RESONANCES

NEWS OF INTEREST TO FLORIDA STATE UNIVERSITY PHYSICS ALUMNI

2021

A Message from the Chair …

Oh, what a wild and crazy time it has turned out to be!

Paul Eugenio

FSU PHYSICS DEPARTMENT CHAIR

Paul Eugenio

Dear Friends and colleagues of the FSU Physics Department,

It is hard for me to grasp that I have been the department chair for two years now. While the first six months were demanding, i.e., learning the role as chair, reshaping the departmental administrative structure, hiring a plethora of new departmental staff, and vigilantly trying not to break anything, these first six months were clearly no indication of what was to come. The last year and half has turned out to be a rather crazy and outrageous time. As we all know, the COVID pandemic not only impacted how we teach and do research at FSU, but it has been debilitating worldwide.

I hope everyone reading this is in good health and in good spirits. It is a real understatement to say that the last academic year was an unprecedented year for the history books. It has been a time of many challenges that include reinventing how we teach, developing new methods and procedures so that we can safely do research in our labs, interacting virtually with colleagues and collaborators from the secure refuge of our home offices, and planning for a flirting return to normalcy which seems to constantly elude us. But even during the ongoing pandemic, the department has been very productive in our three main missions of instruction, scholarly research, and service. As we start the 2021-2022 academic year, the department consists of 48 faculty: 30 professors, 9 associate professors, and 9 assistant professors. We have 182 undergraduate physics majors, 142 graduate students in our Ph.D. program, and 6 graduate students in the FSU Physics Masters-to-Ph.D. Bridge Program for underrepresented minority students.

In this newsletter, you will read about recent happenings in the department including new faculty, retirements, staff highlights, and updates from many physics research areas. I want to draw your attention to the memorial pieces for Bob Schrieffer and Stephan von Molnár. Their impacts to Physics will be long remembered. I would like to express a special thanks to Horst Wahl for all of his hard work during his five years as the previous department chair, and to the Physics Web & Newsletter Committee for getting this newsletter out of hibernation.

As department Chair, I've had the pleasure of closely interacting with many faculty, students, staff, and alumni when they visit campus. I'm always impressed by the level of passion, the depth of connection, and the collegiality that our physics community has for our department and university. As our scholars move on, I encourage all to keep in touch; we would appreciate your sharing life experiences, career advice, and opportunities with our students.

Greg Boebinger elected to the NAS

Laura Greene
FSU PHYSICS PROFESSOR

Dr. Gregory S. Boebinger, FSU Professor of Physics and Director of the National High Magnetic Field Laboratory has been elected to the National Academy of Sciences (NAS). This is more than simply one of the highest accolades bestowed on a scientist — the NAS was established by an Act of Congress and signed by President Abraham Lincoln in 1863 to provide independent, objective advice to the nation on matters related to science and technology.

Greg received bachelor's degrees in Physics, Electrical Engineering and Philosophy in 1981 from Purdue University. He studied for one year at Cambridge University as a Churchill Fellow, after which he entered MIT where he held Compton and Hertz Foundation Fellowships. His thesis research utilized high magnetic fields and ultra-low temperatures to study the fractional quantum Hall effect with Nobel Laureates Horst Stormer and Dan Tsui. The fractional quantum Hall states are many-electron collective states found in two-dimensional layers of electrons in the presence of strong magnetic fields. They exhibit features in common with both superconductivity and superfluidity; however, the fractional quantum Hall states are strikingly unique in that they exhibit fractional charge, that is, particle-like excitations that are composites of magnetic-field flux quanta and electrons, yet exhibit charges equal precisely to one-third of an electron charge. After receiving his Ph.D., Greg spent a year as a NATO Postdoctoral Fellow in Paris at the Ecole Normale Superieure studying other quantum behaviors of electrons in quantum wells.

Greg Boebinger

In 1987, Dr. Boebinger joined the research staff at Bell Labs and established a unique pulsed magnetic field facility for physics research on semiconductors, f-electron compounds, and superconductors in magnetic fields up to 60 T.

In 1998, Greg became head of the pulsed field laboratory at Los Alamos National Laboratory (LANL), one of the three campuses of the National High Magnetic Field Laboratory (MagLab). In 2004, Greg moved to Florida State University as the director of the MagLab, with responsibility for all three campuses: FSU, UF, and LANL. The MagLab is the world leading magnet laboratory, developing and operating high magnetic field facilities that more than 2,000 scientists use annually for research in physics, biology, bioengineering, chemistry, geochemistry, biochemistry, materials science, and engineering. More information can be found on the MagLab's website: nationalmaglab.org

Greg's own research concentrates on a variety of quantum materials including high-temperature superconductors, using the intense magnetic fields to suppress superconductivity. The goal is to study their unconventional behavior in the absence of their superconductivity, with the expectation that this behavior underpins the high-temperature superconducting state, which may lead to an understanding of the mechanism of high-temperature superconductivity.

Greg is keenly interested in communicating science to the general public. His outreach has included commencement addresses, and many public lectures, including those at Aspen's Wheeler Opera House, Bell Labs, Los Alamos, and the Getty Museum. He has appeared on the History Channel and the Discovery Channel and has written articles for *Physics Today* and *Scientific American*. He has a special interest in the historical development of materials research and the interplay of the Arts and Sciences.

Greg has over 120 refereed publications that have collectively received more than 12,000 citations. Since 1984, he has presented 300 invited talks and colloquia at universities and conferences around the world. Greg's accolades include being a Fellow of the AAAS and the APS, and a member of: the American Academy of Arts and Sciences; the Florida Academy of Science, Engineering, and Medicine, and now to the benefit of our nation, the NAS. ⚛

Jorge Piekarewicz named Lawton Professor

Our own Professor Jorge Piekarewicz, along with Professor Gary Taylor of the English department, has been selected to receive the Lawton Professorship for 2021–2022. The award was first presented in 1957 and is considered the highest honor FSU faculty can bestow on a colleague.

Before arriving at FSU in 1990, Piekarewicz was a research fellow at Indiana University and California Institute of Technology. He came to FSU as an assistant scientist and rose through the ranks of the Physics Department, becoming a full professor in 2005. He has served as a member of the Department of Energy/National Science Foundation Nuclear Science Advisory and is an American Physical Society fellow. An accomplished researcher, Piekarewicz has produced more than 150 publications and more than 6,500 citations.

Piekarewicz was born in México City. His father, a holocaust survivor, made it his mission to build a fantastic life for his children in México. Piekarewicz thrived in this nourishing environment. “My mother and father were extraordinarily supportive of my decision to pursue a career in physics.” He credited the support of his parents and the essentially tuition-free university in México for his successful start in physics.

Piekarewicz got his start in nuclear physics when he completed an undergraduate thesis project with Marcos Moshinsky, a renowned nuclear physicist at the Universidad Nacional Autónoma de México, and never looked back. “I would have been just as happy doing research in any other area because I really love physics,” Piekarewicz confessed. At the beginning of his career, there was essentially no link between nuclear physics and astrophysics. The launch of the Chandra Observatory from the Space Shuttle *Columbia* in 1999 changed all of that. With more accurate information on neutron star masses and radii inferred by observations, stronger constraints on the equation of state were needed. Thankfully, Piekarewicz had the theoretical tools already in place to push the field forward. Much of his success he also credits to the support and mentorship of Professor Kirby Kemper.

Jorge Piekarewicz

“During an academic career, you must always be ready to redefine yourself and learn new things,” said Piekarewicz. With the wealth of information coming from electromagnetic and gravitational wave observatories, he never lacks the opportunity to redefine his career. The discovery that excites him the most is the correlation between the radius of a neutron star and the extent of the neutron-rich “skin” of a heavy nucleus. Although 18 orders of magnitude different in size, Piekarewicz was able to use the neutron skin thickness as a proxy for the radius of a neutron star. His upcoming projects aim to reconcile the tensions in the equation of state inferred from Jefferson Lab, LIGO, and other experiments.

At FSU, Piekarewicz has been honored with the University Teaching Award in 2001, 2007, 2014, and 2019 and the Graduate Faculty Mentor Award in 2017. Extremely popular with students, Piekarewicz has been on the Ph.D. supervisory committee of nearly 100 graduate students. He tries to instill a sense of hard work and commitment in his students and has always had an open-door policy. “Think about the admirable endeavor of these students who left home and sacrifice so much for their love of physics.” Piekarewicz maintains that with students, there may be time to be firm, but there is always time for empathy and a little humor.

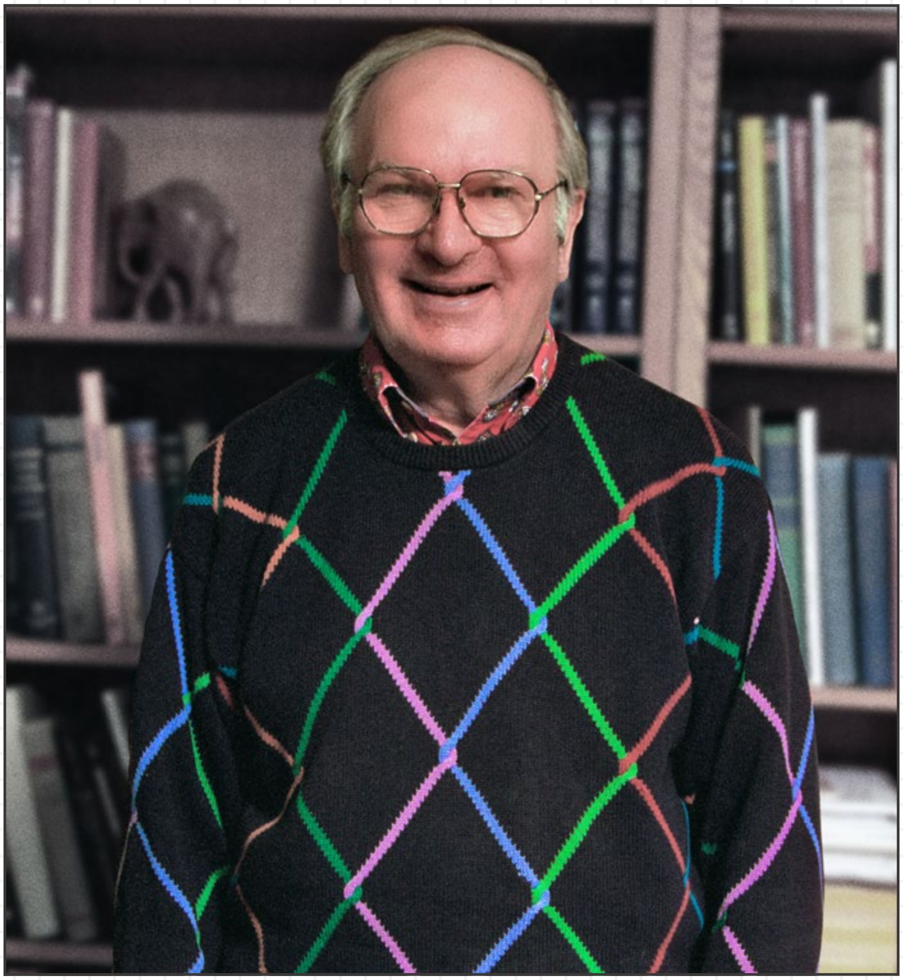
To the department, Piekarewicz brings kindness, compassion, and positivity. Despite losing close family members in the concentration camp, his father always tried to instill in him the importance of staying positive and having a deep sense of appreciation for what he has. “In physics, we are fortunate people who do what we love,” said Piekarewicz. Finally, he offered the following words of wisdom on research: “What we do is like having a baby—at least that is what I heard! That thrill of the discovery is enough for us to forget about all the hard work and sleepless nights and keep going.” ⚛

Bob Schrieffer dies in 2019

Gregory Boebinger and Nicholas Bonesteel
FSU PHYSICS PROFESSORS

FSU Professor Emeritus and Nobel Laureate J. Robert (Bob) Schrieffer passed away on July 27, 2019 in Tallahassee, at the age of 88.

Schrieffer solved a problem that had baffled the best brains in physics for more than 40 years. In 1911 it was discovered that certain metals, when cooled to low enough temperatures, are able to carry electrical current with no resistance. This seemingly miraculous property of superconductivity is a phenomenon that arises directly from quantum mechanics, yet it now underlies many contemporary technologies, such as magnetic resonance imaging (MRI) body scanners and particle accelerators. For decades, however, there was no theory to explain how electrons in superconducting materials overcome the mutually repulsive properties of electrons and other causes of resistance. Schrieffer's contribution to this landmark theory earned him a share in the 1972 Nobel Prize for Physics, and his subsequent career saw him elected President of the American Physical Society (APS).



Robert Schrieffer

In early 1957 Schrieffer, then a 26-year-old graduate student, wrote down a quantum mechanical wave function that accounted for the behavior of electrons in superconductors. With his thesis advisor John Bardeen and postdoc colleague Leon Cooper, who both shared the Nobel prize, he published the now famous BCS wave function, and the full BCS theory of superconductivity, less than a year later. The work has had far-reaching consequences both for fundamental science and practical technology. Schrieffer went on to a distinguished scientific career, continuing to make fundamental contributions to our understanding of electrons in solids.

Born in Oak Park, Illinois in 1931, Schrieffer spent his later teen years in Eustis, Florida. Upon graduating from High School in Eustis, he went to MIT as an undergraduate and from there to graduate school at the University of Illinois at Urbana-Champaign (UIUC). It was at UIUC that he began working with John Bardeen, who had just won his first Physics Nobel prize for the invention of the transistor.

Bardeen proposed to Schrieffer that he try his hand at understanding superconductivity. This was a risky proposition. After the initial success of quantum theory in describing ordinary conductors, insulators, and semiconductors, there had been countless attempts to understand superconductors as well, and all had failed. But the timing was right for another attempt. Bardeen, together with his then-postdoc David Pines, had recently studied the effect of phonons (quantized sound waves) on metals, showing that they mediated an attractive interaction between electrons. Cooper found that this attractive interaction could lead to the formation of bound pairs of electrons. However, Cooper's theory described only the formation of a single electron pair – the question remained how to describe the

Schrieffer story continued from previous page

many electrons pairing in the full electronic state of the metal, and why such pairing would lead to the properties of a superconductor.

The story of how Schrieffer first hit upon the BCS wave function is the stuff of legend among condensed-matter physicists. He was riding the subway while attending an APS meeting in New York City in 1957, musing on the superconductivity problem, when it struck him that a natural wave function for describing a state with electron pairing was one in which the number of electrons was not fixed, but had a certain quantum mechanical uncertainty. He wrote it down there and then. This key insight, radical at the time but now part of the standard tool kit of theoretical physics, cracked the problem wide open.

With the wave function in hand, it quickly became possible to calculate many of the observed properties of superconductors, and to predict new properties, which were subsequently found. At the time of its original publication, the BCS theory represented the solution of one of the most puzzling and longstanding problems in physics. Schrieffer's key insight was a genuine intuitive leap of great beauty that has contributed to many branches of fundamental physics. Within condensed matter physics it has been applied not just to superconducting metals, but also to superfluid helium-3 and cold-atom systems. Elsewhere, BCS has been applied to complex nuclei and neutron stars. And it played a vital role in establishing the modern understanding of quantum field theory that underlies today's standard model of strong, electromagnetic and weak interactions.

Schrieffer went on to do postdoctoral work at the Niels Bohr Institute in Copenhagen and the University of Birmingham, UK. He then held faculty positions at the University of Chicago, the University of Illinois in Urbana-Champaign, and the University of Pennsylvania. In 1980 he moved to the University of California, Santa Barbara, and joined the newly-formed Institute for Theoretical Physics, where, from 1984 to 1989, he served as its second director, helping to establish its strong reputation as a center for theoretical physics research. His final move was back to the Florida of his youth, where he assumed a statewide professor position in the Florida State University System. From 1993 to 2006 he served as the first chief scientist of the National High Magnetic Field Laboratory headquartered at Florida State University in Tallahassee, where he played a crucial role in establishing the scientific credentials of this new user facility.

Throughout his career, Schrieffer's scientific work exhibited the same flair as his brilliant wave function insight. In 1979, Schrieffer and colleagues showed that certain conducting polymers could exhibit excitations with electrical charge, but no spin (the magnetic field of each electron is called its "spin"). The opposite could also occur: Excitations could have spin, but no charge. It was a revelation that the two fundamental properties of electrons, charge and spin, could be split apart. This deconstruction of electrons has since been discovered at many other frontiers of condensed matter physics. A later collaboration showed that a second example of deconstructed electrons, the fractionally-charged excitations in the fractional quantum Hall states, also exhibit fractional statistics, meaning they are neither the conventional bosons or fermions that were thought to divide all fundamental particles into two classes.

Schrieffer was equally known for his warmth, charm, generosity, and brilliance. When discussing physics with Bob, his eyes would twinkle and a boyish demeanor would shine through. This enthusiasm for physics and provision of wise counsel to younger physicists never waned. His unique style is captured, as if in a photograph, by the BCS wave function. ⚛

RESONANCES

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For the latest on what's happening in the Physics Department, join us online at **https://physics.fsu.edu/**

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Horst Wahl served five years as department chair

From September of 2014 until August of 2019, Professor Horst Wahl served as the physics department chair. The entire department is grateful for his dedication and productive term as our chair.

Professor James Brooks was elected chair in 2013, and served from August 2013 until his unexpected passing on September 27, 2014. His absence left a hole in our department and in our hearts. In this time of great sadness for our department, Horst graciously accepted the responsibility as interim chair. The department quickly convened a chair selection committee and many in the department expressed strong confidence in Horst continuing beyond his initial interim role. Despite some initial hesitancy, Horst rose to the challenge and successfully led the department till 2019.

From 2014 – 2019, the department's faculty expanded by 12 new research and teaching positions. They are Associate Professor Eric Hsiao (hired 2015), Professor and Chief Scientist at the MagLab Laura Greene (hired 2015), Teaching Faculty II Yuko Hori (hired 2015), Assistant Professor Ted Kolberg (hired 2016), Assistant Professor Rachel Yohay (hired 2016), Assistant Professor Sean Dobbs (hired 2017), Assistant Professor Hitesh Changlani (hired 2018), Assistant Professor Kohsaku Tobioka (hired 2018), Associate Professor Fernando Febres Cordero (hired 2018), Assistant Professor Mark Spieker (hired 2019), Assistant Professor Vandana Tripathi (hired 2019), and Assistant Professor Guangxin Ni (hired 2019). We are extremely proud of our ability to attract so many productive and talented physicists. On several occasions, the caliber of the top applicants inspired us to request more faculty positions than initially approved by the Dean's Office.

A recent painting of Horst Wahl, executed in oils by Havana, Florida artist D. Arthur McBride.

With the support of the search committees and the entire faculty, Horst successfully requested and negotiated multiple additional hires during his tenure.

In addition to expanding our faculty, Horst also invested considerable efforts to increase support for the technical staff so important to our mission. After some negotiations, the College (i.e. the Dean) agreed to provide additional funding to reemploy retired technical staff members Bob Smith, Ian Winger and Jim Valentine. Our department needs more staff, but we view this as a great start. Our staff members are vital to our mission, and we highly value their contribution.

Horst also helped to reorganize the teaching structure for introductory courses. The department hired our first teaching faculty. In addition, Horst negotiated an increase for college-supported TA funding to support introductory classes. The department also received additional financial support for hiring undergraduate learning assistants. Both undergraduates and graduate students have expressed appreciation for these changes; undergraduates appreciate learning from students who have more recently experienced the challenges of learning physics, and our undergraduate physics majors and graduate students appreciate the experience in teaching.

Having served our department for five years, Horst has accomplished much, and he has a unique perspective on what else we might address. Here's a list of his recommendations for future improvements. 1) Because of our recent successes and our building's aging infrastructure, we are quickly running out of both office space and physical facilities for labs; we need a new building. 2) We need more support for technical infrastructure and staff. For example, there is a dire need for more support for electronics both in terms of infrastructure and staff. 3) We highly value our support staff, and we therefore need to advocate for better wages for them as well.

We are forever grateful to Horst for his service and helping our department to grow in substantial ways. Expressing his own thoughts, Horst said, "I am grateful for the opportunity to serve as chair. One of the most rewarding aspects of being chair was the opportunity to connect with so many people in our department and become aware of facets of their personalities. I was also able to fully appreciate how productive and impressive our department is. I feel humbled and grateful for having had the privilege of serving our department, and I hope that I did a little good for the department."

Horst, you did. We cherish your contribution. Thank you. ⚛

Physics Department Awards Ceremony

April 15, 2021

Despite the challenges raised by the COVID-19 pandemic and subsequent pivot to remote learning, the department's annual awards ceremony would not be stopped. As with so many other meetings and other gatherings over the last 18 months, this year's ceremony was held virtually, via Zoom, on April 15, 2021.

Following is a listing of all the awards and recognition bestowed during the ceremony, including those presented to undergraduate students, graduate students, faculty, and staff. Digital copies of the award certificates were used during the ceremony itself; physical copies were later printed and mailed to recipients.

UNDERGRADUATE STUDENT AWARDS

- **Günter Schwarz Memorial Scholarship**
  - **Matthew DeJong** *"For combining his deep interests in physics and music"*

- **Anna Jane Hendren Runyan Undergraduate Award**
  - **Graham O'Donnell** *"For his outstanding academic success"*
  - **Rebecca Van Gelder** *"For her outstanding academic success"*

- **Charles and Anna Uhrhan Scholarship**
  - **Meg Van Deventer** *"For her outstanding Honors Thesis research on the electronic properties of one-dimensional metal-halide hybrid materials"*

- **Clara Kibler Davis Scholarship**
  - **Zain Abhari** *"For her outstanding Honors Thesis on spectroscopy, her leadership of the Society of Physics Students, and her sustained excellent work as a Learning Assistant"*
  - **Ashlyn Langford** *"For the design and construction of an optical inspection system that is compatible with ultra-high vacuum conditions"*
  - **Chika Onubogu** *"For cross-correlation studies of the cosmic microwave background and summer research on magnetic fields in radio jets in galaxy clusters"*
  - **Christina Schiffert** *"For her hard work, problem solving, and strong responsibility in making a specialized low-noise voltage meter for in-situ scanning of low-dimensional nano-electronic devices"*

- **Joseph Lannutti Award for Undergraduate Research**
  - **Margaret Van Deventer** *"Non-linear Current-Voltage Characteristics Due to Ion Migration In 1-D Organic Metal Halide Hybrids"*
  - **Jane Case** *"Reconstruction of ^{26}Si Excitation Energies for the Astrophysical Abundances of ^{26}Al"*
  - **Justin Marquez** *"Simulated Signals for Highly Charged Heavy Stable Charged Particles"*

- **Phi Beta Kappa Academic Honor Society Recognition**

  FALL 2020
  - **Drew Goldstein, Lexington Mandachi, Christopher Ragsdale, Rebecca Van Gelder**

  SPRING 2021
  - **Zain Abhari, Justin Marquez**

- **SPS: Sigma Pi Sigma, the Physics Honor Society**
  - **Zain Abhari, Michael Burns, Matthew DeJong, Francisco Gallo, Ryan Goodrich, Ashlyn Langford, Christopher Ragsdale, Enrique Roman, Christina Schiffert, Jacob Strack, James Sullivan, Meg van Deventer, Rebecca Van Gelder, Lee Wall, Ty Wilson**

- **University Recognition: 2021 Leadership Awards Night**
  - **Zain Abhari** *"Academic Leadership Award for Arts & Sciences"*

'Awards Ceremony 2021'

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GRADUATE STUDENT AWARDS

Dirac Fellowship

- **Pablo Giuliani** *"For the development and implementation of novel statistical strategies for nuclear structure that provide powerful constraints on the structure and dynamics of neutron stars"*

Hellmann-Dirac Award

- **Yuting Tan** *"For her theoretical explanation of the colossal dielectric response near Mott metal-insulator transitions, through the development of 'hybrid-DMFT methods' that unraveled its microscopic mechanism"*

Hagopian Family Endowment Award in High Energy Physics

- **Suho Kim** *"For his important work on long-lived particles searches and the upgrade of the CMS forward calorimeter"*
- **Vazha Loladze** *"For his outstanding contributions to the exploration of dark sectors and elusive axion"*

John D. Fox Award

- **Gordon McCann** *"For his development of experimental and analysis techniques to study resonances of astrophysical importance"*

J.W. Nelson Award

- **Josiah Cochran** *"For outperforming in every way his research and teaching duties, and in particular for the experimental realization of a low-noise cryo-electronics stage used to analyze on-chip superconducting devices"*
- **Lily J. Stanley** *"For her discovery of novel dynamics in disordered two-dimensional electron systems with short-range Coulomb interactions and studies of the 2D metal-insulator transitions"*

Yung Li Wang Award

- **Jennifer Neu** *"For her discovery of a superconducting dome in the exotic superconductor $Nb_2Pd_xSe_5$ and presence of long range incommensurate superstructures"*
- **Sangsoo Kim** *"For excellent research contributions in magnetic characterization of spinel thin films and for excellence in performing his TA duties"*
- **Wenkai Zheng** *"For exposing the rich inter-layer exciton physics in moire lattices of metal monochalcogenides"*

John E. & Melissa D. Gray Novotny Award

- **John McFarland** *"For his discovery and development of new computational methods to tackle the quantum many-body problem"*

Clara Kibler Davis Scholarship

- **Greta Chappel** *"For investigations of the strongly correlated electron state in the compound URu_2Si_2, clarifying the roles of hybridization between electron states and effective charge doping"*

Lynn Shannon Proctor Award

- **Giovanni Franco Rivera** *"For excelling in his work on sensitive spin detection using a superconducting microwave cavity on a chip"*

Anna Jane Hendren Runyan Graduate Award

- **Jing Lu** *"For her continued excellence in research and her exemplary contributions to multiple observational programs"*

‘Awards Ceremony 2021’
—continued from previous page

- **Major Michael J. Mills Scholarship in Astrophysics**
  - **Felipe Maldonado** *“For exploring the cosmological constraints made possible by the next generation of cosmic microwave background measurements, and for exemplary outreach work that brings the science of astrophysics to primary and secondary schools and to diverse audiences”*

FACULTY & STAFF AWARDS and RECOGNITION

- **PAI Award for Excellence in Teaching**
  - **Ted Kolberg**
  - **Rachel Yohay**

- **Physics Atom Award**
  - **Melissa Bunker**

- **Recognition of Service**

  5 Years of Service
  - **John Whitaker**

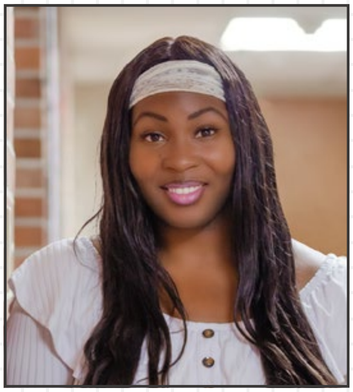
  10 Years of Service
  - **Jason Aragon**

  15 Years of Service
  - **Mark Cartagine**

  25 Years of Service
  - **Joe Ryan**

- **In Recognition of Dedicated Scholarship and Service**
  - **Hon Kie Ng** *1988–2021*

Jenny Zhou
BUSINESS MANAGER



Ashley West
HR REPRESENTATIVE

Justine Carré Miller
STUDENT AFFAIRS COORDINATOR

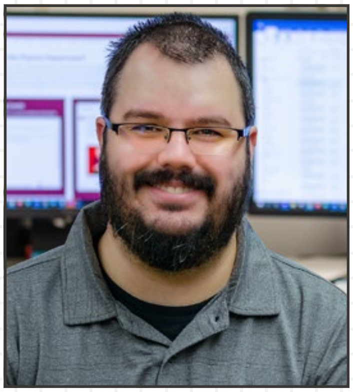
Staff announcements

Since our last newsletter, there have been significant personnel changes made here in the physics department. As a metaphorical subway ride between the prior and current newsletter "stops," a number of people have come on board, some have departed, and some did both along the way.

Noteworthy personnel who have retired include Greg Brown, Kathy Mork, Roger Beck and Eva Crowdis. All worked here for many years, and their extensive, professional and dedicated work was—and is—so very much appreciated by the physics family.

The COVID pandemic definitely put a strain and hardship on everyone as the department continued diligently pushing forward on its teaching and research missions. Working remotely posed challenges and a few staff members actually continued working on-campus during that entire time. The entire staff's admirable hard work and perseverance, especially this past year-and-a-half, is gratefully recognized and deeply appreciated.

We want to welcome a number of staff members who came on board since the last newsletter (and a few who began their employment *during* the campus lockdown). These are: John Whitaker, Jenny Zhou, Iris Pounsberry, Tennessley Harris, Christine Huang, Ashley West, Carissa Hollis, and Justine Carré Miller. *Welcome, all!* ⚛



John Whitaker
I T SUPPORT SPECIALIST

Tennessley Harris
ACCOUNTING REPRESENTATIVE

Carissa Hollis
GRANTS COMPLIANCE ASSOCIATE

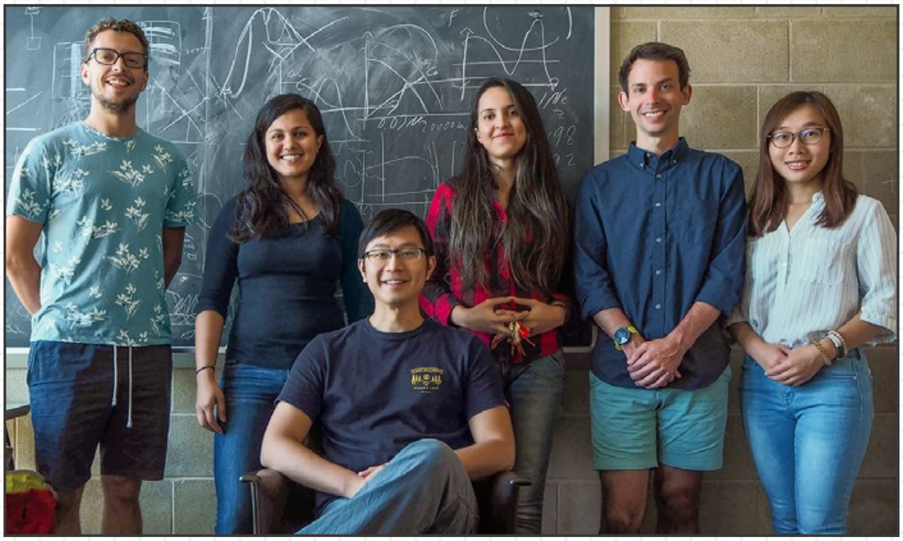
Christine Huang
TRAVEL ASSOCIATE

Iris Pounsberry
I T SUPPORT SPECIALIST

astrophysics update

Eric Hsiao joins FSU Astrophysics group in 2015

Professor Eric Hsiao joined the FSU physics department in 2015. He grew up in Taipei, Taiwan, and moved to the west coast of Canada in high school. Hsiao received his Ph.D. from the University of Victoria in Canada in 2009. He went on to hold postdoctoral research positions at Berkeley Lab, Carnegie Observatories, and Aarhus University, where he worked on various observational surveys, wide-ranging in their survey characteristics, including the Carnegie Supernova Project (CSP), Supernova Cosmology Project (SCP), Nearby Supernova Factory (SNfactory), Supernova Legacy Survey (SNLS).



Eric Hsiao (seated) and his group (from right to left): Chris Ashall, Sahana Kumar, Melissa Shahbandeh, Scott Davis, and Jing Lu.

Hsiao's research group at FSU has been laying the groundwork for future space-based missions, such as the James Webb Space Telescope (JWST) — the successor of the Hubble Space Telescope — and the Nancy Grace Roman Space Telescope (RST), the premier telescope for the next generation of dark energy experiments. With the first-of-its-kind infrared data set, the group has provided insights into the progenitors of core-collapse supernovae and concrete improvements in the use of thermonuclear supernovae as a probe for Universal expansion. Through the aid of theoretical expertise at FSU and the unique data set from CSP, the group has also made the surprising discovery of the origin of the peculiar "super-Chandrasekhar-mass" Type Ia supernovae through several lines of evidence to be published in three papers.

The research group included Christopher Ashall, Scott Davis, Sahana Kumar, Jing Lu, and Melissa Shahbandeh. Since 2016, the group has produced over 70 refereed publications and generated over 1,600 citations. Graduate student Davis defended his Ph.D. thesis and secured a postdoc position at the University of California, Davis in 2020. Postdoc Ashall has also moved on to his next postdoc position at the University of Hawaii.

Hsiao also led the effort to secure funding and a permanent site for an astronomical observatory and now serves as the director of the FSU Observatory completed in 2019. The observatory is now an important component of the physics department's education and outreach efforts. ⚛

condensed matter & materials physics update

New CMMP faculty: Dr. Hitesh Changlani

Hitesh Changlani

Dr. Hitesh Changlani joined the FSU Physics faculty as an assistant professor in August 2018.

A former postdoctoral research fellow at the University of Illinois at Urbana-Champaign and Johns Hopkins University, Changlani is interested in correlated quantum systems of many strongly interacting particles. These systems harbor new forms of magnetism such as quantum spin ice, quantum spin liquids, valence bond solids and spin nematics. For this purpose, his group uses a combination of analytical insights and state-of-the-art computer algorithms closely working with experimentalists at the MagLab and elsewhere.

Specifically, his research interests include the study of equilibrium and non-equilibrium dynamics of electrons in Mott insulators and geometrically frustrated magnets, and the development of numerical techniques for the quantum many-body problem (tensor networks, Monte Carlo and density matrix downfolding). The goal is to predictively model quantum materials to enable a resolution of outstanding fundamental physics questions, and thus to pave the way for future technologies.

He is the recipient of the 2021 NSF CAREER award titled *CAREER: Towards Predictive Modeling of Emergent Correlations and Dynamics in Strongly Interacting Quantum Matter.*

New CMMP faculty: Dr. Guangxin Ni

Dr. Guangxin Ni joined the FSU Physics faculty as an assistant professor in January 2020. Dr. Ni is a former postdoctoral research scientist at Columbia University in the city of New York.

Professor Ni's research in experimental condensed matter physics involves the study of light-matter interactions in low-dimensional quantum materials down to the nanometer length scales. In his laboratory at the Maglab, Ni attempts to first focus on the programmable two-dimensional van der Waals heterostructures, where novel quantum effects could be identified and investigated using scanning nano-light excitations.

Harnessing strong light-matter interactions represents a unique way to explore new types of quantum systems under extreme conditions, beyond what is attainable with conventional optics, and could lead to the development of new types of quantum devices on-demand. Ni is also developing new types of scanning nano-optical methodologies operating at ultrahigh vacuum conditions, cryogenic temperatures and high magnetic field conditions.

The delivery of such unique apparatus is anticipated to benefit the explorations of a broader class of quantum solids for both fundamental science and potential quantum technological applications. He is the recipient of the 2021 DOE CAREER award titled *Probing Quantum Materials with Evanescent Waves Using Advanced 4-Dimensional Scanning Near-Field Optical Microscopy.*

Guangxin Ni

‘CMMP Update’
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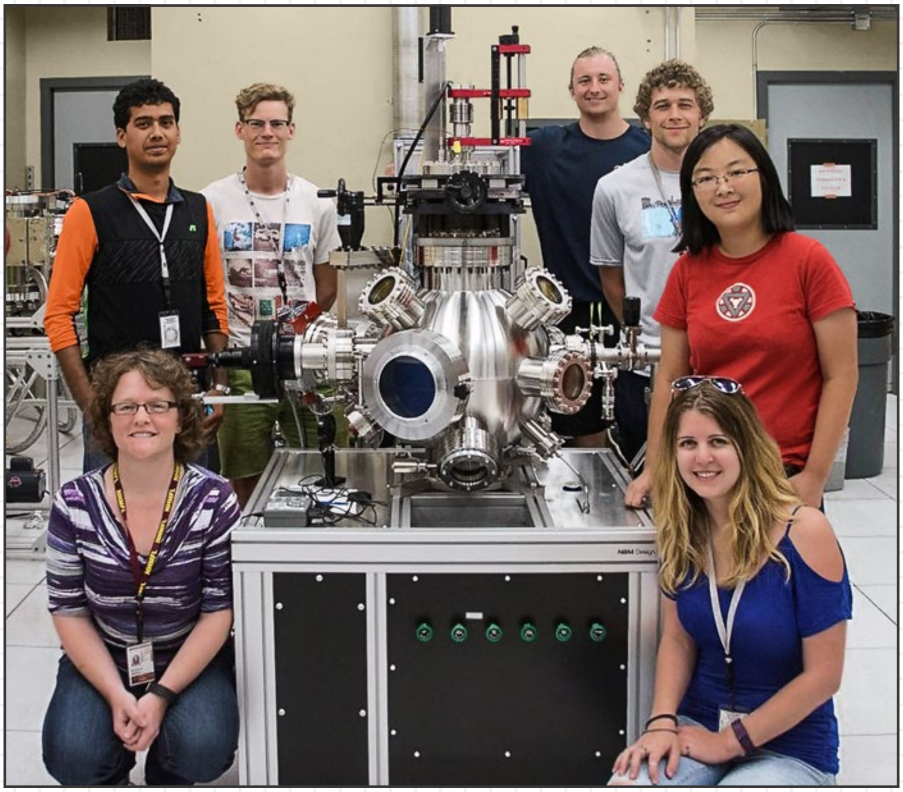
CMMP faculty update: Dr. Christianne Beekman



The Beekman Group. Clockwise from lower left: Professor Christianne Beekman, Naween Anand, Samuel Cherrier-Vickers, Scott Wallace, Kevin Barry, Biwen Zhang, and Christie Thompson.

Professor Christianne Beekman joined the department in 2014. Christianne grew up near Amsterdam in the Netherlands. She received her Master’s degree in physics from Leiden University in the Netherlands in 2005 and her Ph.D. from the same university in 2010. She held postdoctoral positions at the University of Toronto and at Oak Ridge National Laboratory. In Toronto, she worked on optical characterization of multiferroics and topological insulators, and in Oak Ridge she worked on growth and characterization of thin films of multiferroics.

Since joining FSU, the Beekman group has established an externally-funded research program that focuses on magnetically frustrated systems such as pyrochlores and spinels. The complex oxides that the group investigates are often composed of multiple elements, including transition metals, usually resulting in complex lattice structures and exotic correlated physics. The interaction between various competing orders involving spin, charge, orbital, and lattice degrees of freedom often lead to remarkable physical properties and concomitant exciting multifunctionalities, which can be structurally tuned. The Beekman group aims to control these correlated states using external perturbations including strain engineering, electric fields and optical excitations. The group has set up a state-of-the-art thin film deposition facility and has developed thin film growth recipes for various materials. Leveraging various available characterization facilities at national laboratories across the US, Beekman’s group uses neutron diffraction, capacitive torque magnetometry, and magneto-optical measurements to characterize fundamentally and technologically relevant properties in strained and confined versions of frustrated antiferromagnets. These intensive efforts are expected to lead to new insights into a broad range of fundamental physical properties as well as to advancements in “materials by design” research strategies.

Beekman’s group included Kevin Barry, Christie Thompson, Naween Anand, Samuel Alvado Cherrier-Vickers, Scott Wallace, Biwen Zhang, and Sangsoo Kim. Since 2015, the group has produced more than 10 refereed publications, including invited perspectives in *Science*. Graduate students Barry and Thompson graduated in 2020. Barry now holds an Associate Battery Engineer position with a company in Indiana. Postdoc Anand moved on to his next postdoc position at Argonne National Laboratory after leaving the group in late 2018.

Among numerous awards, Christianne received one of the most prestigious NSF Early Career Awards in 2019. Christianne spearheaded the development of a new course, “Materials Synthesis and Applications” and a new undergraduate lab—for which she obtained funding—to strengthen the physics department’s education in the area of materials science. ⚛

high energy update

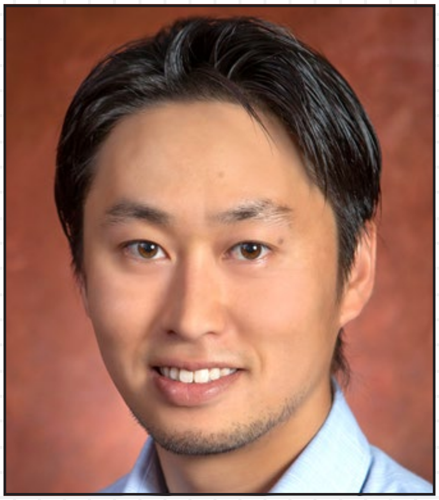
Laura Reina
FSU PHYSICS PROFESSOR

High Energy Physics is living through a very exciting time of discoveries (including the discovery of the Higgs boson by the Large Hadron Collider experiments at CERN, in 2012) and explorations of known and unknown fundamental interactions through a broad spectrum of experimental and theoretical developments. The FSU High Energy Group has been a leading player in this arena through the work and achievements of past and current members, and has gained even more momentum thanks to the new colleagues who have joined the group in recent years.

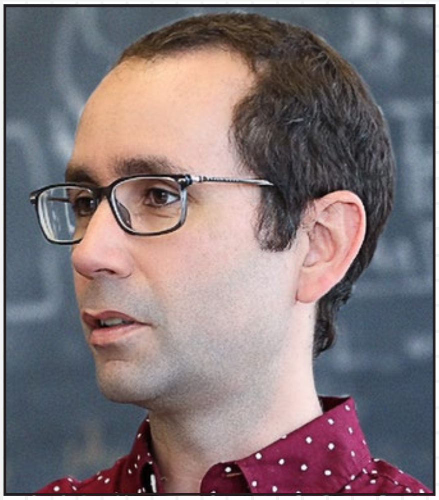
Ted Kolberg

Over the past five years, three long-standing members of the group retired: Jeff Owens (theory, 2017), Bernd Berg (theory, 2019), and Horst Wahl (experiment, 2020), while the group has welcomed four outstanding new members: Ted Kolberg and Rachel Yohay in 2016, and Fernando Febres Cordero and Kohsaku Tobioka in 2018. Kolberg and Yohay joined the HEP experimental group working on the CMS experiment at the CERN Large Hadron Collider and re-started our detector development lab with significant responsibilities for the upgrade of the CMS detector planned to start in 2025. Yohay was awarded a U.S. Department of Energy Early Career Award in 2018. In addition to their work on the upgrade of the CMS detector, Kolberg uses the CMS data to search for new, long-lived particles and works on operations of the hadronic calorimeter while Yohay searches for new decay modes of the Higgs boson and works on the inner silicon tracker. Febres Cordero and Tobioka joined the HEP theory group, complementing and broadening our existing research activities in precision physics and new physics exploration at colliders and beyond. Febres Cordero has been spearheading the development of groundbreaking techniques for the calculation of scattering amplitudes from collider events to black-hole merging, while Tobioka is leading a comprehensive program of new physics investigations that connects information from a uniquely broad spectrum of data, from low energy experiments to cosmological measurements. Other long-time members of the group are Harrison Prosper (experiment), Laura Reina (theory), Susan Blessing (experiment), Todd Adams (experiment), Andrew Askew (experiment), and Take Okui (theory).

Rachel Yohay



Kohsaku Tobioka



Fernando Febres Cordero

Senior members of the group have taken up important scientific responsibilities in the HEP community, with Harrison Prosper elected Chair of the CMS Collaboration Board (2019-2021) and Laura Reina serving on the High Energy Physics Advisory Board (2015-2018) and as Theory Convener of the Energy Frontier during the ongoing Particle Physics Community Planning Exercise (2020–2022).

For an article on two major conferences the group has been honored to host recently, please see page 15 of this issue. ⚛

Physics Department hosts pair of major conferences in 2021

Laura Reina
FSU PHYSICS PROFESSOR

In 2021, members of the High Energy Physics (HEP) group organized two major conferences that have virtually connected hundreds of colleagues from around the world to our department, and highlighted its scientific strength.

The 15th International Symposium on Radiative Corrections (RADCOR 2021) (https://indico.cern.ch/event/958085/), held May 17–21, is a biennial conference that rotates among Europe, Asia, and the Americas, and is dedicated to the application of quantum field theory techniques to particle physics phenomenology, with particular emphasis on precision calculations for colliders, progress in higher-loop and higher-multiplicity calculations in the Standard Model, cross sections for new physics, new techniques for calculations, advances in computer-algebra methods, and new theoretical developments.

This year, it was held in conjunction with the XIX Workshop on Radiative Corrections for the LHC and Future Colliders (LoopFest), organized at FSU by Fernando Febres Cordero, Manfred Kraus, and Laura Reina, with the help of graduate students Gustavo Figueiredo, Angelica Goncalves Dos Santos, and Irene Roman. With almost 300 attendees, it represents the major event in this fundamental area of collider physics in the last two years and a great scientific recognition for the HEP theory group.

In Summer 2021 (July 12–14), the HEP group also hosted the Meeting of the Division of Particle and Fields of the American Physical Society (DPF 2021) (https://indico.cern.ch/event/1034469/), a biennial meeting that focuses on the most recent developments in particle physics over a broad spectrum of topics, and discusses future plans and directions for this field. With an emphasis on highlighting the work of young researchers, it represented a particularly important event this year, since DPF is coordinating the 2021–2022 Snowmass Community Planning exercise, a physics study that will inform decisions on future directions in particle physics. The meeting had more than 900 participants and offered both plenary, parallel, and community discussion sessions. The organizing committee consisted of Todd Adams, Fernando Febres Cordero, Vasken Hagopian, Ted Kolberg, Laura Reina, Host Wahl, and Rachel Yohay and its success was made possible by the contribution of all members of the HEP group, including our wonderful postdocs and graduate students.

We would like to recognize the support of the FSU Physics Department, the FSU College of Arts and Sciences, and the FSU Office of Research for the support that made both events possible. ⚛

The poster for 2021's DPF Meeting. For the RADCOR/LoopFest 2021 poster, please see the following page.

The RADCOR/LoopFest 2021 poster.

The National High Magnetic Field Laboratory (MagLab) glows at night under the star-studded Tallahassee sky. Courtesy NHMFL.

nuclear physics *update*

Nuclear Physics Group update: Local and National Context

The FSU nuclear physics group has a long history of excellence combining the opportunities afforded by the local laboratory with other facilities on the national and international stage. Three groups make up the nuclear physics effort at FSU: The FSU Nuclear Hadronic Physics program is centered at Jefferson Lab, continuing in high gear with a leadership role in GlueX, recently augmented by new faculty member Sean Dobbs. The Relativistic-Heavy-Ion-Collision research is centered at the RHIC laboratory, with strong FSU contributions to the new sPhenix detector system. For the area of Nuclear Structure and Nuclear Astrophysics, a major boost will come in 2022 from the beginning of operations at the new FRIB national facility, located at Michigan State University. FRIB is designed to give scientists access to the properties and reactions of the most exotic nuclei, with extreme neutron-to-proton ratios and at the limit of nuclear binding. FSU is well-positioned to become a driving force at this new laboratory, with three new faculty active in this area: Sergio Almaraz-Calderon, Mark Spieker and Vandana Tripathi. At the same time, these new researchers also develop new research opportunities at the John D. Fox Accelerator Laboratory on FSU's campus, which will be described below.

Exploring the synergy between nuclear physics and astrophysics has always been a core mission of the field and a major focus for FRIB science. At FSU, strong groups in experimental and theoretical low-energy nuclear physics, as well as in astrophysics and astronomy work in synergy to tackle the open questions at the crossroads of these disciplines. The programs are funded by the Department of Energy (DOE) and the National Science Foundation (NSF). FSU plays a major role in the FRIB Theory Alliance.

One constantly renewing resource for FSU nuclear physics is the excellent team of graduate students: As one of the leading educators in the U.S. in the field of nuclear physics (fourth-highest Ph.D. productivity in the U.S.), Florida State University has trained many students who now play key roles in nuclear science, homeland security, national defense, health care, high-tech industry, and education. ⚛

New Nuclear faculty: Sean Dobbs (in his own words)

I was born in 1980 in Philadelphia, spending my childhood up and down the east coast before earning my BS in Physics and Computer Science from Carnegie Mellon University in 2003. I moved to Northwestern University, obtaining my Ph.D. in 2011, and continued my postdoctoral research there, eventually achieving the rank of assistant research professor. The majority of my research at Northwestern focused on the analysis of electron-positron collision data in the charmonium and bottomonium sectors from the CLEO experiment at Cornell University, including searches for the elusive spin-singlet heavy quarkonium states, searches for exotic multiquark states, and a series of precision measurements of timelike hadronic form factors. In 2013, I joined the GlueX Collaboration, a photon beam experiment located at Jefferson Lab

Sean Dobbs

in Newport News, Virginia, and took on major responsibilities for the preparation and commissioning of this experiment.

I joined the faculty of Florida State University in August 2017 as an Assistant Professor, coincidentally the same year that GlueX started its first major data collection campaign. I have played a leading role in the acquisition and analysis of this data, first as the Calibration Coordinator for the experiment, and in 2020 was elected the Physics Analysis Coordinator. My research group is investigating several topics available in the large GlueX data set, including studies of eta and eta´ meson decays, and searches for hybrid mesons, multiquark and other exotic hadrons. I have also lead the study of charmonium production in GlueX, including the first measurement of J/psi photoproduction near threshold, leading to new insight into the nature of the mass of the proton, and a search for

'Nuclear Physics Update'
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charm-quark-containing pentaquarks. These studies are being extended with high precision and to additional charmonium states as more data have become available.

GlueX started its second run in 2020, with an improved detector and more intense photon beam, and plans to run for several more years to collect a data set four times larger than its initial run. This data will allow for more detailed searches of exotic hadrons, particularly those containing strange quarks, more studies of photoproduction in the charm quark sector, and hopefully some new surprises along the way. I am also involved in other future efforts to use the GlueX detector, being a co-spokesperson of the KLF K-Long meson beam experiment, which will give further insight into the spectroscopy of strange quark hadrons, and am also a member of the PANDA proton-antiproton annihilation experiment, both of which are scheduled to start taking data after 2025. ⚛

New Nuclear faculty: Mark-Christoph Spieker (in his own words)

I was born in September 1986 in Bielefeld, Germany. I earned bachelor's (2010) and master's (2013) degrees in Physics from the University of Cologne in Germany. In 2017, I received the title of Dr. rer. nat. in Experimental Physics (Ph.D. equivalent) from the Faculty of Mathematics and Natural Sciences of the University of Cologne. During my doctoral studies and as part of the group of Professor Andreas Zilges, I performed particle-gamma coincidence experiments to study different aspects of nuclear structure at the Cologne laboratory and different international laboratories, specifically focusing on electric dipole excitations in atomic nuclei. From November 2017 to October 2019, I worked at the National Superconducting Cyclotron Laboratory (NSCL) located at Michigan State University as an NSCL fellow with Professor Alexandra Gade. Here, I was the research associate in charge of the various gamma-ray spectroscopy setups operated by the group of Professor Gade. The setups included among others the Gamma-Ray Energy Tracking In-beam Nuclear Array (GRETINA) during its third campaign at the NSCL. I joined Florida State University as an Assistant Professor in October 2019. In May 2020, I received the FRIB (Facility for Rare Isotope Beams at Michigan State University) Visiting Scholar Award for Experimental Science to conduct a PAC-approved experiment with GRETINA, the S800 and the liquid hydrogen target in the neutron-deficient Kr isotopes at the NSCL. The experiment ran in August 2020. At the moment, I am the chair of the GRETINA-GRETA User Executive Committee (term ends January 2022).


Mark-Christoph Spieker

My research group, currently including two graduate students (Alex Conley and Bryan Kelly), performs experiments to study different nuclear-structure phenomena, which could also significantly influence reactions taking place in explosive stellar scenarios. The experiments are performed at the John D. Fox Laboratory at Florida State University. At the heart of the program stands the FSU Enge Split-Pole Spectrograph (SPS). This is a magnetic spectrometer which allows for detailed studies of excited states of the atomic nucleus due to its excellent energy resolution. Gamma decay properties of excited states can be selectively studied in particle-gamma coincidence experiments. For these experiments, my group is building a highly efficient CeBr3 scintillator array and a new scattering chamber. We have already performed nuclear-structure experiments with GRETINA, the S800 spectrograph and the liquid hydrogen target at the NSCL to study octupole excitations in the neutron-deficient Kr isotopes. Plans to continue the experiments at the upcoming Facility for Rare-Isotope Beams (FRIB) are in place and a proposal was submitted to the first call for proposals. If accepted, we will be able to study collective excitations in ^{98,100}Zr, two nuclei which have significantly changed our understanding of dynamic shell evolution during recent years. Future plans for the Fox lab include the addition of fast-timing and conversion electron detection capabilities to the SPS ancillary detector systems. ⚛

'Nuclear Physics Update'

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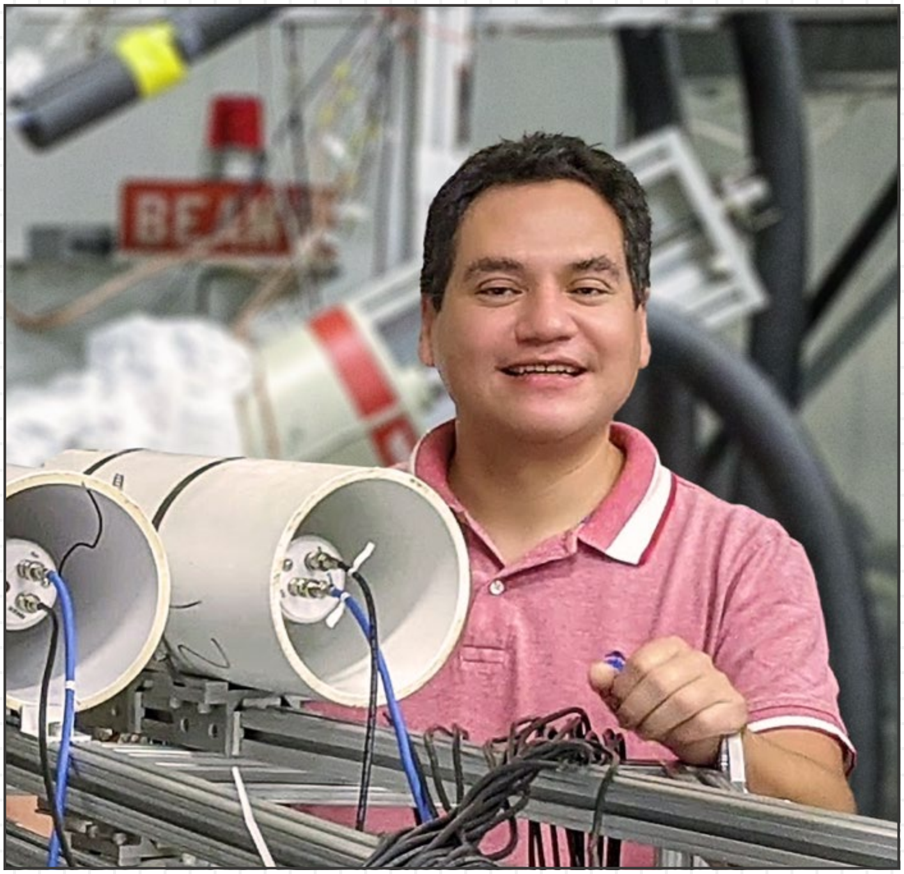
New Nuclear faculty: Sergio Almaraz-Calderon (in his own words)

I was born in Tenancingo, Mexico. I did my undergraduate studies (B.Sc.) in physics at the National University of Mexico (UNAM). As a part of an international REU program, I visited the University of Notre Dame in the summer of 2003. After graduating from UNAM in 2004, I moved to the US to attend graduate school at the University of Notre Dame where I joined the research group of Professor Ani Aprahamian. I got my M.Sc. degree in 2007 and my Ph.D. in 2012 from the University of Notre Dame. My research at that time focused on the study of low-lying resonances in light exotic nuclei relevant for nuclear structure and nuclear astrophysics. After completing my Ph.D., I joined Argonne National Laboratory as a postdoctoral fellow in the Low Energy nuclear physics group where I specialized in nuclear astrophysics working with Dr. Ernst Rehm in the study of nuclear reactions with short lived nuclei and detector development. I joined Florida State University as an Assistant Professor in the Physics Department in January of 2015. I will be promoted to associate professor in the upcoming Fall 2021 semester.



Sergio Almaraz-Calderon

At FSU, my research focuses on nuclear reactions with short-lived radioactive beams that can influence astrophysical processes as well as in the development of novel experimental techniques and detector systems. My research takes place at the local John D. Fox Accelerator Laboratory at Florida State University as well as in other facilities around the country, such as Argonne National Laboratory, the Edwards Nuclear Laboratory at Ohio University, and the Cyclotron Laboratory at Texas A&M. One of my lines of research has been understanding the observation of the 1.8 MeV gamma-ray line detected by gamma-ray telescopes like COMPTEL and INTEGRAL throughout the Galaxy, as well as the enrichment of ^{26}Mg found in meteorites and pre-solar grains. Both observations have been linked to the decay of the radioactive nucleus ^{26}Al, which confirms that active stellar nucleosynthesis is ongoing in our galaxy. For this purpose, I have developed and performed measurements using isomeric beams (long-lived excited states in nuclei), as well as developed active-target detectors and neutron detector systems. My research group currently consists of five graduate students (Nathan Gerken, Jesus Perello, Benjamin Asher, Ashton Morelock and Eilens Lopez-Saavedra. Nathan has successfully defended his Ph.D. dissertation and he just graduated in Spring 2021. Jesus and Ben will defend their dissertations in the Summer of 2021). Plans in my research group include constant innovation of detection systems and techniques in experimental nuclear physics; coincidence measurements using neutron, gamma-ray and charged-particle detectors, and studies with isomeric beams. Besides my work at the John D. Fox Accelerator Laboratory at FSU, at Argonne National Laboratory, and other facilities around the world, I am eager to take advantage of the exciting research opportunities in nuclear structure, nuclear reactions and nuclear astrophysics that will open at the Facility for Rare Isotope Beams (FRIB), the state-of-the-art experimental facility for nuclear physics in the US. ⚛

'Nuclear Physics Update'
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New Nuclear faculty: Vandana Tripathi (in her own words)

I was born in Agra, India and finished my early and higher education there. I obtained my Ph.D. in experimental low energy Nuclear Physics from Jawahar Lal Nehru University while working at the Inter University Accelerator Center in New Delhi. A short one-year postdoc at the Bhabha Atomic Research Center (BARC), Mumbai led to Scientific Officer D position at BARC. However, personal reasons made me relocate to Florida State University where I worked as a post doc, then as Research Faculty before transitioning to Assistant Professor at the Department of Physics in 2019.

My research focuses on experimentally understanding the structure of nuclei especially those that lie away from stability. The nucleus as we know consists of positively charged protons and neutrons which are neutral. These nucleons are under the influence of the repulsive Coulomb force amongst the protons and strong attractive nuclear force between all nucleons. The balance between the two decides the stability of the nucleus and hence only certain isotopes are stable. With too large or too small a neutron number, the nucleus becomes unstable or "radioactive" and may undergo beta emission as one of the possible paths toward attaining stability. These short-lived or "exotic" nuclei display properties which are distinct from their stable counterparts. Knowledge of their properties is important to understand the nuclear interaction and they also play a key role in nucleosynthesis. We explore the ground and excited state properties of these "hard to reach" nuclei by exciting them via nuclear reactions. For my work, I use gamma ray spectroscopy to study the deexcitation process to obtain information on excited states which can then be compared to theoretical predictions and are also used in informing nucleosynthesis.

Vandana Tripathi

My research work is based at the John D. Fox Superconducting Laboratory at FSU, where we exploit fusion evaporation reaction to study the excited states in neutron-rich nuclei using the FSU gamma ray array. Additionally, beta decay of very exotic nuclei can provide information on more exotic nuclei and this work is carried out at the National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University. As the NSCL transitions to FRIB, the premier radioactive beam facility in the world we look forward to more exciting physics. The ATLAS facility at Argonne National Laboratory with powerful gamma ray detectors like GAMMASPHERE and GRETINA provides another venue to extend our knowledge of properties of nuclei away from stability. ⚛

'Nuclear Physics Update'
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FRIB-Theory Alliance Bridge Position

JORGE PIEKAREWICZ
FSU PHYSICS PROFESSOR

Nuclear physics is at the dawn of a new era of discoveries enabled by the commissioning of new experimental facilities, remarkable theoretical advances, and the first direct detection of gravitational waves from a binary neutron-star merger. This historical detection is providing fundamental new insights into the nature of dense matter and the astrophysical site for the rapid-neutron-capture process (r-process)—topics central to the science mission of the Facility for Rare Isotope Beams (FRIB), scheduled to become operational by 2022. Other more recent discoveries—both in heaven and on earth—have strengthened the synergy between astrophysics and nuclear science.

Advances in nuclear theory underpin the goal of understanding how nuclei and strongly interacting matter in all its forms behave. During the most recent 2015 Long Range Plan for Nuclear Science, the community recognized that in order to realize the full scientific potential of current and future experimental facilities, new investments in theoretical nuclear physics are required. The FRIB theory alliance emerged to enhance and support FRIB's scientific mission. A central mission of the theory alliance is to enhance the field through the national theory fellow program and tenure-track bridge positions at universities and national laboratories across the US. The faculty bridge program enhances opportunities for theory faculty hires at universities, with a 50 percent cost share with the host institution for a period of up to six years. Given the exciting science and obvious benefits, Florida State University entered into a partnership with the FRIB theory alliance to conduct a search in theoretical nuclear physics.

The search committee received excellent applications and decided to invite four candidates for interviews, all of which were conducted via Zoom during the 2021 Spring semester. We are pleased to announce that Dr. Kevin Fossez will be joining the Physics Department this fall. Kevin obtained his Ph.D. from the University of Caen, France in 2014 and then went to Michigan State University (the home of FRIB!) to conduct theoretical research in nuclear structure, nuclear reactions, and nuclear astrophysics, all areas of great relevance to the scientific program at FRIB. Kevin moved to Argonne National Laboratory in 2019 as a FRIB Theory Fellow, further solidifying his connection to the FRIB science program.

Kevin will be joining the group of nuclear/hadronic theorists made up by Simon Capstick, Jorge Piekarewicz, Winston Roberts, and Alexander Volya. Kevin is an expert in the physics of open quantum systems, where the continuum plays a critical dynamic role in the structure of the very neutron-rich nuclei that will be produced at FRIB. Kevin will develop fruitful collaborations with members of both the theoretical and experimental nuclear groups here at FSU, and will provide valuable insights and support to the scientific mission of FRIB. We are delighted to have Kevin join the FSU Physics family. ⚛

New Nuclear faculty: Kévin Fossez (in his own words)

I was born in Normandy, France, and got my Master's degree in physics at the University of Caen and did my Ph.D. at a French national laboratory called the Grand accélerateur d'ions lourds GANIL, where I studied dipolar anions and exotic nuclei as open quantum systems. Then, I moved to East Lansing, Michigan, to work as a postdoctoral researcher at Michigan State University and the Facility for Rare Isotope Beams (FRIB) in two different groups focusing on exotic nuclei and the nuclear ab initio many-body problem, respectively. There, I developed a research program that was awarded by the FRIB Theory Fellow, allowing me to work at Argonne National Laboratory (ANL) near Chicago, before joining FSU on an FRIB Bridge position.


Kévin Fossez

My research interests include the study of many-body open quantum systems at the atomic and nuclear scales, with a focus on emergent phenomena in weakly bound and unbound nuclei present in astrophysical processes, which reveal unique information about nuclear forces and how the atomic nucleus self-organizes. This research program supports the scientific effort led by the FRIB community as well as the experimental program at the John D. Fox Laboratory at FSU.

In the future, I plan to develop new models of nuclear forces and new many-body approaches for the description of exotic nuclei at the limits of nuclear stability that will be studied by the FRIB community, of which FSU is a part. The long-term goal is to understand how properties of exotic nuclei emerge from quarks and gluons to nucleons and nuclei. ⚛

‘Nuclear Physics Update’
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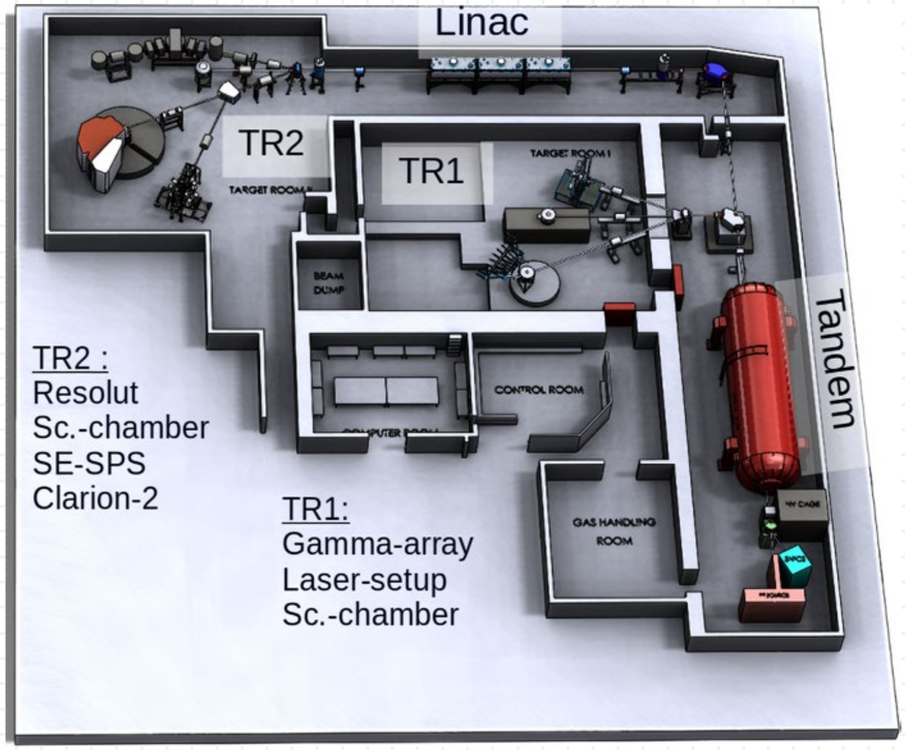
Keeping it fresh: The John D. Fox Accelerator Lab at 60

Ingo Wiedenhöver
FSU PHYSICS PROFESSOR

The FSU Nuclear Structure and Nuclear Astrophysics group has built its strength on the connection between research performed at the national laboratories with the work at the local John D. Fox Superconducting Accelerator Laboratory, which has just celebrated its 60-year anniversary. (http://fsunuc.physics.fsu.edu). The three new faculty members Sergio Almaraz-Calderon, Mark Spieker and Vandana Tripathi are developing strong research programs at the Fox Lab in addition to their programs at FRIB. This local laboratory has repeatedly reinvented itself and engaged at the forefront of research topics. Continually funded for decades by the National Science Foundation, the group has been awarded a three-year $5.7M grant to support laboratory operations, graduate students and research projects. The following projects represent the three major thrusts of scientific research at the John D. Fox Laboratory, and all three are pursuing new research opportunities with the same overarching goals as FRIB.



Floorplan of the John D. Fox Superconducting Accelerator Laboratory at FSU.

Nuclear astrophysics research at the RESOLUT radioactive beam facility

Already active for 15 years, the laboratory has performed research with beams of radioactive nuclei delivered by the RESOLUT facility. The program is measuring nuclear reactions that drive explosive nucleosynthesis and determine the chemical evolution of the universe. Experiments have delivered prominent results on Big-Bang nucleosynthesis and reactions triggering thermonuclear explosions such as Novae and X-ray bursts. A current specialty of RESOLUT is the delivery of nuclei in short-lived isomeric states, which may play a crucial role in the production and destruction of certain radioisotopes, such as 26Al. These have been observed through gamma-ray astronomy throughout the galaxy and are being used to deduce the chemical impact of massive star explosions. Over the next several years, RESOLUT will perform experiments to calibrate the nuclear reactions in the outer layers and ejecta of Type-Ia supernovae. This topic is developed in collaboration with the FSU astrophysics group, who want to use the observation of the outer layers of supernova ejecta to diagnose the impact of progenitor stars on the ignition mechanism and the light curve of these astronomical standard candles.

Research with beams of exotic nuclei requires very different experimental methods than conventional accelerator experiments. The program around RESOLUT has spawned a collaboration between FSU and LSU to develop highly-specialized detector systems for this type of experiment, such as the active-target detector ANASEN, which currently is the world-leading detector of its type that is optimized for low-cross-section reactions. As an example of the mutual benefits of the local program for the national and international laboratories, ANASEN will be used at the TRIUMF Canadian national lab this year for a series of experiments and will likely later play the same role for FRIB.

‘Nuclear Physics Update’

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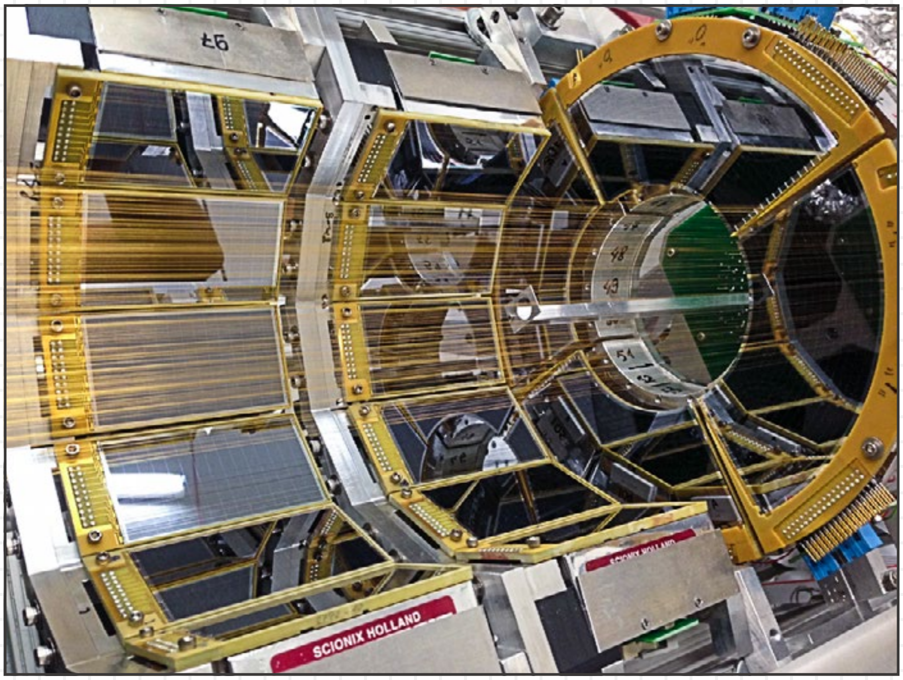
New ‘Super’ Enge Split Pole Spectrograph

A new capability for the Fox-lab is the high-resolution “Super” Enge Split Pole Spectrograph, which was brought to FSU in 2013 after its previous host, the Yale accelerator laboratory, ceased operation. The installation of the 32-ton magnet required the construction of a concrete pedestal, which supports the weight on its own foundation of 28 piles, which were inserted through the floor of the existing experimental hall. The spectrograph was commissioned in 2018 in close collaboration with scientists from LSU and has now become the busiest instrument in the laboratory. It earned the “super” designation by providing the largest acceptance of any high-resolution magnetic spectrograph, making it ideal for coincidence measurements in combination with other detector systems.

The spectrograph is frequently used in its classical function to study the orbital composition of nuclear excitations, such as the measurement of the single-neutron strength in the nuclide 51Ti, which has 22 protons and 29 neutrons, one neutron outside of the N=28 “magic” number. The 2019 experiment established the orbital structure of seven states for the first time, confirming the existence of the N=32 gap near the stable nuclei at high excitation energies. This N=32 shell gap also determines the limits of stability in very exotic neutron-rich Z=14 Silicon isotopes, a topic of high interest at FRIB.

A new experimental program is being developed around the combination of the high-resolution spectrograph with a high-efficiency silicon detector array, again developed in collaboration with LSU. In the area of Nuclear Astrophysics, this program provides precise resonance



The ANASEN “active-target” detector system during assembly. ANASEN was developed by a collaboration between FSU, LSU and Texas A&M groups to perform experiments at the John D. Fox Laboratory and national laboratories.

Participants at the Workshop on Science with the SE-SPS, March 22–23, 2019.

‘Nuclear Physics Update’

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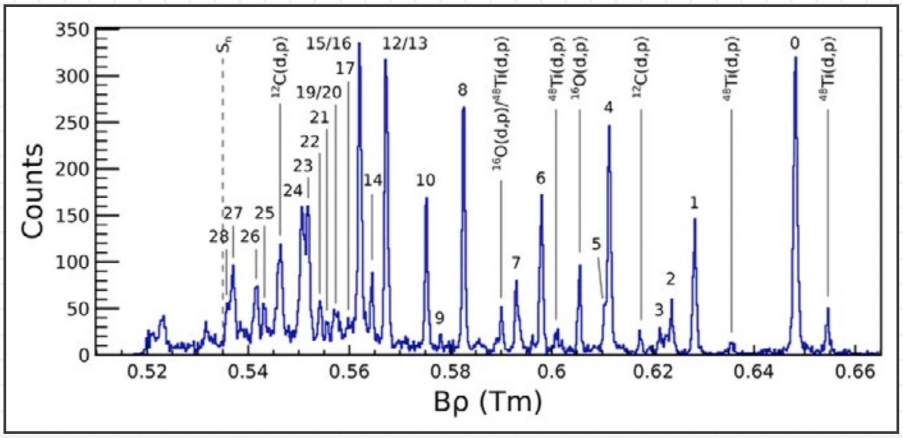
energies and decay-branches, quantitative information on reactions where low cross sections prohibit direct measurements, even at FRIB. This type of information also serves to guide direct experiments at FRIB and other laboratories. The coincidence capability also allows the FSU group to study the effects of the continuum on the wave functions of resonant states in unprecedented detail, a mechanism at play in the most exotic nuclei to be studied at FRIB. New faculty member Mark Spieker is developing a compact gamma-detector array to study the resolved line-structure of the so-called Pygmy Dipole Resonance (a low-energy companion of the Giant Dipole Resonance), which affects the rates at which neutrons are captured in the astrophysical r-process, which creates most heavy elements in the universe and is thought to occur in neutron-star mergers.



Spectrum of the ^{50}Ti(d,p)^{51}Ti reaction, measured at FSU with the SE-SPS. The spectrum confirmed the existence of a N=32 sub-shell gap in Titanium isotopes (L. Riley et al.: *Physical Review C*, in print)

The Clarion-2 frame being assembled at the John D. Fox laboratory, March 2021 by a collaboration from Oak Ridge National Laboratory and the FSU group.

Nuclear structure research and the new Clarion-2 detector array

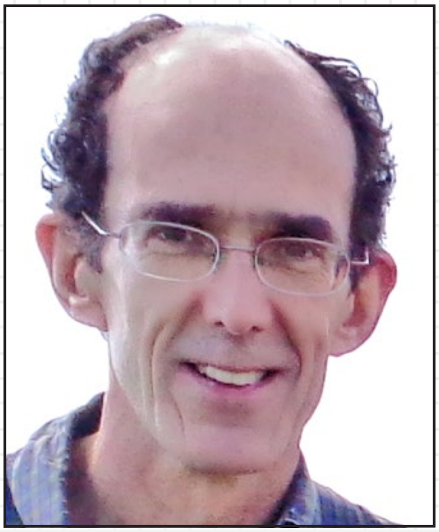
The FSU group has been using a Gamma-detector array to systematically study the excitations of nuclei between ^{16}O and ^{40}Ca with respect to their particle-hole configurations across the N=20 shell gap. The FSU group has also used Gamma-spectroscopy at Michigan State University’s NSCL laboratory to study the modification of the shell structure in the most exotic nuclei, a program that is now receiving a major boost from FRIB. In a synergistic effort with the FSU nuclear theory group, the data was used to optimize a better-designed shell-model interaction, which could reproduce 1p-1h and 2p-2h configurations in this region. This “FSU” interaction has a high predictive power for the more exotic nuclei to be studied at FRIB, which will be used to guide and interpret future experimental findings.

A major development for this line of research is coming from the Clarion-2 gamma-ray spectrometer, currently being assembled at the Fox Lab by a collaboration led by Vandana Tripathi and a group from Oak Ridge National Laboratory. This device will contain up to 16 Clover-type Anti-Compton detector systems and will create a world-class instrument for gamma-spectroscopy at the FSU accelerator with an order-of-magnitude increase of sensitivity. The collaboration is also planning to reconfigure the Clarion-2 system to perform beta-decay gamma-ray spectroscopy experiments at FRIB, which will give FSU first-row access to study the changes in the orbital structures of the most exotic nuclei. ⚛

A brief history of 18 years of ultra-precise atomic mass measurements at FSU

Many physicists are familiar with the Atomic Mass Evaluation, the large compendium of atomic masses of all known isotopes. Less well-known is that the majority of the most precise measurements of atomic masses, those with fractional uncertainties of 0.1 parts-per-billion or less, were made using a unique cryogenic Penning ion trap housed in the Physics Department at FSU.

The FSU mass measurement program, led by Edmund Myers, started in a rather unconventional way. Some time in the 1990s, undergraduate student James K. Thompson (who is now a JILA Fellow and professor at the University of Colorado) worked with Myers as a research student on Myers's then-main research project, laser spectroscopy of highly-charged ions, using ion beams from the tandem accelerator in the nuclear physics lab. During that time, Myers invited David Pritchard, an MIT physicist famous for early work on ultra-cold atoms and atom interferometry, who also had a precision Penning trap for atomic mass measurement, to give a colloquium at FSU. After Thompson left FSU, he joined Pritchard as a graduate student. Several years later, with the idea that Penning traps might be a more suitable tool for precision laser spectroscopy on highly-charged ions than fast beams, Myers made a visit to MIT to learn about Penning traps. While there, Myers realized that the reason for his interest in the MIT trap had been somewhat misconstrued! This became even more apparent, at a conference a year later, when Pritchard informed Myers that a bid from the National Institute of Standards and Technology had fallen through, and that after James Thompson and his co-student Simon Rainville at MIT had finished, Myers could take the whole Penning trap apparatus "south" to FSU. So, in April 2003, after spending a brutal winter at MIT while being introduced to the art of precision mass measurement, Myers, along with FSU graduate student Matthew Redshaw (now a professor at Central Michigan University with his own Penning trap program), drove a Ryder rental truck with the superconducting magnet and other Penning trap apparatus from MIT to FSU. But, in the words of Nobel laureate Eric Cornell, who as a Ph.D. student had previously worked on the Penning trap: "It's not just the trap you need to transfer. It's the technology!"



Edmund Myers

The idea behind the Penning trap mass measurement is to measure the ratio of cyclotron frequencies of ions in the same high magnetic field: the mass ratio is the inverse of the cyclotron frequency ratio. Penning trap mass spectrometers are used worldwide for chemical analysis, most notably by Alan Marshall's group at the MagLab, and by nuclear physicists for measuring masses of unstable isotopes. But both applications require orders-of-magnitude less precision. What differentiates the ultra-precise MIT/FSU system is that the measurements are carried out on single ions, which can be trapped for periods of up to months, in the extreme vacuum created by cooling the trap to liquid helium temperature, and which are detected, non-destructively, via the tiny image currents they induce in the trap electrodes — and also, that the ion's cyclotron frequency, typically at 10s of MHz, is obtained from the evolved phase of the cyclotron motion over many seconds, a method loosely analogous to pulsed NMR. While a few other institutions worldwide have carried out mass measurements with single ions in Penning traps, and have now adopted phase-coherent measurement of cyclotron frequency, still unique to FSU is that the two ions, whose masses are to be related, are trapped together and then manipulated into specific orbits in the same trap. In this way, simultaneous, or near simultaneous measurements of the cyclotron frequencies can be made. This cancels the effect of magnetic field variation on the ratio of cyclotron frequencies.

The measurements at FSU are not just for the mass table. With few exceptions, they have been strongly motivated by determinations of Fundamental Constants, by setting limits on the mass of neutrinos, and by searches for physics beyond the Standard Model. As an example, FSU has produced the most precise masses of ^{133}Cs and ^{87}Rb. These are needed for the "photon-recoil" method for obtaining the fine-structure constant, α. This value of α can then be combined with Quantum Electrodynamics theory for the magnetic-moment anomaly of the electron ("g_e–2"), to make a prediction that can be tested experimentally. FSU has also produced the most precise Q-values (energy release) of the three most promising isotopes for observing neutrino-less double-beta-decay, and also the most precise Q-value of the beta-decay of tritium. This last measurement enables an important test of systematics in the large-scale, international, tritium beta-decay experiment, KATRIN. An example of measurements that were not so strongly motivated when the data were taken, but are now an essential ingredient of a "hot topic," are measure-

'18 years'
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ments of the masses of isotopes of strontium and ytterbium. Combined with ultra-precise laser spectroscopy these enable "King-plot" analyses of isotope shifts, which place limits on hypothetical electron-neutron interactions not included in the Standard Model.

The scientific impact of the FSU mass measurement program is reflected in the number of publications in Physical Review Letters, by continuous support from the Atomic, Molecular and Optical Physics program of the National Science Foundation, and receipt of two NIST Precision Measurement Grants. Educationally, it has provided projects for five MS/Ph.D. students (including Brianna Mount, now a professor at Black Hills State University, whose research involves mass spectrometry at the Sanford Underground Research Facility), four postdoctoral researchers, many undergraduate students, and also (because basic Penning trap theory is accessible with high-school math) by students in FSU's Young Scholars program.

In the last few years Myers, with current graduate student David Fink and several undergraduates, has focused on mass ratios of light ions, and, most recently, the proton/deuteron mass ratio with a precision goal of a few parts-per-trillion. This is motivated by precise QED theory for the HD^+ molecular ion together with a new generation of ultra-precise laser and microwave spectroscopy. The mass measurements are actually of the cyclotron frequency ratio of H_2^+ to D^+. The resolution in cyclotron frequency is such that, using $E=mc^2$, different vibrational levels of the H_2^+ ion can now be resolved due to their difference in mass! The spontaneous decay of a single, vibrationally excited H_2^+ ion can be tracked non-destructively and in real time. While such mass-energy spectroscopy is the norm in high-energy physics, it is a novelty for molecular spectroscopy where the energy scale is ten orders of magnitude smaller!

Looking ahead, besides more precision measurements for Fundamental Constants and fundamental physics, a new Penning trap project has been started with the eventual aim of precise laser spectroscopy on H_2^+ and its antimatter counterpart, to test the CPT theorem. Not quite spectroscopy on highly-charged ions, but close! ❁

Edmund Myers acknowledges support from the Physics Helium Recovery Lab, the John D. Fox Superconducting Accelerator Lab, and the Physics Machine Shops.

Moving on: faculty retirements

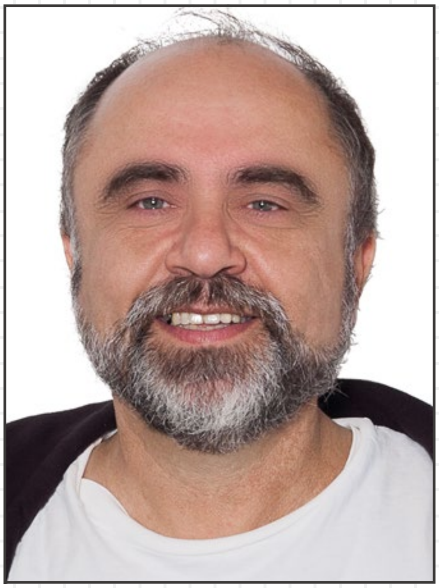
Bernd Berg

Bernd Berg joined the FSU Physics Department as Associate Professor in 1985, holding a joint appointment with the FSU Supercomputer Computations Research Institute (SCRI) until 2000.

In 1988, he became full professor in Physics and held this position until his retirement in 2019.

Berg graduated with Dr. Rer. Nat. ("Doctor rerum naturalium," Latin for "Doctor of Natural Sciences") in Theoretical Physics from the Freie Universität Berlin in 1977 and held an Associate Professorship at Hamburg University from 1978 till 1985, during which time he also spent three years at CERN as Fellow.

Berg's scientific career has seen him emerging and affirming himself as an expert in theoretical particle physics and statistical physics. He has been nationally and internationally recognized for his contributions to Lattice Gauge Theory, Monte Carlo algorithms and statistical analysis of Monte Carlo and other data, as well as studies of complex systems. In 2004 he was elected Fellow of the American Physical Society; in 2006, a Fellow of the Japanese Society for the Promotion of Science, and then in 2007 he received a prestigious research award of the German Humboldt Foundation. At FSU, he has been recognized with the named Dirac Professorship in 2006 and a Distinguished Research Professorship in 2012. He continues his research work at FSU as an Emeritus Professor in the Physics Department.



Bernd Berg

On top of having established an outstanding scientific career, Berg has been a very dedicated teacher. He has served the FSU Physics Department by teaching a very broad spectrum of classes, from introductory undergraduate classes to advanced graduate ones. Several of his graduate students have moved on to very successful careers, including the academia. Among his pedagogical achievements, Berg has authored a book, *Markov chain Monte Carlo simulations and their statistical analysis*, published by World Scientific. ❁

'Faculty retirements'

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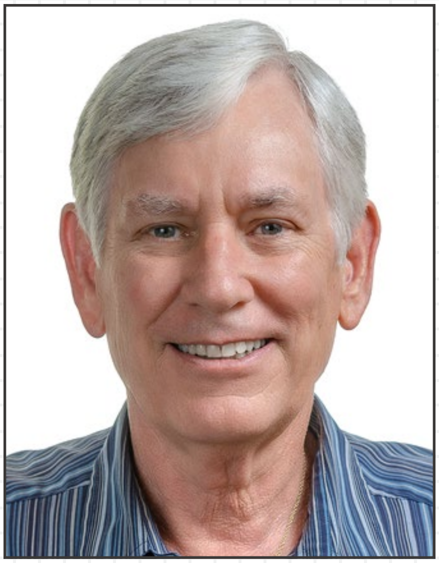
Jeff Owens

Jeff Owens joined the High Energy Physics group at FSU as a research associate in 1976, after having graduated from Tufts University in 1973 and following three years as a research associate at Case Western Reserve University. He became Assistant Professor at FSU in 1979 and was quite rapidly promoted to Associate Professor in 1982 and to Full Professor in 1985. Jeff served the physics department as Associate Chairman from 1988 to 1991, and then as Chairman from 1991 to 1997, while the Department was undergoing a substantial expansion due to many new faculty members brought to FSU by the inauguration of the National High Magnetic Field Laboratory in the early '90s. He continued serving the department and the university as member and chair of several committees, including a six-year stint as Associate Dean of the College of Arts and Sciences from 2003 to 2009. FSU honored him with a Distinguished Research Professorship in 1995 and with the Guenter Schwarz Named Professorship in 2001.



Jeff Owens

On top of a prominent faculty career, Jeff Owens has an outstanding scientific career. He acquired national and international visibility in theoretical particle physics thanks to his pioneering work in Quantum Chromodynamics (QCD), for which he was elected Fellow of the American Physical Society in 1996. In particular, he developed some of the first applications of the idea of parton distribution functions (PDF) and has been among the founding members of CTEQ, a multi-institutional collaboration devoted to a broad program of research projects in high-energy physics, centered on QCD and its implications in all areas of the Standard Model and beyond, including the development of one of the most broadly used set of PDF for collider physics calculations. As an Emeritus Professor at FSU since 2018, Jeff continues his involvement with studies of the quark and gluon structure of the nucleon as a member of the CTEQ-JLab collaboration, and still very much enjoys other life passions, such as flying his Cessna 182N Skylane. ⚛

Per Arne Rikvold

Professor Per Arne Rikvold joined the Florida State University Physics department in 1987. He received his B.Sc. in Physics with minors in Mathematics, Statistics, and Chemistry, and his M.Sc. in Theoretical Solid State Physics from the University of Oslo in Norway. Following his master's degree, he spent two years as a Japanese Government research student at Kyushu University in Fukuoka, Japan. After further stays at the University of Oslo, University of Geneva in Switzerland, and Kernforschungsanlage Jülich in Germany, he received his Ph.D. in Physics from Temple University in Philadelphia in 1983. Before Joining the FSU Physics Department he did a postdoc in Mechanical Engineering at State University of New York at Stony Brook, and he worked as a Senior Research Chemist with ARCO Chemical Company in Newtown Square, Pennsylvania. He is a Fellow of the American Physical Society and a Foreign Member of the Norwegian Academy of Science and Letters.

Per Arne Rikvold

Dr. Rikvold has continued his research in retirement. He returned to Norway and joined the Oslo Institute of Physics. His research focuses on applications of equilibrium and nonequilibrium computational statistical mechanics to problems in Condensed-matter physics and materials science. In particular, he studied the dynamics of magnetization switching in nanoparticles, magnetic molecules, and ultrathin films, which are important materials for ultra-high-density recording media and possibly for future quantum computers. He is also an expert on applications of computational statistical mechanics to adsorption processes in electrochemical systems, which present new, low-cost methods to synthesize nanostructures of technological importance. He also works in biophysics with emphasis on the dynamics of biological evolution. A unifying theme for these seemingly disparate research areas is the application and further development of methods and concepts from nonequilillbrium statistical mechanics. ⚛

'Faculty retirements'
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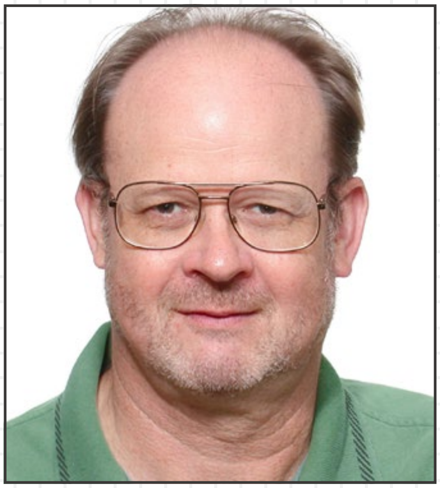
Pedro Schlottmann

Pedro Schlottmann came to Florida State University as a Professor of Physics in 1990. He received his Ph.D. from the Technical University of Munich (Germany) in 1973. After postdoctoral appointments at the Max-Planck Institute in Munich, the Freie Universitaet Berlin and U.C. Berkeley, he became Assistant Professor at the Freie Universitaet Berlin and a Heisenberg Fellow of the German National Science Foundation. He was a research scientist at the Kernforschungsanlage Juelich (1982-1985) and joined the Physics Department of Temple University in Philadelphia in 1985.

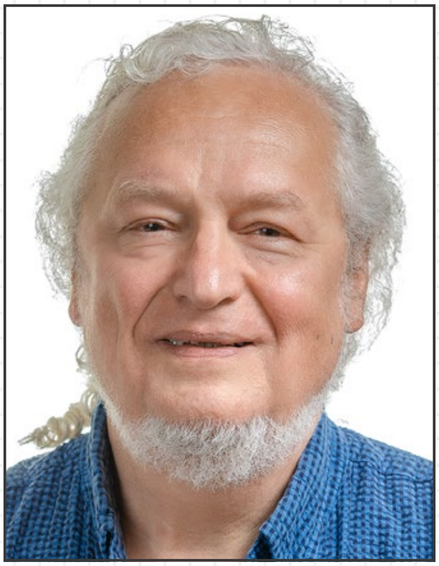


Pedro Schlottmann

Now an Emeritus Professor at FSU, he continues working on his research interests, which are Condensed Matter Theory, Many-Body Physics and Statistical Mechanics with special emphasis on strongly correlated electrons; in particular, heavy fermions, quantum criticality, manganites, magnetism, and mesoscopic systems. ⚛

Horst Wahl

Horst Wahl joined the Faculty of the FSU Physics Department as an Associate Professor in 1986, coming from a senior position at the Austrian Academy of Sciences (OAW), and was promoted to full professor in 1990. After graduating from the University of Vienna in 1969, Horst spent several years at CERN as Fellow and Staff Physicist. During the same time, from 1974 to 1976, he also held an Associate Professor visiting position at Stony Brook University. A member of the UA1 experiment that, together with UA2, discovered the W and Z particles at CERN in 1983, Horst has been among the pioneers of modern collider physics. After leaving UA1, Horst joined the DØ experiment at Fermilab and dedicated the rest of his scientific career to this experiment which, together with the Fermilab CDF experiment, brought us the discovery of the top quark in 1995. During the Tevatron Run 2 period (2001-2011), he took more shifts than any other member of the collaboration to ensure the highest quality data was recorded. It is hard to imagine a more accomplished scientific career in experimental particle physics!



Horst Wahl

Besides his outstanding scientific career, Horst Wahl has been a key member of the FSU Physics Department, with a unique sense of dedication to students, colleagues, and the local community. On top of taking the leadership of very demanding classes, and contributing to so many outreach Department events, Horst has been the initiator and main organizer for many years of the QuarkNet program at FSU, an educational program sponsored by NSF and DOE whose aim is to support science education in schools by providing opportunities for school science teachers to learn firsthand about frontline physics research at universities. He spent countless summers organizing QuarkNet activities at FSU and even at CERN, with immense benefit to the local science teacher community. Last but not least, Horst dedicated five years of his time at FSU—from 2014 to 2019—to serve as Chair of the Physics Department with vision and relentless effort. After retiring in 2020, Horst Wahl is staying in the department as Emeritus Professor. ⚛

Dirac Lectures held online in 2020

Laura Reina
FSU Physics Professor

The Dirac Lectures series is an initiative of the FSU Physics Department to celebrate the memory of Paul Dirac, FSU Physics faculty member, Nobel prize winner, and namesake of the Dirac Science Library. These lectures bring outstanding speakers to FSU to present physics topics of particular interest and notability.

The 2020 Dirac Lectures (October 19-23, 2020) were dedicated to the subject of Gravitational Waves, from their momentous discovery in 2015 to their widespread impact across multiple disciplines including astrophysics, cosmology, nuclear and particle physics. They were organized as a series of six lectures, delivered by three outstanding speakers: Daniel Holz (KICP, University of Chicago), Chung-Pei Ma (UC-Berkeley), and Hitoshi Murayama (Kavli IPMU and UC-Berkeley).

As a special event, we were delighted to host Rainer Weiss (MIT) who delivered a public lecture on *The Beginning of Gravitational Wave Astronomy: Current State and Some About the Future* on October 19, 2020. Professor Weiss is among the pioneers of gravitational-wave astronomy, who made critical contributions to the construction of interferometers with the required sensitivity to detect gravitational waves almost a century after first predicted by Albert Einstein. For his valuable contributions, Professor Weiss shared the 2017 Nobel Prize in Physics with Kip Thorne (Caltech) and Barry Barish (Caltech).

The poster used to publicize 2020's Dirac Lectures.

The lectures and the public lecture were very well-attended and received widespread praise from students, colleagues at several institutions, as well as the local community who enjoyed Professor Weiss's public lecture. Recordings and slides of the lectures are available at the 2020 Dirac Lectures website: https://www.physics.fsu.edu/2020-dirac-lectures.

The local organizing committee was made up of Nick Bonesteel, Fernando Febres Cordero, Kevin Huffenberger, Takemichi Okui, Jorge Piekarewicz, Laura Reina (Chair), and Kohsaku Tobioka. ⚛

IN MEMORIAM

Stephan von Molnár

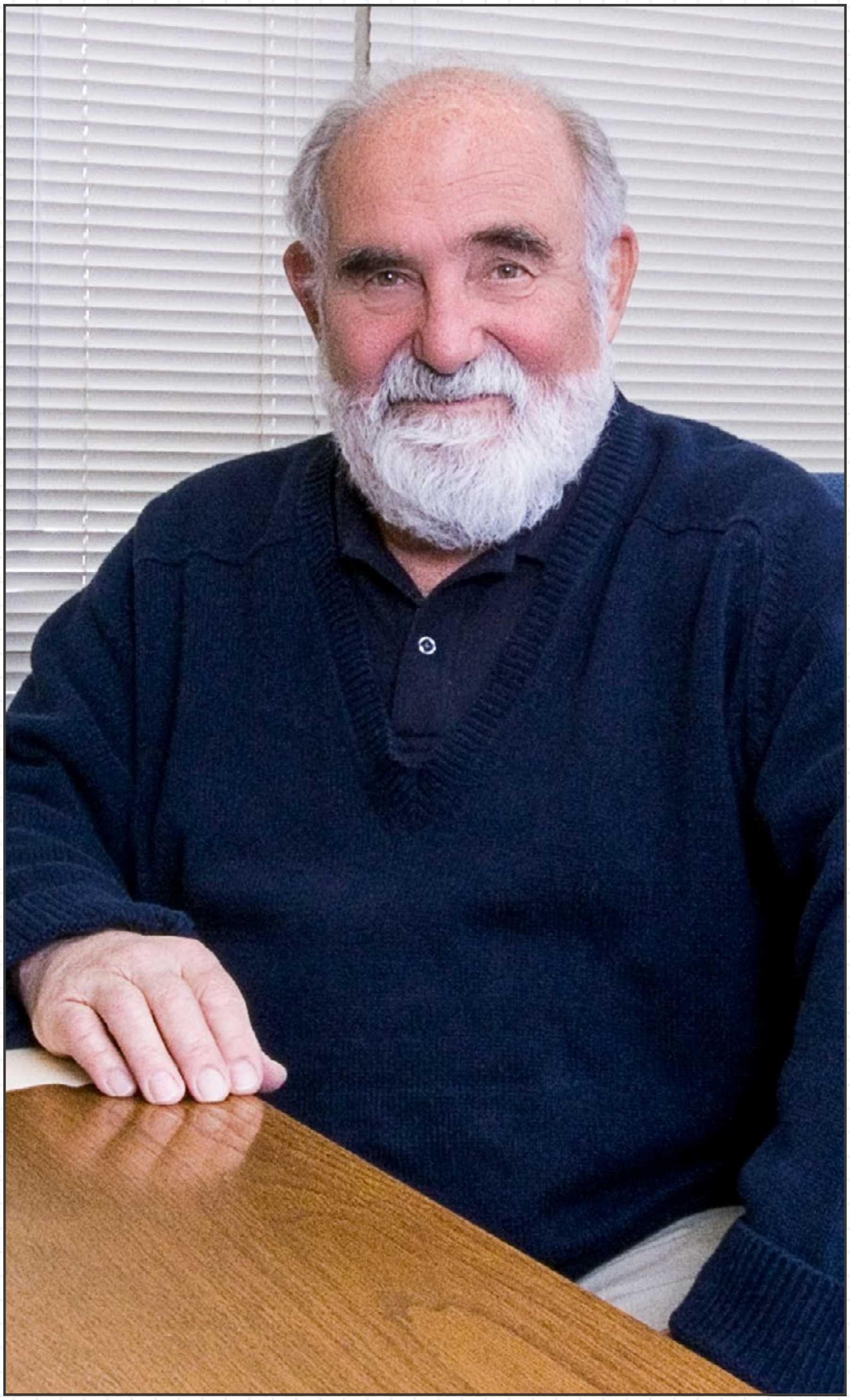
1935 – 2020

Stephan von Molnár passed away on November 17, 2020. He would have been 86 on June 26, 2021.

Stephan was a professor of physics at FSU from 1994 until his retirement in 2013, and was director of its interdisciplinary center for materials research and technology — MARTECH — between 1994 and 2007. Stephan received his Ph.D. in physics from the University of California, Riverside in 1965. From 1965 to 1993, he was a member of the Research Staff at the IBM Thomas J. Watson Research Center, where he also held positions as manager of the Cooperative Phenomena Group (1970–1989) and senior manager of the Novel Structure Physics Group (1989–1993).

Stephan was a pioneer in the field of magnetic semiconductors and a trailblazer of spintronics, the technology of utilizing electron spin for electronic functionalities. His many accomplishments include: the conceptual development and experimental observations of magnetic polarons, realization of the first magnetic tunneling (field emission) device, experimental demonstration of a magnetically driven continuous insulator-metal transition, development of pure-phase transition metal-doped III-V diluted magnetic semiconductors, and invention of semiconductor Hall gradiometry and its applications in nanomagnetism and magnetic biosensing.

Stephan's passion went far beyond his science. His interests ranged from music and theater to sports; he was not only a fan but also a skilled squash player. Stephan was a warm, gracious, and great-hearted colleague who made a lasting impression on numerous researchers, especially those he mentored. His wise counsel, frank critiques, timely encouragement, and unwavering support early in their career are fondly remembered by many.



Dr. Stephan von Molnár