



SPRING 2017

QUANTUM TIMES

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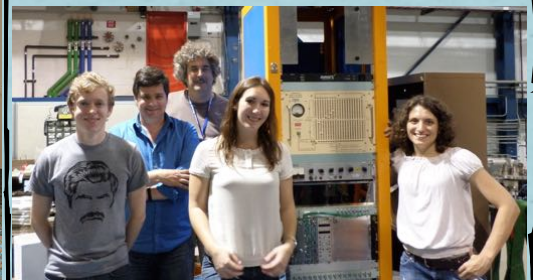


NEW MEXICO STATE UNIVERSITY
DEPARTMENT OF PHYSICS NEWSLETTER

Alumni

Alumni support is essential to having a strong, vibrant department. We hope that reading this newsletter will inspire you to help the Physics Department with your tax-deductible donation. See page 2 for details!

GIVE NOW!



Editor: Tegan Fuqua

A Message from the Department Head

Dear Alumni and Friends:



It is a pleasure to send you this newsletter with the latest information about our department. I often stress that I consider it the primary mission of our department to “print diplomas,” i.e., to reward students for their hard work by awarding a degree. Our undergraduate programs in physics and engineering physics have grown tremendously since the renovation of Gardiner Hall. We now have almost 100 undergraduate majors, the highest enrollment since the 1960s. We award about 15 BS/BA degrees per year, more than ever. Our student society is very active in K-12 outreach—they often visit local schools or welcome kids to NMSU, showing them with demonstrations how much fun physics can be. You will remember that physics is never easy. We reward our students (especially those with good grades and financial need and from underrepresented groups) with scholarships at our annual spring banquet. Please follow the example of other alumni who already support our students with donations.

The NMSU Ph.D. program in physics was approved in 1958 and we have awarded many advanced degrees since the 1960s. It is exciting to hear from alumni how our graduates contributed in the Mercury, Gemini, Apollo, and space shuttle programs. Some of our Ph.D.s have become university professors. My first Ph.D. student works as a lithography engineer at Intel. My first MS student builds satellites at the Air Force Research Lab in Albuquerque.

Today, our graduate program is in need of your support. Our stipends are not competitive compared to other universities. NMSU does not cover tuition and health insurance, and funding from federal labs and agencies to support our students has been in decline. Recognizing this challenge, Professor George Goedecke (who successfully raised federal graduate fellowships two decades ago) recently established an endowment for physics graduate fellowships. **Contributing to this fund is the greatest need for our department.**

I hope that your degree from NMSU has brought you success, both intellectually and financially. We hope that you will be able to make a contribution to our department in one of four areas listed below. To donate by check, please write the FUND NUMBER (see below) in the memo section of your check and send it to NMSU Foundation, PO Box 3590, Las Cruces, NM 88003. You can also call 575-646-1613 or 800-342-6678 to donate to any of the four funds listed below.

I am supporting the NMSU Physics Department’s needs with my personal gift of \$_____.

Name: _____

Major: _____

Address: _____

Degree: _____

Email: _____

Year degree awarded: _____

Additionally, my company (or my spouse’s company) will match this gift: yes / no

Enclosed is the company’s matching gift form.

My gift is to be used as follows (Appeal Code #20455):

___ [Goedecke Graduate Fellowships](#) (982254)

___ [Engineering Physics Scholarships](#) (102911)

___ [Undergraduate Physics Scholarships](#) (102910)

___ [K-12 Outreach](#) (982251)

Please enclose a check made out to “NMSU Foundation, Inc.” If you prefer to use a VISA or MasterCard, please fill out the following.

___ VISA ___ MasterCard

Card No. _____ Security Code _____ Exp. Date _____

Print Name _____ Signature _____

Geophysics: Faculty Changes

Dr. Lauren Waszek Joins the Department

Dr. Lauren Waszek

recently joined the physics department as an assistant professor. Her research focuses on the seismic structure of Earth's interior, specifically from the inner core to the upper mantle. Currently, she is investigating the different deflection depths of slabs that are subducting into the mantle. Some of her projects are continuing her early research, which examined the hemispherical asymmetry of the seismic velocity structure of Earth's inner core. This semester, Dr. Waszek and her student assistant are working on reexamining the differential rotation of Earth's inner core using seismic body



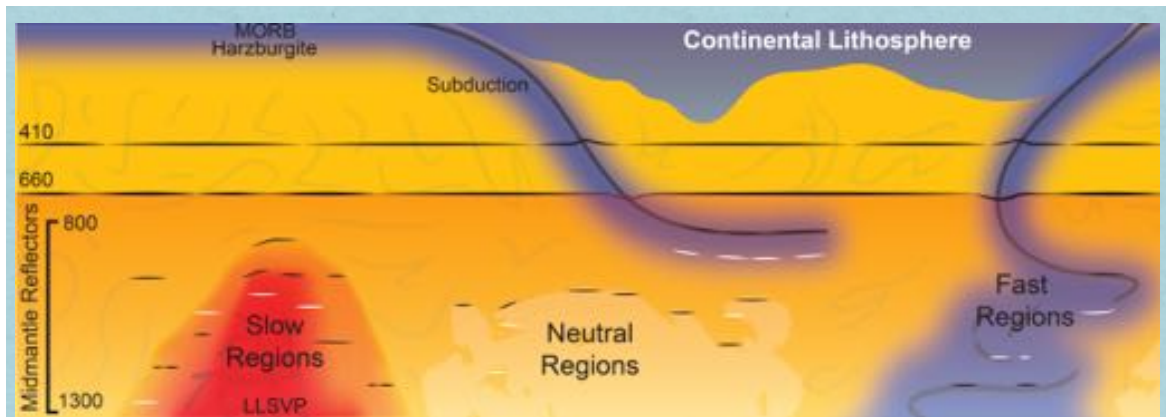
waves. They will attempt to determine if the inner core rotates with respect to the mantle and, if it does, if the rotation rate varies on seismically observable timescales. Their method utilizes shallow seismic refraction ray paths, which allow for the removal of influence from 3D mantle structure.

Next semester, Dr. Waszek and her assistant will begin a project that will involve

geodynamical modeling of the inner core's evolution processes to model seismic observations. They will use a Python code to simulate growth, rotation, and translation in various combinations and incorporate

the relationship between growth parameters, such as age and growth rate, into estimates of seismic velocities from mineral physics.

Dr. Waszek studied natural sciences with a focus on physics at the University of Cambridge. While working on her master's degree, she completed a research project on deep Earth seismology. She continued to study the inner core for her doctorate, also completed at Cambridge. After she earned her Ph.D., she obtained a fellowship from Cambridge, where she continued to study the deep Earth. Though her main research interests involve geophysics, Dr. Waszek considers herself a physicist at heart. She finds it rewarding to work in a physics department where the expertise of the geophysicists allows for collaborations that can develop specialized research trajectories.



Conceptual interpretation of observations of three distinct mantle domains. Potential sub-horizontal mid-mantle reflectors are denoted black (positive impedance) and white (negative impedance), grouped by seismic domains: 1) Fast, cold downwelling regions (blue). 2) Slow, hot upwelling regions (red). 3) Neutral regions (yellow), perhaps with compositionally or texturally distinct material (white). Basaltic heterogeneity is denoted by black contours. While reflections provide new constraints for the make-up of the mid-mantle, mantle composition and structure particularly at great depth remains poorly understood.

Dr. James Ni - Professor Emeritus

Dr. James Ni recently retired from teaching. He joined NMSU's physics department in the fall of 1984. At the same time, the geophysics program was suffering because several tenured faculty members had left. Dr. Ni was able to rebuild the program by recruiting internationally recognized faculty and created one of NMSU's most valued and productive research groups. He was an outstanding teacher, successfully instructing both undergraduate and graduate students. In addition, he mentored several master's and doctoral students and postdoctoral researchers, many of whom became professors and lecturers at prestigious

universities, such as the University of Missouri at Columbia, the National Autonomous University of Mexico (UNAM), and the University of Cambridge.

Dr. Ni's research concentrated on the tectonics of the Himalayas, the Tibetan Plateau, China, Mexico, and the Rio Grande Rift. He participated in several international research projects, including INDEPTH (a series of projects focused on Tibet and the Himalayas) and RISTRA (a study designed to image the Rio Grande Rift and Colorado Plateau). His work in seismology and neotectonics has contributed to the understanding of seismic hazards in New Mexico, ensuring the safety of the state's citizens. Dr. Ni was an incredible asset to the



department and university and will be greatly missed by both faculty and students. He was honored at the January 21, 2017, basketball game versus the University of Missouri-Kansas City (UMKC) by NMSU chancellor Garrey Carruthers for his contributions to the university.

Alumnus Profile - Gale Harvey

Gale Harvey earned his bachelor's degree in physics from NMSU in 1962. His interest in physics came from multiple sources. His father was interested in science, several of his high school friends had fathers who were German immigrant scientists, and he had a natural inclination for physics in general. He went on to earn his master's in physics from the Virginia Polytechnic Institute and State University. Mr. Harvey worked for 48 years with the NASA Langley Research Center in Hampton, Virginia. He was involved in intercontinental ballistic missile reentries, atmospheric research lasers, and the space shuttle thermal protection system. In the 1970s, Mr. Harvey worked in meteor astronomy and directed the NASA Faint Meteor Spectra Patrol.

Ever since he left NMSU, he has maintained a connection with its physics department. In 2007, he demonstrated his appreciation by creating the Gale A. Harvey Endowed Scholarship for physics students in financial need. Mr. Harvey was the first in his family to graduate from high school and attend college. He received no financial support from his family while in college. In creating the Gale A. Harvey Endowed Scholarship, Mr. Harvey's goal was to ensure other undergraduates do not have to suffer from financial stress as he did.

Khadijih Mitchell was a two-time recipient of the Gale A. Harvey Endowed Scholarship. As a full-time physics undergraduate, Ms. Mitchell was a single mother of two young children. Money was often tight and paying for school was not easy. The Gale A. Harvey Endowed Scholarship helped her provide for her children and pay for many school necessities. "I was very grateful for the scholarship," said Ms. Mitchell. "Both times I received it, it came when I was worried about how I was going to make ends meet." She currently lives in Albuquerque, New Mexico, with her two children and partner Michael. She teaches high school math at Mission Achievement & Success Charter School and is an avid cyclist. She spends as much of her free time as possible on nature adventures.

Distinguished Alumni

Dr. Stephen Hanzély

Dr. Stephen Hanzély was honored as an NMSU Distinguished Alumnus in Fall 2016. He earned his master's and doctoral degrees in physics from NMSU and then taught physics and astronomy for 39 years at Youngstown State University (YSU) in Youngstown, Ohio. In 1994, Dr. Hanzély received a Fulbright Fellowship and taught for one semester at the University of Veszprém in Hungary. He has received several awards from YSU, including the Youngstown State University Heritage award, the most prestigious award YSU gives to former faculty and staff. After he retired from YSU in 2002, Dr. Hanzély devoted his time to Habitat for Humanity of Mahoning County, Ohio, starting on construction sites and rising to president of the Board of Directors and interim executive director. He was also the principal grant writer, securing



\$1.5 million in funds for his local Habitat for Humanity affiliate. In 2009, he was recognized with the State of Ohio Habitat Volunteer of the Year Award.

Dr. Hanzély and his wife Brigitta were Hungarian refugees and international students. To repay the generosity with which they were met upon arriving in the US, they created the Dr. Stephen and Brigitta Hanzély Endowed Scholarship in 2012. The scholarship offers financial assistance to physics undergraduates at NMSU.

Dr. Mary Hockaday

Dr. Mary Hockaday was honored as an NMSU Distinguished Alumna in Fall 2015. She earned her bachelor's in physics from the



University of Hawaii in 1980 and her master's and doctorate in physics from NMSU in 1984 and 1986, respectively. After completing her Ph.D., Dr. Hockaday joined the Fast Transient Plasma Group at Los Alamos National Laboratory (LANL), becoming its only female experimentalist. She has held several positions at LANL, including Institutional Deputy for the National Ignition Campaign, and is currently Associate Director of LANL's Experimental Physical Sciences. Dr. Hockaday served on the American Physical Society's Committee on the Status of Women in Physics to encourage women to participate in physics.

Dr. Hockaday has remained active with NMSU's physics department and currently serves on the Department of Physics Advisory Board. She also runs the Los Alamos Neutron Science Center, which manages subcontracts with the physics department.

The Goedecke Legacy

Dr. George Goedecke, former physics professor and department head, and his wife Barbara have created a graduate student fellowship. The George and Barbara Goedecke Physics Excellence Fund aids graduate students who demonstrate outstanding skill in physics education and research. The physics conference room was recently named the George and Barbara Goedecke Conference Room in recognition of their continued support of physics graduate students.

After he earned his doctorate in physics from the Rensselaer Polytechnic Institute, the Goedeckes moved to Las Cruces in 1961. While Ms. Goedecke completed her master's in biology, Dr. Goedecke taught a variety of undergraduate and graduate classes. In addition, he conducted research in a number of theoretical physics topics, was department head from 1988 to 1995, and served on the NMSU Faculty Senate for two terms. Though Dr. Goedecke retired from full-time teaching in 1995, he has remained an active member of the physics department as a professor emeritus.

Education and Outreach

Engaging Local Students

Each semester, NMSU's Society of Physics (SPS) chapter conducts a number of outreach events, both on campus and in local middle and high school classrooms. SPS members demonstrate a variety of experiments and explain the science behind each, adjusting the complexity of the explanations to fit students' age and experience with math and physics. The SPS presenters take an inclusive approach to their demonstrations—they ask students what they think is happening in a given experiment, creating an open and engaging learning environment.

One of the most popular experiments demonstrates the nature of monochromatic light. Presenters let a sodium street light warm up, turn off the overhead lights, and show students several pieces of cloth, asking them to say what color they think each is. The basic principles of monochromatic light are explained and, before the lights are turned back on, students are asked to look at their shirts and remember what colors they put on that morning. Students are always amazed when the lights are turned on and they see the pieces of cloth are all colors of the rainbow and not shades of white, grey, and black as they originally thought. This experiment and countless others demonstrate how SPS members create a sense of



NMSU Physics Summer Camp

wonder, showing students physics can be fun and encouraging them to study science, no matter what field they choose.

NMSU Physics Summer Camp

In July 2015, the physics department hosted NMSU's first physics summer camp, designed and hosted by four physics undergraduate students. Approximately ten students attended, all of whom were recruited from local middle and high school classrooms visited by SPS during the previous school year. The students worked through college-level labs covering topics from the nature of waves to how to bend an electron beam. A variety of talks were given, both by the undergraduates and guests, on a wide range of physics-related subjects, like astronomy and

what the future of physics may hold.

Students were able to interact with several experiments they saw in outreach events and were shown additional ones that were not used in outreach events. One such experiment was a gravity simulator, which demonstrates the nature of space-time.

The 2016 summer camp drew twenty students. Each day was devoted to a different core physics concept, with students learning the basics of mechanics, electricity and magnetism, and heat, light, and sound. The final day of camp was devoted to discussing more complex and theoretical topics, such as black holes and relativity. Several professors, including Dr. Stefan Zollner and Dr. Michael Engelhart, gave talks about their careers throughout the week, providing students with examples of how they can use physics in real life.

Master's and Ph.D. Graduates, 2015-2016

2015

Manal Abdallah, Ph.D.

Fall 2015

Advisor: Dr. Matthias Burkardt

Ramaninder Brar, Ph.D.

Fall 2015

Advisor: Dr. Jacob Urquidi

Sanjiv Jha, Ph.D.

Spring 2015

Advisor: Dr. Igor Vasiliev

Adrian Losko, Ph.D.

Spring 2015

Advisor: Dr. Heinrich Nakotte

Abraham Meles, Ph.D.

Spring 2015

Advisor: Dr. Xiaorong Wang

Corinne Silkwood, M.S.

Spring 2015

Advisor: Dr. Heinrich Nakotte

Hector Trejo, Ph.D.

Fall 2015

Advisor: Dr. George Goedecke

2016

Tareq Alhalholy, Ph.D.

Spring 2016

Advisor: Dr. Matthias Burkardt

Michael Boergert, Ph.D.

Summer 2016

Advisor: Dr. Heinrich Nakotte

Andrea Gallegos, Ph.D.

Spring 2016

Advisor: Dr. James Ni

Mahmoud Hammouri, Ph.D.

Fall 2016

Advisor: Dr. Igor Vasiliev

Nathan Nunley, M.S.

Summer 2016

Advisor: Dr. Stefan Zollner

Darshana Perera, Ph.D.

Spring 2016

Advisor: Dr. Stephen Pate

Rajiv Ranasinghe, Ph.D.

Fall 2016

Advisors: Dr. Thomas Hearn,
Dr. James Ni

Cesar Rodriguez Mena, M.S.

Summer 2016

Advisor: Dr. Stefan Zollner

Dan Short, Ph.D.

Fall 2016

Advisor: Dr. David Voelz

Erandi Wijerathna, M.S.

Spring 2016

Advisor: Dr. David Voelz

2017

Nalin Fernando, Ph.D.

Spring 2017

Advisor: Dr. Stefan Zollner

Physics Department Highlights

- The department hosted a joint meeting of the Four Corners and Texas Sections of the American Physical Society (APS) in October, 2016.
- Michael Kaemingk, an engineering physics undergraduate, will participate in a Research Experience for Undergraduates (REU) at CERN in Geneva, Switzerland, in Summer 2017.
- Dr. James Ni gave a colloquium, titled "Our still-evolving understanding of the Tibetan Plateau," at the Ministry of Earth Sciences of India on March 9, 2017.
- Nuwanjula Samarasingha, a graduate student, received an award for best student talk at the AVS 63rd International Symposium & Exhibition in Nashville, TN.
- Over the summer of 2016, Dr. Stephen Pate received a High-Purity Germanium gamma-ray detector, purchased with a proposal through the College of Engineering, that will be used in the Experimental Modern Physics lab course.



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