



ACADEMIC PROGRAMS QUARTERLY

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Welcome to the March issue of the *Academic Programs Quarterly* (APQ). We are pleased to share highlights from several exciting initiatives, events, and spotlights across our community, each reflecting the continued growth, collaboration, and scientific excellence that define our programs.

Our lead feature celebrates the launch of a landmark educational partnership advancing the study of warm dense matter, a field vital to national security, fusion energy research, and planetary science. This collaboration brings together national laboratories and universities to deliver a rigorous graduate-level course supported by a robust bootcamp, world-class instructors, and cutting-edge curriculum. With more than 100 participants from across the country and abroad, the program is already strengthening

future workforce pipelines and laying the foundation for a forthcoming comprehensive textbook—an important step toward establishing a unified educational resource in this emerging discipline.

We also spotlight the continued growth of the ZNetUS consortium, a national network committed to advancing pulsed magnetic science and high-energy-density research. The program has just announced its second round of user facility experimental awards, expanding opportunities for university-led campaigns. This edition also welcomes a new executive committee chair and recognizes the outgoing chair's contributions to building a strong, collaborative research community.

In February, the Stewardship Science Academic Programs (SSAP) Symposium brought together researchers, students, and laboratory professionals for two days of inspiring talks, a poster session, and networking. With 300 attendees and more than 130 graduate student posters, the event showcased a wide spectrum of innovative research and offered meaningful opportunities for collaboration. Outstanding Poster Awards were presented to seven students whose work demonstrated exceptional scientific rigor and communication. We provide a brief introduction to them and their award-winning posters on page 4.

We also take a moment to honor the life and legacy of a respected scientific leader, Dr. William Evans. His dedication, mentorship, and long-standing support for stewardship science left an enduring impact on our community. His influence continues to resonate through the programs he shaped and the many colleagues and young scientists he encouraged throughout his career.



Dr. David A. LaGraffe delivered the keynote address of the 2026 SSAP Symposium, held in Bethesda, Maryland, on February 23-24.

Finally, our Student Spotlight features a doctoral researcher whose work explores thermal transport in materials under extreme conditions. Her expanding educational portfolio of collaborations, international research experiences, and contributions to major experimental campaigns underscores the transformative potential of NNSA's Academic Programs through their hands-on learning supported by strong laboratory partnerships.

David A. LaGraffe, PhD
Principal Assistant Deputy
Administrator
Office of Research, Development, Test,
and Evaluation

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2026 CALENDAR

- 6/22-26 2026 International Conference on Plasma Science (ICOPS), Stateline (Lake Tahoe), NV
- 7/27-8/5 High Energy Density Summer School: Foundations of High Energy Density Physics, University of Michigan
- 8/27-28 Summer Showcase Workshop for UC San Diego PSAAP IV SHAPE Center, UC Livermore Collaboration Center, Livermore, CA

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Advancing Warm Dense Matter Education: A Flagship NNSA–Academia Partnership

by Ivan I. Oleynik

(University of South Florida) and

Frank Graziani (Lawrence Livermore National Laboratory)



Warm Dense Matter (WDM) is a new scientific frontier focused on understanding how matter behaves under extreme temperatures and pressures. Found in planetary interiors, fusion targets, and high-energy-density laboratory experiments, WDM exists at multi-megabar pressures and temperatures ranging from tens of thousands to millions of kelvin. These conditions place WDM far beyond the reach of conventional condensed-matter or plasma theory, making it one of the most challenging regimes in modern physics. In this state, quantum mechanics, strong coupling, and thermal effects act simultaneously, giving rise to some of the most compelling problems in contemporary science. Advancing our understanding of WDM is essential for harnessing fusion energy, accurate modeling of planets and exoplanets, and the design of materials operating under extreme conditions relevant to national security applications.

Recognizing a critical need to educate the next generation of scientists and engineers in this mission-essential area for NNSA, the High Energy Density Science Center at Lawrence Livermore National Laboratory (LLNL) partnered with the University of South Florida (USF) and the University of California San Diego (UC San Diego) to develop and deliver the graduate-level course Warm Dense Matter: Concepts and Fundamentals. The course addresses a significant training gap within the NNSA complex and the broader high-energy-density science (HEDS) community by providing interdisciplinary education at a key scientific frontier. Jointly developed during 2024–2025 by Frank Graziani (LLNL), Ivan Oleynik (USF), Farhat Beg (UC San Diego), Federica Coppari (LLNL), and Sebastien Hamel (LLNL), the course was delivered online in Fall 2025 by a team of world-class lecturers

drawn from NNSA laboratories and academia.

The instructional team included Lorin Benedict (LLNL), Rip Collins (University of Rochester), Federica Coppari (LLNL), Tilo Döppner (LLNL), Zhandos Moldabekov (Helmholtz-Zentrum Dresden), Jon Eggert (LLNL), Frank Graziani (LLNL), Sebastien Hamel (LLNL), Omar Hurricane (LLNL), Zsolt Jenei (LLNL), Marcus Knudson (Sandia National Laboratories), Burkhard Militzer (UC Berkeley), Michael Murillo (Michigan State University), Ivan Oleynik (USF), Aurora Pribram-Jones (UC Merced), and Dan Shim (Arizona State University), ensuring broad coverage of experiment, theory, and computation across the WDM landscape.

The curriculum provides a comprehensive introduction to warm dense matter, spanning foundational physics; hydrodynamics and shock physics; equilibrium and transport properties; simulation methodologies; experimental platforms and diagnostics; and applications in planetary science and inertial confinement fusion. A central theme is the close integration of theory, simulation, and experiment, emphasizing the synergy between state-of-the-art experimental facilities, such as high-power lasers, pulsed-power drivers, synchrotrons, and X-ray free-electron lasers, and advanced computational approaches, including density functional theory, molecular dynamics, path-integral Monte Carlo, radiation hydrodynamics, and plasma kinetic and transport simulations.

Instruction was offered for academic credit to graduate and senior undergraduate students nationwide, as well as to scientific personnel pursuing professional development and members of the general public seeking personal enrichment. More than 100 participants from the United States and abroad enrolled, including laboratory staff who completed the course for credit as part of formal professional development program.

To support participants with diverse academic backgrounds, a five-week Warm Dense Matter bootcamp was conducted at the beginning of the term. The bootcamp provided focused refreshers in classical and quantum mechanics, thermodynamics and statistical mechanics, hydrodynamics, plasma physics, and transport phenomena, complemented by hands-on training in Python and the scientific Python ecosystem using Jupyter notebooks. This preparation equipped participants with the foundational skills needed to succeed in the course and to apply these tools effectively in future research.

Building on the success of the course, the NNSA–academia collaborative team is now writing a comprehensive, pedagogically focused textbook on warm dense matter. At present, the field lacks a modern instructional text. Existing references, such as the WDM Roadmap, primarily function as research monographs rather than teaching resources. The new textbook, under contract with Springer in the Shock Wave and High Pressure Phenomena series, will provide the first unified and up-to-date educational foundation for students and early-career scientists, directly supporting NNSA workforce development.

The course will be offered annually as a sustained educational program. To support this long-term vision, the team continues to refine the curriculum to ensure that its content, pacing, and assessment methods reflect both the latest scientific advances and best practices in interdisciplinary education. Overall, this initiative exemplifies a highly successful and mutually beneficial NNSA laboratory–academia partnership, delivering a flagship educational resource for NNSA laboratories and the broader HEDS academic community while fostering sustained innovation in undergraduate and graduate education and strengthening long-term talent pipelines aligned with NNSA's mission.

ZNETUS Consortium for Advancement in Pulsed Magnetic Science and Technology

by Stephanie Miller (NNSA)

The Z-pinch Network US (ZNetUS) is a national consortium of researchers working to advance pulsed magnetic science, technology, and high energy density physics for energy and national security. With a focus on developing future scientific leaders, ZNetUS now hosts a NNSA User Facilities program aimed at fostering academic collaboration and expanding access to cutting-edge capabilities in this critical field. These efforts enable user access to a network of university-scale pulsed power machines.

Building on the successes of the first round of User Facilities awards, ZNetUS recently awarded a second group of experimental campaigns from an FY25 call for proposals. Details about the first experiments can be found in the [2026 AP Annual](#). These 12 new campaigns will be completed in the upcoming year across the research network. Congratulations to the awardees; we wish you success with your experiments. Stay tuned for details about their results and keep an eye out for future calls for proposals.

ZNetUS

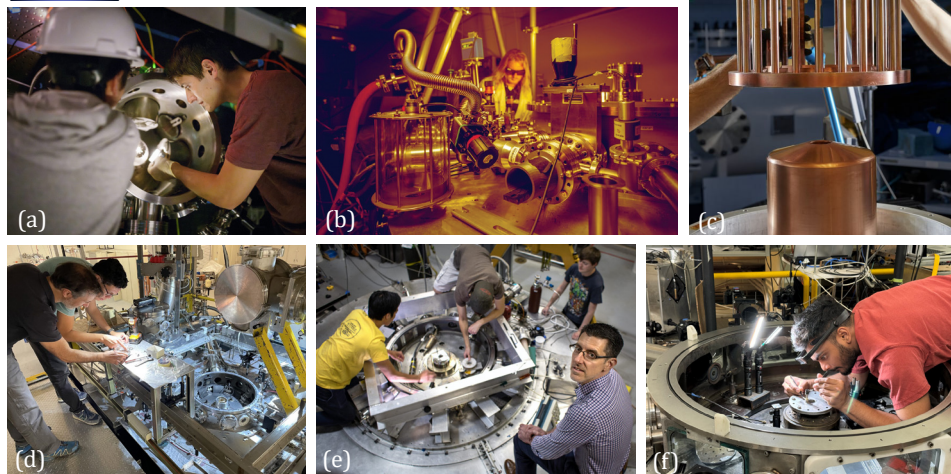


Figure 1. ZNetUS, in collaboration with their partners, uses the following state-of-the-art facilities for small-scale student projects to large-scale fusion and neutron science initiatives. (a) Mykonos, Sandia National Laboratories (b) CESZAR, University of California San Diego, (c) MJOLNIR, Lawrence Livermore National Laboratory, (d) ZEBRA, University of Nevada, Reno, (e) MAIZE, University of Michigan, and (f) COBRA, Cornell University.

Additionally, welcome to Jens Schwarz, the new ZNetUS Executive Committee Chair. Jens will be transitioning into this role following Keith LeChien. We would like to thank Keith for his leadership over the past few years at helping to shape ZNetUS into the successful program it is today. Jens brings deep experience and a

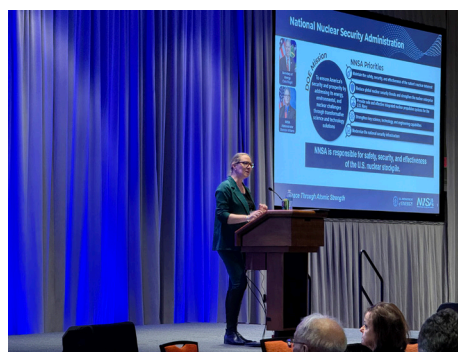
strong commitment to the mission of ZNetUS, and we look forward to his leadership as the program continues to grow and evolve.

Visit <https://znetus.org> for a full list of facilities and information about the next call for proposals which is anticipated to be posted in June 2026.

2026 Stewardship Science Academic Programs Symposium

The National Nuclear Security Administration's (NNSA) Stewardship Science Academic Programs (SSAP) Symposium, held February 23-24, in Bethesda, Maryland, brought together a vibrant community of researchers, students, and laboratory professionals. With 300 registered attendees, the symposium demonstrated strong interest and participation from across the scientific community.

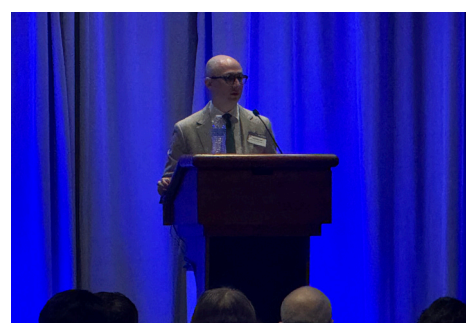
In addition to SSAP grantee presentations, this year's Symposium featured a memorable keynote address by Dr. David LaGraffe, Principal Assistant Deputy Administrator of the NNSA Office of Research, Development, Test, and Evaluation, who shared valuable insights and inspired attendees with his expertise and career trajectory. Additionally, guest speaker Dr. Sarah L. Nelson,



Dr. Sarah L. Nelson, NNSA Office of Experimental Sciences, spoke to attendees about Research in Service of the Stockpile.

Assistant Deputy Administrator, NNSA Office of Experimental Sciences, delivered an engaging talk that was well-received by participants, further enriching the program.

Representatives from the Nevada National Security Sites, Lawrence



Mr. Noah Stevens, NNSA Office of Research, Development, Test, and Evaluation, kicked off this year's Symposium with the welcome from NNSA.

Livermore, Los Alamos, and Sandia National Laboratories gave presentations, followed by a meet and greet session during which attendees had the opportunity to interact with staff from the national labs,

(continued on page 4)

2026 SSAP Symposium

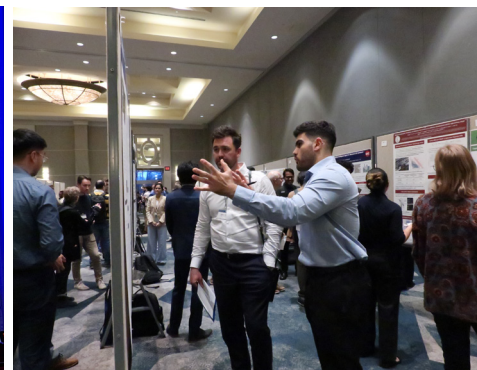
user facilities, and fellowship and internship programs supported by NNSA.

A special graduate student lunch was held during the symposium, creating valuable opportunities for connection and mentorship. Graduate students had the chance to interact with laboratory staff, fostering relationships that will support their academic and professional development. This lunch facilitated conversations, networking, and guidance, strengthening the sense of community within the SSAP.

This year, 130 graduate students registered to present their research posters at the symposium. These presentations showcased innovative research and provided a platform for students to share their work with



Left: David Funk, Vice President of Enhanced Capabilities for Subcritical Experiments at the Nevada National Security Sites (NNSS), spoke to attendees about opportunities at NNSS. Right: Research methods and findings were topics of discussion among graduate students and academia, NNSA, and national laboratory staff during the Symposium Poster Session.



peers and experts in their fields. The quality of student research was recognized through the Outstanding Poster Awards. Seven graduate students were selected as award winners, highlighting their excellence in scientific communication, research methodology, and contribution to their

respective disciplines (see below). Congratulations to all the presenters and award winners, and thank you to the poster judges.

Thank you to everyone who attended and contributed to making the Symposium a successful event.

2026 Stewardship Science Academic Programs Symposium Outstanding Poster Awards

The SSAP Symposium Poster Session is an amazing networking event and highlight of the Symposium each year. Students presented their research posters and discussed their work with subject matter experts from the scientific community, laboratory professionals, and NNSA professional staff as well as other graduate students. This year, seven graduate student posters received the 2026 Stewardship Science Academic Programs Symposium (SSAP) Outstanding Poster Award (Figure 1). Congratulations to the recipients that follow and thank you to the poster judges.

Arthur Alvarez

Texas A&M University
 $54\text{Fe}(d,p\text{g})55\text{Fe}$ Reaction Measured with DAPPER

Veronica Contreras

University of Michigan
Glowing On-shot Scintillator Stack for Imaging Protons (GOSSIP): A High Repetition Rate Diagnostic for Proton Probing at NSF ZEUS

Brandi Daddario

Arizona State University
Shock Temperatures of Liquid Methane at Planetary Interior Conditions



Figure 1. Academic Programs Coordinator and Federal Program Manager for Stewardship Science Academic Alliances and High Energy Density Laboratory Plasmas programs Dr. Stephanie Miller (right) with six of the 2026 SSAP Symposium Outstanding Poster Award winners: (L-R) Matilda Duffy, Brandi Daddario, Afreen Syeda, Hi'ileinani Dikilato, Arthur Alvarez, and Peter Dyszel.

Hi'ileinani Dikilato

California Institute of Technology
Shock Response of Layered Systems with Pressure-Induced Phase-Transformation Heterogeneities

Matilda Duffy

Georgia Institute of Technology
Towards the Synthesis and Characterization of Plutonium Hydride Complexes: Isolation of a Cerium(IV) Hydride

Peter Dyszel

University of Tennessee, Knoxville
First Ever Energy Correlations in Two-Neutron Emission from 134Sn : Revealing the Long-Sought $i13/2$ Neutron Single-Particle State in 133Sn

Afreen Syeda

University of Rochester
Viscosity Measurements in Shock-compressed Epoxy from Particle Acceleration

Academic Programs Highlights

Remembering Dr. Will Evans

Lawrence Livermore National Laboratory
Physics Division Leader

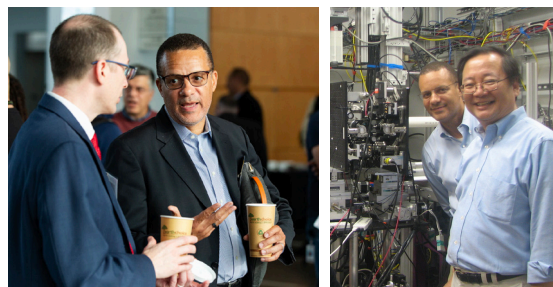
We are deeply saddened by the sudden passing of Dr. William Evans, Physics Division Leader at Lawrence Livermore National Laboratory and an unwavering supporter of the Stewardship Science Academic Programs (SSAP).



Throughout his distinguished career at Lawrence Livermore National Laboratory—first as a scientist in the field of static high-pressure research, then as Associate Division Leader of the Condensed Matter Section, and ultimately as Physics Division Leader—Dr. Evans was known for his dedication to advancing scientific research and fostering collaboration among peers. His expertise and

commitment to excellence set a high standard for those who worked alongside him, inspiring colleagues and mentees alike.

Dr. Evans' legacy is defined not only by his scientific achievements but also by his generosity, mentorship, and steadfast commitment to the advancement of science. He played an integral role in the NNSA-sponsored high-pressure facility, the High Pressure Collaborative Access Team (HPCAT), at Argonne National Laboratory's Advanced Photon Source, and served on the HPCAT Executive Council for many years. Dr. Evans emphasized continuous improvement in HPCAT operations, particularly in strengthening its focus on NNSA mission work and support of SSAP research. Beyond these accomplishments, Dr. Evans



Left: Dr. Evans and NNSA colleague Dr. Douglas Allen Dalton at a HPCAT workshop in 2023. Right: Dr. Evans with Dr. Choong-Shik Yoo (SSAA PI) performing experiments at HPCAT in 2011.

touched the lives of many through his encouragement and guidance, leaving a profound and lasting impact on the scientific community.

As we mourn his loss, we also celebrate the remarkable life and career of Dr. William Evans. Our thoughts are with his family, friends, and colleagues during this difficult time.

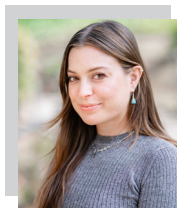
► Student Spotlight | Stewardship Science Academic Alliances

Mercedes Vasquez (mmvasquez@berkeley.edu) | University of California, Berkeley

Degree in Progress: *PhD, Mineral Physics* | Advisor: *Raymond Jeanloz* | SSAA Program: 2020 - Present

Research Topic

Measuring Thermal Transport Properties of Complex Metal Alloys and Dielectrics under Extreme Conditions



Research Responsibilities

My doctoral research is centered on investigating the role of thermal transport in the structural evolution of planetary cores, specifically by measuring the thermal conductivity of dielectrics and complex iron alloys at pressures relevant to deep planetary interiors and high energy density science. My experiments utilize ultrafast pump-probe spectroscopy in combination with diamond cell techniques to achieve high pressure states. This research helps us to understand the effect of pressure (i.e., increasing density) on the mechanisms that govern thermal transport within solids. We can use this understanding to test first-principles theory and model the evolution of planets.

National Laboratory Experience

As an undergraduate student, I had the opportunity to do a summer internship at Lawrence Livermore National Laboratory (LLNL). This experience opened my perspective to the possibilities within high energy density research, and I decided to pursue a PhD in the field. Throughout the past five years as part of the Stewardship Science Academic Alliances (SSAA) program, I have worked as a graduate student intern and collaborator with LLNL having the opportunity to participate in numerous projects including the analysis of X-ray diffraction data from laser-driven compression experiments performed at the National Ignition Facility. Through these collaborations, I was able to work on experiments at Department of Energy laboratories, including Lawrence Berkeley and Argonne National Laboratories, as well as the European X-ray Free Electron Laser in Hamburg, Germany. This kind of research experience

wouldn't have been possible without the SSAA program.

Academic Programs Experience

The SSAA program provided me with the unique opportunity to combine my academic research at the University of California, Berkeley with the global-scale, impactful science at LLNL. The experience was instrumental to my growth as an experimental scientist by allowing me to access state-of-the-art facilities and introducing me to a supportive network of mentors throughout my PhD. My collaborations cultivated my own research interests and provided pathways for me to pursue them as the focus of my doctoral thesis work. I was also able to present my work from these collaborations at a variety of conferences both across the United States and internationally, which helped me to expand my scientific network and refine my technical communication abilities.