

Quanta

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A publication for the faculty, staff, students, alumni, emeriti & friends of the
Department of Physics at Virginia Tech

Message from the Chair:



It is a pleasure to sit down near the end of the year and write this message. The only challenging part is that with so many talented, energetic people in the department and so many things going on, it is difficult to keep it to a single page!

A major research highlight of the past year has been the exponential growth in our department's funding and activities in the rapidly growing area of quantum information science (QIS). Quantum information science broadly encompasses the domains where quantum mechanics affects information science, and it includes quantum sensing, communications, and computing. It has become a worldwide priority with both countries and major corporations such as Google, IBM, and Microsoft making major investments. In the United States, one (among many) signs of the importance of this is the National Quantum Initiative Act that just passed Congress and is on its way to the President's desk for signature as I write this. This effort is led here by Associate Professor Sophia Economou and Assistant Professor Ed Barnes. In the past 1.5 years, they have been awarded a total of 14 grants where they are PI or co-PI totaling \$26.5M with a Virginia Tech share of \$7.2M from the National Science Foundation, Department of Energy, Army Research Office, Defense Advanced Research Projects Agency, and the Office of Naval Research. Professor Kyungwha Park is a co-PI on two of these grants. This has led to the rapid growth of a strong group of six postdoctoral fellows and eleven graduate students. We look forward to seeing the exciting results they produce in the coming years, and we anticipate this will be an area of further growth for our department. Read more about the excitement in this issue.

A particularly enjoyable part of my year is our faculty hiring season in early spring. The chair spends significant time with each of the candidates, and I come away from those interactions revitalized due to the enthusiasm and energy of our candidates. There is remarkable talent out there, and I am pleased that we have been able to continue to attract and hire excellent colleagues. Dr. Rana Ashkar, a faculty member from last year's hiring cycle, joined us in January from Oak Ridge National Laboratory. This year's cycle resulted in three new hires. We have two new Collegiate Assistant Professors - Dr. Brenden Magill and Dr. Travis Merritt. In January 2019, Dr. Ian Shoemaker will join us as an Assistant Professor from the University of South Dakota, where he is currently an Assistant Professor. He works on theoretical particle physics and will be a strong addition to our group here with his focus on astroparticle physics. You can read about Rana, Brenden, and Travis in this issue, and we'll have a full story on Ian in next year's newsletter.

Just a few years ago, we tripled the number of freshman physics majors, and that has led to a record number of graduates this past year. We graduated 66 students with Bachelor's degrees in physics this past academic year! With over 400 people in attendance at the May graduation, we had to do it in Squires Colonial Hall this year. Our graduate program continues strong with over 80 students enrolled in Fall 2018. Even with increased numbers, we continue to preserve our supportive "family" atmosphere that I hope many alumni remember fondly. I pass by our undergraduate majors room every day; it is full of students who know they have a welcome home in Robeson.

In staff news, John Miller retired after working for 34 years in our machine shop. He has contributed to many research projects over that time. We will miss him, but we are excited for him as he gets to enjoy his retirement. The College of Science established a new Outstanding Staff Award. Since this was the first year for this award, the competition was stiff. So we were thrilled to learn that one of the recipients was our own Diane Walker-Green, Director of Undergraduate Advising and Enrollment Management. Certainly this comes as no surprise to the legions of students that Diane has helped over the years!

I hope you enjoy this newsletter. Feel free to drop me a line or even better, should you be in Blacksburg come and see me in Robeson Hall. It would be great to catch up and introduce you to new arrivals since you left.

Happy Holidays!

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COLLEGE OF SCIENCE



Lara Anderson, Marc Michel named Luther and Alice Hamlett Junior Faculty Fellows



Lara Anderson, assistant professor of physics, and F. Marc Michel, assistant professor of geosciences, both in the College of Science at Virginia Tech, have been named the Luther and Alice Hamlett Junior Faculty Fellows by the Virginia Tech Board of Visitors.

The Luther and Alice Hamlett Junior Faculty Fellowships were established in the College of Science by the estate of Luther J. and Alice Hamlett. It was the intention of Luther Hamlett — who earned his bachelor's degree in biology from Virginia Tech in 1945, and was a strong supporter of the Academy of Integrated Science — to

direct his gift to faculty and students associated with these new and innovative scientific programs. Alice passed away in 2009, and Luther passed away in 2016.

A recipient of the Luther and Alice Hamlett Junior Faculty Fellowship will hold the title for a period of three years. The award is renewable.

“Dr. Hamlett and his wife, Alice, are among the most generous supporters our college has ever had,” said Sally C. Morton, dean of the College of Science. “Their love of learning, and of Virginia Tech, inspires all who knew them.”

The Hamlett estate also established the Luther and Alice Hamlett Scholarships in the Academy of Integrated Science. These endowed scholarships are helping fund more than two dozen students enrolled in the programs of the Academy, which include Nanoscience, Systems Biology, Computation Modeling and Data Analytics, the Integrated Science Curriculum, as well as the minor of Science, Technology, and Law.

Anderson joined Virginia Tech's Department of Physics in 2013 as an assistant professor. She also holds an affiliate position with the Department of Mathematics and is an affiliated member of the Integrated Science Curriculum, helping develop the two-year program in cross-disciplinary science fundamentals within the Academy of Integrated Science.

She has held visiting positions or fellowships with the Kavli Institute for Theoretical Physics, the Isaac Newton Institute for Mathematical Sciences, and the Simons Center for Geometry and Physics. Her research productivity has been recognized with numerous National Science Foundation awards, including a current \$600,000 project on String Compactifications: From Geometry to Effective Field Theory.

Anderson has earned the reputation as an outstanding teacher, including a Favorite Faculty award from Virginia Tech's Division of Student Affairs. She has mentored four undergraduate research projects related to mathematical aspects of her work in string theory. Since joining Virginia Tech she has taken part in numerous efforts to increase the numbers of women and other underrepresented groups in the sciences, including co-organizing the American Physical Society's Conference for Undergraduate Women in Physics in January 2017.

Anderson has published more than 38 scholarly papers and has delivered over 50 invited conference talks and 70 invited seminars and colloquia. She has organized or co-organized 11 professional meetings.

Michel joined the Department of Geosciences in 2012. He also is a member of the Academy of Integrated Science, serving in its Nanoscience program. He teaches Nanoscience and Environment, Mineralogy, and Advanced Topics in Mineralogy, and has guided 16 undergraduate students on research projects in his first five years at Virginia Tech. He has written more than 40 publications in nanoscience and geoscience journals, six book chapters, and has given more than 25 invited or keynote presentations at professional conferences.

He recently received a \$560,000 National Science Foundation CAREER Award, with the goal of advancing innovative research on how the smallest minerals, known as nanoparticles, crystallize from their originating solution. He also is co-principal investigator on a \$2.5 million NSF award to establish the Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure known as NanoEarth.

Michel also is principal investigator to another NSF-funded project on “Mineral Formation by Cluster Self-Assembly: Schwertmannite as a Partially Crystallized Nanomineral” and is a co-principal investigator on the continuing project, Center for Environmental Implications of Nanotechnology, a multi-university collaborative funded by NSF and the Environmental Protection Agency in excess of \$24 million.

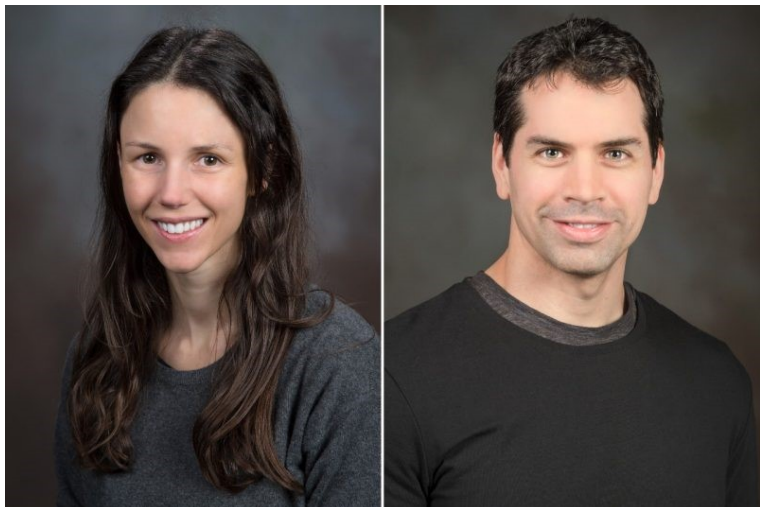


Luther and Alice Hamlett in an undated photo.
Image courtesy of family.

Written by Steven Mackay

VT News January 3, 2018

Physics researchers bring in federal funding to boost quantum science and technology research



Researchers in the Department of Physics are building a major program in quantum information sciences thanks in part to multiple federal grants that have brought \$3.7 million directly to Virginia Tech. Among the most recent federal agency grants is a \$460,000 grant from the U.S. Office of Naval Research with the goal of developing techniques to control physical quantum systems, such as atoms, circuits, and molecules. This builds on other funds from the National Science Foundation (NSF), the U.S. Army Research Office, and the U.S. Department of Energy. Leading the research projects are Sophia Economou, an associate professor, and Edwin Barnes, an assistant professor, both from the Department of Physics, part of the Virginia Tech College of Science. Their research spans a range

of quantum information science and emerging quantum technologies, including computing, communication, and simulation, and involves fellow faculty at Virginia Tech, along with graduate, undergraduate, and postdoctoral researchers. "Quantum science and technology could have far-reaching impact in science, technology, communications, and computing," Barnes said. "For example, future powerful quantum computers will be able to solve certain types of problems that are beyond the reach of existing supercomputers, which will have uses in the fields of chemistry and medicine, machine learning, and cryptography." Competition to make quantum computing a reality is fierce among such nations as the United States, Japan, China, Germany, and England, and companies, including IBM, Intel, and Google. "Research geared toward the understanding, design, and control of physical systems that will be used as quantum bits is crucial," said Mark Pitt, head of the Department of Physics. "Professors Economou and Barnes have developed a research program that includes the investigation of various quantum technologies." Systems under investigation by Economou and Barnes for quantum computing range from well-established candidates, such as superconducting circuits developed by IBM and Google; to spin quantum bits in silicon, an approach taken by Intel; to more exploratory systems, such as single-molecule magnets. A \$1.8 million Department of Energy-funded grant on molecular magnet quantum bits is led by Barnes as the primary investigator, with support work from Economou, Assistant Professor Nick Mayhall of the Department of Chemistry, and Associate Professor Kyungwha Park of Physics. Meanwhile, a multi-university NSF grant worth \$2 million headed by Economou partnering with researchers from multiple universities focuses on the distribution of exotic highly correlated, or entangled, photon states. The \$3.7 million coming to Virginia Tech is only a portion of the funds from projects led by Economou and Barnes. In all, \$6.5 million is going to Virginia Tech and its research partners at the University of Minnesota, University of Pittsburgh, and University of Washington, among others. Quantum information science is highly interdisciplinary, Economou said. Theoretical chemists hope to use quantum processors to solve complex problems involving strongly correlated molecules, such as those relevant for laboratory tests and photosynthesis. Computer scientists are working on algorithms tailored specifically to quantum computers. Engineers are crucial in developing quantum-computing devices and networks. Lastly, materials scientists are needed to develop pristine materials that can abide the fragility of quantum computers to their environment. This past fall, Economou and Barnes led the NSF-funded workshop Quantum Leap: Workshop on Quantum Elements of Secure Communication, focusing on convergent research in quantum information, which scientists say could provide communications a revolutionary boost in security and privacy. The workshop was part of a larger effort, called Growing Convergent Research, that addresses five of the federal agency's 10 Big Ideas for Future NSF Investments. They also are leading one of the NSF's Emerging Frontiers in Research and Innovation programs. "It is exciting to design quantum control techniques that our experimental collaborators go on to demonstrate in the lab," Economou said. "We not only get to see our theoretical predictions come to life, but also know that they could have an impact on groundbreaking future technologies."

Written by Steven Mackay

VT News June 13, 2018

Welcome Our New Faculty Members



Rana Ashkar has been named as an assistant professor in the Department of Physics, part of the Virginia Tech College of Science. With her research area focusing on experimental soft condensed matter physics and biophysics, Ashkar is the first faculty hire for the department in the area of Economic and Sustainable Materials, one of the strategic growth areas for Virginia Tech and identified as an area of institutional excellence by the Provost's Office. She also is an affiliate member of the Center for Soft Matter and Biological Physics and the Macromolecules Innovation Institute. Before joining Virginia Tech, Ashkar was a Clifford G. Shull Fellow at Oak Ridge National Laboratory in Oak Ridge, Tennessee, where she was developing a new plat-

form for exploring the effect of local curvature in biomimetic lipid membranes using nano-patterned thermo-responsive polymer scaffolds. Prior to that, she held a joint postdoctoral position at the National Institute of Standards and Technology, part of the U.S. Department of Commerce, and the University of Maryland at College Park. During her postdoctoral scholarship, her research was focused on understanding collective nanoscale dynamics in polymer nanocomposites and biomembranes, which are critical to the technology and biopharmaceuticals industry. An expert in neutron scattering, Ashkar will continue to use the unique properties of neutrons to explore the nanoscale structure and dynamics of soft materials, including polymeric systems and biomimetic lipid membranes. By combining nanoscale information with macroscopic material properties, she will explore how molecular arrangements and motions can be used to tailor materials with well-defined performance. Mapping out structural and dynamical hierarchy from molecular to macroscopic scales is key to understanding the physics of soft matter and designing novel functional materials, Ashkar said. Ashkar earned a bachelor's degree from the Lebanese University in 2003, a master's degree from the American University of Beirut in 2007, and her Ph.D. from Indiana University in 2012, all in Physics.

Written by Steven Mackay

VT News March 5, 2018



Brenden Magill was appointed as a Collegiate Assistant Professor in Fall 2018 with a primary focus of his activities on the Nanoscience degree program. Brenden got his B.S. in physics from San Diego State University in 2003 and followed that with a M.S. (2005) and Ph.D. (2013) in physics from Florida State University. After that he worked at Virginia Tech in collaboration with Professors Khodaparast and Robinson as a postdoctoral fellow from 2013 – 2016 and as a Research Scientist from 2016 – 2018. His research interests are in the area of experimental condensed matter physics with a particular focus on time resolved spectroscopy of a variety of

novel materials.



Travis Merritt was appointed as a Collegiate Assistant Professor in Fall 2018 with a primary focus of his activities on both the lecture and laboratory components of our introductory physics programs. Travis got his B.S. (2005) and Ph.D. (2013) in physics from Virginia Tech. His Ph.D. research work was experimental condensed matter physics work with Professor Khodaparast. Since 2014 he has been an instructor in introductory physics courses and coordinator of all the introductory physics laboratories at Virginia Tech.

Department News

Alma Robinson receives Alumni Award for Excellence in Teaching



Alma Robinson, an instructor in the Department of Physics in the College of Science, has received the university's 2018 Alumni Teaching Award for Teaching Excellence.

Sponsored by the Virginia Tech Alumni Association, the Alumni Award for Excellence in Teaching is presented annually to as many as two Virginia Tech faculty members. Recipients receive a \$2,000 cash prize and are inducted into the Academy of Teaching Excellence.

Robinson began her teaching career at a high school in Northern Virginia. After a few weeks in the classroom, she learned that the deepest rewards in teaching go beyond the subject matter and, instead, come from building relationships with students and empowering them.

She came to Virginia Tech to help recruit and train the next generation of high school physics teachers. She wants to provide physics majors with positive undergraduate teaching opportunities and encourage them to inspire young people by becoming physics teachers.

During each class, she probes her students with conceptual questions and uses a think-pair-share/peer instruction model. The model asks them to elicit their prior knowledge and grapple with their preconceptions, articulate their thoughts to a classmate, and reconcile opposing perspectives by appealing to their personal experience, reason, and the laws of physics.

"Her drive and desire to teach to the best of her ability was clear in every choice she made. As my friend and I progressed through our college career, she encouraged and guided us in our desired respective career fields. She gave us both connections to further our careers, research for myself and an internship for my friend, and continued to support us with her guidance," wrote Ashley Adkins, a former student, in a letter of nomination.

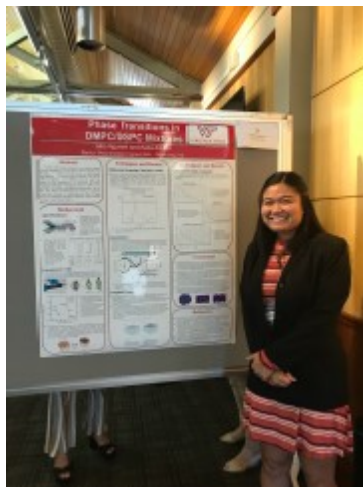
In 2015, the Virginia Tech Center for Instructional Development and Educational Research awarded her "Teacher of the Week." In 2018, Robinson received the Certificate of Teaching Excellence from the College of Science.

Written by Lindsey Grooms
Class of 2019

VT News April 25 2018

Student News

Sophomore Julie Nguyen wins best poster award at WoPhys'18



Sophomore physics major **Julie Nguyen** won a best poster award at the recent 10th Annual Conference for Undergraduate Women in Physical Sciences (WoPhys'18) held at University of Nebraska-Lincoln on Oct. 11 – 13, 2018. The subject of Julie's poster was "Phase Transitions in DMPC/DSPC Mixtures", and it was based on work she did in Professor Rana Ashkar's newly established biophysics laboratory during Summer 2018.



Applause, Applause!

Congratulations to our **Society of Physics Students** chapter (advisor **Alma Robinson** and 2017-18 **President Erika Birnbaum**) for being named an Outstanding SPS Chapter for 2017 – 18.

Monty Campbell, a sophomore in physics, was featured in the December 2, 2018 Collegiate Times for his musical talents.

Virginia Tech alumnus **Chris Martin** won the local PhysTEC teacher of the year award.

Graduate student **Shadisadat Esmaeili** was selected as an Associate of the Academy for Graduate Teaching Assistant Excellence, in recognition of her strong commitment to excellence in teaching and creating affirming learning opportunities in higher education.

Awards Day



On Friday, April 13, 2018, the department held its annual awards day luncheon. Awards and scholarships were presented to forty-nine students in honor of their academic excellence in undergraduate and graduate studies.

Keynote speaker **James Thomas ("Gantt") Ward** (class of 2013) spoke of his time as an undergraduate student at Virginia Tech and how that influenced his career as a Radiological Physics Consultants Inc.

Students meld creativity and innovation in the University Libraries Fusion Studio



Fourth year physics student Erod Baybay is passionate about cycling and wants to make a difference for his fellow Hokies. As a member of Virginia Tech's chapter of Design for America, he saw an opportunity to use his talents to create an initiative that fuses those interests.

Design for America is a national network of students that employ a human-centered design process to create social change. Last year, Baybay and fellow Design for America members Justin Redman, Josh Stutton, and Dalton Philips created Bikesburg, an initiative to promote bicycling as an alternative mode of transportation. "We thought this could potentially apply to all students on campus and we could make an impact," said Baybay. The Bikesburg team of undergraduate

physics, engineering, and urban studies majors meet weekly in the University Libraries Fusion Studio to research, create, and innovate with the goal of increasing the safety and popularity of bicycling as a way for students to commute to class and across town.

"In the beginning, we conducted research and gathered information about cycling at Virginia Tech and in the Town of Blacksburg," said Baybay. "We cooperated with Blacksburg and the Office of Alternative Transportation on campus to create a 15-year bicycle plan." As a part of Bikesburg, the group created and distributed informational materials to raise awareness of cycling resources on campus and helped promote the roam NRV bikeshare program. Throughout the students' work, Sara Sweeney Bear, Fusion Studio Manager, has been their mentor and advocate. "She has helped us refine how we present ourselves and reach out to the community. She has created an atmosphere for us to collaborate better," said Baybay. "Most of the student groups in this space are working on projects that are not a part of a class," said Bear. "They take something they're interested in and good at and create something new to make a difference. All of the groups are so creative and take different approaches to problem solving." The Fusion Studio enables students to take risks and build resilience to move forward and not give up. Currently, there are six groups using the Fusion Studio located on the second floor of Newman Library. The projects vary widely including the development of a portable electric keyboard, the invention of a new sensor to read the core temperature of objects, a tool to help combat panic attacks, and a video program that documents students' travel abroad experiences for inclusion in their ePortfolios. "I know that the groups are helping each other ideate because they help me. They are interested in what I do and give me feedback on the services we provide in the studio," said Bear. "The space itself is a prototype and is always changing. There's not really anything like this." Bear's research centers on the role of play in adult learning. "So often if you can integrate play into work, you can get a lot more out of both. Play gives permission to take risks. Through this environment and the technology and creative resources that fill this space, students are able to freely brainstorm, create, and innovate."

Student groups apply to work in the Fusion Studio, and if accepted could receive funding from the University Libraries based on their project needs. Baybay's group, now in its second year in the studio, is also working with the University Libraries 3D Design Studio. Engineering students in the team created a 3D model in CAD for a universal mold for bike reflectors. They will print the mold using 3D Design Studio printers.

"This is an excellent way to create prototypes quickly. We always ideate and prototype before we move to the final product," said Baybay. "We hope to have the reflectors created by the end of the semester. We will give these reflectors to students so they are safer on the roads."

Written by Ann Brown

VT News November 8, 2018

Welcome our New Research Faculty



Behrouz Khodadadi - is a postdoctoral researcher at Professor Satoru Emori's Spin Magnetic lab at Virginia Tech Department of Physics. He earned his PhD in Experimental Condensed Matter Physics in May 2016 from University of Alabama, Material Science for Information Technology (MINT) center.



Danielle Lucero - My main scientific interests include studies of the cold gas (neutral hydrogen and molecular gas) in nearby spiral and early-type galaxies. I use these studies to test the empirical and physical models of molecule formation in these galaxies. I am also interested in how the HI content of galaxies changes with redshift and am heavily involved in ongoing and upcoming HI surveys which aim to answer this question (Chiles, Apertif, MIGHTEE-HI). I am also heavily involved in the science commissioning of Apertif.



Khadijeh Sona Najafi- PostDoc at Virginia Tech in Edwin Barnes and Sophia Economou group, June 2018 onwards.

PhD, theoretical condensed matter from Georgetown University, Washington D.C, USA.



Priyanka-I am currently working on two projects: I am also investigating the change in the underlying dynamics of surface growth process due to control implementation. Another with graduate student Ruslan Mukhamadiarov, where we are studying driven diffusive Ising systems with regions held at different temperatures



Nikhil Raghuram joined the department in August 2018 and is working with Lara Anderson and James Gray. He studies string theory, focusing in particular on string compactifications and F-theory. He received his PhD in June 2018 from MIT, working under his advisor Washington Taylor.

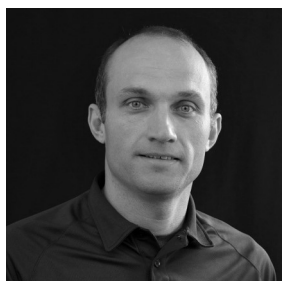


Alex Wysocki - Joined the department in July 2018. He is a research scientist with Prof. Kyungwha Park working on electronic structure and magnetic properties of single-molecule magnets.

Welcome our New Staff



Melissa McPeak Undergraduate Advisor - Joined the department as an undergraduate advisor in January, 2018. She has an MBA with a concentration in Human Resource Management and her background includes customer relations as well as student advising. Her daughter, who is a college senior, keeps her on the go in her spare time. She is pleased to be a part of this department.



Matt Tolbert Lab Instrument Maker - Originally from Floyd, Virginia, I currently reside in Christiansburg with my wife Kelly of 21 years, 18 year old daughter Carson who is a sophomore at Radford University majoring in Elementary Education, and my 15 year old son Haden who is a freshman at Christiansburg High School. My wife and I are youth sponsors at our church and enjoy going on convention and mission trips with the youth we mentor. In my spare time I enjoy camping, running, and family trips to Disney World. After working 12 years at Maco Tool Inc. in Christiansburg, I went to work in the College of Architecture and Urban Studies as a Metal Shop Technician in 2009. There I worked directly with students and faculty on design and studio projects as well as thesis and research projects. I am extremely excited about being apart of the Department of Physics and really enjoy working with students, staff and faculty here.

In Short



Professor Giti Khodaparast was awarded a 2018 International Association of Advanced Materials Medal for her notable and outstanding contribution to the field of Advanced Energy Materials and Technology.

Postdoctoral fellow **Oscar Macias** and Professor **Shunsaku Horiuchi** published in Nature Astronomy in May 2018 on work that reveals that a mysterious source of gamma rays arise from ancient stars.

Professor Bruce Vogelaar and **graduate student Xinjian Ding** were co-authors on a publication about a new measurement of the neutron lifetime at Los Alamos National Lab in the May 6, 2018 edition of Science magazine.

Professor Mark Pitt, current and former students **Juliette Mammei**, **John Leacock**, **Wade Duvall**,

In Short Continued

and **Anna Lee** and former research scientist **Norman Morgan** were co-authors on a publication about a precision measurement of the weak charge of the proton at Jefferson Lab in the May 9, 2018 edition of *Nature* magazine.

The first collisions at the SuperKEKB particle accelerator in Japan were observed by the Belle II detector in April 2018. **Professor Leo Pilonen** and his group an important part of the Belle II collaboration.

Professor Camillo Mariani was part of the observation of a significant excess of neutrino events in the MiniBooNE detector.

Professor Patrick Huber co-authored an article in the July/August 2018 CERN Courier about prospects for a muon collider.

The department's **Center for Neutrino Physics** hosted NUFACT 2018 (20th International Workshop on Neutrinos from Accelerators) at Virginia Tech in August 2018.

The department's **Center for Soft Matter and Biological Physics** hosted the 6th Virginia Soft Matter Workshop at Virginia Tech in September 2018.

Professor Mariani's group contributed to the newly commissioned CERN ProtoDUNE detector that began operations in September 2018.

Professor Patrick Huber and alumnus **YuenKeung (Joseph) Hor** were co-signers of a letter on "Neutrino Physics for Korean Diplomacy" in the November 9, 2018 *Science* magazine.

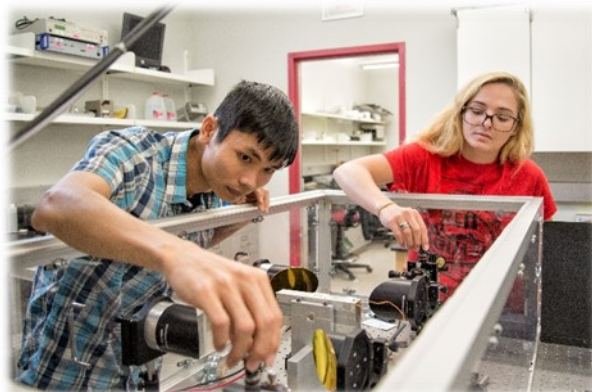
The department received a "5+ Club" award from the Physics Teacher Education Coalition (PhysTEC) for graduating eight well-prepared physics teachers in the 2017 – 2018 academic year. The PhysTEC program in our department is headed by **Professor John Simonetti** and teacher-in-residence **Alma Robinson**.

Professor **Bruce Vogelaar** and former student **Zachary Yokley** were co-authors on a publication about the fundamental p-p solar neutrino chain measured in the Borexino experiment in Gran Sasso Lab in Italy in the October 25, 2018 edition of *Nature* magazine.

Department of Physics Annual Fund

Your Support helps Invent the Future

The **Department of Physics** continues to increase the quality and prominence of its research and educational programs. Our nationally and internationally recognized faculty, pursuing research in the areas of particle and nuclear physics, hard and soft condensed matter physics, biophysics and astrophysics while providing our students with a sound education that melds fundamental principles with current research, are helping Virginia Tech improve its standing as one of the top STEM schools in the country.



Your support is critical for our success. Contributions from our alumni, parents, and friends help our many deserving students, provide state-of-the-art facilities, expand research activities, and allow our students explore a wide array of career opportunities. Gifts made without restriction allow departmental leaders to respond to opportunities immediately and to allocate resources where they can have the greatest impact.

Every gift counts – no matter the size. Our goal this year is to **increase overall participation.** A gift to the Department of Physics is the clearest signal our alumni and friends can give to show their support of the great work of our faculty and increasing the quality of experience for our students. **When all of us give, our collective contribution makes a significant difference.**

When you receive your College of Science Annual Fund letter or phone call, please earmark your support for the **Department of Physics** Annual Fund. Simply make a notation on the gift card or let the caller know that you want to direct your donation to Physics. To make an immediate contribution, you may visit the university's website at givingto.vt.edu or contact the Office of Gift Accounting at (800) 533-1144

For more information or to learn about other ways to support the College of Science, please contact Wade Stokes, Assistant Dean of Advancement, at (540) 231-4033 or lwstokes@vt.edu.

We thank you in advance for your support!

Physics in Your Neighborhood!

Alumni Reunion – 2019 March Meeting of the APS in Boston, Massachusetts (Time and Place TBD)

For more information, go to <http://www.phys.vt.edu/events>

Quanta 2018

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