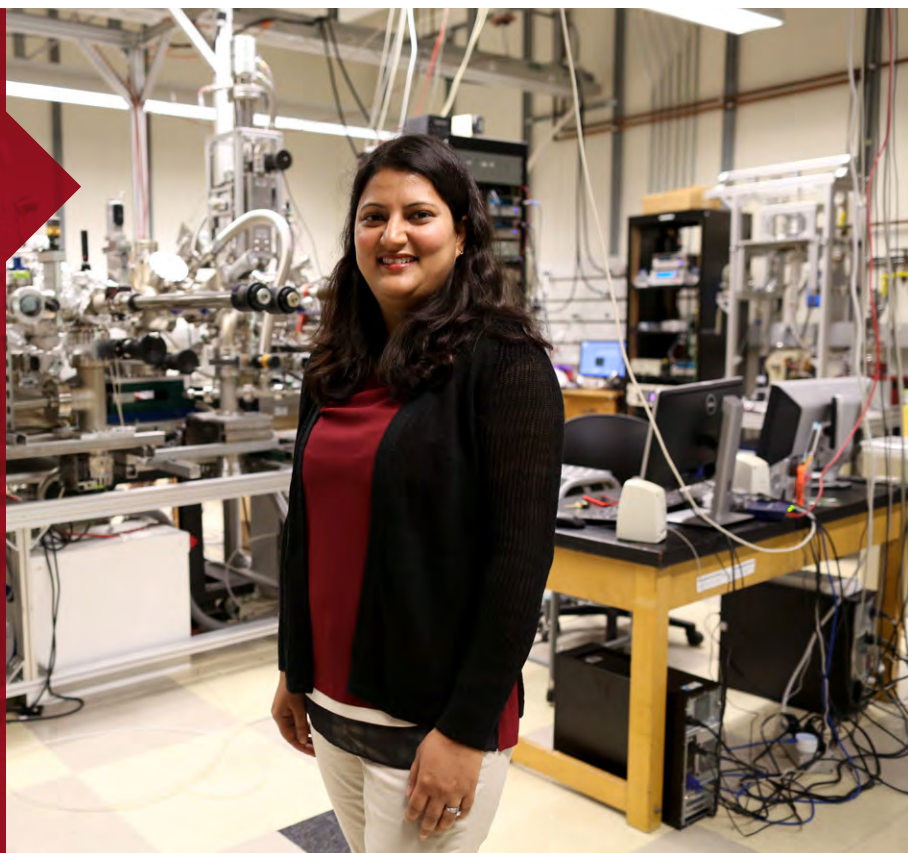
More about CEM on page 6

Physics Professor **Louis DiMauro's** five-year, \$12.5M Department of Defense Multidisciplinary University Research Initiative (MURI) grant funds his leadership of a research team from six institutions to study interactions of intense, ultrafast mid-infrared radiation with matter, work with enormous potential in many areas of science, technology, medicine and national security. Ohio State collaborators include Professor **Pierre Agostini**, Dr. **Cosmin Blaga**, and Dr. **Enam Chowdhury**, and researchers at U.S. universities — Texas-Austin; Arizona; Central Florida; Louisiana State — and the U.K.'s Imperial College, London.



Creating a Welcoming Climate for Women...

Physics postdoctoral researcher **Jyoti Katoch** documents the specific ways Ohio State's Department of Physics has been working to create a welcoming, supportive atmosphere to build the numbers of women in physics at all levels in an article recently published by the American Physical Society (APS) online. Katoch, chose Ohio State's physics department in part because of the "friendly to women and under-represented minorities' atmosphere."



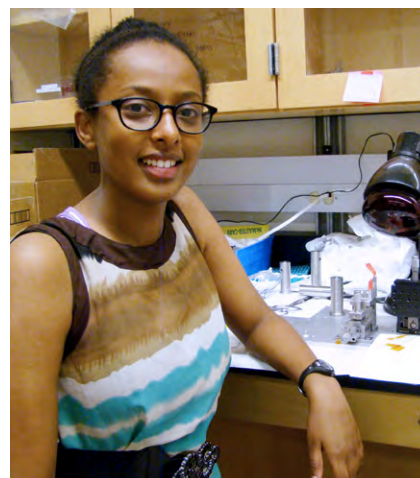
...and for underrepresented minorities: Physics Bridge Program Considered National Model

- In 2013, Ohio State successfully competed with 42 institutions around the country to become a formal Bridge Program Site, one of the first established by the American Physical Society (APS)

"We are specifically calling out Ohio State in our national conversations, as an example of how a top-tiered physics graduate program at a research intensive public institution has combined its passion for cutting-edge research and a commitment to serving all students from all backgrounds."

— Ted Hodapp, APS Bridge Program director

The Bridge Program benefits from ongoing whole-department, whole-institutional support and deep, unswerving commitment by faculty, staff and students to address major equity gaps.



We are always making news. Connect with us and find out more.



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instagram.com/osuphysics/

UNDERGRAD STUDENT AWARDS



CHURCHILL SCHOLAR

Jonathan Timcheck: Winner of 2013 Goldwater Award; named 2015 Churchill Scholar

Timcheck, who graduated in engineering physics in May 2015, **conducted high energy physics research with Physics Professors Richard Hughes and Brian Winer.**

Also a 2013 Goldwater Scholar, Timcheck is working on a master's degree in applied math at the University of Cambridge, UK; then will begin a physics PhD program in the United States.

The Churchill Foundation awards 14 scholarships annually to support one year's graduate study for exceptional graduating seniors or recent graduates in the sciences, engineering or mathematics. Candidates selected are high achievers in academic work and GRE scores, conducted significant research and demonstrated leadership and concern for society's critical problems.

Timcheck plans to teach and do research at a major university.

He is only the fourth Ohio State student named a Churchill Scholar. Physics major Tyler Merz, named 2010-11 Churchill Scholar; also was a Goldwater Scholar in 2010.



GOLDWATER SCHOLAR

2015 Goldwater Award Winner Lucas Beaufore, a junior honors student in engineering physics, does instrument verification research with Ohio State participants in the Dark Energy Survey (DES), an international collaboration supported by the U.S. Department of Energy and the National Science Foundation. **Physics Professor Klaus Honscheid is his advisor.**

Last summer, Beaufore helped develop a laser system at the Ultrafast Nanophotonics Group at Ludwig-Maximilians-Universität München in Munich, Germany, through the DAAD's RISE program (Research Internships in Science and Engineering).

A multi-award winner, Beaufore received a Physics Summer Research Scholarship; Physics' Smith Sophomore Award, Physics' Helen Cowan Book Award and won first place at the 2014 Denman Undergraduate Research Forum.

A member of the Honors Collegium, Beaufore is active in the Society of Physics Students, the Engineering Council and FIRST Robotics Mentoring.

His plans include work toward a PhD in applied physics followed by a research career in government or the private sector developing technology and instrumentation for space exploration.

UNDERGRADUATE PHYSICS STUDENTS RANK
AMONG NATION'S HIGHEST ACHIEVERS

HONORING THE LEGACY OF

STEVE PRICE

(MARCH 3, 1949 - NOVEMBER 26, 2014)

In 2009, Price and wife, Jill Levy, endowed the Dr. Pliny A. and Margaret H. Price Prize in honor of Steve's parents. The Price Prize allows CCAPP to bring the world's most promising graduate students in astrophysics to Ohio State for a week, not just to present a seminar, but create long-term collaborative relationships. In 2014, Steve and Jill were proud to reach a milestone, a \$250,000 contribution to the Price Prize endowment. There are now twelve alumni of this program. (The first two are professors at Harvard and the University of Toronto.) Nothing comparable exists at other institutions, making CCAPP an international destination for outstanding young astrophysicists.

In February, 2011, Price and Levy provided extensive funding to renovate The Price Place. Designed as a gathering spot for CCAPP postdocs, students and visitors, it includes a large blackboard and state-of-the-art electronics display and is a hub of CCAPP activities.

John Beacom, professor of physics and of astronomy and director, CCAPP, reflects on Price's impact on the Center for Cosmology and AstroParticle Physics.

We greatly miss Steve's frequent and important presence at CCAPP. It is difficult to adequately express the enormous part he played in the life of our departments and the Center for Cosmology and AstroParticle Physics (CCAPP). Steve helped us grow the culture, success and recognition of CCAPP, and that is an enduring legacy.

One of the last times I saw Steve, he and a few others were in the Price Place, giving a student feedback on his upcoming conference talk. I don't think anything better illustrates the way his personal, passionate involvement made a difference to CCAPP's success in mentoring young people and public outreach initiatives. He had such joy in sharing the beauty he saw in astrophysics and an incredible excitement at seeing young people grow their careers.

At Steve's Celebration of Life last December, I was struck by how many people mentioned they were curious about his fascination with the cosmos.

This past winter, I was preparing a public lecture on what we do in physics and astronomy, why we do it, and what it means. I thought of Steve often as I worked, and tried to create a talk that would have entertained his curiosities and be accessible to others like him.

The video on YouTube (go.osu.edu/beacom-TEDx) is my tribute to Steve, and to Jill, who remains involved with our work at CCAPP. I hope it sheds some light on what drew him to these subjects.

View annotated photos of Steve Price on CCAPP's Facebook page (facebook.com/osuccapp)



ALUMNI SPOTLIGHT

REAR ADMIRAL FRANK W. LACROIX

AN ALUMNUS SHARES HIS THOUGHTS ON PHYSICS AT OHIO STATE

Over time, I have shared with many colleagues and professionals that the best “life decision” I ever made was to study engineering physics/physics at Ohio State. I can’t remember a day of my professional life when Ohio State’s physics department’s contribution didn’t loom large.

I arrived at Ohio State after graduation from a small all-male eastern prep school in a graduating class of 55. I had selected The Ohio State University over M.I.T., Worcester Polytech and other schools nearby because of the vast research infrastructure at the time and the obvious energy level and excitement of both the science and engineering faculty and students.

Once I began my studies, I realized that everyday Ohio State presented me with gifts beyond the classroom. Some stand out:

- The first was the opportunity to work in the then ground-breaking research as a young university freshman laboratory assistant helping to interpret CERN elementary particle collision tracks as Ohio State became involved in the early phases of the Standard Model development. As a freshman, the university lit a fire and zeal for scientific discovery that never dimmed.
- The second was the manner in which Ohio State introduced me to a simple but important life-tenet: People should be judged as individuals. Before attending Ohio State, I had never had the opportunity to work with other races, colors or creeds. The university and the physics department in particular were melting pots, which nurtured respect for individuals and an atmosphere of peer respect. These both had a profound and lasting influence on me, which eased my professional transition and development after college.



Photo courtesy of The Ohio State University NROTC Alumni Society

- Next, the science education was superb. On more than one occasion during my professional career when I was faced with significant technical challenges, I paused and reflected, then reached into the memory bank for solutions or approaches provided by a particularly thoughtful and persistent Ohio State professor years before; I was never disappointed.
- Lastly, my fellow physics graduates, classmates and alumni at Ohio State remain among my best friends today.

Read more about Frank Lacroix, Rear Admiral, United States Navy (retired) at physics.osu.edu/Lacroix

Please share **YOUR** memories of your days as an Ohio State physics student with us and your fellow alumni.

Fill out the form on the back cover flap or email palmer.14@osu.edu



What Do You ASPIRE To?

For the past two years, young high-school women starting 10th, 11th or 12th grades have seen that they can aspire to a career in physics.

With Support from her NSF CAREER Award, Associate Professor Amy Connolly initiated the new annual workshop, ASPIRE (Achieving in Science through Physics Instrumentation, Research and Exploration).

Connolly works on ultra-high energy neutrino experiments. Her five-year, \$650,000 NSF CAREER Award helps support her search for high-energy neutrinos, sometimes call “ghost particles.”

The first year’s two-day workshop enrolled 20 young women; this past summer, a four-day workshop attracted 24.

In the PRB, girls get their hands on physics equipment and software used by physicists and learn what it takes to do real physics research.

In 2014, participants worked on two separate radio-themed projects learning to make measurements with oscilloscopes and perform calculations with the Mathematica program. In 2015, they also learned to program an Arduino, a micro-controller; and how to give scientific presentations.

“The girls are very enthusiastic about the experiences they have. And, each year, we are able to provide them with more new, diverse things to tackle,” Connolly said.

Young women apply for the program, held in August. A \$20 participation fee helps offset costs, but, Connolly said, “No one is turned away for lack of funds.”

ASPIRE is a companion effort of GRASP (Girls Reaching to Achieve in Sports and Physics), a five-day summer camp for middle school girls, hosted by Physics’ Undergraduate Studies Office since 2008.

Both are working to increase numbers of women in physics, by showing physics is an accessible path female physicists, such as Connolly, are traveling — happy, respected and successful.

ASPIRE, GRASP and other initiatives are championed by the Department of Physics to boost opportunities for underrepresented minorities in STEM fields.

I think ASPIRE is a great way to explore physics...This workshop really opened up my range of possible career pathways.



The Pulser (Project) was fun! Mathematica was really fun! I liked learning why things happened. Thanks to everyone who answered my questions; I understand what I learned --Oh my, gosh I was so excited for the Arduino. I had wanted one for my birthday...but it (had been out of stock...) It was awesome! I am so grateful to take mine home! Thank you so much! Truly!



Love science. Love science. I LOVE science. Thank you.

WE WOULD LIKE TO HEAR FROM YOU!

Physics alumni are everywhere, in all 50 states and 28 countries around the world. Please take a moment to fill out and return this form so that we can share your stories with fellow alumni wherever they may be, via our website or the next newsletter.

Mail this form to:

Department of Physics
The Ohio State University
Physics Research Building
191 W. Woodruff Ave.
Columbus, OH 43210

Name _____

Address _____

Degree _____

Year of graduation _____

Email _____

Daytime phone _____

Tell us your news (professional and personal):



Mail to: Department of Physics
The Ohio State University
Physics Research Building
191 West Woodruff Avenue
Columbus, Ohio 43210

FOR MORE INFORMATION, CONTACT:

Suzanne Rinker, Senior Director of Development,
Natural and Mathematical Sciences
College of Arts and Sciences
rinker.33@osu.edu; (614) 292-3487

Dear Alumni and Friends,

Please consider a gift or donation to the Department of Physics. Each and every gift makes a tangible difference in the lives of our students and faculty.

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YES, I WANT TO SUPPORT The Department of Physics fund # _____ from the list below through an annual pledge of:

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*presidents club

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Credit card payment

16 digit account number

Master Card Visa Discover

Exp. date _____

Signature _____

My employer will match my gift.

Name of Employer _____

Phone () _____

ASC_MAPS-PhysicsNL-PR-C



Physics Chair's Discretionary Fund

Provides the chair with the flexibility to fund small but urgent academic and research priorities as well as the ability to host important community building events within the department

Fund # **302325**

Physics Outreach Fund

Support community and school outreach for the Department of Physics, including visit, demonstrations and other activities to promote Physics.

Fund # **313441**

Physics Building Fund

Contributions and Expenditures related to the Physics Research Building

Fund # **301915**



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