University of Virginia
Physics News
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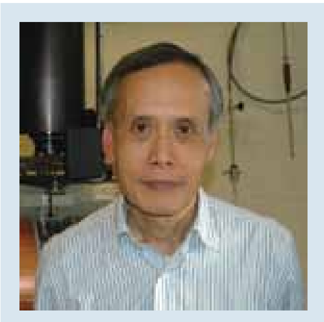
Letter from the Chair



Dear Alumni & Friends,

Warm greetings to you all on behalf of the physics department! As we begin a new academic year, we are reminded that so much has happened in the past year. As the University community is still in the process of healing after the horrifying events of August 11 and 12, there is the need for civil conversation, trust, and respect in the community. Everyone should feel safe, welcome and have a sense of belonging in the department and university. We will continue our effort to advance diversity and inclusivity.

The department underwent a rigorous program review in May. The review was positive overall, and the external review panel provided some valuable suggestions for us to further improve our department. Relevant to the program review, I will take this opportunity to report several transformational developments. First, you will remember our more-than-six-decade-old iconic physics building, which has proven to be remarkably resilient through earthquakes and hurricanes. In the changing context of higher education, modern space is needed to support new learning approaches, cutting-edge research opportunities, and improved residential experiences for our students. The good news is that in the Spring the Virginia General Assembly approved the renovation of our physics building. On the research front, the department has added astrophysics and cosmology as a new subfield. Our first faculty hired into this area, Kent Yagi, joined our department this Fall. Kent will be studying gravitational waves emitted from black hole and neutron star mergers. (His research will be featured in the next newsletter issue.) Our department is looking forward to collaborating with the astronomy department and National Radio Astronomy Observatory.

Our graduate program has made a big step forward in diversifying our talent pool. Thanks to the effort of our graduate program director, Olivier Pfister, and admissions director, Chris Neu, UVa has been accepted as a partner university of the American Physical Society Bridge Program whose goal is to increase the number of under-represented-minority students in the physics PhD program. Our department currently has three students in this program and more are expected to join in the future.

As you will read in this issue, we continue to highlight the promising future of our majors and the exciting research carried out by our faculty. We also believe that it is important to remember the historical figures of our department. As always, your continued support of the department is appreciated and cherished.

Joseph Poon
Chair, Department of Physics

Spotlight on Recent Graduates – In Their Own Words

In this issue we include stories of two recent graduates, from the classes of 2009 and 2017. We hope this will give our majors an idea of what they can accomplish after graduation, and how to get there by finding the ideal positions that suit them.

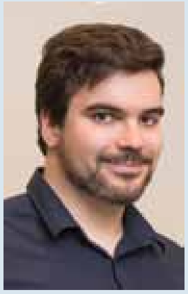
Sean A. Cantrell, class of 2009

I graduated from UVa in May 2009 with a BS in physics and a BA in mathematics. As an Echols Scholar, I was afforded the opportunity to focus my curriculum around my majors and to prepare myself extremely well for the next stage in my life: graduate school. I defended my PhD dissertation in particle theory, titled "Aspects of AdS/CFT," from Johns Hopkins University in 2015, and proudly walked across their stage to receive my degree in May 2016.

My experience at Hopkins made me appreciate even more the courses offered (and required) in UVa's physics BS track, for it is among the most rigorous and comprehensive of curricula offered at various universities that I learned of. I felt truly prepared for both my

See *Recent Graduates* on page 2.

Recent Graduates *(continued)*



coursework and research. While it is difficult to decide which course was my favorite, I found any one that emphasized mathematics, such as general relativity and mathematical methods of physics, was extremely useful, both for my graduate studies and my current work.

While in graduate school, I consulted for a startup that was attempting to market some technology I co-developed as an undergraduate. At the conclusion of that venture, I cofounded another startup, NLS Analytics, during my final few years at Hopkins that marketed nonlinear characterization software and instruments. Post-graduation, I continued bootstrapping my company for another year. I cannot recommend bootstrapping a company for long – it is unforgiving work exacerbated by tremendous financial burden. While I continue to push my company forward on the side by filing our third patent, I am now employed as a consulting data scientist at Excella Consulting in Arlington, Virginia.

Data science has exploded over the last few years – every company seems to want data scientists, and everyone seems to want to become a data scientist. I specialize, in particular, in deep learning. It is frequently assumed that I am unaided in my current work by my degree, but that could not be further from the truth. By and large, the impression seems to be that deep learning is a field for computer scientists. Those making this assertion are not entirely wrong – there's a lot of optimization, and thus algorithm design, that goes on in the field – but there is so much low-hanging fruit in the realm of network topology and architecture that former physicists and mathematicians are perfectly primed to tackle, that it is the perfect field for those emerging from academia and wanting to enter a revolutionary industry that makes use of those skills. Neural networks are all secretly linear algebra and group theory, it's just that nobody talks about them that way (yet), so I believe physicists have a competitive advantage in that respect.

I am presently leading the effort to build an AI-powered chat bot for my client, leveraging and improving on very recent network architectures, such as improved deep memory networks (MetaMind, now Salesforce – 2015) and gated recurrent units (2014). I am also collaborating on the creation of a general natural language processing platform that will become Excella's first product. (Jargon warning) For this platform, we are creating a novel method to embed words in a manifold, promote the manifold to a Lie group, and (with the aid of deep nets to find a representation of the group) construct sentence vectors by acting on a "ground state" with elements of the group (much like how quantum states are evolved using unitary operators or excited using ladder operators). To tie this current work back to the importance of my education at UVa: I first learned about manifolds and differential geometry in UVa's course on general relativity, taught by Peter Arnold, learned about Lie groups in mathematical methods of physics, taught by Paul Fendley (who, I understand, is now at Oxford), and learned quantum mechanics through multiple courses taught by Cass Sackett, Paul Fishbane, and Michael Fowler.

I am ecstatic with my job. I get to solve interesting and challenging problems and am highly appreciated by my clients. Excella affords me a lot of autonomy, and encourages my continual academic pursuits and research. I believe the real take away from my story is that physics provides a solid foundation to enter relevant, new, and exciting fields, and that my experience at UVa was pivotal to my success in it.

Andrew Mahone, class of 2015

My love for physics began in 2009, during my junior year of high school. I went to Tandem Friends School, a small local private school with a mere 35 kids in my graduating class. Naturally, schools of that size do not have a lot of options when it comes to STEM courses. Thus, I had the choice of taking physics or environmental science that year. I chose physics. A couple other students and I loved the course so much that we convinced the administration to offer AP Physics B (as it was referred to at the time) my senior year. It was the knowledge gained these two years of high school that led me to the University of Virginia Physics Department in 2013.

Andrew Mahone, class of 2015, with his sister in Italy.

Continued on page 3.

Recent Graduates *(continued)*

I began my college career in August of 2011, attending Temple University in Philadelphia as an undecided business major at Temple's Fox School of Business. After two years in Philly, I realized that my undergraduate career would be better spent studying the theoretical side of business at a more prestigious school back in my hometown. Thus, in 2013 I transferred to the University of Virginia. Having to declare a major upon matriculation and not having the prerequisites for economics, I thought back to my high school days and remembered how much I loved physics. In August of 2013, I entered UVa as a third-year physics student on the BA track number 2. After one semester, I gained the prerequisites for economics and declared it as my second major. Six semesters (including two summers), countless hours in the library, enough Greenberry's coffee for a lifetime, many lab reports, and a 35-page empirical report later, I graduated from the University of Virginia in August of 2015 with a BA in physics and economics.

After graduating, I traveled around the world for a bit before accepting a job as a tutor at Georgetown Learning Centers in Charlottesville. I tutored everything from math to physics to biology to Spanish. I tutored essentially every topic covered in high school including SAT and ACT with the exception of chemistry. I even had the occasional multivariable calculus and diff eq student. In August of 2016, I decided to revisit business school and began pursuing my MS in Commerce at UVa's McIntire School of Commerce. With the desire to eventually start my own business, I chose to study marketing and management.

I can't begin to describe the impact that my years studying physics had on me in business school. First of all, business is all about solving complex, abstract problems. The Physics Department prepared me very well for this. My physics professors began building up my problem solving skills in the introductory courses using problems with clear, objective answers. Once I became an expert in physics laws, concepts, and mathematics to the point where I could solve the majority of objective problems with no issue, I started enrolling in more advanced courses such as quantum mechanics, intermediate lab, and nuclear physics. At this point, the problems became a little more abstract. For example, I would spend days in the lab trying to figure out how to make the tip of a scanning tunneling microscope atomically sharp. The majority of problems that arose in the lab did not have a clear, cut and dry solution. It was the development of these abstract problem-solving skills that really separates UVa's Physics Department from the rest.

I graduated from McIntire on June 4th, 2017, with an MS in Marketing and Management using many of the skills acquired from my time at the Physics Department. Starting in August, I will begin working at Epic Systems Corporation in Madison, Wisconsin, as a healthcare IT consultant. I am sure that I will continue to use these skills every single day of my life as an IT professional. Furthermore, I will most definitely use my skills and knowledge acquired at UVa and elsewhere throughout my career when starting my own company in the near future. Considering my interests and passions, my physics knowledge will be a vital part of the core competencies and operations of my company. I would definitely recommend the physics major to anyone considering it, if not for the subject material itself, then for all the indirect skills offered that will certainly increase one's human capital, making him or her a competitive asset in the working world.

The 2017 Solar Eclipse as Seen from UVa Grounds

On August 21st, the SPS, together with the Astronomy Club of UVa, organized an eclipse viewing event on the lawn. Here is the partially eclipsed sun as seen from Charlottesville, Virginia. Image taken using an H-Alpha telescope provided by the Astronomy Department at UVa. The H-Alpha telescope blocks out the vast majority of the light from the sun by blocking all wavelengths of light outside of a very narrow window in the electromagnetic spectrum. This narrow window is centered around the wavelength of light emitted by a certain energy transition in Hydrogen's electronic structure, called the H-Alpha transition. Photo courtesy of physics student Chris Li.

Honors and Awards

Undergraduate Students

Bridget Andersen won a 2017 Goldwater Scholarship; **Arvind Gupta** was given an Honorable Mention.

Gage DeZoort won the Best Poster Award at 2016 PhysCon.

Peter Carr received UVa A&S's 2015 Lawrence Harrison Kilmon and May Lewis Kilmon Scholarship.

Owen Sperling received UVa A&S's 2015 George C. and Carroll F. M. Seward Scholarship.

Anna Yanchenko won the 2015 Outstanding Undergraduate Physics Major Research Award.

Brigid McDonald won an APS Award as one of the three best research presentations at the 2015 APS Conference for Undergraduate Women in Physics.

Gabriel Wong was selected to be a 2014 Kavli Institute Graduate Fellow at UCSB.

UVa's SPS Chapter was named a 2015-16 SPS Outstanding Chapter and was recognized as an SPS Distinguished Chapter for the previous three years.

Graduate Students

Gabriel Wong won the 2015 Allan T. Gwathmey Memorial Award.

Ajinkya Kamat won Third Place in UVa's 2014 Three Minute Thesis Competition.

Moran Chen won the 2014 Allen T. Gwathmey Memorial Award.

Staff

Bryan Wright won UVa's 2017 IT Excellence Award.

Pam Joseph received the 2013 Outstanding Contribution Award.

Faculty

Despina Louca was elected President of the Neutron Scattering Society of America for a 4-year term starting in 2017.

Simonetta Liuti serves on the *Physical Review C* Editorial Board for a 3-year term that began in January 2017.

Brad Cox was named AAAS Fellow in 2016.

Xiaochao Zheng was elected APS Fellow in 2015.

Craig Group won the 2015 Cory Family Teaching Award.

Bob Jones serves on the Chair line of APS DAMOP from 2015 to 2019.

Utpal Chatterjee won the 2015 NSF Career Award.

Peter Arnold and **Despina Louca** were elected APS Fellows in 2014.

Brad Cox was named Virginia's Outstanding Scientist in 2014.

Brad Cox and astronomer John Hawley were named UVa's 2014 Distinguished Scientists.

Gordon Cates serves on the Chair line of APS DNP from 2014 to 2018.

Paul Fendley, **Seunghun Lee**, **Olivier Pfister** and **Hank Thacker** were elected APS Fellows in 2013.

P.Q. Hung was awarded Vietnam's Medal for the Cause of Science and Technology in 2013.

Olivier Pfister won UVa's Distinguished Research Career Award.

Alumni News

David Tanner (BA 1966, MS 1967) was awarded the 2016 APS Frank Isakson Prize.

Thank You!

We greatly appreciate your continued support of the Deaver Scholarship Fund, general pledges and new initiatives. For additional information, please contact:

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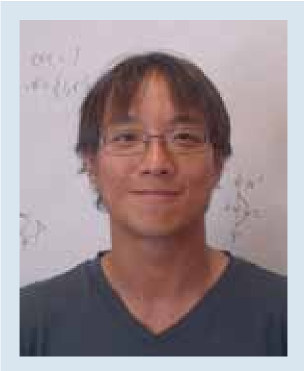
New Faculty Profiles

Jeffrey Teo

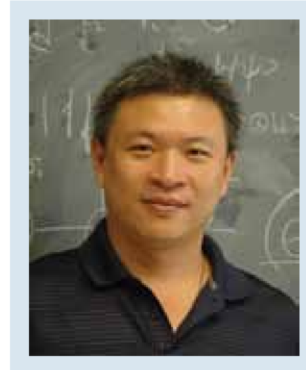


Jeffrey Teo joined the department in Fall 2014. He completed his PhD at the Department of Physics and Astronomy at the University of Pennsylvania in 2011. He was then a Simons Postdoctoral fellow at the Institute of Condensed Matter Theory at the University of Illinois at Urbana-Champaign. His research focused on the theory of topological phases of matter, the realization of exotic quasiparticles as topological defects, and the search for topological materials.

During his PhD and postdoctoral period, Jeffrey contributed to the fundamental theoretical classification and characterization of topological defects in topological phases of matter. This includes defects in crystalline materials like dislocations and disclinations, vortices in superconductors, monopoles or "hedgehog" textures in three dimensional heterostructures. The theoretical framework has been widely applied on a range of topological systems, including topological insulators and superconductors, fractional quantum Hall states, spin liquids, etc. Thanks to a quantum entangled electronic ground state, these defects carry exotic low energy quasiparticles that can never manifest in conventional systems. For example, a 1D electronic channel along a line defect is "chiral" in the sense that electrons can only propagate in a single direction, like a one-way highway. The absence of a backward channel forbids backscattering and therefore guarantees dissipationless transport. A point defect in a superconductor can host a "Majorana fermion bound state". This type of defect has the amazing property of sharing a single quantum state non-locally between a spatially separated pair. This allows robust quantum information storage and has great prospects in quantum computing.

Since joining UVa, Jeffrey has been concentrating on the topological phases that emerge from interacting arrays of topological defects. For example, this type of approach has been successful in pioneering the microscopic understanding of the effect of many-body interactions on the surfaces of topological insulators and superconductors. This also allows one to theoretically construct new 3D electronic phases, which are typically beyond the handling capability of current numerical techniques, originated from commonly occurring materials, like Weyl or Dirac semimetals.

Gia-Wei Chern



Gia-Wei Chern joined the department in the fall semester of 2015. Before coming to UVa he was a J. R. Oppenheimer Fellow at the Theoretical Division of Los Alamos National Laboratory. He received his BS in Electrical Engineering and PhD in Optoelectronics Engineering at the National Taiwan University (NTU). After briefly working in the optics and fiber industry, he decided to pursue a career in Physics and enrolled in the Johns Hopkins University (JHU), where he received his PhD in Physics.

His primary research interests are in theoretical condensed matter physics with a special focus on strongly correlated electron systems. Such compounds are crucial building blocks for the next generation multifunctional devices. Indeed, recent breakthroughs in materials science such as high-temperature superconductivity, colossal magnetoresistance, and multiferroics are all canonical examples of strongly correlated electron materials. One central goal of his research is to develop analytical and numerical tools that can reliably predict collective behaviors and new emergent phases of these materials.

Strongly correlated systems are also host to exotic phases and collective behaviors. The most famous recent example is the so-called "spin-ice" materials such as $Ho_2Ti_2O_7$ and $Dy_2Ti_2O_7$, of which the elementary excitations are particle-like objects that carry a net magnetic charge, or essentially magnetic monopoles. Interestingly, while fundamental magnetic monopoles remain elusive to our experimental detection so far, these intriguing particles can emerge in simple solid-state crystals as collective magnetic excitations. Moreover, thanks to recent advances in nanotechnology, physicists can even fabricate artificial spin ice in magnetic nano-arrays with specially designed geometry. Gia-Wei has pioneered in the theoretical modeling of spin-ice systems and, in particular, phenomena that are related to emergent magnetic charge degrees of freedom.

Here at UVa, Gia-Wei's team is working on a new frontier of correlated electron materials, which is to incorporate the electron correlation effects into the state-of-the-art quantum molecular dynamics (MD) simulations. MD simulations have become a powerful and widely used predictive tool in computational physics,

See *New Faculty* on page 6.

New Faculty *(continued)*

materials science, chemistry and biology. However, even the state-of-the-art MD methods have limited validity in their modeling of correlated materials. To address this problem, Gia-Wei adopts an interdisciplinary approach by integrating advanced numerical methods developed in correlated electron physics, quantum chemistry, and computer sciences. He envisions this effort will provide transformative tools for understanding and eventually engineering the functionalities of correlated electron materials.

Marija Vucelja

Marija Vucelja started as an Assistant Professor at UVa's Department of Physics in Fall 2015. Marija obtained her PhD at the Weizmann Institute of Science's Department of Physics of Complex Systems. She worked on mixing and clustering of particles in flows, problems that are relevant to understanding the formation of rain droplets and planetesimals, clustering of pollutants on water surfaces and appear in many industrial applications. She derived the compressibility of surface flows and described the aggregation-disorder transition of particles in flows. Using "chaotic mixing" she substantially accelerated select Monte Carlo algorithms (the main numerical tools for studying complex systems). Marija held two prestigious postdoctoral fellowships: she was a Courant Instructor at NYU and a Rockefeller Physics Fellow at the Rockefeller University. During this time, she worked on the emergence of clones in populations and the host-pathogen arms race of bacteria and phages.

Marija Vucelja is a theoretical physicist working in the fields of soft condensed matter, computational physics and biophysics. Especially she works with glassy systems – be it in population genetics, where Marija looks at the evolution of diverse populations, or more general spin-glass systems, where she is often interested in the relaxation dynamics, memory and aging. A part of her work is finding analogies between disordered glassy systems and population dynamics.

Marija enjoys outdoors, sports and playing the piano. She speaks six languages: she is a native speaker of Serbian and Hungarian and daily uses Russian, Hebrew, English, and once in a while German. Lately, one of her goals is to be proficient in Hebrew, before the newest addition to the family, Daniel Vucelja Klich, catches up with Hebrew. Marija is married to our colleague Israel Klich, who is also a UVa professor of physics.

The Story of the Cabreras

The Virginia Connection to Three Generations of Devotion to Science

For three generations, from father to son, the Cabreras have been leaders in science across the Western world, starting in Spain and ending in California, by the way of Virginia. The middle generation, Nicolás Cabrera, served as the chair of UVa's Physics department in the 1960s.

The family saga of Cabrera starts with Blas Cabrera, born in 1878 in the remote Canary Islands. At age 15, he traveled to Madrid to study law, but quickly switched to science under the influence of the great neurologist Ramón y Cajal. By the time he got his Physics Doctorate in 1901, young Blas was already recognized as a leader. He cofounded the Spanish Academy of Sciences and won the competition for the Chair of Electricity at the University of Madrid. In 1910 he was named Director of the newly created Laboratorio de Investigationes Físicas, where he began the precise measurements of magnetism that made him internationally famous. His main contacts were with Langevin in Paris and Peter Weiss in Zurich. Van Vleck, from Harvard, based his *Theory of Electric and Magnetic Susceptibilities* on Cabrera's data. Much later, he wrote: "B. Cabrera will be remembered as the physicist who did the right experiments at the right time … the year 1925, which marked the climax of the empiricism of the old quantum theory and the crucial ensuing years of the true quantum mechanics". At the Solvay Conference on Magnetism of 1930, which Cabrera helped organize, he appears in the official photograph with the great theorists of that time: Bohr sits at his left, Pauli stands behind, Einstein, Langevin and Marie Curie are on the right. The following year, in recognition of the high precision of his experiments, he was appointed to the International Bureau of Weights and Measures (BIPM).

With prodigious activity and dedication, Blas Cabrera continued to lead Spanish science, both in the lab and in education and development. He became Director of the University of Madrid, had a major role in the creation of the National Institute of Chemistry and Physics, and of the Summer International University of Santander, which he directed. It all came to a sad end with the Spanish Civil War and Franco's dictatorship. Cabrera went into exile, first in Paris as secretary of BIPM, then in Mexico City at the Universidad Nacional. He died there in 1945.

Nicolás Cabrera, the youngest son of Blas and Maria Sanchez, was born in Madrid in 1913 and grew up in the rich cultural atmosphere of his parents' home, where scientists, scholars and artists would mingle in the evenings. On one memorable occasion, Albert Einstein was the guest

See *The Story of the Cabreras* on page 7.

The Story of the Cabreras *(continued)*

of honor, Andrés Segovia performed on his classical guitar, and then Einstein asked for a violin to add his own performance. Nicolás had wide interests, from engineering to history, and settled on physics in his second year at the University of Madrid. He went to work at the Rockefeller Institute, founded and directed by his father; together they published on the magnetism of rare earths. When Franco seized power in 1938, he left with his family for Paris and stayed there as his parents moved to Mexico, earning a doctorate from the Sorbonne while working at BIPM. He wrote papers about the effects of surface oxidation on the samples used in metrology. Impressed by this work, Mott invited him to Bristol as a Research Associate; together they wrote a seminal paper in 1947, "Theory of Oxydation of Metals", which for the first time described oxide growth based on quantum mechanics. This work marks Cabrera's shift from experiment to theory and the start of his lifelong focus on surface physics. Two years later, with Frank and Burton, he published "The Growth of Crystals and the Equilibrium States of Their Surfaces". This famous paper, known as BCF, explains why crystals can grow much faster than is predicted by the addition of atoms on flat facets: growth may occur at persisting surface defects, notably screw dislocations, and a flat surface can become rough at a temperature well below the bulk melting temperature. The original BCF model of this "roughening transition" involved only the top layer and was based on the then-new solution of the Ising model in two dimensions; much theoretical work has been done on more realistic extensions of BCF and the precise nature of the transition, but the idea has stood the test of time.

Returning to his modest position at BIPM, Cabrera received many tempting offers. From Virginia came chemist Allan Gwathmey, who was very interested in crystal growth. He convinced his very good friend Jesse Beams, then Chair of Physics at the University of Virginia, to offer Cabrera a joint position as Associate Professor in Chemistry and Physics, which he accepted in 1952. At Virginia, Cabrera built a strong group in Solid State Physics, recruiting from Bristol Jack Mitchell and Doris Wilsdorf. He continued research on crystal growth, notably in collaboration with his best student, Bob Coleman. After he succeeded Beams as Chair in 1962, he oversaw a rapid expansion of the Physics Department. His influence extended to the newly created Department of Material Science and he got involved with people in Aerospace Engineering, on the theory of gas-surface interactions. The best known of his pioneering papers on this subject, published in 1970, was written in collaboration with newly-arrived Vittorio Celli, F.O. Goodman from Aerospace and then-student Dick Manson. It develops a quantum theory of surface scattering and absorption, still known as CCGM..

Nicolás Cabrera comes as close as humanly possible to the ideal figure of a renowned scientist and a perfect gentleman, someone who has a keen insight in the ways of nature and at the same time is fully at ease with his fellow humans, always benevolent and encouraging, yet also reserved and detached in his judgment. He was given by birth the opportunity to study and work with famous people in France and England, and happily his natural talent was up to the challenge and thrived on it. But he also knew sorrow in his life as an exile from a country torn by civil strife. Although the Physics Department was prospering under Cabrera's leadership, both in Solid State and in Nuclear Physics, he always felt a duty and a desire to return to Madrid to rebuild and continue his father's work. Nostalgia for Spain was always near the surface, especially for his lively wife, Carmen, who had also grown up exiled in Paris. There were evenings at the Cabreras' with singing and guitars, and as the party took wing more and more of the songs were Spanish. The opportunity to return came with a political thaw in 1968. He accepted the post of Director of the Physics Department at the University of Madrid and enthusiastically set up to rebuild it in a new, more open way. He was now Don Nicolás, an almost legendary figure to younger generations. Unfortunately, the Franco regime reverted to repressive measures, dismissing half of the group that Cabrera had assembled. Promises were not kept, including the fulfillment of his work at Virginia with experiments to study surfaces by the scattering of He atoms. Cabrera had to endure difficult years, until the situation gradually improved after Franco's death in 1975. Research is flourishing now at the University of Madrid and at the Nicolás Cabrera Research Institute founded in the year of his death, 1989.

Blas Cabrera the younger was born in Paris in 1946 and grew up in Virginia, enrolling at UVa as a physics major, destined to follow in his forefathers' footsteps. He found his own path under the guidance of Bascom Deaver, newly recruited by his father to launch Low Temperature Physics in our Department. He worked for his thesis with Bill Fairbank at Stanford, developing superconductive devices for high sensitivity, high precision measurements. On February 14, 1982, his apparatus detected a signal that could only be attributed to a magnetic monopole passing through it. This "Valentine day event" could never be reproduced, despite much effort by Blas Cabrera with improved detectors, and by many others as well. However, through his development of increasingly more sophisticated devices, he became a world leader in the field of fundamental measurements. He rose through the ranks to become Chair of Physics at Stanford, from 1996 to 1999. He is involved in advanced astrophysics programs using his wide-band, high-resolution spectrometers, but his abiding interest is the search for WIMPS (Weakly Interacting Massive Particles), the hypothesized constituents of Dark Matter. He has been the leading designer and developer of

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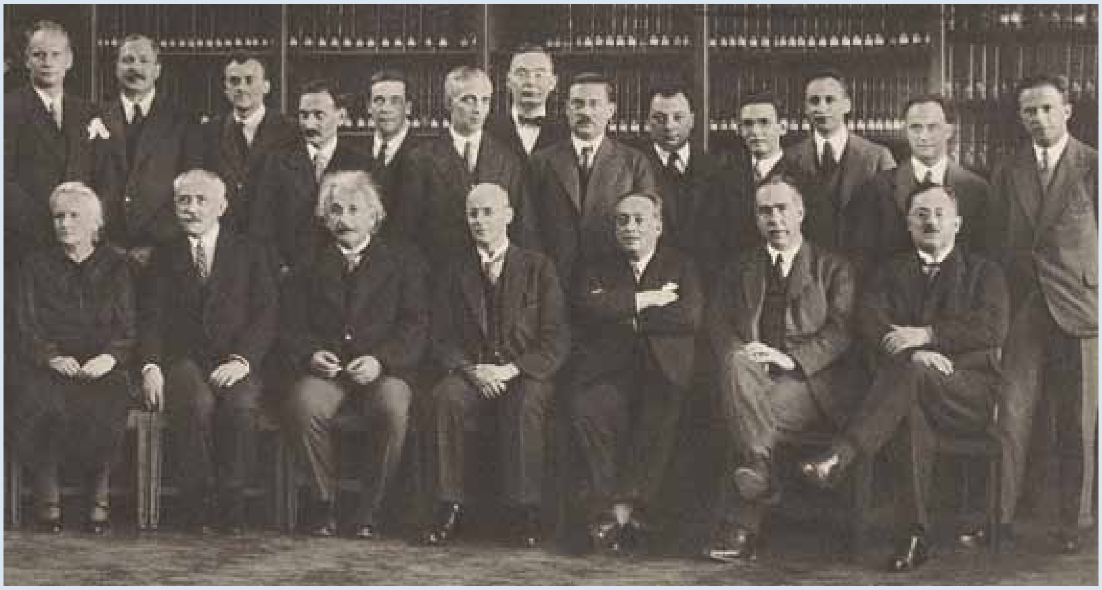
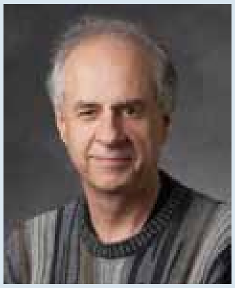
The Story of the Cabreras *(continued)*

cryogenic detectors for CDMS, the Cryogenic Dark Matter Search, which started at Stanford and has now evolved into SuperCDMS, under construction in the Sudbury mine site at a depth of 2 km (for screening from cosmic rays). Blas and his collaborators from 23 institutions are not hesitant to risk much of their careers on a discovery that would revolutionize particle physics and cosmology.

Vittorio Celli





The three generations. Left: The elder Blas Cabrera at the 1930 Solvay Conference, on Magnetism (front row, third from right). You can check out the 11 Nobel Prize winners in a full photo at https://commons.wikimedia.org/wiki/File: Solvay_conference_1930.jpg. Photograph by Benjamin Couprie. Courtesy of the Solvay Institutes, Brussels.
Upper right: Nicolás Cabrera. Image from iopscience.iop.org/article/10.1088/0953-8984/14/24/000/meta
Lower right: Blas Cabrera, Jr. Courtesy of Stanford University.

The Department of Physics will host the next
Conference for Undergraduate Women in Physics (CUWIP) in January 2018.
For more details please see https://pages.shanti.virginia.edu/cuwip-2018/