



The Science of Collaborative Research

2017 ANNUAL REPORT

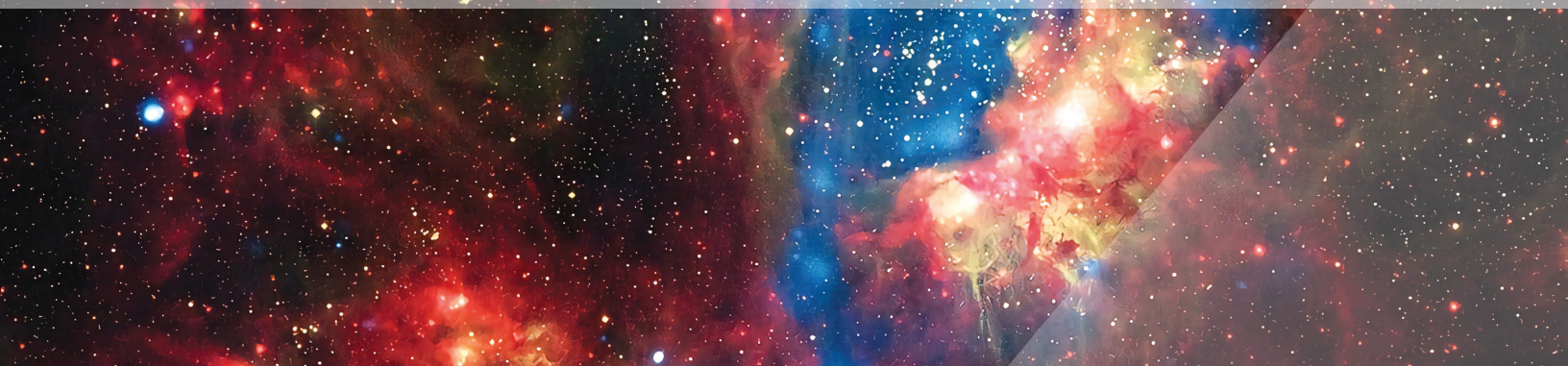
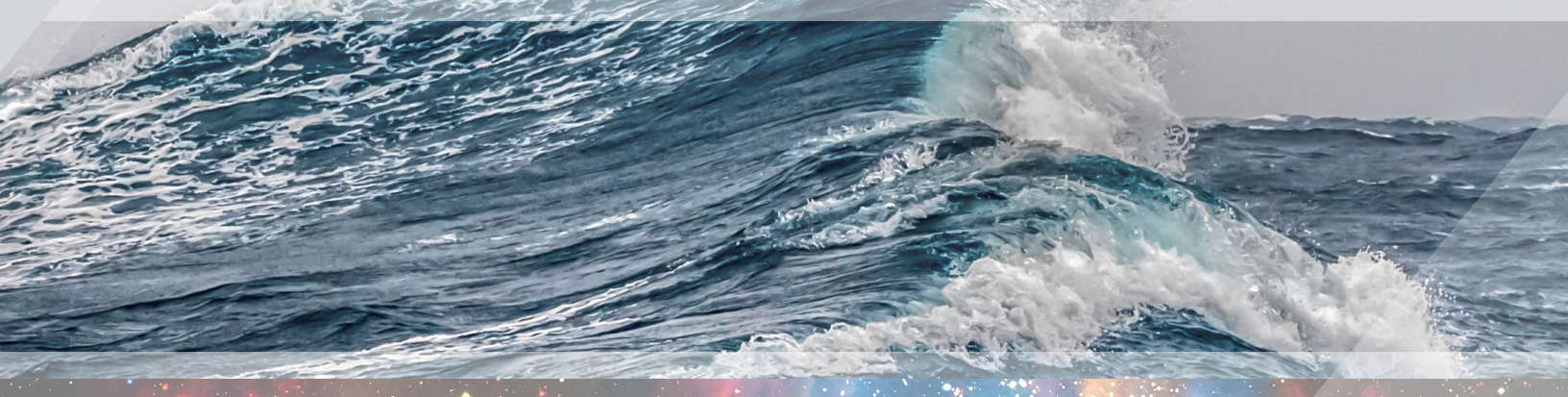
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mirror_mod.use_x = False  
mirror_mod.use_y = False  
mirror_mod.use_z = True
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selection at the end -add  
mirror_ob.select= 1  
mirror_ob.select=1
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context.scene.objects.active  
("Selected" + str(modifier  
mirror_ob.select = 0  
bpy.context.selected_object  
data.objects[one.name].select
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print("please select exactly
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--- OPERATOR CLASSES ---
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On behalf of SURA, I am proud to present our 2017 Annual Report, which gives an overview of our accomplishments from the past year. As a forum for collaborative research, our success is a direct reflection on our member universities who share the belief that enabling these partnerships will strengthen their programs as well as the scientific capabilities of the nation.



In 2017, we were excited to welcome Stuart Henderson as the new director of the Thomas Jefferson National Accelerator Facility, which SURA continues to steward as the majority member of Jefferson Science Associates, LLC. The lab is now prepared to exploit the full capabilities of a nine-year, \$338M accelerator upgrade which has recently been completed. And we were thrilled to grow our strong partnership with the Commonwealth of Virginia, which has financially supported our efforts to land the next generation science project – the Electric-Ion Collider.

SURA continues to grow our coastal and environmental research program in which researchers can exploit the NOAA-funded project that we have led to better predict seasonal dead zones, coastal inundation, and marine forecasts. Within our information technology program, we remain a valued leader for the National Science Foundation's XSEDE program for minority-servicing institutions. By engaging both researchers and institutions, SURA has exceeded our goals for attracting new users from underserved communities by helping engage them to advanced cyberinfrastructure.

Perhaps most exciting in 2017 has been our branching out into space science, with exciting new programs with NASA. These started with the CRESST II program at Goddard Space Center last spring, and continued with a unique academic reach-back role for our members on the Laboratory Support Services and Operations program at the Kennedy Space Center last fall.

These and other accomplishment are summarized in this SURA 2017 Annual Report. It not only summarizes the successes of the past year, but also previews the exciting growth that lies ahead for SURA and its members in the years ahead. Thank you for being a part of SURA.

Sincerely,

A handwritten signature in black ink that reads "Jerry P. Draayer". The signature is fluid and cursive, with a long horizontal flourish at the end.

Jerry P. Draayer
President & CEO

SURA's mission is to advance collaborative research and education and to strengthen the scientific capabilities of its members and our nation.

JEFFERSON SCIENCE ASSOCIATES LLC



JLab Completes Nine-Year, \$338M Upgrade



Having completed a nine-year construction project to upgrade its research capabilities, the Department of Energy's Thomas Jefferson National Accelerator Facility is ready to pave the way for the next era of ground-breaking experiments at the lab. Jefferson Science Associates is a joint venture between PAE and SURA, which

serves as JSA's majority and administrative member, serving as the contractor for the DOE-owned nuclear physics lab.

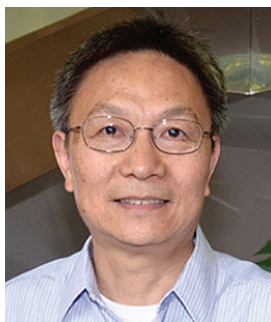
In September, Jefferson Lab completed the \$338 million construction project to upgrade the facility from 6 to 12 GeV (billion volts), adding a new experimental hall. Originally, the laboratory envisioned delivering electron beams to three of its four experimental halls simultaneously upon completion of the upgrade, but delivered to all four by early 2018.

While it was not thought to be technologically feasible to provide beam to all four halls, lab staff made technological advances in equipment and accelerator capability, opening the door to providing additional research capacity.

According to Rolf Ent, Jefferson Lab's Associate Director for Experimental Nuclear Physics, the accomplishment opens the possibility of JLab, an Office of Science User Facility, to deliver electron beams for an even richer program of study for its more than 1,500 users worldwide.

"This means that we can now study four different topics in nuclear physics simultaneously," said Ent. "Being able to run experiments in all four halls at the same time allows us much more flexibility in scheduling experiments to maximize the research we can accomplish. Now, by smart scheduling and operation, we can gain at least 25 percent more in physics output, and possibly more!"

Jefferson Lab is a world-leading nuclear physics research laboratory devoted to the study of the building blocks of matter inside the atom's nucleus—quarks and gluons—that make up 99 percent of the mass of our visible universe.



SURA's Distinguished Professorship Awarded

The SURA Governor's Distinguished CEBAF Professorship (GDPCP) review committee is comprised of the presidents of the College of William & Mary, Virginia Tech, University of Virginia, Old Dominion University, and Virginia Commonwealth University. In the spring of 2017, they finalized the appointment of Jefferson Lab asso-

ciate director for theoretical and computational physics Jianwei Qiu as a GDPCP at the College of William & Mary. The GDPCP/Governor's Distinguished Scientist program, in place since the mid-1980s, enables the lab to attract distinguished, uniquely qualified individuals to join the leadership team. Qiu is the thirteenth individual to have been awarded GDPCP or GCS honors.

JSA Initiatives Fund

The JSA Initiatives Fund Program supports projects, initiatives, and activities that further the scientific outreach of Jefferson Lab. Funded annually by the JSA owners, SURA and PAE Applied Technologies, the fund has provided \$5.4M to support over 330 projects since 2006. The majority of the funds benefit the lab's extended user community in ways that complement the lab's basic and applied research missions.

The 2017 program included 31 new awards totaling \$390K, with over \$450K of contributing funds from other sources. Sixty-five percent of the awarded funds supported educational and outreach activities at the lab. The remaining funds went to support meetings, workshops, conferences, and other lab and user initiatives and activities, including projects promoting the lab's diversity and inclusion efforts.



Raúl Briceño received the Nathan Isgur Distinguished Research Fellowship in 2017, funded by the JSA Initiatives Fund Program.

National Society for Hispanic Physicists (NSHP)

Incorporated in the Commonwealth of Virginia in 2014 under SURA sponsorship, NSHP received the second of a five-year NASA grant for the Heliophysics Education Consortium, an event held at the annual Society for Advancing Hispanics/Chicanos & Native Americans in Science (SACNAS) meeting in Salt Lake City October 19–21, 2017. NSHP also received two IEEE grants to support student participation at the 2017 SACNAS.



Jefferson Lab Science Activities for Teachers Program

The JSAT program provided 60 local fifth-, sixth-, and eighth-grade science teachers with essential knowledge in the physical sciences and teaching methods. The 2017 curriculum included teaching methodologies and activities in matter, energy transfer, force and motion, magnetism and electricity, atomic structure, waves and sound, simple machines, watershed, and optics. Teachers received sets of materials associated with the topics that were used contemporaneously in the classrooms with the students. The JSAT Program has received national, state, and local recognition and awards.

INFORMATION TECHNOLOGY



NSF-Funded XSEDE Outreach



Linda Akli, SURA Assistant Director for Training Education & Outreach (center) with participants at NSF's Emerging Researchers National Conference in Washington DC, March 2-4, 2017.

Vital to the nation's future, and a foundation for two of XSEDE's strategic sub-goals, is raising awareness of the value of advanced computing services and the preparation of the current and next generation of scholars, researchers, and practitioners in their use. SURA's leadership of XSEDE's Broadening Participation program focuses on assisting under-represented minorities, women, and minority-serving institution researchers with their use of advanced computing. The incorporation of computational and data science into teaching and the adoption of advance computing into research practices builds capacity at MSIs and within new user communities. Engaging both researchers and institutions has allowed SURA to exceed our goals for attracting new users from underserved communities and supports their persistent engagement with advanced cyberinfrastructure. XSEDE is a National Science Foundation-funded program.

SURAnet 30th Anniversary

2017 marked the 30th anniversary of SURAnet—a foundational program that helped develop today's Internet—which was observed at the Spring 2017 SURA Board of Trustees meeting. This celebration included a special presentation that provided an overview of the impact of SURA's 30-year history of leadership in information technology programs. The event and presentation were professionally videoed with both highlights and full versions available for viewing from the SURA website.



Mark Hoit, Vice Chancellor of Information Technology at North Carolina State University and Chair of the SURA IT Committee, kicks off the SURAnet 30th Anniversary Celebration at Louisiana State University on April 18, 2017.

Cloud Vendor and Third-Party Provider Working Group

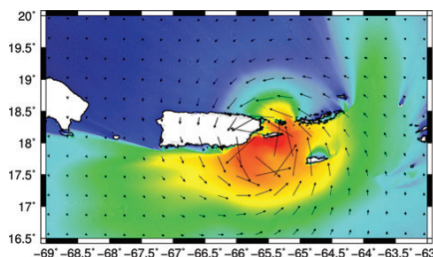
In 2017, the SURA IT Committee formed a working group comprised of Chief Information Security Officers (CISOs) to examine best practices involved in assessing the information security implications of using cloud and third-party IT service providers. This group is now collaborating with EDUCAUSE to develop a best practices guide intended to be used by an institution's IT management team and IT security staff to assist in evaluating cloud and third-party vendor software and services.

COASTAL & ENVIRONMENT RESEARCH



Coastal and Ocean Modeling Testbed (COMT)

Since 2010, SURA has developed and managed the COMT, which include participants from academia, the private sector, and government agencies. Projects are advancing the operational use of models for the prediction of extreme events and chronic conditions to help save lives, protect property, and sustain marine resources. Projects have focused on: (1) Estuarine Hypoxia Modeling in Chesapeake Bay; (2) U.S. West Coast Physics and Ecosystems Modeling; (3) Surge and Wave Modeling for Puerto Rico/U.S. Virgin Islands; (4) Inter-comparison of Hypoxia Models for the Northern Gulf of Mexico; and (5) Cyberinfrastructure.



COMT's coupled model results, from Hurricane Maria impacting Puerto Rico, show peak currents (arrows) and wave heights (colors), produced by the Caribbean Coastal Ocean Observing System.

One recent success was achieved when the National Weather Service's National Hurricane Center was able to increase the resolution and geographical coverage of the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model to produce coupled inundation forecasts involving compound effects in addition to storm surge. Additionally, methodologies developed by COMT to couple storm surge and wave models were successfully used by Puerto Rican scientists to predict surge and wave heights generated by Hurricane Maria last September. Another achievement has been modeling of low or depleted oxygen that leads to 'dead zones' and the flooding of coastal areas, in which COMT has played an instrumental role.

Coastal Resilience Initiative

Climate change, sea level rise, ecosystem evolution, changes in storm intensity, and coastal erosion are likely to speed alteration of coasts in the future. Since 2014, SURA's Coastal and Environmental Research Committee has been promoting a Consortium for Coastal Resilience. The program goals are to integrate natural and social sciences and to facilitate a network of modelers, scholars, and stakeholders from academia, federal, state and local agencies, as well as non-governmental organizations and the private sector.

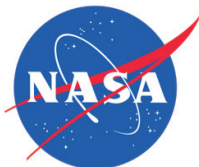
SURA entered an agreement with Springer Publishing Company for an edited/multi-authored book entitled *Tomorrow's Coasts: Complex and Impermanent*. It is intended to be a non-technical discussion of the causes and consequences of future coastal change for consumption not only by academics but also by planners, managers, and the lay public. Expected out by spring of 2018, the book consists of 21 chapters and will serve as a launch pad for future CERC initiatives and collaborative research proposals.

SPACE SCIENCE



SURA Launches Space Collaboration With CRESST II

The Center for Research and Exploration in Space Science & Technology (CRESST II), a five-year, \$87.5 million cooperative agreement with NASA's Goddard Space Flight Center in Maryland, was awarded in March 2017 to the University of Maryland—College Park, the University of Maryland—Baltimore County, and their three partners: Catholic University of America, Howard University, and SURA.



First created in 2006, the next phase of the program will facilitate collaborations between NASA researchers and space scientists from CRESST II partner institutions. Priorities will be to carry out observational, experimental, and theoretical research in support of Goddard's Sciences and Exploration Directorate, including the study of the solar system, stars, galaxies, and the universe at large.

SURA now acts as the lead institution in recruiting and attracting visiting scientists and sabbatical researchers to enable and facilitate NASA collaborations with the greater scientific community. SURA administers the CRESST II summer internship program, coordinates scientist program travel and consulting; and facilitates scientific colloquia, workshops, conferences, and other Special Program support.

LASSO Contract at Kennedy Space Center

NASA awarded its Laboratory Support Services and Operations (LASSO) contract at the agency's Kennedy Space Center in Florida to URS Federal Services Inc., an AECOM company, of Germantown, Maryland, joined by SURA as a university consortia collaborative partner.

LASSO is a cost plus fixed-fee contract, including a two-month phase-in period which began in August, followed by a two-year base period and three one-year options. The total potential value of the contract is approximately \$69.4 million.

The contract scope includes program management; laboratory maintenance and support; operational laboratory services; and professional and technical support for scientific research and engineering analysis, test, and evaluation in laboratory environments.

PUBLIC AFFAIRS



SURA Promotes Robust Science Funding

In light of severe reductions in science funding recommended for FY18, SURA joined with coalition partners on several fronts to protect this investment in U.S. research and innovation. With visits to Capitol Hill, coordinated messaging with other organizations, and outreach with lab users, SURA had its most active year on Capitol Hill in 2017.

After the President's Budget Request was released, SURA joined with other federal lab contractors to demonstrate impacts of the proposed 18 percent cut (including a reduction in force at JLab of 150 staff out of 725). We again helped facilitate a Nuclear Physics Day to lobby on Capitol Hill in mid-May. JLab users joined those from the other two nuclear physics laboratories—the Facility for Rare Isotope Beams (FRIB) at Michigan State University and the Relativistic Heavy Ion Collider (RHIC) at

Brookhaven National Lab in New York—to advocate for strong funding for the DOE's Office of Science which funds the labs.

SURA continued to work with the Task Force for American Innovation and the Energy Sciences Coalition to communicate the importance of science and research funding to agencies and Congressional offices through Hill visits, letter to Congress, op-eds, and social media messaging.

Virginia Continues EIC Funding Support

The Commonwealth of Virginia completed a \$6.5M appropriation over three years to help Jefferson Lab contend for the next large nuclear physics research facility expected to be announced by the Department of Energy—the Electron-Ion Collider (EIC). This included \$1M in 2017 to complete design and fabrication work on accelerating components critical for the science in an EIC.



With the National Academies of Sciences (NAS) study expected this year to endorse the construction of such a ~\$1.5B project, SURA has worked with Virginia policy-makers to secure funds necessary for JLab to prepare a winning proposal and expand its science mission.

With initial estimates showing that such a construction project would increase Lab staff by 30 percent, lawmakers have supported this funding for both its scientific and economic development benefits. A 2014 study, based on smaller scope and a lower building costs, estimated that construction and initial operation of the EIC would create nearly 5,000 jobs in the Commonwealth over 7 to 10 years.

SURA Honors Distinguished Scientist from UT-Austin

SURA presented its 2017 Distinguished Scientist Award to Thomas J.R. Hughes, the Peter O'Donnell Chair in Computational and Applied Mathematics at The University of Texas at Austin at its board meeting in April. The annual honor and honorarium goes to a research scientist whose extraordinary work fulfills the SURA mission to “strengthen the scientific capabilities of its members and our nation.”

Hughes received his B.E. and M.E. in mechanical engineering from the Pratt Institute and his M.S. in mathematics and Ph.D. in engineering science from the University of California-Berkeley. He taught at Berkeley, Caltech, and Stanford before joining UT Austin in 2002.

Hughes is the most influential researcher in computer-aided engineering and its integration with computer-aided design. His published works have garnered over 85,000 citations and his h-index is 134 (Google Scholar), making him one of the most cited engineers. The fruits of his work have been implemented in industrial and commercial computer programs that are used throughout the world.



Betsy Beise, SURA Board of Trustees Chair (University of Maryland); Hughes; Jerry P. Draayer, SURA President & CEO; and, Kelvin Droegemeier, SURA Board of Trustees Vice-Chair (University of Oklahoma).

Dr. Hughes is a member of the U.S. National Academy of Sciences, the U.S. National Academy of Engineering, the American Academy of Arts and Sciences, and a foreign member of the Royal Society of London, the Austrian Academy of Sciences, and the Istituto Lombardo Accademia di Scienze e Lettere. Hughes has received honorary doctorates from A Coruña, Louvain, Pavia, Padua, Trondheim, and Northwestern Universities.

Consolidated Statement of Financial Position

ASSETS	2017	2016
Cash	\$ 1,982,226	\$ 1,292,507
Accounts receivable, net	24,073,234	27,112,975
Investments, net	21,507,181	20,848,683
Property Plant Equipment, net	1,036,166	1,037,359
Other Assets	560,066	208,836
Total Assets	49,158,873	50,500,360
LIABILITIES		
Accounts Payable and Accrued Expenses	\$ 20,387,373	\$ 23,665,338
Deferred Revenues	5,970,820	4,438,466
Deferred Rent	394,245	455,280
Other Liabilities	7,290,000	6,880,000
Total Liabilities	34,042,438	35,439,084
EQUITY		
NET ASSETS	\$ 15,116,435	\$ 15,061,276
Total Liabilities and Net Assets	49,158,873	50,500,360

Consolidated Statement of Activities

REVENUES	2017	2016
DOE Contract Revenues	\$ 158,037,054	\$ 179,728,483
DOE Management Fees	3,033,085	2,860,695
Grants Revenues	1,838,925	1,180,545
Commonwealth of Virginia Funding	1,355,196	1,744,047
Membership Dues	345,500	324,500
Other Revenues	1,637,509	1,726,980
Total Revenues	166,247,269	187,565,250
EXPENSES		
Salaries and Fringe Benefits	\$ 91,113,117	\$ 91,452,457
Operating and Other Expenses	77,627,556	98,736,887
Total Expenses	168,740,673	190,189,344
Operating (Loss) Income	\$ (2,493,404)	\$ (2,624,094)
Non-operating Income from Investments	2,635,861	1,664,689
Changing in Unrestricted Net Assets	(142,457)	(959,405)

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