PHYSICAL SCIENCES

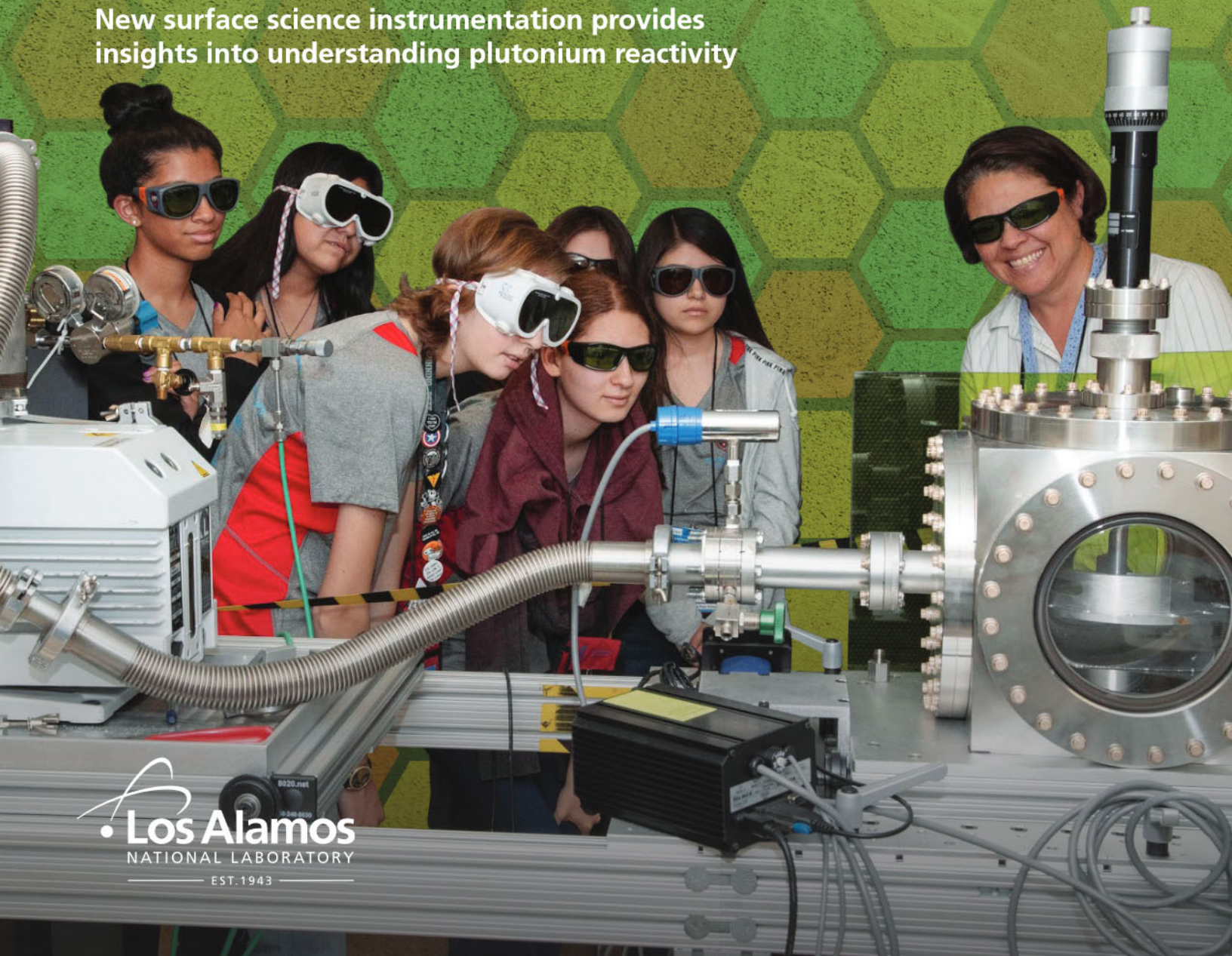
VISTAS

PERSPECTIVES ON EXCELLENCE IN COMMUNITY RELATIONS
AT LOS ALAMOS NATIONAL LABORATORY // FALL 2019

Summer camp illuminates STEM opportunities for young women

Rotor transport successfully commands many moving parts

New surface science instrumentation provides insights into understanding plutonium reactivity



Los Alamos
NATIONAL LABORATORY
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On the cover, foreground: Adriana Reyes-Newell (Physical Chemistry and Applied Spectroscopy, C-PCS) (right) shows Los Alamos summer physics camp participants how the laser-induced breakdown spectroscopy technique is used by the Curiosity and Mars rovers to unveil the chemical composition of rocks on the red planet.

From left are students Ananya Mulakala (Monte del Sol Charter School); Marissa DeAguero (Santa Fe Indian School); Savanah DeAguero (Pojoaque Valley High School); Davina Velasquez (Española Valley High School); Rachel Anderson (Santa Fe High School); and Maile Montano (Peñasco Independent School District).

Background: Hexagons from the summer camp logo (left), representing scientific thinking.

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Supersonic jets fired from seven plasma guns collide at the Plasma Liner Experiment. Plasma Physics (P-24) researchers are studying the merging of discrete plasma jets into a spherically imploding plasma liner as a component of an innovative approach to controlled fusion.

FROM TONI'S DESK

Toni Taylor, Associate Laboratory Director for Physical Sciences

I am excited to introduce the fourth 2019 issue of *Physical Sciences Vistas*, with a focus on "excellence in community relations." Excellence in community relations comprises one of the four elements of the Laboratory Agenda, focusing on sustaining and enhancing LANL's partnership with the community across the Northern New Mexico region. This issue highlights the diverse efforts of personnel in our Physical Sciences Directorate (ALDPS) in community service and outreach as well as our service to the scientific community. It is appropriate that this issue arrives in time for the holiday season as we all reflect on our fortunate circumstances at LANL and how we can give back to our surrounding community.

In this issue, highlights of our contributions and outreach to our surrounding communities and the scientific community include descriptions of the following.

- The third annual summer physics camp that hosted 22 high school girls in Northern New Mexico, where—working with LANL scientists and engineers—they investigated scientific concepts ranging from atomic structure to space exploration. Anna Llobet, a scientist in Physics Division, organized, developed, and led this program, described in this issue.
- A volunteer project to lay bricks for the restoration of ancestral homes in the historic center of Ohkay Owingeh Pueblo, the setting for traditional observances and the spiritual and social center of the community.
- Grassroots efforts to grow the Lab's radiological control technician pipeline through enhanced education and training for Northern New Mexicans at Northern New Mexico College (NNMC). Specifically, the efforts of Mike Duran of LANSCE Facility Operations and an adjunct professor at NNMC are described.
- Tommy Rockward, a scientist in the Materials Physics and Applications Division, is the LANL lead for the NNSA Minority Serving Institution Partnership Program, which aims to create a sustainable pipeline connecting DOE sites and minority-serving institutions in STEM disciplines. This program provides minority students in STEM with internships at LANL, matching each student with a Lab mentor, with the ultimate goal of creating a diverse STEM pipeline at LANL.
- Paul Dixon, Civilian Nuclear Programs, has been recognized as 2019 Outstanding Volunteer of the Year for his volunteer work with FIRST (For Inspiration and Recognition of Science and Technology). FIRST is an international nonprofit organization that hosts science, technology, engineering, art, and math education events.
- Malcolm Boshier, Materials Physics and Applications Division, and Don Brown, Materials Science and Technology Division, received 2019 LANL Distinguished Mentor Awards.
- Jim Foley, Sigma-1 group leader, and Ellen Cerreta, Materials Science and Technology division leader, are serving as president and vice president-elect, respectively, of The Minerals, Metals & Materials Society (TMS). TMS is a professional society serving 14,000 members internationally.

In support of excellence in mission operations, we describe the huge accomplishment of moving the Lab's massive motor-generator rotor to the General Electric repair facility in Virginia. This feat involved coordination across more than 10 Lab organizations, external contractors, and the State of New Mexico. The successful realization of this move relied heavily on implementing the Safe Conduct of Research Principles.

Finally, we present a highlight on Sarah Hernandez's research in the Plutonium Surface Science Laboratory, located in the Materials Science and Technology Division's Target Fabrication Facility. Her studies include the oxidation and corrosion of plutonium and aging of plutonium using density functional theory methods, providing new insights into plutonium reactivity. This effort supports excellence in mission-focused science, technology, and engineering.

As we close 2019, I want to thank everyone for their critical contributions to ALDPS and the Laboratory and extend best wishes for a peaceful holiday season and a productive and healthy new year. Be safe out there!

Toni

Exemplifying excellence in community relations

Summer physics camp illuminates STEM opportunities for young women

At left: Kira Lorenc and Rachel Rivera (both Los Alamos High School) and Ananya Mulakala (Monte del Sol Charter School) examine particle interactions in a self-built "cloud chamber."

Below: Tiffany Desjardins (P-23) (right) describes the Vertical Shock Tube, located at the Los Alamos Neutron Science Center, to campers.

Over the course of two weeks this summer, 22 young women from Northern New Mexico built then programmed their own computers. They designed, constructed, and launched model rockets. They investigated scientific concepts ranging from atomic structure to space exploration. They learned to solder and they toured local experimental research facilities.

The third annual Los Alamos National Laboratory Summer Physics Camp for Young Women allowed these students from 15 area schools the opportunity to work alongside scientists, engineers, and technologists, who shared with them their experiences of a career in the fields of science, technology, engineering, or math (STEM).

The free camp, held in Pojoaque, aims to empower local young women to explore a future in STEM by providing them with a grounding in STEM disciplines, introducing them to role models, and showcasing the wide range of STEM opportunities available at the Lab and in New Mexico.

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Associate Laboratory Director for Physical Sciences Toni Taylor (far right) shared lunch with students attending a tour of Lab facilities. Here she talks with camp co-organizer and LANL intern Zoe Martinez (Santa Fe Indian School).

'This camp expanded my mind to a whole other level of education. Thank you so much for putting the hard work into this camp and making it possible for me to learn more about the STEM fields.'

Gracie Valencia
McCurdy Charter School student

2019 summer physics camp students.

'This has truly inspired me even more to pursue a STEM career and maybe even get a full-time job at LANL.'

Ariana Garcia
Santa Fe Capital High School student and LANL intern

Summer physics camp continued ...

"The ultimate goals are to inspire the youth in our neighboring communities and increase the diversity in STEM fields generally, and in the Lab's workforce in particular," said camp organizer Anna Llobet (Neutron Science and Technology, P-23). (To read more about Llobet, who won a LANL Distinguished Performance Award for her efforts with the camp, please see page 9.)

Camp organizers also invited local teachers to participate, offering them the chance to connect with area STEM volunteers and providing them with demonstration activities they could use in their own classrooms. "While 45% of the students were strongly considering a college future in STEM before the camp, only 55% of the students reported having any family members working in STEM fields, indicating a strong need for STEM role models in our local student population," Llobet said.

To underline the wide range of STEM careers available, especially at Los Alamos National Laboratory, camp participants visited the Los Alamos Neutron Science Center, the Laser-Induced Breakdown Spectroscopy Lab, the National High Magnetic Field Laboratory-Pulsed Field Facility, and the New Mexico Consortium Biolab. Students also received guidance on professional development from the Lab's Student Programs Office, including resumé and interview tips and information about student internships at the Lab and opportunities at New Mexico colleges.

GET THE DETAILS

Funding: The 2019 Summer Physics Camp for Young Women was sponsored by Los Alamos National Laboratory, the LANL Foundation, Pojoaque Valley High School, Triad National Security, New Mexico Consortium, and Los Alamos Public Schools. **Organizers:** LANL organizers were Anna Llobet and Zoe Martinez (Neutron Science and Technology, P-23); Josefina Salazar, Scott Robbins, and Cassandra Casperson (Partnerships and Pipeline Office, PPO); Alan Hurd (National Security Education Center, NSEC); and Sarah Hernandez (Nuclear Materials Science, MST-16). Lead educators were Albert Einstein Distinguished Educator Fellow Pascale Creek Pinner (DOE) and Megan Rains (Los Alamos Public Schools).

Clockwise from top: Participants learned from Lab radiation protection staff how to measure radioactive decay in day-to-day objects and how to suit up for work in a high-radiation environment; Judith Allison (Veritas Scholars Academy) presents the results of her team's rocket experiment; Alex Marchi (Materials Synthesis and Integrated Devices, MPA-11) helps Ananya Mulakala (Monte del Sol Charter School) calculate the altitude of the rocket launched by her teammates.

94 **total volunteers from a range of STEM fields,**

60 **of whom were women.**

Accelerator Operations and Technology Deputy Division Leader Mark Gulley (right) answers questions from Marissa Abeyta (Española Valley high School) (left) and Jazlyn Sanchez (Santa Fe Preparatory School) during a tour of the Los Alamos Neutron Science Center's linear accelerator.

Leonardo de Melo (MPA-Q) (right) shovels adobe mud into wooden frames.
Photos by David Moore (Community Partnerships Office, CPA-CPO)

Laying a foundation for the future

Lab volunteers make adobe bricks at Ohkay Owingeh

Prior to joining the Lab earlier this year, Leonardo de Melo said he knew very little about the area's Native American culture "and nothing about adobe bricks."

That changed this summer when de Melo (MPA-Quantum, MPA-Q) joined other Lab volunteers to give a little time and a lot of sweat to make adobe bricks to restore ancestral homes in the heart of Ohkay Owingeh Pueblo.

Since 2006, the restoration of the four connecting plazas at the historic center of the pueblo has seen 30 families return to renovated houses, bringing life back to the area known as Owe'neh Bupingeh, the setting for traditional observances and the spiritual and social center of the community.

"During my visit I saw that the pueblo's residents are committed to keeping their traditions alive by renovating their buildings with adobe bricks," de Melo said. "It was nice to see families and people of all ages volunteering to help one of the communities around LANL."

While the houses are built with traditional construction methods, interiors are updated with modern kitchens and

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GET THE DETAILS

Participants: In addition to Leonardo de Melo (MPA-Quantum, MPA-Q); Josiah Srock (National High Magnetic Field Laboratory-Pulsed Field Facility, MPA-MAGLAB); and Robert Moore (Mechanical Design Engineering, AOT-MDE), volunteers included staff from Human Resources-Field and Central Services (HR-FCS); Configuration and Development Services (NIE-CDS); Information Systems and Modeling (A-1); Assembly Operations (PT-3); Earth System Observations (EES-14); Acquisition Services Management Mission Operations (ASM-MO); Space Instrumentation Realization (ISR-5); Actinide Analytical Chemistry (C-AAC); Institutional Systems Services (XIT-ISS); Communications Arts and Services (CPA-CAS); Deputy Laboratory Directorate for Operations (DDOPS); Design Agency Quality (ALDW-DAQ); Human Resources-Employee Relations (HR-ER); Information Sciences (CCS-3); and Environmental Stewardship (EPC-ES).

Lab volunteers continued ...

living spaces. This balance of using traditional techniques and honoring the history in the buildings while making them work for families now (and into the future) has been one of the keys to the success of the project.

Under the supervision of experienced builders from the pueblo, de Melo, Josiah Srock (National High Magnetic Field Laboratory-Pulsed Field Facility, MPA-MAGLAB), Robert Moore (Mechanical Design Engineering, AOT-MDE), and other Laboratory volunteers kept up a steady pace of brick-making. Some shoveled the right combination of sand, clay mud, straw, and water into mixers and then dumped the mixed adobe into wheelbarrows. The wheelbarrows were then heaved to where volunteers deposited the heavy, brown mixture into wooden forms laid on the ground. Others, on their knees, kneaded the mud into the corners of forms, smoothing off the tops before carefully pulling the forms straight up to reveal bricks with smooth, clean edges.

"As an engineer, I've always been fascinated by traditional building techniques," Srock said. "Making these bricks is definitely an art and takes an experienced eye. The building experts adjusted the mixture throughout the day depending on the texture of the clay or sand in each batch and how the humidity changed."

At the end of the day more than 700 new bricks were drying in three long columns.

Josiah Srock (MPA-MAGLAB) hauls a fresh batch of adobe mud.

'Making these bricks is definitely an art and takes an experienced eye. The building experts adjusted the mixture throughout the day depending on the texture of the clay or sand in each batch and how the humidity changed.'

Josiah Srock
MPA-MAGLAB

Once cured, these bricks made by Lab volunteers and their families would be used to restore ancestral homes in the 700-year-old pueblo core.

Rotor transport successfully commands many moving parts

In a feat of meticulous planning, involving coordination across more than 10 Lab organizations, external contractors, and the State of New Mexico, the Laboratory's massive motor-generator rotor has made its way to a General Electric (GE) repair facility in Virginia.

The copper and steel rotor is the central portion of the Laboratory's motor-generator. It weighs more than 460,000 pounds and is 69 feet long and 6 feet in diameter.

Recent tests showed that the rotor needs repairs and maintenance that require specialized facilities at the GE factory.

In an implementation of the Safe Conduct of Research Principles, the move called upon the expertise of Laboratory staff and contractors—ranging from engineers, millwrights, and carpenters to electricians and numerous safety professionals. Over the course of several weeks, these experts worked together to disassemble the machine, pull the rotor from the generator, and then mount it onto a special heavy-haul, dual-lane trailer that was moved with both push and pull trucks to ensure necessary power and control. From Los Alamos the rotor was transported to Clovis, New Mexico, where it traveled by rail cross country. After repairs are completed, the rotor will be transported back to Los Alamos.

Extracting the 69-foot-long rotor from the generator required the precision use of a series of gantry cranes and a multi-axle, self-propelled mobile trailer.

The rotor repair project is a Laboratory institutional initiative to sustain this unique national asset well into the future. The generator supports the Lab's basic research and mission science by delivering large bursts of electrical energy (hundreds of megajoules) in short time scales (about one second) safely, repeatably, and under control to physics and materials science experiments. It is a major piece of infrastructure, with a power output capacity of 1.4 billion watts, energy storage of 1.2 gigajoules, and requiring a dedicated 12,000-square-foot building. The generator was first delivered to the Laboratory in 1989 for use in early fusion energy experiments. It was originally built in Switzerland and designed for use by the Tennessee Valley Authority.

The rotor makes its way off Lab property on the multi-axle trailer, which is designed and operated to distribute weight evenly and comply with road and bridge loading requirements.

Safe Conduct of Research Principles

- Everyone is personally responsible for ensuring safe operations.
- Leaders value the safety legacy they create in their discipline.
- Staff raise safety concerns because trust permeates the organization.
- Cutting-edge science requires cutting-edge safety.
- A questioning attitude is cultivated.
- Learning never stops.
- Hazards are identified and evaluated for every task, every time.
- A healthy respect is maintained for what can go wrong.

New surface science instrumentation provides insights into understanding plutonium reactivity

The Plutonium Surface Science Laboratory allows studies of plutonium surfaces in a laboratory setting. New scientists can study plutonium more easily at this facility because it does not require the extensive training needed to work in the Plutonium Facility. The capability enables students and early-career staff to obtain experience with surface science instrumentation that is fully configured for the study of radioactive materials.

In *Actinide Research Quarterly,* Sarah Hernandez (Nuclear Materials Science, MST-16) highlighted the laboratory and the results of her research using its capabilities. In many cases, she wrote, the lab's surface analytical techniques have never been applied to plutonium surfaces and are providing new insights into understanding plutonium reactivity. Hernandez, who received her PhD in physics from the University of Texas at Arlington, was a Seaborg Institute Postdoctoral Research Fellow before becoming an MST-16 staff scientist. Her studies include the oxidation and corrosion of plutonium and aging of plutonium using density functional theory methods.

Hernandez and collaborators used time-of-flight secondary ion mass spectrometry (ToF-SIMS) to detect negative and positive secondary ion fragments, which provided insight into the surface species that might exist. Their results reveal that gallium is located at the surface of gallium-stabilized delta-plutonium and is reactive to oxygen exposure. They showed that gallium is also reactive to other environmental gas exposures, such as water vapor. Further studies are needed to fully understand PuH_x fragments, and there are future plans to investigate a deuterium-loaded, gallium-stabilized delta-plutonium sample to determine the source of the hydrogen. As a whole, the suite of experimental surface science instruments within the Plutonium Surface Science Laboratory delivers a powerful ability to explore the oxidation and corrosion of plutonium surfaces from a multitude of perspectives.

Sarah Hernandez (MST-16) uses the KORE time-of-flight secondary ion mass spectrometer to perform surface analysis of a plutonium sample in the Plutonium Surface Science Laboratory.

At right: A gallium-stabilized delta-plutonium sample mounted and ready to be inserted on the stage in the sample analysis chamber.

Actinide Research Quarterly is published by Los Alamos National Laboratory and is a publication of the Glenn T. Seaborg Institute for Transactinium Science, a part of the National Security Education Center. The magazine highlights research in actinide science in such areas as process chemistry, metallurgy, surface and separation sciences, atomic and molecular sciences, actinide ceramics and nuclear fuels, characterization, spectroscopy, analysis, and manufacturing technologies.

Mission connection: The work supports the Laboratory's Stockpile Stewardship mission area and its Materials for the Future science pillar.

GET THE DETAILS

Participants: Providing sample selection, preparation, and installation of the sample into ToF-SIMs were Ron Allen (Nuclear Materials Science MST-16); Ed Cagle (Hazardous Materials Management, NPI-7); Claudette Chavez (Safeguards Science and Technology, NEN-1); Susie Duncan (formerly MST-16); John Dunwoody (Materials Science in Radiation and Dynamics Extremes, MST-8); James Gallegos (formerly MST-16); Paul Martinez (NPI-7); Jeremy Mitchell (MST-16); Alison Pugmire (Engineered Materials, MST-7); Mike Ramos, Scott Richmond, and Joe Romero (MST-16); Nyana Sanchez (formerly Science and Technology Operations, DESH-STO); Rachel Sanchez (DESH-STO); Mike Torrez and Anthony Valdez (MST-8); Darrell Vigil (NPI-7); and Kenneth Vigil (TA-55 Operations, DESH-TA55). **Funding:** The work was supported by a Glenn T. Seaborg Institute Postdoctoral Fellowship and the LANL Office of Experimental Sciences (LANL Program Manager Ray Tolar). **Reference:** "New surface science instrumentation for understanding the reactivity of plutonium," *Actinide Research Quarterly*, 1, 33 (2019). **Technical contact:** Sarah Hernandez

Lab researcher helps fuel an agile workforce through diverse pipelines

'To find the best STEM researchers for the next generation, we need to look everywhere.'

Tommy Rockward
MPA-11 fuel cell researcher and LANL diversity program leader

Tommy Rockward (far left) and University of New Mexico graduate student Andre Spears attach fuel cell hardware to a test bench. Spears was a graduate research assistant funded through the African American Partnership Program.

To fulfill its national security mission, the Laboratory needs the creativity that thrives as a result of a diverse workforce. To develop this innovative labor pool, Laboratory scientist Tommy Rockward leads programs that attract, support, and retain talent from underrepresented populations in science, technology, engineering, and math (STEM).

"To find the best STEM researchers for the next generation, we need to look everywhere," he said. That's why Rockward, a fuel cell researcher in Materials Synthesis and Integrated Devices (MPA-11) works at the bench and outside the Lab to encourage minorities to pursue STEM careers.

At Los Alamos, Rockward helps run the African American Partnership Program (AAPP), a Laboratory program that matches students with a Lab staff member who serves as a mentor—with the ultimate goal of retaining African American students in STEM fields at Los Alamos National Laboratory.

Rockward serves as the LANL lead for the NNSA Minority Serving Institution Partnership Program (MSIPP), which aims to create a sustainable pipeline connecting DOE sites and minority-serving institutions in STEM disciplines. Through 10 consortia, the program provides minority students in STEM studies summer internships in institutions across the NNSA complex, including national laboratories, plants, and site offices.

At Los Alamos, the MSIPP supports the Partnership for Research and Education Consortium in Ceramics and Polymers (PRE-CCAP) and Energy Sciences: Experimental and Modeling (ESEM).

PRE-CCAP is led by the University of Texas at El Paso and includes Florida International University and Tennessee State University, and in addition to LANL, the Kansas City National Security Campus as an NNSA partner. ESEM is led by Prairie View A&M University and includes Morehouse College, Tennessee State University, and Inter American University of Puerto Rico along with LANL and Lawrence Livermore National Laboratory as NNSA partners.

Rockward was also responsible for the creation of the Consortium for Materials and Energy Security (CMAES), which ran from 2014–2018.

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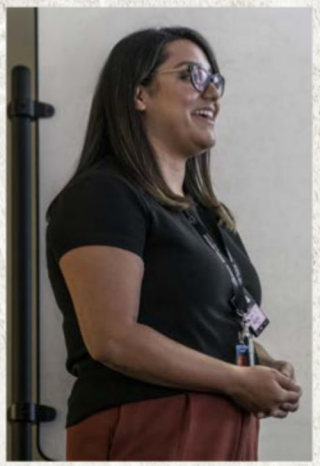
Participants in the Laboratory's Minority Serving Institution Partnership Program, seen here, are offered research opportunities, mentorship, and professional development training.



Laboratory MSIPP students highlighted their accomplishments and presented their experience to the program's leadership during LANL Industry Day.

At left, Raquel Herrera (MPA-11) is a University of Texas at El Paso undergraduate and PRE-CCAP scholar.

Stefan Williams, a Morehouse College graduate now attending the University of Tennessee, Knoxville, is a former CMAES scholar using the AAPP to complete his doctoral research in MPA-11.

Lab researcher continued ...

Rockward draws on his personal experience as he encourages students interested in the Lab's diversity programs. He attended a rigorous college preparatory high school before attending Southern University A&M, where he joined the school's ongoing fuel cell research program. He graduated with a master's degree in applied physics, took an internship at Los Alamos, and formally began his career at the Laboratory in 1997 as a graduate student.

"Tommy's dedication to underrepresented minorities in STEM is inspiring," said Laboratory Diversity Officer C.J. Bacino (Office of Diversity and Strategic Staffing, HR-ODSS). "His extraordinary efforts have truly made a difference and positively impacted the Laboratory's diversity and inclusion reputation."

R&D scientist, Neutron Science and Technology (P-23)

MEET ANNA LLOBET

Anna Llobet, a physicist in Neutron Science and Technology (P-23), created the Los Alamos National Laboratory Summer Physics Camp for Young Women, now in its third year (see story on page 2).

Llobet (pictured above, at right, with two 2019 campers) partnered with area public school teachers to understand local young women's needs. She developed a program and secured funding for the free camp. She sorted through participant applications and arranged visits to Los Alamos research facilities. She recruited volunteers to give talks and demonstrations, to direct hands-on experiments, and to serve as proof that science, technology, engineering, and math (STEM) careers can be both varied and exciting. Llobet's leadership has put the physics camp on a solid path for the future.

Her efforts have supported participants' dreams and are providing area public schools access to STEM volunteers. In a 2019 post-camp survey, 80% of the students stated that to a great extent the camp was valuable for their future. The vast majority said they would consider applying for future Laboratory internships, so Llobet's work will greatly impact the Lab's talent pipeline in the years to come.

For her dedication she received a Los Alamos Distinguished Performance Award this year. "You don't do it for a pat on the back," she said of her volunteer work. "You do it because it's the right thing to do."

Llobet's commitment to helping others originates in her childhood. She said she was raised by parents who embodied generosity and expected it from their children. Her education at an all-girls school exposed her to strong female role models.

Llobet, who has a PhD in physics, is an accomplished condensed matter physicist who has received awards for her contributions to the Lab's national security science mission. She studies shock physics phenomena and is leading the Pu@pRad project, which aims to restart dynamic plutonium experiments at the Lab's Proton Radiography Facility by 2023.

Cultivating scientific potential via service

Through TMS leadership, Foley and Cerreta advance professional development of materials researchers

As TMS President and TMS Vice President-Elect Jim Foley and Ellen Cerreta, respectively, are guiding the society's efforts at fostering the professional development of scientists and engineers around the world.

With approximately 14,000 members, TMS (for The Minerals, Metals & Materials Society) promotes the global science and engineering professions concerned with minerals, metals, and materials. The organization creates networking, publication, and professional development opportunities and nurtures the next generation of science and engineering professionals through a strong student membership program in collaboration with three other societies.

At the passing of the gavel at the 2020 TMS board of directors meeting in San Diego, Foley, the Fabrication Manufacturing Science (Sigma-1) group leader, will transition to past president and Cerreta, Materials Science and Technology division leader, will begin her service as vice president.

In the April issue of *JOM*, a TMS journal, Foley thanked the organization and its members for professional development and networking opportunities that early on helped him advance his career and wrote that he plans to continue volunteering. "The reason our society is so great is because of all the many individuals spending their precious time volunteering," Foley wrote.

Foley, who has a PhD in metallurgical engineering from the University of Wisconsin at Madison, joined Los Alamos in 2003. He is a fellow of ASM International and has served on its board of trustees. He served on the TMS board twice, contributed to several committees, and has advanced TMS programming.

Jim Foley

Ellen Cerreta

'The reason our (TMS) society is so great is because of all the many individuals spending their precious time volunteering.'

Jim Foley
TMS president and
Sigma-1 group leader

Cerreta, who has a PhD in materials science from Carnegie Mellon University, joined the Lab as a postdoctoral researcher, becoming a staff member in 2003. She is a fellow of ASM International and has served on ASM and TMS leadership boards. In 2016 she began a three-year term as TMS structural materials division chair. She is an adjunct faculty member at the Institute of Shock Physics at Washington State University.

Paul Dixon

Dixon distinguished for fostering next generation of science and engineering talent

Paul Dixon (Civilian Nuclear Programs, SPO-CNP) has been recognized for his volunteer work with FIRST (For Inspiration and Recognition of Science and Technology). He was named the 2019 Outstanding Volunteer of the Year by the Las Vegas, Nevada, regional section—for his work with its FIRST Robotics Competition (FRC).

FIRST is an international nonprofit organization established in 1989 that hosts science, technology, engineering, art, and math education events. FIRST offers robotics-based cooperative competitions for students in grades K–12. The events combine the excitement of sport with science and technology as students build robots that compete in team alliances on a special playing field.

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Boshier and Brown recognized for outstanding student mentoring

Malcolm Boshier (MPA-Quantum, MPA-Q) and Don Brown (Materials Science in Radiation and Dynamics Extremes, MST-8) have received 2019 Los Alamos Distinguished Mentor Awards. The awards are presented by the Student Programs Advisory Committee.

Boshier was nominated by Sara Hurd (MPA-Q), a sophomore pursuing a degree in chemical engineering at New Mexico State University and a member of Boshier's quantum technologies team. Hurd noted Boshier's dedication to her education and growth as a scientist. Boshier encourages Hurd to be part of a high-level team by inviting her to present her work alongside experienced team members and assigning her projects that capitalize on her strengths, challenge her limits, and contribute to the group's goals.

Boshier, who has a DPhil in physics from Oxford University, and his team of staff scientists, postdocs, and students develop applied quantum technologies.

Brown was nominated by his student, Tom Stockman (Finishing Manufacturing Science, Sigma-2), with support from current and previous students. According to his nominators, Brown encourages his students' scientific creativity and enables them to pursue their ideas by connecting them with needed resources using his experience and networks within the material science, neutron diffraction, and additive manufacturing communities. He trusts his students with leadership roles and allows them to develop their potential by sending them to conferences and experiments conducted at other facilities. He provides them with a holistic view of their research by discussing its context within the Laboratory, the DOE, and the scientific community.

Malcolm Boshier

Don Brown

Brown, who has a PhD in physics from Pennsylvania State University, leads MST-8's scattering science team, which examines mission-relevant materials under extreme environments to understand how manufacturing techniques can affect microstructure and ultimately performance.

Dixon continued ...

Dixon, who lives and works in Nevada, is the Lab's Civilian Nuclear Program Office deputy director, overseeing research and development in the fields of nuclear energy and nuclear waste disposal and clean up.

He is also the senior program manager for Environmental Sciences, coordinating multi-lab efforts in advanced simulations for environmental clean-up efforts within DOE. He has contributed to several well-known environmental management projects, including managing radioactive waste during the 2000 Cerro Grande fire, which burned 47,000 acres of forest, including thousands of acres of Laboratory property. For his scientific contributions to the Yucca Mountain Project he received a 2001 Technical Achievement Award. Dixon, who has a PhD in geochemistry from Yale University, has been with the Lab for 30 years.

It was through a Yucca Mountain Project colleague that Dixon became involved with FIRST. After judging a contest, he said he was hooked. "Being part of FIRST is so addictive," Dixon said. "Each year you see the future science and engineering leaders being created."

'Being part of FIRST is so addictive. Each year you see the future science and engineering leaders being created.'

Paul Dixon

2019 FIRST Robotics Competition outstanding volunteer of the year, Las Vegas regional section, and SPO-CNP deputy director

Dixon has served on the Nevada FIRST board of directors for 3 years and has been a FIRST FRC judge for 10 years at both the Las Vegas and Orlando regional competitions. He is the judge advisor for the Las Vegas Regional FRC.

Grassroots effort grows into rad-tech training alliance

Radiological control technicians (RCTs) play a vital role in ensuring the Laboratory safely conducts operations while executing its national security mission. In Laboratory activities involving certain radiological hazards, RCTs must be present to actively monitor radiation levels, verify dose rates for areas and people, ensure compliance with federal and Laboratory policies and procedures, and complete required documentation. The scope of LANL's mission requires a large RCT workforce—and demand is expected to grow with the round-the-clock execution of the Lab's manufacturing mission to deliver 30 plutonium pits per year.

Mike Duran (LANSCE Facility Operations, DESH-LFO) became acutely aware of this need a decade ago when he was a team leader in the Lab's health physics group. Now, an effort he initiated to address this challenge has been solidified by a collaboration between the Laboratory and Northern New Mexico College (NNMC) to train and employ a steady pipeline of RCTs at Los Alamos.

With funding from the Laboratory and the New Mexico Department of Workforce Solutions, NNMC has expanded its associate degree program to prepare students for entry-level RCT positions at the Lab and across the DOE complex. The curriculum follows Los Alamos and DOE training requirements for RCTs, with the Laboratory providing technical staff to take part in instruction. The Laboratory offers internships to students to work at Los Alamos while they are pursuing the two-year program.

NNMC is a minority-serving institution, offering bachelor's, associate, and certificate programs. The college primarily serves rural communities within a 40-mile radius of its campus in Española, New Mexico, within one of the most underserved regions in the state.

Mike Duran (left) shows Alejandra Loya-Munoz (both DESH-LFO) how to survey an experimental component using a dose-rate meter at the Spectrometer for Materials Research at Temperature and Stress at LANSCE.

'It's been very rewarding to realize that my teaching efforts have been successful in helping prepare our local students in the support of the Laboratory's mission.'

Mike Duran
Health physicist, DESH-LFO

An investment in the Lab's future

For 25 years Duran has leveraged his positions at the Lab and NNMC to help bring area students to "the Hill" as RCTs. As a health physicist, he uses his background in physics and the health effects of radiation to develop and evaluate radiation protection programs at the Los Alamos Neutron Science Center (LANSCE). As an adjunct professor at NNMC, he teaches radiation control classes in the evenings.

"There was such a need," he said, describing the RCT retention challenge he observed a decade ago, as his students moved on to more senior positions in the radiation protection community. "We were constantly hiring."

To amend this situation, Duran looked to his talented and hardworking NNMC students, regularly advising them to look into Lab career opportunities and sharing with them his experience at LANSCE. He advertised internships, encouraged his fellow professors to share the information, and convinced the college to host recruitment fairs. He organized Laboratory tours for the students. When they saw the complex radiological situations that Lab employees navigate they better understood their lessons and could envision themselves working at the Lab, he said. His small pilot program showed that the partnership had promise, graduating about 10 students per year.

Now, with the new training program, 75 students are enrolled in classes and 10 are selected for internships at the Lab. Of the 55 RCTs hired by the Lab within the last year, one-third are students enrolled at NNMC.

Duran always knew he was doing the right thing, he said, and he finds the formalization of the program affirming. "It's been very rewarding to realize that my teaching efforts have been successful in helping prepare our local students in the support of the Laboratory's mission."

STUDENT AWARDS & RECOGNITIONS

Nathan Taylor Bieberdorf
Materials Science In Radiation and Dynamics Extremes (MST-8)

Andrew Ernest Cardin
Center for Integrated Nanotechnologies (MPA-CINT)

Kavita Chintam
Materials Synthesis and Integrated Devices (MPA-11)

Matthew Critchley
Subatomic Physics (P-25)

Jonathan Leo Doorn
National High Magnetic Field Laboratory (MPA-MAGLAB)

Rachel Marie Flanagan
Materials Science In Radiation and Dynamics Extremes (MST-8)

Berenice Garcia
Subatomic Physics (P-25)

Andre Gouws
Materials Science In Radiation and Dynamics Extremes (MST-8)

Elizabeth Anne Hjelvik
Center for Integrated Nanotechnologies (MPA-CINT)

Codie Yoshiko Fiedler Kawaguchi
Plasma Physics (P-24)

Rebecca Anne Lalk
Center for Integrated Nanotechnologies (MPA-CINT)

Eldred Lee
Subatomic Physics (P-25)

Joseph Andrew Lundeen
Neutron Science and Technology (P-23)

Kevin Daniel Meaney
Plasma Physics (P-24)

Courtney Ann Nelson
Nuclear Materials Science (MST-16)

Jeffrey Duytam Nguyen
Center for Integrated Nanotechnologies (MPA-CINT)

Karl Marvin Niendorf
Materials Synthesis and Integrated Devices (MPA-11)

Luis Noriega
Engineering Services (ES-LFO)

Daniel Cris Poulson
Subatomic Physics (P-25)

Alexander Martin Rasmus
Plasma Physics (P-24)

Cameron Gregory Richards
Engineered Materials (MST-7)

David Sebastian Arias Roldan
Center for Integrated Nanotechnologies (MPA-CINT)

Christopher Douglas Roper
Plasma Physics (P-24)

Natalia Leonie Rubio
Materials Science In Radiation and Dynamics Extremes (MST-8)

Mario Patrick Santistevan
Materials Science and Technology (MST-DO)

Kassidy Alayna Shedd
Applied Modern Physics (P-21)

Rachel Sidebottom
Neutron Science and Technology (P-23)

Michael Paul Springstead
Plasma Physics (P-24)

Tom James Stockman III
Finishing Manufacturing Science (Sigma-2)

Landon Tafoya
Neutron Science and Technology (P-23)

Kwyntero Van Kelso
Plasma Physics (P-24)

Nomita Nirmal Vazirani
Plasma Physics (P-24)

Bradley Thomas Wolfe
Subatomic Physics (P-25)

Christopher Burton Cude-Woods
Subatomic Physics (P-25)

Calvin Joseph Young
Plasma Physics (P-24)

Above and Beyond | Academic/ Scientific Distinction | Patent | Presentation | Publication | Research Grant

2021 Physical Sciences Directorate

Los Alamos NATIONAL LABORATORY EST. 1943

Sigma foundry workers Eunice Solis (left) and Seth Imhoff (both Fabrication Manufacturing Science, Sigma-1) finish the assembly of a graphite mold stack for uranium casting using vacuum induction melting technology.

Associate Laboratory Director for Physical Sciences:
Antoinette J. Taylor

Physical Sciences Vistas, produced by Karen Kippen, Efrain Garcia, and Madeline Bolding, is published by the Physical Sciences Directorate at Los Alamos National Laboratory.

For more information about this publication, contact aldps-comm@lanl.gov.

LA-UR-19-32506
Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by Triad National Security, LLC, for the National Nuclear Security Administration for the U.S. Department of Energy under contract 89233218CNA000001.

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NNSA
National Nuclear Security Administration