U.S. DEPARTMENT OF ENERGY

Fiscal Year 2017 Report to Congress on Laboratory Directed Research and Development at the DOE National Laboratories

Report to Congress
December 2017

United States Department of Energy
Washington, DC 20585

Message from the Acting Chief Financial Officer

As required by Section 3136 of the National Defense Authorization Act of 1997 (Public Law 104-201; 50 U.S.C. 2793) and requested in the Fiscal Year (FY) 2001 Energy and Water Development Appropriations Conference Report (H. Rpt. 106-988), the Department of Energy (DOE) is submitting a *Report on Laboratory Directed Research and Development (LDRD) for FY 2017.* The report provides the FY 2017 LDRD expenditures by laboratory and weapons production plant.

In FY 2017, 1,851 LDRD projects at the DOE National Laboratories cost $574.79 million. The Report also includes information on DOE's Plant Directed Research, Development and Demonstration, and the Site Directed Research, Development and Demonstration Programs.

This report is being provided to the following Members of Congress:

- **The Honorable Rodney P. Frelinghuysen**
  Chairman, House Committee on Appropriations

- **The Honorable Nita M. Lowey**
  Ranking Member, House Committee on Appropriations

- **The Honorable Mike Simpson**
  Chairman, Subcommittee on Energy and Water Development
  House Committee on Appropriations

- **The Honorable Marcy Kaptur**
  Ranking Member, Subcommittee on Energy and Water Development
  House Committee on Appropriations

- **The Honorable Thad Cochran**
  Chairman, Senate Committee on Appropriations

- **The Honorable Patrick Leahy**
  Vice Chairman, Senate Committee on Appropriations

- **The Honorable Lamar Alexander**
  Chairman, Subcommittee on Energy and Water Development
  Senate Committee on Appropriations

- **The Honorable Dianne Feinstein**
  Ranking Member, Subcommittee on Energy and Water Development
  Senate Committee on Appropriations

- **The Honorable John McCain**
  Chairman, Senate Committee on Armed Services

- **The Honorable Jack Reed**
  Ranking Member, Senate Committee on Armed Services

- **The Honorable Deb Fischer**
  Chairman, Subcommittee on Strategic Forces
  Senate Committee on Armed Services

- **The Honorable Joe Donnelly**
  Ranking Member, Subcommittee on Strategic Forces
  Senate Committee on Armed Services

- **The Honorable Mac Thornberry**
  Chairman, House Committee on Armed Services

- **The Honorable Adam Smith**
  Ranking Member, House Committee on Armed Services

- **The Honorable Mike Rogers**
  Chairman, Subcommittee on Strategic Forces
  House Committee on Armed Services

- **The Honorable Jim Cooper**
  Ranking Member, Subcommittee on Strategic Forces
  House Committee on Armed Services

If you have any questions or need additional information, please contact me or Mr. Joseph Levin, Associate Director of External Coordination, Office of the Chief Financial Officer, at 202-586-3098.

Sincerely,

Alison L. Doone

Alison L. Doone
Acting Chief Financial Officer

Executive Summary

As required by Section 3136 of the National Defense Authorization Act of 1997 (Public Law 104-201; 50 U.S.C. 2793) and requested in the FY 2001 Energy and Water Development Appropriations Conference Report (H.Rpt. 106-988), the Department of Energy (DOE) has prepared a *Report on Laboratory Directed Research and Development (LDRD) for FY 2017.* The report provides the FY 2017 LDRD expenditures by laboratory. The Report also includes information on DOE's Plant Directed Research, Development and Demonstration by weapons production plants, and the Site Directed Research, Development and Demonstration Program of the Nevada National Security Site.

In FY 2017, 1,851 LDRD projects at the DOE National Laboratories cost $574.79 million. These projects address the Nation's energy, environmental, and nuclear challenges.

FY 2017 REPORT ON LDRD AT THE NATIONAL LABORATORIES

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Secretarial Affirmation

On behalf of the Department of Energy, I am pleased to present the Fiscal Year 2017 Laboratory Directed Research and Development (LDRD) Report to Congress. The Department's National Laboratories develop and execute unique scientific and technical capabilities supporting national-level missions that are beyond the scope of academic and industrial institutions. Further, the laboratories develop and sustain scientific and technical capabilities that the Federal Government deems critical. The LDRD Program provides the laboratories the flexibility to establish and maintain an environment that encourages and supports creativity and innovation, and contributes to their long-term viability. LDRD allows the Department's laboratories to position themselves to advance our national security mission and respond to our Nation's future research needs.

Based on the information and acknowledgments provided to the Department and its contractors by the Federal agencies that are funding LDRD activities in Fiscal Year 2017, I affirm that all LDRD activities derived from funds of other Federal agencies (1) have been conducted in a manner supporting scientific and technical development that benefits the programs of those agencies, and (2) are consistent with the appropriations acts that provided funds to those agencies.

Rick Perry

Rick Perry
Secretary of Energy
December 2017

Message from the Secretary

This report provides the Senate and House Committees on Appropriations an account of the implementation of the Committee to Review the Effectiveness of the National Energy Laboratories (CRENEL) recommendations directed to the Department, as requested in Senate Report 114-236.

I am proud to present the Department's activities to address CRENEL recommendations that support the incredible work that makes our National Laboratories the crown jewels of science in America. I have had the tremendous privilege to travel to several of these Labs, met the men and women who work there, and seen firsthand the awe-inspiring power of their efforts.

They tackle some of the toughest scientific challenges in the world, and develop life-changing technologies. They keep us safe, through research that defends us from external threats and keeps our nuclear stockpile secure, modern, and effective.

This Report is provided to the following Members of Congress:

- **The Honorable Thad Cochran**
  Chairman, Senate Committee on Appropriations
- **The Honorable Patrick Leahy**
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- **The Honorable Rodney Frelinghuysen**
  Chairman, House Committee on Appropriations
- **The Honorable Nita M. Lowey**
  Ranking Member, House Committee on Appropriations
- **The Honorable Michael "Mike" Simpson**
  Chairman, Subcommittee on Energy and Water Development, and Related Agencies
  House Committee on Appropriations
- **The Honorable Marcy Kaptur**
  Ranking Member, Subcommittee on Energy and Water Development, and Related Agencies,
  House Committee on Appropriations

I. Legislative Language

This report responds to Section 3136 of the National Defense Authorization Act of 1997 (Public Law 104-201; 50 U.S.C. 2793), which requires submission each year of "a report on the funds expended during the preceding fiscal year on [LDRD] activities [...] to permit an assessment of the extent to which such activities support the national security mission of the Department of Energy." It also responds to the Conference Report (H.Rpt. No. 106-988) accompanying the Fiscal Year (FY) 2001 Energy and Water Development Appropriations Act, which requested that the DOE Chief Financial Officer "develop and execute a financial accounting report of LDRD expenditures by laboratory and weapons production plant." Further, this report addresses the request in the Conference Report (H.Rpt. No. 107-258) accompanying the FY 2002 Energy and Water Development Appropriations Act, which requests that the Secretary of Energy include in the annual Report to Congress on LDRD expenditures "an affirmation that all LDRD activities derived from funds of other agencies have been conducted in a manner that support science and technology development that benefits the programs of the sponsoring agencies and is consistent with the Appropriations Acts that provided funds to those agencies."

II. Introduction

Section 31 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2051), directs the Department of Energy (DOE) to ensure the continued conduct of research and development (R&D) and assist in the acquisition of an ever-expanding body of theoretical and practical knowledge in the fields of energy, its production, uses, handling, and effects. This mission, initially the responsibility of the Atomic Energy Commission (AEC), then that of the Energy Research and Development Administration, and subsequently DOE, has been and continues to be carried out to a significant extent in government-owned facilities.

The AEC recognized that to maintain the laboratories' intellectual vitality, their ability to respond immediately to developments at the cutting edge of science and technology, and their ability to retain the best scientific, technological, and managerial talent, a certain amount of work must be left to the laboratories' discretion. Thus, from its inception, the AEC and its successor agencies made allowable certain amounts of research derived from the ideas of the National Laboratory researchers themselves.

In 1985, in response to the recommendations of national panels and commissions, the Department established the Exploratory Research and Development Program to formalize the practice of providing its National Laboratories with the means to conduct laboratory-initiated R&D.[1] Six years later, DOE renamed the program Laboratory Directed Research and Development (LDRD) and formally established it at the DOE National Laboratories. Today, the

[1] See, among others, the *Report of the White House Science Council*, Office of Science and Technology Policy, Executive Office of the President, Washington, DC, May 1983; and Guidelines, Energy Research Advisory Board, December 1985.

LDRD Program at the DOE National Laboratories and analogous programs at the Department's nuclear weapons production plants (Plant Directed Research and Development, or PDRD) and Nevada National Security Site (NNSS) (Site Directed Research and Development, or SDRD) are active components of the DOE mission to promote scientific and technical (S&T) innovation that advances the economic, energy, and national security of the United States (U.S.).[2]

All LDRD activities conducted at the DOE National Laboratories are governed by a standard DOE policy (DOE Order 413.2C, *Laboratory Directed Research and Development*), which provides guidance to ensure effective management and oversight of the LDRD Program, while at the same time supporting the laboratories' statutory authority to pursue innovative, self-selected projects in support of the DOE mission. DOE's LDRD policy is consistent with the Department's management practices for all R&D activities in that it includes annual planning and reporting requirements, as well as program and peer reviews to ensure the investments reflect highly innovative and the highest quality research projects. In addition, DOE concurs with each proposed LDRD project before a laboratory commences work to ensure the project complies with Departmental policy. The remainder of this report responds to the LDRD Program financial reporting requirements required by law (see **Appendix A** for the list of statutory and report language requirements) and also provides financial information on PDRD and SDRD programs in Section V of this report for completeness.

[2] PDRD Programs at DOE's Kansas City, Y-12, Pantex, and Savannah River Plants are consistent with the statutory authorizations found in Section 310 of the FY 2001 Energy and Water Development Appropriations Act (P.L. 106-377) and Section 3156 of the FY 2001 Floyd D. Spence National Defense Authorization Act (P.L. 106-398). The NNSS's SDRD Program is consistent with the statutory authorizations found in Section 310 of the FY 2002 Energy and Water Development Appropriations Act, 2002 (P.L. 107-66).

III. FY 2017 LDRD Financial Reporting

In accordance with Section 309 of Division D of the Energy and Water Development Appropriation Act, 2015, (Public Law 113-235) and DOE Order 413.2 C, the maximum funding level established for LDRD must not exceed six percent of a laboratory's total operating and capital equipment budgets, including non-DOE funded work, for the year. The total certified cost base shown in the table below represents a laboratory's total operating and capital equipment budgets, including non-DOE funded work, less exemptions and LDRD. DOE Field Chief Financial Officers certify the accuracy of the cost base.

Table 1. FY 2017 Laboratory Costs and LDRD Costs at DOE Laboratories

Laboratory	DOE-Funded Work ($M)	SPP Funded Work ($M)	Total Lab Certified Cost Base ($M)	LDRD Costs ($M)	LDRD Rate (%)	Projects
Ames Lab	55.56	1.06	56.62	1.17	2.07%	9
Argonne National Lab	555.61	142.04	697.65	33.08	4.74%	146
Brookhaven National Lab	459.99	58.94	518.93	10.36	2.00%	47
Fermi National Accelerator Lab	313.98	1.14	315.12	3.77	1.20%	23
Idaho National Lab	747.92	239.32	987.24	22.69	2.30%	84
Los Alamos National Lab	1,782.64	195.35	1,977.99	115.76	5.85%	299
L. Berkeley National Lab	638.77	120.29	759.06	25.49	3.36%	90
L. Livermore National Lab	1,328.14	250.02	1,578.16	92.63	5.87%	215
National Renewable Energy Lab	311.58	39.06	350.64	14.36	4.10%	80
Oak Ridge National Lab	1,007.00	259.89	1,266.89	40.90	3.23%	186
Pacific Northwest National Lab	645.03	271.14	916.17	43.31	4.73%	211
Princeton Plasma Physics Lab	83.17	1.28	84.47	2.77	3.28%	25
SLAC National Accelerator Lab	237.97	14.96	252.93	3.51	1.39%	31
Sandia National Labs	1,913.65	971.47	2,885.12	154.74	5.36%	344
Savannah River National Lab	171.38	24.42	195.80	9.57	4.89%	57
Thomas Jefferson National Accelerator Facility	108.47	3.01	111.48	0.68	0.61%	4
TOTAL LDRD	$ 10,360.86	$ 2,593.39	$ 12,954.27	$ 574.79	4.44%	1,851

LDRD is an institutional investment that is accumulated through a percentage of the overhead rate charged by a laboratory because LDRD funds cutting edge, creative work that benefits all laboratory programs. Consistent with Public Law 113-235, LDRD is accumulated through a percentage of the total project cost, excluding LDRD and line-item construction, for all work performed by a laboratory. LDRD is an allowable cost in accordance with the terms of the laboratory management and operating contracts and is identified in the laboratories' accounting systems.

The total FY 2017 LDRD program cost at the national laboratories was $574.79 million, which represents 4.44 percent of total cost base at these laboratories.

Each National Laboratory conducted a review of its FY 2017 LDRD projects to determine the relevance of those projects to the missions of the various laboratory customers that provided funds for LDRD. For this review, laboratory customers were considered in three mission categories – defense, non-defense, and homeland security (i.e., Department of Homeland Security (DHS)). The review concluded that FY 2017 LDRD projects were relevant to one, two or all three mission categories. Further, the review indicated that funds contributed by each customer category were invested in LDRD projects relevant to the respective mission areas at a level at least equal to the LDRD funds provided by the customers.

IV. LDRD and the Strategic Partnership Projects (SPP)

SPP creates opportunities to leverage non-DOE Federal and non-Federal resources to accelerate scientific discovery and deploy solutions that benefit both DOE and sponsoring entity missions and goals. SPP plays an important role in the laboratories' efforts to develop, strengthen, and sustain unique S&T capabilities deemed critical by the Government and, in many cases, represents a coordinated set of activities that seek to address large and complex national needs. This leveraging of DOE and SPP activities allows the laboratories to deliver national solutions in a cost-effective manner.

Congress provided language in Conference Report 107-258 accompanying the Energy and Water Development Appropriations Act, 2002, which requested that DOE notify other Federal agencies that a portion of SPPs will be used to fund LDRD projects. In addition, with the creation of DHS in the FY 2002 Homeland Security Act, Congress enacted a requirement that LDRD funding provided by DHS must be used to benefit DHS missions. In response to the FY 2002 Conference Report, the Secretary of Energy issued guidance requiring all LDRD laboratories to notify other Federal agencies of LDRD charges before funding work at the laboratories. Specifically, each new and/or revised SPP proposal DOE provides to a Federal agency must indicate the amount of LDRD charges that will be collected on the project. Furthermore, the proposal notifies the sponsor that, by providing funding, the agency is

acknowledging that LDRD activities are beneficial to its organization and are consistent with the appropriation acts that provided funds to the agency. Subsequently, each SPP funding acceptance document also includes the LDRD charge acknowledgement.

In February 2003, the Secretary of Energy and the Secretary of Homeland Security entered into a Memorandum of Agreement to implement key provisions of the Homeland Security Act. In addition, the Deputy Secretary of Energy issued DOE Order 484.1 on *Reimbursable Work for the Department of Homeland Security.* The Order provides information on the process by which the DHS may place orders for reimbursable work activities to be performed at the DOE laboratories. In the Order, there are provisions for notification of LDRD charges in the cost proposal as well as requirements for acknowledgements regarding the benefits of LDRD before final approval.

In December 2003, the DOE Office of the Chief Financial Officer provided other Federal agency Chief Financial Officers who are customers and sponsors of work at the Department's laboratories with applicable guidance and policy documents to explain the Department's processes. Collectively, the implementation and execution of these policies provide the basis for the Secretary's affirmation that the LDRD Program is managed in accordance with the Congressional requirements cited above.

V. FY 2017 PDRD and SDRD Programs – Financial Reporting

Plant Directed Research and Development (PDRD) - Fiscal Year Expenditures

Section 308 of Division C of the Omnibus Appropriations Act, 2009 (Public Law 111-8) allowed the Secretary of Energy to authorize an amount not to exceed four percent for PDRD. Table 2 shows FY 2017 PDRD expenditures by site.

Table 2. FY 2017 PDRD Expenditures

Plant	DOE-Funded Work ($M)	SPP Funded Work ($M)	Total Plant Certified Cost Base ($M)	PDRD Costs ($M)	PDRD Rate (%)	Projects
Kansas City National Security Campus	532.13	242.72	774.85	26.70[3]	3.45%	183
Pantex Plant	655.02	6.87	661.89	6.70	1.01%	41
Savannah River Site	203.56	0.00	203.56	2.48	1.22%	14
Y-12 National Security Complex	884.10	0.00	884.10	21.58	2.44%	54
TOTAL PDRD	**$2,274.81**	**$249.59**	**$2,524.40**	**$57.46**	**2.28%**	**292**

[3] The Kansas City National Security Campus PDRD costs listed above include project and overhead costs

Site Directed Research and Development (SDRD) - Fiscal Year Expenditures

Section 308 of Division C of the Omnibus Appropriations Act, 2009 (Public Law 111-8) allowed the Secretary of Energy to authorize an amount not to exceed four percent for SDRD. Table 3 shows FY 2017 SDRD Program expenditures.

Table 3. FY 2017 SDRD Expenditures

Site	DOE-Funded Work ($M)	SPP Funded Work ($M)	Total Site Certified Cost Base ($M)	SDRD Costs ($M)	SDRD Rate (%)	Projects
Nevada National Security Site	369.82	63.95	433.77	9.15	2.11%	56

Appendix A. Statutory and Report Language Related to LDRD

Section 3115 of the National Defense Authorization Act, 2016 (Public Law 114-92)
FUNDING OF LABORATORY-DIRECTED RESEARCH AND DEVELOPMENT PROGRAMS.
(a) IN GENERAL.—Section 4811(c) of the Atomic Energy Defense Act (50 U.S.C. 2791(c)) is amended—
(1) by striking "to such laboratories" and inserting "to a national security laboratory";
(2) by striking "not to exceed 6 percent" and inserting "of not less than 5 percent and not more than 7 percent"; and
(3) by striking "by such laboratories" and inserting "by the laboratory".
(b) BRIEFING REQUIRED.—Not later than February 28, 2016, the Administrator for Nuclear Security shall provide a briefing to the congressional defense committees on—
(1) all recent or ongoing reviews of the laboratory-directed research and development program, including such reviews initiated by the Secretary of Energy;
(2) costs and accounting practices associated with laboratory-directed research and development; and
(3) how laboratory-directed research and development projects support the mission of the National Nuclear Security Administration.

Section 311 of the Consolidated and Further Continuing Appropriations Act for Fiscal Year 2015 (Public Law 113-235)
"Of the funds authorized by the Secretary of Energy for laboratory directed research and development, no individual program, project, or activity funded by this or any subsequent Act making appropriations for Energy and Water Development for any fiscal year may be charged more than the statutory maximum authorized for such activities."

Section 309 of Division D of the Energy and Water Development Appropriations Act, 2014 (Public Law 113-76). "Notwithstanding section 307 of Public Law 111-85, of the funds made available by the Department of Energy for activities at Government owned, contractor operated laboratories funded in this or any subsequent Energy and Water Development Appropriations Act for any fiscal year, the Secretary may authorize a specific amount, not to exceed 6 percent of such funds, to be used by such laboratories for laboratory directed research and development."

Section 307 of the Energy and Water Development Appropriations Act, 2010 (Public Law 111-85). "Of the funds made available by the Department of Energy for activities at Government-owned, contractor-operated laboratories funded in this Act or subsequent Energy and Water Development Appropriations Acts, the Secretary may authorize a specific amount, not to exceed 8 percent of such funds, to be used by such laboratories for laboratory directed research and development: Provided, That the Secretary may also authorize a specific amount not to exceed 4 percent of such funds, to be used by the plant manager of a covered nuclear

weapons production plant or the manager of the Nevada Site Office for plant or site directed research and development."

Section 308 of Division C of the Omnibus Appropriations Act, 2009 (Public Law 111-8). LABORATORY DIRECTED RESEARCH AND DEVELOPMENT. "Of the funds made available by the Department of Energy for activities at government-owned, contractor-operated laboratories funded in this Act or subsequent Energy and Water Development Appropriations Acts, the Secretary may authorize a specific amount, not to exceed 8 percent of such funds, to be used by such laboratories for laboratory directed research and development: Provided, That the Secretary may also authorize a specific amount not to exceed 4 percent of such funds, to be used by the plant manager of a covered nuclear weapons production plant or the manager of the Nevada Site Office for plant or site directed research and development: Provided further, That notwithstanding Department of Energy order 413.2A, dated January 8, 2001, beginning in fiscal year 2006 and thereafter, all DOE laboratories may be eligible for laboratory directed research and development funding."

Section 309 of Division C of the Consolidated Appropriations Act, 2008 (Public Law 110-161). LABORATORY DIRECTED RESEARCH AND DEVELOPMENT. "Of the funds made available by the Department of Energy for activities at government-owned, contractor-operated laboratories funded in this Act or subsequent Energy and Water Development Appropriations Acts, the Secretary may authorize a specific amount, not to exceed 8 percent of such funds, to be used by such laboratories for laboratory-directed research and development: Provided, That the Secretary may also authorize a specific amount not to exceed 4 percent of such funds, to be used by the plant manager of a covered nuclear weapons production plant or the manager of the Nevada Site Office for plant or site-directed research and development: Provided further, That notwithstanding Department of Energy order 413.2A, dated January 8, 2001, beginning in fiscal year 2006 and thereafter, all DOE laboratories may be eligible for laboratory directed research and development funding."

109th Congress - House of Representatives Energy & Water Appropriations Conference Report 109-275 (2006). "The conferees are concerned with the level of overhead charges applied to programs funded in this bill and urge the Department to continue to work to minimize the overhead burden on all program activities. In order to ensure an equitable allocation of overhead costs the Secretary should apply overhead charges to LDRD activities consistent with cost accounting practices applied to program activities that are direct funded. The conference agreement increases the allowable percentage for LDRD, PDRD and SDRD activities to allow this accounting change without harming the underlying discretionary research activities. The change in accounting practices should be implemented with no net reduction in LDRD levels below 6 percent of the funds provided by the Department of Energy to such labs for national security activities and 2 percent for PDRD and SDRD activities at the appropriate plants and sites. Within 90 days after the date of enactment of this Act, the Secretary of Energy shall submit a report to the Committees on Appropriations detailing how the accounting change will be implemented without impacting the basic research and the change shall be implemented

within 180 days of enactment."

Section 311 of the Energy and Water Development Appropriations Act, 2006 (Public Law 109-103). "Of the funds made available by the Department of Energy for activities at government-owned, contractor-operator operated laboratories funded in this Act or subsequent Energy and Water Development Appropriations Acts, the Secretary may authorize a specific amount, not to exceed 8 percent of such funds, to be used by such laboratories for laboratory-directed research and development: Provided, That the Secretary may also authorize a specific amount not to exceed 3 percent of such funds, to be used by the plant manager of a covered nuclear weapons production plant or the manager of the Nevada Site Office for plant or site-directed research and development: Provided further, That notwithstanding Department of Energy order 413.2A, dated January 8, 2001, beginning in fiscal year 2006 and thereafter, all DOE laboratories may be eligible for laboratory directed research and development funding."

108th Congress - House of Representatives Energy & Water Appropriations Report 108-212 (2004). "The Committee recognizes the value of conducting discretionary research at DOE's National Laboratories. Such research provides valuable benefits to the Department and to other Federal agencies, and is crucial to attracting and retaining scientific talent at the laboratories. However, the Committee continues to have concerns about the financial execution of this program. One concern centers on the manner in which DOE levies the LDRD "tax" on all DOE and Work for Other programs, and then accumulates the funds into an overhead pool. This Committee typically deals with defense and non-defense allocations within the Energy and Water Development bill, and the line between those two allocations is not easily crossed. Under LDRD, however, the laboratory directors are able to pool defense and non-defense appropriations at will. The only obvious solution to this concern is to require DOE to establish and track separate LDRD accounts for defense and non-defense funding sources, and the Committee is not yet ready to direct that change. The other principal concern deals with the application of LDRD to work being performed for other agencies (Work for others). The conference report accompanying the Energy and Water Development Appropriations Act, 2002 (P.L. 107–66) directed the Secretary to "include in the annual report to Congress on LDRD activities an affirmation that all LDRD activities derived from funds of other agencies have been conducted in a manner that support science and technology development that benefits the programs of the sponsoring agencies and is consistent with the Appropriations Acts that provided funds to those agencies." The Department has implemented this guidance by including the following language into its standard project proposal and funding acceptance documents that it requires the funding WFO agencies to sign: "The Department of Energy believes that LDRD efforts provide opportunities in research that are instrumental in maintaining cutting edge science capabilities that benefit all of the customers at the laboratory. The Department will conclude that by providing funds to DOE to perform work, you acknowledge that such activities are beneficial to your organization and consistent with appropriations acts that provide funds to you." This is too facile a solution for the Department. According to a review conducted by this Committee's investigative staff, only a little more than half of the WFO customers indicated they could reliably certify that DOE's LDRD activities are

consistent with the funding agencies' appropriations acts. Nevertheless, most agencies sign the required certification letter to DOE because they see no real alternative. The Committee fully expects that there are terms and conditions attached to the appropriations acts for these other agencies that are being ignored through this so-called "certification" process for LDRD work."

The Committee is considering changing the arrangement by which LDRD activities are funded to eliminate these concerns. The results of an ongoing General Accounting Office review will help to inform the Committee's choice. The Committee is receptive to streamlining the annual LDRD report to Congress, which is undoubtedly a significant burden for the Department to prepare and is of little value to this Committee in resolving the concerns identified above. The Department should work with Committee staff to develop a simpler and more useful LDRD report."

107th Congress - House of Representatives Energy & Water Appropriations Conference Report 107-258 (2002). "The conference agreement does not include bill language proposed by either the House or the Senate regarding the Laboratory Directed Research and Development (LDRD) program. The conferees recognize the benefits of LDRD and expect LDRD activities to continue at previously authorized levels. However, when accepting funds from another Federal agency that will be used for LDRD activities, the Department of Energy shall notify that agency in writing how much will be used for LDRD activities. In addition, the conferees direct the Secretary of Energy to include in the annual report to Congress on all LDRD activities an affirmation that all LDRD activities derived from funds of other agencies have been conducted in a manner that supports science and technology development that benefits the programs of the sponsoring agencies and is consistent with the Appropriations Acts that provided funds to those agencies."

Utilization of Department of Energy National Laboratories and Sites in Support of Homeland Security Activities - FY 2002 Department of Homeland Security Act (Public Law. 107-296, Section 309, 6 USC 189(6) f) " Laboratory Directed Research and Development by the Department of Energy.--No funds authorized to be appropriated or otherwise made available to the Department in any fiscal year may be obligated or expended for laboratory directed research and development activities carried out by the Department of Energy unless such activities support the missions of the Department of Homeland Security."

106th Congress - House of Representatives Energy & Water Appropriations Conference Report 106-988 (2001). "The conference agreement includes an allowance of six percent for the laboratory directed research and development (LDRD) program and two percent for nuclear weapons production plants. Travel costs for LDRD are exempt from the contractor travel ceiling. The conferees direct the Department's Chief Financial Officer to develop and execute a financial accounting report of LDRD expenditures by laboratory and weapons production plant. This report due to the House and Senate Committees on Appropriations by December 31, 2000,

and each year thereafter, should provide costs by personnel salaries, equipment, and travel.4 The Department should work with the Committees on the specific information to be included in the report."

Section 3136 of the National Defense Authorization Act for Fiscal Year 1997 (Public Law 104-201).

(a) Limitation.—"No funds authorized to be appropriated or otherwise made available to the Department of Energy for fiscal year 1997 under section 3101 may be obligated or expended for activities under the Department of Energy Laboratory Directed Research and Development Program, or under any Department of Energy technology transfer program or cooperative research and development agreement, unless such activities support the national security mission of the Department of Energy."

(b) Annual Report.—"(1) The Secretary of Energy shall annually submit to the congressional defense committees a report on the funds expended during the preceding fiscal year on activities under the Department of Energy Laboratory Directed Research and Development Program. The purpose of the report is to permit an assessment of the extent to which such activities support the national security mission of the Department of Energy. (2) Each report shall be prepared by the officials responsible for Federal oversight of the funds expended on activities under the program. (3) Each report shall set forth the criteria utilized by the officials preparing the report in determining whether or not the activities reviewed by such officials support the national security mission of the Department."

[4]The offer to streamline the LDRD report resulted in the Department and Hill contacts agreeing not to require costs be provided by personnel salaries, equipment, and travel.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2017

Project ID	Project Name	Equipment	Other	FY Total
AMES - Ames Laboratory				
FY2015-MPR-0812	Studies of Novel Materials Using Dynamic Nuclear Polarization Nuclear Magnetic Resonance Spectroscopy	$0	$97,985	$97,985
FY2016-FZHA-0501	Graphics Processing Unit-accelerated Software for Materials Simulation and Discovery	$0	$118,703	$118,703
FY2016-SBUD-0420	Resonance Ultrasound Spectroscopy of Correlated Materials and Materials at the Edge of Stability	$0	$141,774	$141,774
FY2016-SGUP-0424	In-situ Characterization of Mechanochemical Reactions	$0	$81,146	$81,146
FY2017-AKAM-0414	Computationally Aided Search for New Topological Quantum Materials and Phases.	$0	$191,498	$191,498
FY2017-ISLO-0427	Catalytic Deconstruction of Lignocellulosic Components of Wet Waste	$0	$225,711	$225,711
FY2017-LKE-1	Theoretical Tools to Accelerate Discovery and Exploit Novel Two-Dimensional Spintronic Materials	$0	$31,769	$31,769
FY2017-LZHO-0429	In situ Advanced Electron Microscopy of Phase Transitions for Energy Conversion Materials	$0	$118,858	$118,858
FY2017-TPRO-0427	In situ Differential Phase Contrast Scanning Transmission Electron Microscope Imaging with the Liquid Cell for Direct Observation of Electrical Double Layer at Solid-liquid Interface	$0	$104,448	$104,448
Total # of Projects for AMES: 9	**Total Equipment Cost for AMES: $0**	**Total Other Cost for AMES: $1,111,892**		**Total Cost for AMES: $1,111,892**
ANL - Argonne National Lab				
P/ANL2014-191	Defect-localized Spins in Semiconductors for Quantum Optoelectronics	$0	$167,536	$167,536
P/ANL2014-192	Computational Spectroscopy of Heterogeneous Interfaces	$0	$173,647	$173,647
P/ANL2015-078	Josephson Plasma Wave-Based Ultra-High Frequency Electronics	$0	$166,892	$166,892
P/ANL2015-091	Next Generation Natural Gas Adsorbent through Rational Design and Modeling	$0	$255,092	$255,092
P/ANL2015-096	Understanding Atomic Scale Uranium Interactions Under Severe Accident Conditions	$0	$164,204	$164,204
P/ANL2015-121	Development of Advanced Vanadium Oxide Nano-Composite Thermochromic Materials for High Performance Smart Windows	$0	$253,194	$253,194
P/ANL2015-147	Development of a Compact 352-Megahertz/12 kilowatt Continuous Wave Solid State Radio Frequency Power Amplifier System for Accelerators	$0	$427,341	$427,341
P/ANL2015-150	Unraveling Mesoscale Spatial-temporal Correlations in Materials Using Coherent X-ray Probes	$0	$410,517	$410,517
P/ANL2015-151	Chemical Vapor Processing for Additive Manufacturing	$0	$178,915	$178,915
P/ANL2015-153	The VelociProbe: Ultra-High-Resolution Ptychographic Hard X-ray Nanoprobe	$0	$347,500	$347,500
P/ANL2015-157	Sustainable Transportation: Novel Bio-derived Fuel Additives for Improved Vehicle Efficiency	$0	$151,718	$151,718
P/ANL2015-159	Large-scale Modeling and Simulation for an Adaptive and Resilient Power Grid	$0	$184,691	$184,691
P/ANL2015-161	Ion Beam Figuring with In-situ Metrology: Diffraction Limited X-ray Optics and Dynamic Aperture for Three-Dimensional Control of Thin-Film Deposition and Ion-Beam Erosion	$0	$165,485	$165,485
P/ANL2015-168	The Computational Design of New Functional Materials from Complex Transition Metal Oxides	$0	$129,055	$129,055
P/ANL2015-169	Agent-based Behavioral Modeling of Ebola Spread in Chicago and other Large Urban Areas	$0	$194,008	$194,008
P/ANL2015-170	Biomimetic Approaches for Water Smart Landscapes	$0	$42,092	$42,092
P/ANL2015-171	Genome Engineering of Environmental P. Fluorescens to Investigate Bacterial Interactions with Plant and Other Microbes	$0	$171,703	$171,703
P/ANL2015-173	Isotope Geochemistry via Tin Isotope Fractionation using Inelastic X-Ray Scattering of Synchrotron Radiation	$0	$32,378	$32,378
P/ANL2015-174	Conversion of 2-carbon and 3-carbon Paraffin's into Liquid-Phase Products	$0	$99,857	$99,857

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Project ID	Project Name	Equipment	Other	FY Total
P/ANL2015-176	Connected & Automated Vehicles development an integrated model combining both traffic flow models and advanced vehicle models	$0	$521,147	$521,147
P/ANL2015-178	Towards Ionotronics: First- Principles Strategies for Coupling Electronic and Ionic Properties in Complex Oxides	$0	$28,160	$28,160
P/ANL2015-179	Illuminating Linkages Between Microbial Diversity and Biogeochemical Cycling in a Redox Dynamic Environment	$0	$356,588	$356,588
P/ANL2015-180	Functional Analysis of Proteins from a Key Signaling Network Involved in Plant Growth Promoting Bacteria	$0	$372,961	$372,961
P/ANL2015-181	Fine Resolution Reconstruction of Large Volumes of Brain	$0	$423,871	$423,871
P/ANL2016-001	Structure and Dynamics of Chiral Molecules and Radicals	$0	$136,013	$136,013
P/ANL2016-010	A Theory of Out-of-Equilibrium Phase Transitions	$0	$162,057	$162,057
P/ANL2016-020	Nano-mechanical Delivery of Biomolecules into Live Bacterial Cells	$0	$157,542	$157,542
P/ANL2016-023	Real-time Monitoring of Material Structure Evolution in Additive Manufacturing Processes	$0	$177,375	$177,375
P/ANL2016-027	A Novel Gas-Filled Microchannel Plate X-ray Polarimetry imager	$0	$239,191	$239,191
P/ANL2016-048	A Missing Protein in the Bacterial Methylmercury Pathway	$0	$206,861	$206,861
P/ANL2016-054	Perovskite Halide-based Intermediate-Band Solar Cells	$0	$334,338	$334,338
P/ANL2016-063	Efficient Droplet-Based Environmental Mechanical Energy Harvesting Through Reverse Electrowetting	$0	$177,818	$177,818
P/ANL2016-069	Genetic algorithm Optimization of Interface structure from Electron Microscopy	$0	$189,142	$189,142
P/ANL2016-082	Top Down Fabrication of Large Area Monolayers of Two-dimensional Materials	$0	$193,129	$193,129
P/ANL2016-092	Spin Vortex-based Non-volatile Superconducting Memory	$0	$205,328	$205,328
P/ANL2016-094	Ordered Core-shell Nanostructure for Transverse Thermoelectric Applications	$0	$227,038	$227,038
P/ANL2016-098	Images from Inner Space: Exposing Quantum Mechanics within Nucleons and Nuclei	$0	$213,621	$213,621
P/ANL2016-120	New Thin Film Oxide, Chalcogenide and Oxy-chalcogenide Materials Discovery	$0	$793,416	$793,416
P/ANL2016-123	New Lithium-6 Rich Semiconductors for Neutron Detection	$0	$217,307	$217,307
P/ANL2016-126	Advanced Control Algorithms For Improving Energy Consumption of Connected and Automated Vehicles	$0	$153,064	$153,064
P/ANL2016-131	Supported Single-Site Catalysts for Selective Alkane Oxidation	$0	$322,856	$322,856
P/ANL2016-133	Managing Emission and Thermal Absorption	$0	$374,832	$374,832
P/ANL2016-135	Event-based Monte Carlo Transport Methods for Next-Generation Node Architectures	$0	$158,680	$158,680
P/ANL2016-136	A Novel Interferometric Terahertz Phase Imager for National Security Applications	$0	$109,068	$109,068
P/ANL2016-139	Models to Observations - a Digital Atmospheric Library	$0	$226,212	$226,212
P/ANL2016-140	Development of Analysis Methods for Non-Destructive Evaluation of Concrete Degradation in Light Water Reactors	$0	$331,855	$331,855
P/ANL2016-148	Re-form: Leveraging Field Programmable Gate Array Reconfigurability and Floating-point Capabilities for Next-generation Computing Systems	$0	$282,098	$282,098
P/ANL2016-150	A Conveyer Belt of Nanoliter to Picoliter Droplets for Hard X-ray Pump-probe Experiments	$0	$223,251	$223,251
P/ANL2016-152	Integrated Water-Energy Systems Assessment Framework for Water-Energy Sustainability and Resilience	$0	$352,046	$352,046
P/ANL2016-157	Data-driven Multiscale Coupled Urban Systems Modeling	$0	$648,750	$648,750
P/ANL2016-158	Developing a Program for the Production of Medical Isotopes using the Argonne Electron Linear Accelerator	$0	$517,078	$517,078

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Project ID	Project Name	Equipment	Other	FY Total
P/ANL2016-159	Additive Manufacturing for Nuclear Energy Applications	$0	$303,038	$303,038
P/ANL2016-165	Establishing a Proof-of-concept for Protein Function Discovery Initiative	$0	$336,737	$336,737
P/ANL2016-173	Fabrication and Testing of a Borosilicate Microchannel Plate Thermal Neutron Detector with Optimized Geometry	$0	$230,373	$230,373
P/ANL2016-175	Virtual Engine Research Institute and Fuels Initiative (VERIFI) 2.0: Next-Generation Engine/Fuel Simulation Codes	$0	$351,607	$351,607
P/ANL2016-179	Development of a Pre-Conceptual Design of a New Tracking System for CLAS12 Detector- Charged Particle Tracking System Detector	$0	$119,649	$119,649
P/ANL2016-180	In situ Polarized Spectroscopy of Optically Transparent Thermally Reduced Graphene Oxide-Polymer Solar Cells	$0	$160,779	$160,779
P/ANL2016-181	The Search for Weyl Semimetals	$0	$167,691	$167,691
P/ANL2016-182	Core-shell Nanowire Magnetic/Ferroelectric Multiferroic Heterostructure for Voltage Tunable Radio Frequency Devices	$0	$146,882	$146,882
P/ANL2016-183	Understanding and Controlling Charge, Spin, Pseudospins and Lattice Degrees of Freedom in Layered Transition Metal Dichalcogenides	$0	$181,297	$181,297
P/ANL2016-184	Investigation of Solid-Liquid Interfaces in Energy Materials Interfacing Multi-scale Modeling with Experimental Characterization	$0	$168,270	$168,270
P/ANL2016-185	Charge Transport in Nanostructured Materials from ab initio Simulations	$0	$180,448	$180,448
P/ANL2016-186	Ultrafast Spectroscopy of Nanometer-scale Heterojunctions Fabricated by Self-assembly	$0	$135,351	$135,351
P/ANL2016-187	Coherent X-ray Investigations of Defect Dynamics in Next-Generation Nanostructured Materials	$0	$152,517	$152,517
P/ANL2016-188	Understanding the Structure of Matter by studying how to overcome the disadvantages of present magnetic materials in microwave devices	$0	$147,401	$147,401
P/ANL2016-190	Hybrid Silicon Nanolasers	$0	$32,886	$32,886
P/ANL2016-191	Exploring Next Generation Coherent X-ray Science	$0	$441,480	$441,480
P/ANL2016-240	Recovery of Critical Materials from Post-Consumer Electronics	$0	$49,332	$49,332
P/ANL2017-002	Developing Superconducting Magnesium Diboride Films on Copper Radio-Frequency Accelerating Structures	$0	$86,868	$86,868
P/ANL2017-004	The Missing Link in X-ray Scanning Tunneling Microscopy: Synergy of Experiments and Theory for Argonne's Global Leadership	$0	$217,524	$217,524
P/ANL2017-007	A Novel Method of Longitudinal Bunch Shaping by Double Emittance Exchange	$0	$246,639	$246,639
P/ANL2017-012	Integrating High Throughput Computation and Wet-chemistry Synthesis for Functional Supercrystals	$0	$183,044	$183,044
P/ANL2017-013	Atomic Layer Deposition of Silicon Carbide for Nuclear Applications	$0	$180,281	$180,281
P/ANL2017-016	A widely used directive-based parallel programming model for shared-memory programming for next-machine architectures, and future exascale machines. This will enable a lower-overhead and more-scalable runtime, which will in turn enable exposure of more parallelism in scientific computing applications, allowing faster science across a variety of domains.	$0	$214,334	$214,334
P/ANL2017-017	A Continuously Refinable Mesh, Limited Area Atmospheric Model	$0	$207,358	$207,358
P/ANL2017-019	Bonding Dissimilar Materials using Nanoparticles/Nanofilm as Eutectic Compounds	$0	$209,847	$209,847
P/ANL2017-022	Engineered Interfaces for Gallium Oxide Power Semiconductor Devices	$0	$145,113	$145,113
P/ANL2017-023	New Techniques to Manipulate Rare Isotopes using Adaptive Optics	$0	$291,052	$291,052

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Project ID	Project Name	Equipment	Other	FY Total
P/ANL2017-026	Realizing a Gate Tunable Kinetic Inductance for a Transmon Qubit using Strontium Titanate	$0	$194,321	$194,321
P/ANL2017-028	Universal Superconducting Undulator	$0	$276,509	$276,509
P/ANL2017-029	Novel Devices and Systems for Neuromorphic Computing	$0	$87,401	$87,401
P/ANL2017-030	Conceptual Design of a Flexible Spectrum Test Reactor	$0	$197,500	$197,500
P/ANL2017-031	Ecological Organic Photovoltaics using Water-borne Semiconductor Nanoparticles	$0	$178,116	$178,116
P/ANL2017-032	Catalysts Modeled After Nature's Enzymes	$0	$450,998	$450,998
P/ANL2017-033	Advanced Materials for the Energy-Water Nexus	$0	$227,650	$227,650
P/ANL2017-034	The Perfect Thermodynamics of Imperfect Materials	$0	$306,283	$306,283
P/ANL2017-035	Self-assembling Soft Nanostructures with Ultra-Slow Dissociation Kinetics	$0	$171,161	$171,161
P/ANL2017-040	Development of Molten-Salt Reactor Analysis Computation Tools to Support Emerging Markets	$0	$348,022	$348,022
P/ANL2017-041	Technological Improvements to Increase Scalability of Ex-Vessel Melt Coolability and Concrete Interaction Experiments	$0	$333,197	$333,197
P/ANL2017-042	Metal Additive Manufacturing Modeling	$0	$163,577	$163,577
P/ANL2017-049	Scalable Machine Learning Infrastructure for Knowledge Discovery	$0	$299,924	$299,924
P/ANL2017-050	Oxides for Novel Computational Approaches	$0	$395,991	$395,991
P/ANL2017-051	Integrating Atmospheric, Ecological, and Biogeochemical Monitoring in Wetlands	$0	$240,540	$240,540
P/ANL2017-055	Improving Cost and Energy Efficiency of Nontraditional Water Desalination through Innovative Material and Process Integration	$0	$211,756	$211,756
P/ANL2017-057	An Exascale Application for Simulating Urban Boundary Layers	$0	$174,206	$174,206
P/ANL2017-058	A Strategic Scientific Program to Establish Argonne Leadership in the Development of the Future Electron-Ion Collider	$0	$813,314	$813,314
P/ANL2017-061	Towards an Artificial Neuron - Non-Covalent Synaptic Assemblies	$0	$379,774	$379,774
P/ANL2017-063	Enabling Multidimensional X-ray Nano-Tomography	$0	$235,852	$235,852
P/ANL2017-066	End-to-End Genome Annotation and Phenotype Prediction with Deep Learning	$0	$172,477	$172,477
P/ANL2017-073	Developing Advanced Coherent Surface Scattering Reconstruction Method Incorporating Dynamical Scattering Theory	$0	$199,746	$199,746
P/ANL2017-076	Miniaturized High-Efficiency Radio Frequency Energy Harvesting	$0	$243,123	$243,123
P/ANL2017-080	Coherence for High-Energy Diffraction	$0	$242,022	$242,022
P/ANL2017-082	Developing Hierarchical Multi-functional Hybrid Polymer-Proteins Structures for Energy Applications	$0	$406,694	$406,694
P/ANL2017-084	Advancing Additive Manufacturing of Metal Alloys; from Fundamental Principles to Durable Components	$0	$156,298	$156,298
P/ANL2017-087	Linking Climate to Water: Implementing a 4 kilometer Regional Climate Model with hydrologic Model Coupling using Argonne's High Performance Computing Resources	$0	$279,968	$279,968
P/ANL2017-088	Understanding Resilient Infrastructure Dependencies and Interdependencies through Advanced Optimization and Simulation	$0	$934,579	$934,579
P/ANL2017-091	Development of a Compact Accelerator for A High Repetition Rate Free-Electron Laser	$0	$343,903	$343,903
P/ANL2017-092	Quantum Optics with Phonons	$0	$160,837	$160,837
P/ANL2017-093	Beehive: A Dynamic Execution Environment for Performance, Power, and Resilience on Extreme-Scale Computing Systems	$0	$175,169	$175,169
P/ANL2017-094	Microstructural Simulations of Stable Conjugated Polymer Glasses	$0	$154,411	$154,411
P/ANL2017-095	Combining Electrochemistry and Ultrafast Spectroscopies: Real Time Characterization of Multi-Electron/Proton Intermediates in Hydrogen and Oxygen Evolving Catalysts	$0	$121,169	$121,169
P/ANL2017-096	On the Colloidal Suspension of Lithium Clusters in Molten Lithium Chloride	$0	$59,885	$59,885

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Project ID	Project Name	Equipment	Other	FY Total
P/ANL2017-097	A Universal Data Analytics Platform for Science	$0	$33,150	$33,150
P/ANL2017-098	X-ray Investigation of the Potential of Pressure-Assisted Atomization Technology for Medical Inhaler Sprays	$0	$23,801	$23,801
P/ANL2017-099	Towards the Reduction of U.S. Petroleum Consumption by Fueling Light-duty Engines with Propane	$0	$78,290	$78,290
P/ANL2017-100	High-Entropy Alloys for Advanced Nuclear Reactors	$0	$93,646	$93,646
P/ANL2017-101	Enhancing Computational Tools for Polynomial Optimization Problems Relevant to Networked Systems	$0	$24,390	$24,390
P/ANL2017-102	Multiscale Modeling to Understand Ion-diffusion-induced Degradation in Photovoltaics	$0	$130,124	$130,124
P/ANL2017-103	Application of Combined Rheology and X-ray Scattering to Paint Industry for Optimizing Formulation Processes	$0	$145,248	$145,248
P/ANL2017-104	Integrated Imaging - Most materials and systems are spatially complex and heterogeneous, and their behavior is typically linked to this heterogeneity. Imaging and microscopy offer a way to see a material in all of its complexity and explore its local behavior; when combined with spectroscopy, diffraction, or other analytical methods, they allow one to understand what one sees. This project is an approach (1) to promulgate an integrated, top-down approach wherein expertise is applied to selecting an imaging tool and a methodology on the basis of the scientific question and (2) to developing and integrating new tools, methods, and algorithms to efficiently perform hypothesis-driven investigations.	$0	$1,390,408	$1,390,408
P/ANL2017-105	Superconducting Detectors for Future Cosmic Microwave Background Experiments	$0	$1,083,389	$1,083,389
P/ANL2017-106	Exploring the Universe: Large Scale Structure to the First Stars	$0	$1,045,927	$1,045,927
P/ANL2017-107	Building a Battery Recycling Model within current life-cycle-modeling tools. We will expand both models to include a recycling module and allow for the modeling of consumer electronics batteries. The models will include the capability of offsetting the input material requirements as they are replaced by recycled content. Process models for three different general recycling methods will be developed: pyrometallurgical, hydrometallurgical, and direct recycling. Additionally, the models will need to be able to easily incorporate data from each other because they will be providing data back and forth from one another, rather than simply from one to the other as currently configured.	$0	$148,303	$148,303
P/ANL2017-108	Validating Replicability of Waggle Urban Deployments	$0	$49,706	$49,706
P/ANL2017-109	FOXHUNT Proof of Concept Demo - The creation of this graph database and the accompanying analytical tools would move the exploration of export enforcement efforts from speculation based on a limited sample of case studies to a more robust analysis, which would be based on a much more complete view of United States efforts to enforce export controls over the last decade.	$0	$34,199	$34,199
P/ANL2017-110	Argonne Extended Range Friction Tribometer	$0	$114,146	$114,146
P/ANL2017-113	Ultra-High Efficiency Fuel Cell-Heat Engine Hybrids	$0	$76,085	$76,085
P/ANL2017-116	Stretchable Conductive Ink for Energy Harvesting Device	$0	$25,560	$25,560
P/ANL2017-118	Improvement of In-situ Nuclear Fuel Characterization Capability at the Advanced Photon Source	$0	$27,699	$27,699
P/ANL2017-131	Argonne's Unmanned Aircraft System Capability: Application Framework Development and Benchmarking	$0	$38,860	$38,860

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Project ID	Project Name	Equipment	Other	FY Total
P/ANL2017-137	Accurate, Real-time Categorization of Unmanned Aircraft Systems in an Urban Environment Through Application of Deep Learning Strategies Leveraging Distributed Computing Technology	$0	$23,070	$23,070
P/ANL2017-141	Applying Community Network Analysis to Generalize Microbial Assembly Rules	$0	$12,792	$12,792
P/ANL2017-152	Immersive Three-Dimensional Visualization of Military Complex Systems	$0	$79,014	$79,014
P/ANL2017-153	Soft Matter Visualization and Characterization by Electron Optical Beam Lines	$0	$182,460	$182,460
P/ANL2017-154	Tribology of graphene at elevated temperatures	$0	$96,088	$96,088
P/ANL2017-155	Coherent X-ray Studies of Phase Transitions in the Complex Oxides	$0	$3,573	$3,573
P/ANL2017-156	Scalable Data Movement for Data-centric Supercomputing	$0	$4,771	$4,771
P/ANL2017-157	Transport and Photophysical Processes in Hybrid Perovskites for Energy Applications	$0	$25,427	$25,427
P/ANL2017-158	Real-time Control of Urban Drainage Systems	$0	$57,409	$57,409
P/ANL2017-159	Production of Cellulose Nanocrystals from Miscanthus hybrid Giganteus	$0	$195,383	$195,383
P/ANL2017-160	Neuromorphic Architectures for Dynamic and Reactive Learning Based on Neuromodulation	$0	$151,715	$151,715
P/ANL2017-161	A Mechanically-based Antenna for Radio Frequency Incompatible Environments	$0	$43,689	$43,689
P/ANL2017-162	Novel Gallium Oxide Devices for Microwave and Radio Frequency Technology	$0	$50,592	$50,592
P/ANL2017-163	Biofilms and Human-made Surfaces: How Microorganisms Attach to and Influence the World Around Us	$0	$46,640	$46,640
P/ANL2017-164	Simulating The Dynamics of Gene Drive Propagation Through Populations	$0	$41,462	$41,462
P/ANL2017-165	Global Survey of Genomic Systems in Archaeal and Bacterial Species	$0	$42,984	$42,984
Total # of Projects for ANL: 146	**Total Equipment Cost for ANL: $0**	**Total Other Cost for ANL: $32,992,689**		**Total Cost for ANL: $32,992,689**
BNL - Brookhaven National Lab				
BNL13-006	Time resolved imaging of X-rays and charged particles	$0	$37,195	$37,195
BNL14-005	1st Light: Elucidating Solid-Solid Interfaces in Energy Storage Systems	$0	$465,232	$465,232
BNL14-024	Enable Early Sciences in National Synchrotron Light Source II with Experiment-Driven Big Data Stream System	$0	$9,184	$9,184
BNL14-036	Correlative microscopy, spectroscopy and diffraction with a micro-reactor	$0	$2,263	$2,263
BNL15-006	Design, fabrication and test of a Superconducting Radio Frequency (SRL) cavity prototype for the Electron Ion Collider Energy Recovery Linac	$0	$301,901	$301,901
BNL15-009	Nanoconfined Polymer Electrolytes for Rechargeable Lithium-Metal Batteries	$0	$162,362	$162,362
BNL15-010	Hydrocarbon chemistry on zeolite model systems: towards a detailed understanding of energy-relevant chemical transformations	$0	$203,383	$203,383
BNL15-011	Revealing the structure and dynamics of discrete meso-architectures	$0	$175,346	$175,346

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BNL15-020	A new frontier for improving processes for regional and global climate modeling - A tropical cyclone genesis prediction system has been established based on machine learning. The predictive capability was trained using a large pool of satellite observed tracks of meso-scale convective systems and their potential of evolving into tropical cyclones. An automated procedure was developed to extract data from major climate data centers to generate associated environmental features to facilitate the training and testing. Multiple classification algorithms were tested to optimize the system and achieve a predicted hit rate of cyclone genesis near 90%. Characterizations of tropical diurnal convection in a climate model and in an explicit convection model were also performed, aiming to use the machine learning-based framework for improving the initiation of convection in climate models.	$0	$139,582	$139,582
BNL15-025	Growth of Self-activated scintillators for dual gamma and neutron detection	$0	$84,638	$84,638
BNL15-031	Inelastic X-Ray Scattering determination of the inter- and intra-particle dynamics of nanoparticle superlattices	$0	$52,365	$52,365
BNL15-034	Searching and sorting haystacks - develop methods for dealing with the highly fragmented crystallographic data sets that will be generated at National Synchrotron Light Source II	$0	$132,948	$132,948
BNL15-037	In-situ microscopy investigation of complex manganese oxides for energy storage	$0	$98,235	$98,235
BNL16-004	Chiral magnetic effect: from quark-gluon plasma at the Relativistic Heavy Ion Collider to Dirac semimetals at National Synchrotron Light Source II	$0	$173,758	$173,758
BNL16-006	Serial Micro Crystallography at Full Flux	$0	$154,926	$154,926
BNL16-007	Three-Dimensional Ptychography imaging without rotation using highly convergent X-ray beam	$0	$194,795	$194,795
BNL16-010	100 femtosecond single-shot electron beam slicing technology towards ultra-fast imaging	$0	$332,679	$332,679
BNL16-019	In situ synchrotron studies of subsurface material interfaces using X-ray fluorescence mapping and X-ray tomography at National Synchrotron Light Source II	$0	$471,938	$471,938
BNL16-021	Characterization of photo-cathodes and photoelectrons in liquid noble gases	$0	$247,367	$247,367
BNL16-022	Investigation of Silicon Photomultipliers for use in Nuclear and Particle Detectors	$0	$342,412	$342,412
BNL16-023	Analog to Digital Converter and Giga bit per second Link in Complementary Metal-Oxide-Semiconductor for large data generation and in operando analysis	$0	$307,596	$307,596
BNL16-024	Improved X-ray Spectroscopy Detectors	$0	$312,602	$312,602
BNL16-026	Microwave Kinetic Inductance Detectors: from Cosmology to National Synchrotron Light Source II	$0	$325,179	$325,179
BNL16-027	Detector Calibration and Material Analysis - Expanding the Capabilities at National Synchrotron Light Source II	$0	$334,804	$334,804
BNL16-029	Higher-Order-Mode damping for full luminosity of the Electron Ion Collider	$0	$267,199	$267,199
BNL16-034	Advanced Silicon Detectors Research and Development	$0	$246,947	$246,947
BNL16-035	Resolving Technological Issues of a Compact Time Projection Chamber for Use at Both Relativistic Heavy Ion Collider and a Future Electron Ion Collider	$0	$240,585	$240,585
BNL16-037	Exploring hadron structure with ab initio lattice Quantum Chromo Dynamics calculations and making predictions for an addition of an electron ring to existing Relativistic Heavy Ion Collider complex	$0	$158,999	$158,999
BNL16-038	Preconceptual Design Study for Large Scale Structure Experiment post Large Synoptic Survey Telescope/Dark Energy Spectroscopic Instrument	$0	$148,686	$148,686
BNL16-039	Machine Learning Assisted Material Discovery	$0	$493,710	$493,710

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BNL16-041	Dynamic Visualization and Visual Analytics for Scientific Data at National Synchrotron Light Source II	$0	$228,721	$228,721
BNL16-043	Deep Structured Analysis for Image Datasets from Center for Functional Nanomaterials and National Synchrotron Light Source II	$0	$452,440	$452,440
BNL16-045	Catalysis Program in Carbon Dioxide Activation	$0	$503,592	$503,592
BNL16-046	Strong-Strong Beam-Beam Interaction Studies for a Ring-Ring Based Electron Ion Collider	$0	$346,867	$346,867
BNL17-002	High-Powered Erbium-Doped Fiber Laser for 50 milliamp Highly Polarized Electron Beam	$0	$211,536	$211,536
BNL17-003	Integrated Low-Noise and Low Drop-Out Voltage Regulator for Front-End Application Specific Integrated Circuit	$0	$348,301	$348,301
BNL17-004	Next Generation Pad Readout for Neutron Detectors	$0	$304,884	$304,884
BNL17-005	Investigation of Novel Materials for Generating Polarized Electron Beams	$0	$277,150	$277,150
BNL17-011	Engineered Protein Arrays for Structural and In-Operando Studies	$0	$51,810	$51,810
BNL17-015	National Synchrotron Light Source II High Brightness Upgrade Design Studies	$0	$275,274	$275,274
BNL17-016	Diffraction-limited and wavefront preserving reflective optics development	$0	$128,454	$128,454
BNL17-017	Development of Compact, High Efficiency Nanofocusing Optics for Hard X-Ray Nano-Imaging	$0	$95,722	$95,722
BNL17-018	Genomes to Predictive Biology: Machine Learning for the Integration of Inter-Species Functional Genomics Data	$0	$40,800	$40,800
BNL17-023	Molecular Mechanisms of Alkane Hydroxylation	$0	$17,281	$17,281
BNL17-024	Development of a New Approach to Remotely Measure Limitations on Plant Growth	$0	$14,615	$14,615
BNL17-029	High Performance X-ray Diffraction Simulation Toolkit Using Graphics Processing Unit and Central Processing Unit Clusters	$0	$153,892	$153,892
BNL17-035	Transitions in strongly correlated oxide materials	$0	$288,805	$288,805
Total # of Projects for BNL : 47	**Total Equipment Cost for BNL : $0**	**Total Other Cost for BNL : $10,358,960**		**Total Cost for BNL : $10,358,960**
FERMI - FERMI National Accelerator Lab				
FNAL-LDRD-2014-010	Cosmic Microwave Background Detector Development at Fermilab	$0	$445,227	$445,227
FNAL-LDRD-2014-012	Development of High Temperature Superconductor Based Rapid-Cycling Accelerator Magnets	$0	$537,361	$537,361
FNAL-LDRD-2014-025	The Sinuous Target - Generate a new, engineered material for use in high-power accelerator targets	$0	$213,112	$213,112
FNAL-LDRD-2015-009	High Energy Physics Pattern Recognition with an Automata Processor	$0	$50,399	$50,399
FNAL-LDRD-2015-010	Dark Energy Survey and Gravitational Waves- feasibility study of using the Dark Energy Survey to make an optical identification of a source of gravitational waves triggered by upcoming gravitational wave detectors	$0	$2,232	$2,232
FNAL-LDRD-2015-020	Off-the-Shelf Data Acquisition System- Evaluate data acquisition architecture based on commercial technology being developed for the emerging Internet of Things	$0	$158,157	$158,157
FNAL-LDRD-2015-021	Transverse and Longitudinal Profile Diagnostics for Negatively-charged Hydrogen Beams using Fiber Lasers and Synchronous Detection	$0	$17,085	$17,085
FNAL-LDRD-2015-029	Niobium-3 Tin superconducting radio-frequency cavities to reach gradients up to 90 Megavolt per meter-and enable 4.2 Kelvin -operation of accelerators	$0	$293,291	$293,291
FNAL-LDRD-2015-031	A comprehensive investigation of a "transformational" integral optics test storage ring as a "smart" rapid cycling synchrotron for high-intensity beams	$0	$169,508	$169,508
FNAL-LDRD-2016-001	Beam Precision Time Profile Monitor	$0	$100,135	$100,135
FNAL-LDRD-2016-004	Development of an ultra low energy threshold particle detector	$0	$96,543	$96,543
FNAL-LDRD-2016-007	Tuning Axion Detectors with Non-Linear Dielectrics	$0	$132,651	$132,651

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Project ID	Project Name	Equipment	Other	FY Total
FNAL-LDRD-2016-008	Novel Methods for High Performance Superconducting Coating on Copper	$0	$356,512	$356,512
FNAL-LDRD-2016-010	Preparing high energy physics (HEP) reconstruction and analysis software for exascale era computing	$0	$190,974	$190,974
FNAL-LDRD-2016-032	Implement open source high energy physics non-structured query language-database	$0	$130,272	$130,272
FNAL-LDRD-2016-034	Instrumentation for the Initial set of Critical Scientific Experiments in Integrable Optics Test Accelerator and the Fermilab Accelerator Science and Technology Injector	$0	$83,733	$83,733
FNAL-LDRD-2017-003	Optical Microwave Kinetic Inductance Devices for future Cosmic Surveys	$0	$27,964	$27,964
FNAL-LDRD-2017-010	Training Deep Neural Networks for Neutrino Identification in the Cloud	$0	$45,645	$45,645
FNAL-LDRD-2017-019	First demonstration of conduction cooled superconducting radio-frequency cavity	$0	$332,793	$332,793
FNAL-LDRD-2017-020	Development of next-generation niobium-3 tin superconductors for accelerator magnets	$0	$92,555	$92,555
FNAL-LDRD-2017-027	Silicon precision timing detectors for minimum ionizing particles	$0	$107,939	$107,939
FNAL-LDRD-2017-028	Increasing the photon detector light efficiency in a liquid argon detector by an order of magnitude	$0	$128,374	$128,374
FNAL-LDRD-2017-038	Quantum computing using superconducting radio-frequency technology	$0	$61,705	$61,705
Total # of Projects for FERMI : 23	**Total Equipment Cost for FERMI : $0**	**Total Other Cost for FERMI : $3,774,167**	**Total Cost for FERMI : $3,774,167**	
INL - Idaho National Lab				
I15-002	Experimental Scenarios of Adversity and Recovery in Aqueous Separations.	$0	$294,649	$294,649
I15-013	Simulation Based Analysis of Procedures and Accident Management Guidelines	$0	$222,631	$222,631
I15-023	Development of Stochastic Three-Dimensional Soil Response Capability in a Multi-Physics Object Oriented Simulation Environment-to Provide Design and Beyond Design Basis Seismic Motions for Nuclear Facilities	$0	$82,290	$82,290
I15-032	Development of new method for high temperature thermal conductivity measurements of nuclear materials	$0	$252,191	$252,191
I15-039	Transient Modeling of Integrated Nuclear Energy Systems with Thermal Energy Storage and Component Aging and Preliminary Model Validation via Experiment	$0	$426,533	$426,533
I15-040	Acoustic telemetry infrastructure for in-pile Advanced Test Reactor and Transient Test Reactor monitoring	$0	$359,247	$359,247
I15-060	Development of State-of-the-Art Capabilities to Support Transient Test Reactor Modeling and Simulation	$0	$466,466	$466,466
I15-094	Evaluation and Demonstration of the Integration of Safeguards, Safety, and Security by Design	$0	$76,789	$76,789
I15-100	Real time Process Simulator	$0	$350,652	$350,652
I15-111	Adversary Signature Development and Threat Analysis	$0	$178,049	$178,049
I15-125	Phosphoranimines for advanced battery applications	$0	$215,718	$215,718
I15-128	Microstructural evolution and mesoscale coupled flow-reaction-fracturing processes in organic rich nanoporous shales	$0	$289,838	$289,838
I15-135	Dynamic Simulations for Large Scale Electric Power Networks in Real Time Environment using Multiple Real Time Digital Simulator	$0	$336,189	$336,189
I15-141	Interfacing Multiphysics Object Oriented Simulation Environment Components to Enhance Capability	$0	$99,374	$99,374
I15-142	New in core neutron diagnostics-develop and characterize a new technology for neutron dosimetry	$0	$97,384	$97,384
I15-144	Investigation of Sonication Assisted Electrolytic Reduction of Used Oxide Fuel in Molten Salt	$0	$163,872	$163,872

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Project ID	Project Name	Equipment	Other	FY Total
I15-145	Advanced Neutron and X-Ray Imaging at Transient Test Reactor	$0	$181,472	$181,472
I15-146	Tailoring the Kinetic Function of a Surface through Electronic Effects of Nanoscale Architecture	$0	$724,104	$724,104
I16-002	Advanced Carbon Feedstock Processing Using Ionic Liquids.	$0	$392,051	$392,051
I16-003	Recycling of Tantalum-containing Waste Materials to Recover Tantalum Metal	$0	$199,991	$199,991
I16-010	Development of a fully coupled radiation damage production and evolution simulation capability	$0	$497,638	$497,638
I16-013	Micromechanistic approach and critical experiments for quantitative predictions of delayed hydride cracking in zirconium alloys	$0	$319,871	$319,871
I16-026	Computationally Efficient Prediction of Containment Thermal Hydraulics Using Multi-Scale Simulation	$0	$147,583	$147,583
I16-036	Neutron microscope to enable high-resolution neutron tomography at Idaho National Laboratory	$0	$379,268	$379,268
I16-040	Integration of Prognostic Techniques and Probabilistic Safety Assessment for Online Risk Monitoring	$0	$365,812	$365,812
I16-046	Development of a Synergistic Approach To Study Irradiated Materials Using Coupled Experiments and Simulation	$0	$279,735	$279,735
I16-050	Stress Corrosion Cracking Testing in Supercritical Carbon Dioxide	$0	$123,746	$123,746
I16-055	Capability Extension for Multiscale, Multi-Application development within the Multiphysics Object-Oriented Simulation Environment	$0	$513,152	$513,152
I16-058	Predicting Radiation-Induced Microstructural Change via Implementation and Validation of Multiscale Cluster Dynamics in Multiphysics Object Oriented Simulation Environment	$0	$84,268	$84,268
I16-070	Characterization of Neutron Beamlines at Neutron Radiography reactor	$0	$207,921	$207,921
I16-071	Evaluation of Advanced Digital Neutron Imaging Systems for Post Irradiation Examination of Nuclear Fuel	$0	$267,097	$267,097
I16-081	Modeling Thermite Reactions	$0	$134,806	$134,806
I16-085	Production of Fluoroanion Targets for Accelerator Mass Spectrometry	$0	$225,771	$225,771
I16-096	Supporting operator performance and situation awareness in highly automated nuclear power plants	$0	$148,357	$148,357
I16-098	Nuclear Nonproliferation Applications of 14 Carbon Analyses by Accelerator Mass Spectrometry	$0	$206,267	$206,267
I16-106	Risk Analysis Method Integrating Physical, Cyber and Infrastructure Dependencies	$0	$189,113	$189,113
I16-129	Application of Radioactive Isotope Dilution Technique to Measurement of Molten Salt Mass for Electrochemical Recycling Process	$0	$77,101	$77,101
I16-133	Secure Supervisory Control And Data Acquisition Communications System	$0	$194,879	$194,879
I16-149	In-core Qualification of Developmental Instrumentation	$0	$186,984	$186,984
I16-152	Wireless radio frequency signal identification and protocol reverse engineering	$0	$249,905	$249,905
I16-176	Development of Direct Carbon Fuel Cells	$0	$488,765	$488,765
I16-187	Micro-Scale Technique to Evaluate Grain Boundary Cohesion of Irradiated Alloys	$0	$299,543	$299,543
I16-215	Electrochemical Manufacturing Processes	$0	$942,654	$942,654
I16P6-002FP	Kinetic-based Scale-Up Science for an Energy Efficient Route to Ethylene	$0	$347,391	$347,391
I16P6-003FP	Phenomena Identification and Ranking Table Technique Applied to the MegaPower Heat Pipe Reactor Concept	$0	$648,125	$648,125
I16P6-007FP	Consequence-driven Cyber-informed Engineering Methodology Pilot	$0	$258,886	$258,886
I17A1-007FP	High Performance Polymeric Membranes for Filtration Applications High Performance Polymeric Membranes for Nano and Ultrafiltration Applications	$0	$294,860	$294,860

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I17A1-024FP	Design to Enable Narrow Pulse Width in Transient Tests	$0	$223,622	$223,622
I17A1-055FP	Electro-reduction of metals in supercritical fluid-room temperature ionic liquids	$0	$279,916	$279,916
I17A1-070FP	Multi-Purpose Non-Destructive Examination Station in the Advanced Test Reactor Canal	$0	$162,871	$162,871
I17A1-079FP	Affixing Inert Dissimilar Materials to Structural Materials for High Performance Armor Systems	$0	$285,100	$285,100
I17A1-086FP	Development of a complete kinetic model for free-radical-induced degradation of formic and oxalic acids.	$0	$477,139	$477,139
I17A1-093FP	Digital Neutron Imaging of Irradiated Fuel Using a Gamma-Discriminating Scintillation System	$0	$248,490	$248,490
I17A1-101FP	Nuclear Instrumentation and Methods for Emergency Response	$0	$191,932	$191,932
I17A1-105FP	Safety Margin Evaluation for Experiment Irradiation in Advanced Test Reactor	$0	$288,721	$288,721
I17A1-106FP	A Study of Fission Modes to Improve Nuclear Forensics	$0	$207,979	$207,979
I17A1-109FP	Big Data Binary Reverse Engineering	$0	$325,709	$325,709
I17A1-111FP	Design of Low Activation Retrievable Sample Holder for Transient Test Reactor Irradiation of Science-Based Specimens	$0	$304,728	$304,728
I17A1-114FP	Resilient, Scalable Cyber State Awareness of Industrial Control System Networks to Threat	$0	$209,276	$209,276
I17A1-124FP	Systematic Error Control in Cross Section Library Generation for Novel Reactors	$0	$379,916	$379,916
I17A1-142FP	Modeling and Spatial-Temporal Analysis of Cyber-Physical Impacts	$0	$211,418	$211,418
I17A1-150FP	Advanced manufacturing of metallic fuels and cladding by equal-channel angular pressing	$0	$363,178	$363,178
I17A1-152FP	Building Systems: Access, Management, & Automation	$0	$150,335	$150,335
I17A1-156FP	Nuclear Safety Systems Cyber Security	$0	$51,471	$51,471
I17A1-160FP	Mass Storage Equipment Protection	$0	$11,916	$11,916
I17A1-162FP	Securing Electronic Control Unit Communication	$0	$149,524	$149,524
I17A1-164FP	Application of Traditional Risk Assessment Methods to Cyber Manipulation Scenarios	$0	$244,428	$244,428
I17A1-166FP	Electrochemical Reduction of Carbon Dioxide Enriched in Switchable Polarity Solvents	$0	$255,422	$255,422
I17A1-173FP	Fractionation of lignocellulosic biomass with switchable polarity solvents	$0	$149,144	$149,144
I17A1-178FP	Forensics of Embedded Devices	$0	$176,845	$176,845
I17A1-183FP	Vehicle-to-Vehicle, Infrastructure, and People Communication Security	$0	$154,889	$154,889
I17A1-201FP	Human Reliability Analysis for Advanced Reactor Technologies and Systems	$0	$210,909	$210,909
I17A1-206FP	Large Scale Log Analysis for Control System Networks	$0	$50,943	$50,943
I17A1-223FP	New Approach for Post Irradiation Examination Using Modular Transportable Instrumentation	$0	$347,818	$347,818
I17A1-227FP	Multi-Physics, Multi-Scale Coupled Simulation of Power Impulse Experiments	$0	$451,154	$451,154
I17P10-003FP	In-situ small-scale mechanical testing of neutron irradiated ferritic steels	$0	$171,583	$171,583
I17P11-001FP	Enabling Material Discovery for Waste Heat Recovery Systems using a Multimode Optical Sensor	$0	$203,193	$203,193
I17P11-005FP	Improved Industrial Control System Resilience through Automated Detection and Response	$0	$301,062	$301,062
I17P11-007FP	Coupling of Modeling and Experiment to Develop Predictive Models of the Mechanical Behavior of Nuclear Fuels and Materials	$0	$289,488	$289,488
I17P11-014FP	The influence of irradiation on the corrosion kinetics and hydrogen pickup of zirconium alloys	$0	$139,957	$139,957
I17P11-018FP	Advanced Manufacturing of Uranium Dioxide Fuel Pellets with radially and axially zoned burnable poisons and hour-glassing control features	$0	$254,503	$254,503

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I17P11-022FP	Development of Nonlinear Eigenvalue Solvers in the Multiphysics Object Oriented Simulation Environment	$0	$154,621	$154,621
I17P11-030FP	Investigation of Exciton Delocalization and Exciton Coherence in Chromophores and Acoustic Nanostructures	$0	$164,632	$164,632
I17P11-032FP	Production, Encapsulation and Process Optimization of Energy Producing Isotopes	$0	$235,383	$235,383
Total # of Projects for INL: 84	**Total Equipment Cost for INL: $0**	**Total Other Cost for INL: $21,968,203**		**Total Cost for INL: $21,968,203**
KCP -Kansas City National Security Campus				
19663	Capital Equipment Plant Directed Research Development Selective Laser Melt (SLM280) Metals Additive Manufacturing Machine	$0	$11,126	$11,126
1967601	Capital Equipment Plant Directed Research Development High Temp Hot Press	$0	$811,714	$811,714
24865	Low Value Equipment Plant Directed Research Development Laser Sintering	$0	$4,636	$4,636
24889	Low Value Equipment Plant Directed Research Development Ceramic Processing Equipment	$0	$13,635	$13,635
24954	Low Value Equipment Plant Directed Research Development Extruder for Additive Manufacturing	$0	$19	$19
24955	Low Value Equipment Plant Directed Research Development Launch Simulator	$0	$612	$612
24977	Low Value Equipment Plant Directed Research Development Dry Ice Blasting Machine	$0	$38,258	$38,258
24980	Low Value Equipment Plant Directed Research Development X-ray Diffraction Hardware	$0	$11,458	$11,458
24999	Low Value Equipment Plant Directed Research Development 70002a Dual Channel	$0	$174,758	$174,758
25049	Low Value Equipment Plant Directed Research Development Vector-following Launch Simulation	$0	$135,243	$135,243
26020	Low Value Equipment Plant Directed Research Development Room Temperature Vulcanizing Rubber Meter/Mix/Dispense System	$0	$100,215	$100,215
26025	Low Value Equipment Plant Directed Research Development Multi-frequency ultrasonic cleaner	$0	$56,889	$56,889
26026	Low Value Equipment Plant Directed Research Development Liquid Borne Particle Counter	$0	$70,991	$70,991
26034	Low Value Equipment Plant Directed Research Development Autogrinder	$0	$55,335	$55,335
26037	Low Value Equipment Plant Directed Research Development High Vacuum 3 axis stage	$0	$15,024	$15,024
26038	Low Value Equipment Plant Directed Research Development Eye Tracking Glasses	$0	$36,388	$36,388
26039	Low Value Equipment Plant Directed Research Development Table Top Eye Tracker	$0	$50,430	$50,430
26056	Low Value Equipment Plant Directed Research Development Femtosecond Laser	$0	$352,511	$352,511
26078	Low Value Equipment Plant Directed Research Development Bladeless Vacuum Mixer	$0	$34,980	$34,980
26090	Low Value Equipment Plant Directed Research Development Jet Elite Vertical Bandsaw 20 inch Vertical Bandsaw	$0	$12,592	$12,592
704486	Printed Circuit Boards Physically Unclonable Features	$0	$45,139	$45,139
704553	Additive Manufacturing - Metals - develop a simulation system to evaluate part warpage before machine execution	$0	$846	$846
704587	University Senior Design Projects to Support Plant Directed Research and Development	$0	$246,491	$246,491
704599	Lead-Free Materials for Lightning Arrestor Connector Functionality	$0	($1,712)	($1,712)
704608	High Temperature Thermal Analysis - to develop high temperature thermal analysis capability	$0	$43,482	$43,482
704609	Advancement of Welding Simulation to include Fluid Effects	$0	$236	$236
704610	Gamma Ray Imaging - investigate efficient gamma ray imaging designs optimized for imaging sources at short ranges	$0	$1,173	$1,173

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704614	Thick Physical Vapor Deposition Films for Current Viewing Resistor	$0	$248,612	$248,612
704615	Low Temperature Curing of Powder Coating	$0	($1,680)	($1,680)
704618	Additive Manufacturing Surety Technologies	$0	$24,660	$24,660
704636	Electron Beam Melt Additive Manufacturing Technical Fellowship	$0	$1,392	$1,392
704637	Titanium Hermetic Materials - rigorous materials selection evaluation to assess potential insulator compositions and titanium base alloys for hermetic applications	$0	($3,216)	($3,216)
704652	Gas Transfer System Laser Welding in Vacuum	$0	$119,104	$119,104
704654	Optimization of Digital Radio Frequency Memory Technology	$0	$3,304	$3,304
704660	Ultraviolet Photodiode Fabricated Using Graphene and Zinc Oxide Nanowires	$0	($105)	($105)
704661	Low Frequency Magnetic Sensors via Novel Magnetic Thin Films for Magnetic Sensitivity	$0	($202)	($202)
704662	Molecular Modeling of Polymers Utilizing Applications of Molecular Dynamics, Quantum Mechanics and Dissipative Particle Dynamics.	$0	($2,333)	($2,333)
704664	Helical Electro-Magnetic Launcher research Integration	$0	$2,924	$2,924
704665	Additive Manufacturing Metal Qualification	$0	$398,754	$398,754
704672	Infrared Vision: Component and Circuit Board Inspection	$0	$0	$0
704676	Additive Manufacturing for Miniature Simple Link Interface Computer.	$0	$200	$200
704679	Plant Directed Research & Development Proposal - to determine the behavior of software/firmware from machine language code	$0	($991)	($991)
704686	Quick Response Project for Early Readiness Level Feasibility Studies	$0	($10,998)	($10,998)
704691	Quick Configurable Secure -Wireless System	$0	$144	$144
704695	Plant Directed Research and Development Massachusetts Institute of Technology Project	$0	$527,573	$527,573
704700	Firmware Validation as a Reverse Engineering Tool	$0	$282	$282
704701	Additive Manufacturing Raw Material Analysis	$0	$136,137	$136,137
704702	Thin Wall Deformation - to develop a stress relief process that will allow machining to meet flatness and contour requirements of product	$0	$46,018	$46,018
704703	Remote Collaboration using Augmented Reality - primary focus on the evaluation of current remote collaboration offerings and the development of custom applications	$0	$238,739	$238,739
704704	Environmentally Powered Sensor Systems	$0	$88,404	$88,404
704705	High Speed One-Shot Pulse Measurement accuracy	$0	$118	$118
704706	Additive Manufacturing/Metals - investigate the feasibility of alternative methods for material deposition through the use of finite element analysis tools	$0	($2,245)	($2,245)
704707	Model-Based Design For Additive Manufacturing - investigate and determine suitability rules based on geometry, tolerances, material, and machine type.	$0	$81,760	$81,760
704709	Achilles III - researching and developing a new Additive Manufacturing capability	$0	$9,457	$9,457
704711	Techniques for Dynamic Non-Contact Measurements	$0	$2,353	$2,353
704712	Analog to Digital Converter to Field Programmable Gate Array Digital Signal Processing and Analysis	$0	$530	$530
704715	Secure Assembly 1 - evaluate the use of an alternative technology	$0	$87,689	$87,689
704716	Integrated Computational Materials Engineering Development	$0	$587,810	$587,810
704717	Carbon Fiber From Asphaltenes	$0	$13,781	$13,781
704719	Radar 2021- deliver the science and research behind cutting-edge Multi-Chip-Module packaging, miniaturization and Radio Frequency technology	$0	$2,524,829	$2,524,829
704720	Multi-Chip Module- Land Radio Frequency Integrated Circuit Packaging	$0	$318,476	$318,476

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704722	Adopting Orphaned Models for Topology Optimization	$0	$1,995	$1,995
704725	Evaluation of Disturbances to Power Lines via Monitoring Techniques	$0	$153,857	$153,857
704726	Solid State High Voltage Switch	$0	$151	$151
704727	Magnetorheological Fluid Damping - to create a surface which has variable damping characteristics in the context of impact testing	$0	$87,440	$87,440
704728	Advanced Modeling Capabilities	$0	($706)	($706)
704729	Embedded Sensing & Inventory - to determine the viability of low frequency wireless communication	$0	$120,482	$120,482
704731	Molded Safing Wheel Ferrites	$0	$10,222	$10,222
704732	Non-Destructive Testing for Delamination Failure	$0	$550	$550
704734	Tailorable Resonant Plate Shock	$0	$231,305	$231,305
704735	Radio Frequency Module	$0	$1,796	$1,796
704737	Bad Universal Serial Bus Research - investigate vulnerability affecting foundational aspects	$0	$434	$434
704739	Smart Compression Pads	$0	$552	$552
704741	Augmented Reality Vision: Assembly/Inspection	$0	$370,607	$370,607
704743	Baby Blatz - The effects of machine parameters on part properties and characteristics	$0	$15,567	$15,567
704751	Development of Precipitation Hardening Steel for Additive Manufacturing	$0	$218,885	$218,885
704752	Parameter Set Migration for Additive Manufacturing	$0	$501	$501
704754	Additive Manufacturing Metal Heat Treatment	$0	$118,439	$118,439
704755	Digital Radiographic Methods	$0	$43,956	$43,956
704758	High Voltage Signal Processing	$0	$10,657	$10,657
704760	Frequency Response Inspection	$0	$656,727	$656,727
704761	Manufacturing/System Engineering - develop plan to implement industry standards and approaches	$0	$22,578	$22,578
704763	Alternate Pinch Weld Electrode	$0	$10,138	$10,138
704765	Innovation, Development, Experimentation, and Assessment - short term initiatives to evaluate the feasibility of ideas that could turn into full time Plant Directed Research & Development projects	$0	$1,252,707	$1,252,707
704766	Plant Directed Research and Development Broadband Receiver	$0	$401,098	$401,098
704767	Direct Laser Metal Sintering Additive Manufacturing Material and Study	$0	($768)	($768)
704768	Cryogenic Modeling	$0	($1,764)	($1,764)
704770	Copper Development for Additive Manufacturing	$0	$222,301	$222,301
704771	Development of Polymer Additive Manufacturing Lab Capabilities	$0	$29,628	$29,628
704772	Kansas City National Security Campus Technology Sessions- develop training for critical technical skills	$0	$885	$885
704773	Advanced Techniques and Applications for Computed Tomography	$0	$60,796	$60,796
704774	Unique Chip Identification	$0	$59,323	$59,323
704775	Densification of Non-Oxide Ceramics	$0	$304,458	$304,458
704776	Controlled Structural Damping	$0	$7,756	$7,756
704777	Design and Manufacture of Cryogenic Systems	$0	$197,715	$197,715
704778	Nanocellulose Metal Matrix Composites	$0	$180,528	$180,528
704779	Augmented Reality for Office of Secure Transport Operations	$0	$140,988	$140,988
704783	Vector Following Launch Simulations	$0	$56,503	$56,503
704784	Laster Sintering Research and Development System	$0	$184,970	$184,970
704785	Selective Laser Melting Support	$0	($286)	($286)
704787	Big Data Storage and Structure	$0	$148,641	$148,641
704788	Big Data Infrastructure and Formats	$0	$43,370	$43,370
704789	Engineered Substrates	$0	$292,671	$292,671
704790	Milli-Meter-Wave Radio Frequency Identification	$0	$222,434	$222,434
704791	Digitally Tunable Radio Frequency Filter	$0	$34,466	$34,466
704792	Trusted Embedded Platform Implementation	$0	$235,055	$235,055
704793	Defense against Aerial Drones	$0	$89,864	$89,864
704794	Small Spacecraft Technologies	$0	$143,187	$143,187
704795	Antennas and Transverters	$0	$407,841	$407,841
704796	Cleaning of Additive Manufactured Polymer Parts	$0	$74,485	$74,485
704797	Nanocomposites for Next Generation Materials	$0	$149,695	$149,695
704798	Laser Weld Depth Monitoring	$0	$35,986	$35,986

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704799	Additive Manufacturing Machine Characterization of Selective Laser Melting Machine's Solution (SLM280), comparing machine performance from site to site.	$0	$225,410	$225,410
704800	Advancing Aluminum Development for Electron Beam Melt Additive Manufacturing	$0	$176,131	$176,131
704801	Achilles IV - Global Security project aimed at researching and developing a new Additive Manufacturing capability	$0	$30,937	$30,937
704802	Additively Manufactured Magnetic Solenoid	$0	$121,796	$121,796
704803	Three-Dimensional X-Ray Analysis for Three-Dimensional Printing	$0	$52,383	$52,383
704804	In-Situ X-ray Analysis of the additive manufacturing process at the intersection of the energy source with the feedstock	$0	$221,528	$221,528
704805	Large Scale Additive Manufacturing with Wire Fed System	$0	$67,405	$67,405
704806	Laser Oxidations for Wear Resistance and Lubrication	$0	$24,275	$24,275
704807	Machine Health Monitoring	$0	$124,950	$124,950
704808	Materials, Equipment, and Tool Verification	$0	$24,016	$24,016
704809	Automated Optical Inspection	$0	$111,479	$111,479
704810	Smart Storage Shelving	$0	$21,647	$21,647
704811	Dry Ice Blasting	$0	$55,343	$55,343
704812	Next Generation Electrostatic Dissipation Survey	$0	$32,017	$32,017
704813	Scrubbing Native Model-Based Definitions	$0	$10,064	$10,064
704814	Investigation of Conformal Cell Structures	$0	$194,039	$194,039
704815	Investigation of Electromagnetic Techniques	$0	$62,659	$62,659
704816	Development of Material Point Method Simulation Capabilities	$0	$126,921	$126,921
704817	Aging and Absorption of Molecules	$0	$93,074	$93,074
704818	Metal Barrier on Radar Layers	$0	$56,482	$56,482
704819	Design for Additive Manufacturing Research	$0	$175,748	$175,748
704820	Fixture Design and Damage Potential	$0	$238,198	$238,198
704821	Thin-Client Use on Testers	$0	$29,368	$29,368
704822	Trusted Protection Modules	$0	$58,330	$58,330
704823	Ink Jet Fabrication - This project seeks to develop materials and fabrication processes for ink jet printing of electrical and optical devices.	$0	$337,467	$337,467
704824	Advanced Real Time Digital Signal Processing	$0	$91,008	$91,008
704825	Vibrafuge for Environmental Laboratory	$0	$65,506	$65,506
704826	Multiple-Input Multiple-Output Active Vibration Control	$0	$223,316	$223,316
704827	Helical Electromagnetic Launcher	$0	$219,674	$219,674
704828	Digital Radar Target Simulator	$0	$278,878	$278,878
704829	Nuclear Magnetic Resonance Spectra Database	$0	$77,457	$77,457
704830	Materials-At-Risk Pilot	$0	$121,780	$121,780
704831	Additive Manufacturing of Ceramic Composites	$0	$249,318	$249,318
704832	Improved Diamond Like Carbon Recipe	$0	$123,915	$123,915
704833	Non-contact Dimensional and Workmanship Inspection	$0	$81,745	$81,745
704834	Maraging Steel Study	$0	$64,798	$64,798
704836	Polymer Additive Manufacturing Consortium	$0	$983,390	$983,390
704837	Augmented Reality Advanced Inspection	$0	$106,506	$106,506
704838	Firmware Encryption and Obfuscation	$0	$245,014	$245,014
704839	Next Generation Microfluidics	$0	$291,467	$291,467
704840	Magnetic Sensor Array and Video Camera	$0	$401,158	$401,158
704841	Development of Electromagnetic Compatibility Analysis	$0	$156,120	$156,120
704842	Direct Write Electronics	$0	$685,396	$685,396
704843	Ceramic Additive Manufacturing Materials Characterization	$0	$155,043	$155,043
704844	De-embedded Measurement Traceability	$0	$93,713	$93,713
704847	Film Adhesion with Nanoindentation	$0	$36,628	$36,628
704848	Wafer Level Fan Out Development	$0	$118,491	$118,491
704849	Rowhammer Investigation	$0	$16,868	$16,868
704850	Cognitive Radio for Mobile	$0	$198,666	$198,666
704851	High-Voltage Gallium Nitride Switch - Firing Set	$0	$133,873	$133,873
704852	Integrated Circuit Reverse Engineering	$0	$401,777	$401,777

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704853	Diamond Like Carbon and Kynar Coatings on Polymers	$0	$42,959	$42,959
704854	Room Temperature Vulcanizing Rubber Mix-Meter Dispense System	$0	$118,992	$118,992
704855	Thermoset Additive Manufacture	$0	$144,356	$144,356
704856	Glass-Ceramic Processing Science	$0	$102,893	$102,893
704857	Deep Hole Drilling with Twist	$0	$47,244	$47,244
704858	Hybrid Additive Manufacturing	$0	$21,290	$21,290
704859	High Precision Profile Measure	$0	$147,791	$147,791
704860	Selective Vapor Deposition	$0	$51,445	$51,445
704861	Distortion Prediction for Additive Manufacturing-Direct Metal Laser Sintering	$0	$96,261	$96,261
704862	Physics Model of Diamond Like Carbon Deposition	$0	$25,579	$25,579
704863	Nonlinear Environmental-Test Substructure	$0	$109,433	$109,433
704864	Globalstar Decoder using radio	$0	$72,272	$72,272
704865	Sonic Fatigue Chamber - This project will investigate Sonic Fatigue chamber testing to determine if the testing method can meet high frequency Random Vibration requirements of four kilohertz.	$0	$37,437	$37,437
704866	High Resolution Gamma Imaging	$0	$30,595	$30,595
704867	Polar Measurements for Aging Dielectric Materials	$0	$1,106	$1,106
704868	Universal Low Carbon (304L) Material project is to determine if a more restrictive chemistry and phase requirement set is possible. This includes investigation into the melting, rolling, and subsequent heat treatments to determine what changes, if any, will produce an acceptable resulting material.	$0	$18,857	$18,857
704880	Transport Phenomena for Gas Transfer Systems	$0	$5,038	$5,038
704881	Real-Time Tracking in Augmented Reality	$0	$8,573	$8,573
704885	Metallurgical and Mechanical Properties of Additively Manufactured Steel	$0	$19,195	$19,195
704928	Senior Design- small scope activities that are sent to University partners to be used for Senior Design or 'Capstone' projects.	$0	$100	$100
Total # of Projects for KCP: 183	**Total Equipment Cost for KCP: $0**	**Total Other Cost for KCP: $24,209,003**	**Total Cost for KCP: $24,209,003**	
LANL - Los Alamos National Lab				
LANL-20130785PRD2	Efficient Carbon Nanotube Growth on Graphene-Metal Surfaces	$0	$61,942	$61,942
LANL-20140000PRD4	Bayesian Information Gap Decision Analysis	$0	$237	$237
LANL-20140015DR	Probing New Sources of Time-Reversal Violation with Neutron Electric Dipole Moment	$0	$1,104,118	$1,104,118
LANL-20140568DR	Research Enabling a Next Generation Neutron Lifetime Measurement	$0	$306,727	$306,727
LANL-20140616ER	Photocathodes in Extremes: Understanding and Mitigating High Gradient Effects on Semiconductor Cathodes in X-Ray Free Electron Laser	$0	$86,924	$86,924
LANL-20140643ER	In situ X-ray Imaging and Diffraction to Understand the Mechanics of Initiation Mechanisms in Explosive Single Crystals	$0	$112,152	$112,152
LANL-20140645ER	Enabling Mesoscale Science: Nonlocal Dislocation-Flux Crystal Plasticity under Shock Loading Conditions	$0	$61,140	$61,140
LANL-20140665PRD2	Investigating Properties of Quark-Gluon Plasma using Jets and Heavy Quark Production at the Relativistic Heavy Ion Collider	$0	$74,346	$74,346
LANL-20140666PRD2	Bottom-up Chemical Synthesis of Large, Well-Defined, and Organo-Processable Nanographene-based Triarylamine for Optoelectronic Applications	$0	$80,281	$80,281
LANL-20140668PRD2	Quantum Control of Tailor-designed Photoactive Energetic Materials	$0	$93,582	$93,582
LANL-20140670PRD2	Petabyte-Scale Computational Analyses of Genomic Data to Elucidate Aging Mechanisms	$0	$173,277	$173,277
LANL-20140672PRD2	Access to Industrially Important Optically Active beta-X-alcohols via Direct Enantioselective Ester Hydrogenation	$0	$82,058	$82,058
LANL-20140685PRD4	Linking Scaling and Mortality Theory to Understand Climate Impacts on Vegetation	$0	$97,231	$97,231

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LANL-20150030ER	Global Tree Mortality Prediction Based on Hydraulic Function Failure	$0	$331,309	$331,309
LANL-20150033DR	SHIELDS: Space Hazards Induced near Earth by Large Dynamic Storms - Understanding, Modeling, Predicting	$0	$1,520,832	$1,520,832
LANL-20150044DR	First Measurement of a Nanosecond-Pulsed Neutron Diagnosed Subcritical Assembly	$0	$800,513	$800,513
LANL-20150050DR	Chemical Signatures of Detonation Born From Extreme Conditions	$0	$1,421,922	$1,421,922
LANL-20150057DR	Aging in Delta Plutonium Alloys: A Fundamental Approach	$0	$1,303,917	$1,303,917
LANL-20150058DR	Multi-Scale Kinetics of Self-Regulating Nuclear Reactors	$0	$1,570,448	$1,570,448
LANL-20150080ER	Fighting Back Against Pathogens: Discovery and Validation of Novel Drug Targets	$0	$339,512	$339,512
LANL-20150082DR	A New Approach to Mesoscale Functionality: Emergent Tunable Superlattices	$0	$1,465,123	$1,465,123
LANL-20150088DR	Next-Generation Double Beta Decay Experiment	$0	$1,125,590	$1,125,590
LANL-20150090DR	Integrated Biosurveillance	$0	$1,559,591	$1,559,591
LANL-20150098DR	Scalable Codesign Performance Prediction for Computational Physics	$0	$1,491,563	$1,491,563
LANL-20150109DR	Meso-Photonic Materials for Tailored Light-Matter Interactions	$0	$1,546,331	$1,546,331
LANL-20150127ER	Mapping Relativistic Electron Precipitation: Where and When?	$0	$331,425	$331,425
LANL-20150215DR	Cyberphysical Systems and Security	$0	$831,737	$831,737
LANL-20150226ER	Enhanced Photosynthesis through Carbon Concentrating Mechanisms	$0	$338,540	$338,540
LANL-20150236ER	Exploiting Cross-sensitivity by Bayesian Decoding of Mixed Potential Sensor Arrays	$0	$339,728	$339,728
LANL-20150242ER	Ocean Acidification Over the Last 13,000 Years	$0	$308,942	$308,942
LANL-20150300ER	Ultra-sensitive Parallel Micro-imaging with Atomic Magnetometer	$0	$344,984	$344,984
LANL-20150322ER	Development of pH Responsive Protein Switches to Regulate Energy Capture and Conversion Processes in Photosynthesis	$0	$330,243	$330,243
LANL-20150394DR	Cold Cathodes for Next Generation Electron Accelerators: Methodologies for Radically Improving Performance and Robustness	$0	$1,638,810	$1,638,810
LANL-20150397DR	Critical Watersheds: Climate Change, Tipping Points, and Water Security Impacts	$0	$861,861	$861,861
LANL-20150414ER	Mesh Refinement for Three-Dimensional Unstructured Grids	$0	$328,206	$328,206
LANL-20150431ER	Sub-Grid Meso-Scale Model for Twinning and Slip Processes	$0	$337,687	$337,687
LANL-20150437ER	Superconducting Nuclear Recoil Sensor for Directional Dark Matter Detection	$0	$330,213	$330,213
LANL-20150454ER	Methane Coupling Chemistry Promoted by Catalysts Containing Inexpensive Metals	$0	$328,626	$328,626
LANL-20150467ER	Globally Optimal Sparse Representations	$0	$331,746	$331,746
LANL-20150476ER	Neutrinos and Fundamental Symmetries in Nuclei	$0	$310,454	$310,454
LANL-20150485ER	Enabling Automatic Parallelism and Transparent Fault Tolerance	$0	$323,497	$323,497
LANL-20150498ER	Inserting Nonlinear Material Coupling Probability Density Function Information into Turbulent Mixing Models	$0	$302,559	$302,559
LANL-20150504ER	Higher Order Spin Noise Spectroscopy: from Foundation of Quantum Mechanics to Applications.	$0	$332,088	$332,088
LANL-20150508ER	Assessing the Quantum Physics Impacts on Future X-ray Free-electron lasers	$0	$335,986	$335,986
LANL-20150520ER	Transport Properties of Magnetized High-Energy Density Plasmas	$0	$303,586	$303,586
LANL-20150532ER	Three-Dimensional Porous Nanographene for Highly Efficient Energy Storage	$0	$307,035	$307,035
LANL-20150557ER	Long-time Dynamics using Trajectory Splicing	$0	$331,903	$331,903
LANL-20150567ER	Controlled Helium Release from Composite Plasma Facing Materials through Interface Design	$0	$348,039	$348,039
LANL-20150568ER	Magnetic Rayleigh-Taylor Instability	$0	$331,221	$331,221

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LANL-20150575ER	Fundamental Actinium Science In Search of Radiotherapeutics	$0	$347,632	$347,632
LANL-20150577ER	Enhancing the Long-Baseline Neutrino Experiment Oscillation Sensitivities with Neutron Measurements	$0	$260,769	$260,769
LANL-20150594ER	Spatial and Extreme Value Processes for Bridging Micro- and Macro-Scales in Materials	$0	$329,215	$329,215
LANL-20150604ER	Precision 'Bottom-Up' Fabrication of Non-classical Photon Sources	$0	$338,860	$338,860
LANL-20150612ER	Perovskite Solar Cells: The Next Frontier in Energy Harvesting	$0	$371,366	$371,366
LANL-20150613ER	Defect-Induced Emergent Magnetism in (Nonmagnetic) Complex Oxides and their Interfaces	$0	$341,134	$341,134
LANL-20150623ER	Energetic Materials Crystal Engineering: Toward Superior Munitions	$0	$337,446	$337,446
LANL-20150628ER	Majorana Fermions for Quantum Information	$0	$338,531	$338,531
LANL-20150646DR	Nuclear Science for Signatures, Energy, Security, Environment	$0	$1,090,817	$1,090,817
LANL-20150647DR	Signature Development in LANL's Earth and Space Sciences	$0	$1,550,952	$1,550,952
LANL-20150656ECR	Electron Transport in Warm and Hot Dense Matter	$0	$100,109	$100,109
LANL-20150659ECR	Controlling the Electronic Structure of Emerging Atomically Thin Materials Through Heterostructuring	$0	$60,644	$60,644
LANL-20150664ECR	Trojan Horse Drug Development Approach: Targeting Gene Dosage Control to Induce Bacterial Suicide	$0	$92,541	$92,541
LANL-20150673ECR	Hand-held Laser-Ultrasound Two-Dimensional Scanner	$0	$90,452	$90,452
LANL-20150683ECR	A Step toward Nuclear Reaction Studies for Applications at the Facility for Rare Isotope Beams	$0	$102,703	$102,703
LANL-20150690ECR	Optimization of Compton Source Performance through Electron Beam Shaping	$0	$138,333	$138,333
LANL-20150693ECR	Toward a Coupled Multi-physics Modeling Framework for Induced Seismicity	$0	$160,221	$160,221
LANL-20150696ECR	A Novel Crystal Plasticity Model that Explicitly Accounts for Energy Storage and Dissipation at Material Interfaces	$0	$58,769	$58,769
LANL-20150701PRD1	Ultra-Sensitive Micro-Magnetic Imaging Endoscope	$0	$66,093	$66,093
LANL-20150702PRD1	Uniaxial Pressure to Elucidate Complex Electronic States in Actinides	$0	$130,892	$130,892
LANL-20150705PRD2	Development of Radiation Detector Simulation Framework and Safeguards Instrumentation	$0	$37,246	$37,246
LANL-20150707PRD2	Dynamic Strength and Phase Transition Kinetics in Geophysical Materials	$0	$193,738	$193,738
LANL-20150708PRD2	Low-cost High-resolution Sensing and Health Monitoring of Urban Infrastructure	$0	$116,385	$116,385
LANL-20150709PRD2	In-situ, Three-Dimensional Characterization of Solidification in Metals	$0	$53,093	$53,093
LANL-20150710PRD2	New Physics in New Materials	$0	$95,166	$95,166
LANL-20150711PRD2	Remediation Process Simulation-Optimization Under Complex Uncertainties	$0	$45,888	$45,888
LANL-20150712PRD2	Neutron Star Mergers Revisited	$0	$141,133	$141,133
LANL-20150713PRD2	Dendritic microstructure selection in cast metallic alloys	$0	$89,387	$89,387
LANL-20150717PRD2	Studying nuclear astrophysics and inertial fusion with gamma-rays	$0	$172,262	$172,262
LANL-20150741PRD3	A Kinetic Theory Based Study of Type II Core-Collapse Supernovae	$0	$129,687	$129,687
LANL-20150742PRD3	Additively Manufactured High Explosive Materials with Controlled Mesostructure for Tuned Detonation Performance.	$0	$116,067	$116,067
LANL-20150743PRD3	Catalytic Generation of Gas Using Formic and Oxalic Acids for Pressure/Volume Work	$0	$106,012	$106,012
LANL-20150744PRD3	Climate Correlates of Tree Mortality	$0	$112,252	$112,252
LANL-20150750ER	Materials Dynamics via Large-Scale Molecular Dynamics and Embedded Scale-Bridging Simulations	$0	$79,037	$79,037
LANL-20150751ER	Extreme-Scale Kinetic Plasma Modeling of Turbulence and Mix Using Vector Particle-In-Cell	$0	$138,147	$138,147
LANL-20150752ER	Deep Sparse Columnar Neural Network	$0	$188,539	$188,539

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LANL-20150755ER	Advancing Regenerative Medicine with Trinity: Defining a New State-of-the-Art for Biomolecular Simulation	$0	$133,574	$133,574
LANL-20150758PRD3	Ab Initio Modeling of Organometal Halide Perovskites for Photovoltaic Applications	$0	$121,847	$121,847
LANL-20150759PRD3	Novel Routes to Emergent Functionality in Multiferroics	$0	$123,044	$123,044
LANL-20150760PRD4	Macroporous/Nanoporous Hierarchical Carbon Structure (MNHCS) for High-Performance Energy Storage Devices	$0	$145,338	$145,338
LANL-20150762PRD4	Investigating Complex Superconducting Phases via Field-Rotating Transport and Thermodynamic Measurements	$0	$138,516	$138,516
LANL-20150763PRD4	Characterizing Irregular Flows and Mass Transport in Microscopic Pore Spaces	$0	$148,270	$148,270
LANL-20150764PRD4	Record-Low Lasing Thresholds Using Colloidal Type-II Quantum Wells	$0	$73,926	$73,926
LANL-20160007DR	Cosmic Positrons from Pulsar Winds and Dark Matter	$0	$1,572,877	$1,572,877
LANL-20160011DR	Using Extinct Radionuclides for Radiochemical Diagnostics	$0	$1,583,401	$1,583,401
LANL-20160013DR	10 Gigahertz Bandwidth Synthetic Aperture Radar Technology Development for Satellite Deployment	$0	$1,582,012	$1,582,012
LANL-20160037DR	Dark Matter Search with a Neutrino Experiment	$0	$1,639,085	$1,639,085
LANL-20160044DR	Foldamers: Design of Monodisperse Macro-Molecular Structure by Selection of Synthetic Heteropolymer Sequence	$0	$1,651,572	$1,651,572
LANL-20160054DR	Countering Pathogen Interference with Human Defenses	$0	$1,649,224	$1,649,224
LANL-20160069DR	Hybrid Quantum-Classical Computing	$0	$1,302,173	$1,302,173
LANL-20160081ER	Search for Low Mass Dark Photons in High Energy Proton Nucleus (p+A) Collisions at Fermi lab	$0	$344,245	$344,245
LANL-20160085DR	Topology and Strong Correlations: A New Paradigm	$0	$1,458,774	$1,458,774
LANL-20160095ER	Development of a Continuous Flow Reactor for the Conversion of Biomass Hydrolysates to Fuels and Feedstocks	$0	$279,102	$279,102
LANL-20160103DR	Additive Manufacturing of Mesoscale Energetic Materials: Tailoring Explosive Response through Controlled Three-Dimensional Microstructure.	$0	$1,657,741	$1,657,741
LANL-20160144ER	Probing Critical Behavior in Hydraulic Injection Reservoirs and Active Seismic Regions	$0	$296,934	$296,934
LANL-20160156ER	Predicting High Temperature Dislocation Physics in Hexagonal Close Packed Crystal Structures	$0	$316,926	$316,926
LANL-20160172ER	Quantum Optics of Solitary Covalent Dopants in Carbon Nanotubes	$0	$341,951	$341,951
LANL-20160173ER	The Cosmogenic Origins of Iron-60	$0	$322,919	$322,919
LANL-20160180ER	Transient Thermal Conduction in Nonlinear Molecular Junctions	$0	$318,005	$318,005
LANL-20160183ER	Shining Light on the Dense Gluon Structure of Large Nuclei	$0	$310,615	$310,615
LANL-20160189ER	Efficient Exploration of High-Dimensional Model Structural Uncertainties	$0	$293,532	$293,532
LANL-20160220ER	Rigorous Development of Atomic Potential Functions in Terms of Strain Functionals	$0	$324,853	$324,853
LANL-20160231ER	Radio Frequency Scintillation Prediction Driven by Direct Measurement of Ionospheric Spatial Irregularities	$0	$191,422	$191,422
LANL-20160255ER	Investigations of the Magnetic Characteristics of Iron-Only Clusters	$0	$184,685	$184,685
LANL-20160261ER	Molecular Actinide Nitrides	$0	$221,429	$221,429
LANL-20160284ER	Stimuli-Responsive Coordination Polymersomes	$0	$307,555	$307,555
LANL-20160317ER	Global Optimization Methods for Structural Bioinformatics	$0	$315,170	$315,170
LANL-20160320ER	High Efficiency, Low-cost Perovskite Solar Cell Modules	$0	$315,572	$315,572
LANL-20160331ER	Black Carbon Interactions with Radiation, Water & Ice: Laboratory Studies to Calibrate Arctic Climate Models	$0	$323,323	$323,323

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LANL-20160340ER	Using Therapeutic Bacteria to Treat Human Diseases	$0	$292,138	$292,138
LANL-20160357ER	Near-unity, Stable, Scalable Down-conversion of High-power Light Sources	$0	$319,139	$319,139
LANL-20160361ER	A Rigorous Multiscale Method to Couple Kinetic and Fluid Models	$0	$339,513	$339,513
LANL-20160369ER	Nonequilibrium Dynamics and Controlled Transport in Skyrmion Lattices in Nanostructures	$0	$353,211	$353,211
LANL-20160373ER	Tracking Microbial Effects on Water-Uptake and Productivity of Plants	$0	$300,307	$300,307
LANL-20160393ER	Expediting the Genetic Engineering of Microalgae for Industrial Production	$0	$349,426	$349,426
LANL-20160439ER	Selective Extraction of Medically-Relevant Radionuclides from Proton-Irradiated Thorium Targets	$0	$320,885	$320,885
LANL-20160440ER	Time-of-Flight Ion Mass Spectrometer Subsystem for Space and Planetary Missions	$0	$240,455	$240,455
LANL-20160448ER	A Multiscale, Non-stochastic Approach to Model Collisions in Particle Systems	$0	$287,210	$287,210
LANL-20160458ER	Bridging Knowledge Gaps in Simulations of Inertial Confinement Fusion Implosions	$0	$295,179	$295,179
LANL-20160459ER	Narrow Spectrum Gamma-Ray Production Through Inverse Compton Scattering with a Free-Electron Laser	$0	$292,445	$292,445
LANL-20160462ER	Range-Resolved Measurement of Atmospheric Greenhouse Gases for Treaty Verification and Climate Science	$0	$266,978	$266,978
LANL-20160472ER	Kinetic Modeling of Next-Generation High-Energy High-Intensity Laser-Ion Accelerators as an Enabling Capability	$0	$278,780	$278,780
LANL-20160501ER	Connecting Interface Structure and Functionality in Oxide Composites	$0	$307,130	$307,130
LANL-20160518ER	Novel Antennas Based on Atomic Magnetometers	$0	$260,281	$260,281
LANL-20160519ER	Controlling the Functionality of Materials through Interfacial Colloidal Gelation	$0	$310,523	$310,523
LANL-20160528ER	Emergent and Adaptive Polymers	$0	$308,095	$308,095
LANL-20160572ER	Exotic States in Uranium-based Superconductors	$0	$329,360	$329,360
LANL-20160584ER	Accumulator for Low-Energy Laser-Cooled Particles	$0	$309,852	$309,852
LANL-20160587DR	Frontiers in Quantum Science	$0	$706,574	$706,574
LANL-20160588DR	Systems Out of Equilibrium	$0	$551,239	$551,239
LANL-20160595ECR	Real-Time, Real-World Time Series Forecasting Using Internet Data	$0	$218,375	$218,375
LANL-20160599ECR	Assimilation Algorithms for Data Fusion in Large-scale Non-linear Dynamical Systems	$0	$178,665	$178,665
LANL-20160604ECR	Formation, Stability, and Chemistry of Tetravalent Actinide Nanocrystals	$0	$230,022	$230,022
LANL-20160606ECR	Discovering Biosignatures in Manganese Deposits on Mars	$0	$224,540	$224,540
LANL-20160608ECR	Next-Generation Sea Level Predictions with Novel Ice Sheet Physics	$0	$214,002	$214,002
LANL-20160616ECR	New States of Matter in Weyl Semimetals	$0	$75,510	$75,510
LANL-20160619ECR	Microstructural Characterization of Shock-Recovered Explosives for Mesoscale Model Development	$0	$207,441	$207,441
LANL-20160629ECR	Developing a Compact Portable Muon Tracker for Non-Destructive Evaluation	$0	$323,100	$323,100
LANL-20160641PRD2	Revealing the Particle Nature of Dark Matter with Cosmic Gamma Rays	$0	$164,020	$164,020
LANL-20160642PRD1	Laboratory Study of Fracturing and Hydraulic Conductivity through Heterogeneous Materials in Compressive Stress Environments	$0	$126,300	$126,300
LANL-20160643PRD2	Tensor Networks and Anyons: Novel Techniques for Novel Physics	$0	$187,211	$187,211
LANL-20160644PRD1	Quantum Entanglement at Modern Colliders	$0	$39,949	$39,949
LANL-20160645PRD1	Precision Theoretical Analysis of Reactions with Protons Polarized in a Strong Magnetic Field	$0	$148,593	$148,593
LANL-20160646PRD2	Discovering Highly Conducting Oxides by Combining High-Pressure and Thin-Film Techniques	$0	$224,741	$224,741
LANL-20160647PRD2	Coupling Kinetic to Fluid Scales in Space and Laboratory Plasmas	$0	$205,353	$205,353

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LANL-20160648PRD2	Theory of Spin and Valley Dynamics in Two-Dimensional Dirac Semiconductors	$0	$105,511	$105,511
LANL-20160650PRD2	Trace Elements in Martian Rocks and Soils as Observed by ChemCam in Gale Crater, Mars, and Preparation for LANL's Next Mars Mission	$0	$122,605	$122,605
LANL-20160651ER	Target Projects in Theoretical and Experimental Materials Science: Novel Structural Models, Materials Imaging and Informatics, and Strength/Sensing Capabilities Integrated During Manufacturing.	$0	$157,079	$157,079
LANL-20160652PRD2	Using X-Rays with Protons for a Material-Identification Capability via Proton Radiography	$0	$108,429	$108,429
LANL-20160653PRD2	Plasmonics-Transformed Quantum Emitters Through Theory-Guided Synthesis	$0	$132,755	$132,755
LANL-20160654PRD2	Climate, Hydrology and Forest Disturbances in Southern and Western Watersheds	$0	$116,205	$116,205
LANL-20160655PRD2	On the Origin of Colossal Ion Conductivity	$0	$139,073	$139,073
LANL-20160658ER	Quantifying the Value of Real-time Social Internet Data for Diverse Forecasting of Dynamic Phenomena: Feasibility study	$0	$56,884	$56,884
LANL-20160662PRD2	Development and Application of Multi-scale Models for Disease Forecasting	$0	$165,006	$165,006
LANL-20160664DR	Rapid Response to Future Threats (U)	$0	$2,132,731	$2,132,731
LANL-20160670PRD3	Physiological and Structural Acclimation to Climate Change in Forest Ecosystems	$0	$122,084	$122,084
LANL-20160671PRD3	Atom-Efficient Upgrading of Bio-Derived Isopropanol/Acetone Mixtures	$0	$148,563	$148,563
LANL-20160672PRD3	Evolution of Water and Carbon Dioxide at Mars: Implications for its Past and Future	$0	$135,511	$135,511
LANL-20160673PRD3	Strain and Dimensional Tuning of Heavy-Fermion Superconductors	$0	$84,762	$84,762
LANL-20160674PRD3	Radiation Effects and Plasma Interactions in Tungsten Based Materials	$0	$174,721	$174,721
LANL-20160675PRD3	Deoxyribonucleic Acid (DNA) mediated Photonic Superstructures for Enhanced Artificial Photosynthesis	$0	$96,968	$96,968
LANL-20160676PRD4	Regulation of Intercellular Signaling	$0	$123,643	$123,643
LANL-20160677PRD4	Building Full-scale Computational Models of Viruses	$0	$108,308	$108,308
LANL-20160678PRD4	Additive Manufacturing of Composite Lithium Containing Neutron Scintillators	$0	$158,957	$158,957
LANL-20160679PRD4	Understanding Non-Collinear Magnets: From Crystal Structure to Magnetic Function	$0	$143,309	$143,309
LANL-20160680PRD4	Chemical Vapor Growth of Hybrid-Perovskite Materials for Next-Generation Energy	$0	$146,600	$146,600
LANL-20160681PRD4	Turbulence in Supernova Progenitors	$0	$54,442	$54,442
LANL-20170001DR	Hybrid Photonic-Plasmonic Materials: Toward Ultimate Control Over the Generation and Fate of Photons	$0	$1,626,387	$1,626,387
LANL-20170004DR	Critical Stress in Earth Crust	$0	$1,630,205	$1,630,205
LANL-20170006DR	New Science and Technology for a Tabletop Accelerator.	$0	$1,741,814	$1,741,814
LANL-20170026ER	Point of Care Enabling Technologies: Magnetically Coupled Valves & Pumps	$0	$355,581	$355,581
LANL-20170029DR	Real-time Adaptive Acceleration of Dynamic Experimental Science	$0	$1,579,412	$1,579,412
LANL-20170033DR	Material Processing to Performance: A Path to Physically-Based Predictive Capability	$0	$1,561,362	$1,561,362
LANL-20170046DR	Flow Cells for Scalable Energy Conversion and Storage	$0	$1,623,395	$1,623,395
LANL-20170047DR	Impacts of Extreme Space Weather Events on Power Grid Infrastructure: Physics-Based Modelling of Geomagnetically-Induced Currents–During Carrington-Class Geomagnetic Storms	$0	$1,681,692	$1,681,692
LANL-20170048DR	Fieldable Chemical Threat Mapping by Multi-Modal Low Magnetic Field Nuclear Magnetic Resonance Signatures	$0	$1,660,731	$1,660,731
LANL-20170051DR	High-Order Hydrodynamic Algorithms for Exascale Computing	$0	$1,580,615	$1,580,615
LANL-20170055DR	Agile Spectral Reconnaissance from CubeSats	$0	$941,292	$941,292
LANL-20170070DR	Shocked Chemical Dynamics in High Explosives	$0	$1,644,236	$1,644,236

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Project ID	Project Name	Equipment	Other	FY Total
LANL-20170073DR	Probing Quark-Gluon Plasma with Bottom Quark Jets at sPHENIX	$0	$1,688,015	$1,688,015
LANL-20170082DR	Understanding Ejecta, Transport, Break-up and Conversion Processes	$0	$1,492,389	$1,492,389
LANL-20170103DR	Advancing Predictive Capability for Brittle Failure Using Dynamic Graphs	$0	$1,834,148	$1,834,148
LANL-20170109ER	Walking the Road from Impacts to Seismic Sources for Celestial Bodies	$0	$322,167	$322,167
LANL-20170121ER	Interfacial Structure Transfer for Direct Band Gap Wurtzite Group-IV Semiconductors	$0	$302,944	$302,944
LANL-20170127ER	Asynchronous Navier-Stokes Solver on Three-Dimensional Unstructured Grids for the Exascale Era	$0	$279,944	$279,944
LANL-20170141ER	Three-Dimensional Nuclear Quadrupole Resonance Imaging	$0	$340,766	$340,766
LANL-20170143ER	Depleted Uranium Oxides Photodiode	$0	$360,690	$360,690
LANL-20170147ER	Designing Emergent Behavior in the Collective Dynamics of Interacting Nano-Magnets	$0	$321,808	$321,808
LANL-20170155ER	Three-Dimensional Structure from Drone and Stereo Video	$0	$297,310	$297,310
LANL-20170156ER	Mapping Cotranscriptional Assembly of the 30S Ribosomal Subunit to Illuminate Mechanisms of Antibiotic Interference	$0	$336,104	$336,104
LANL-20170179ER	High Energy Lightning: Understanding Relations Between Energetic Particles and Lightning Discharges in Thunderclouds	$0	$339,693	$339,693
LANL-20170183ER	Next Generation Image Processing and Analysis Algorithms for Persistent Sky Surveillance	$0	$322,401	$322,401
LANL-20170198ER	Development of Computational Methods for Large-Scale Simulations of Heavy Elements in Solution Environments	$0	$267,410	$267,410
LANL-20170199ER	Laser Radiochronometry	$0	$334,682	$334,682
LANL-20170201ER	A Polyhedral Outer-Approximation, Dynamic-Discretization Solver for Mixed-Integer Semi-Definite Programming	$0	$314,962	$314,962
LANL-20170203ER	A Novel Ultrasound Tomography Technique for High-Resolution Imaging	$0	$319,794	$319,794
LANL-20170204ER	Continuous in-situ Tuning and Nuclear Magnetic Resonance-Spectroscopy of Correlated Matter	$0	$356,638	$356,638
LANL-20170207ER	Breaking the "Curse of Dimensionality" for Boltzmann-like Systems	$0	$381,717	$381,717
LANL-20170211ER	Dynamics of Nonequilibrium Phase Transitions and Universality	$0	$317,006	$317,006
LANL-20170218ER	Strontium Bose-Einstein Condensate Atom Interferometer with Matter Wave Circuits	$0	$444,215	$444,215
LANL-20170221ER	Exploiting Quantum Interference to Control Ultracold Molecular Collisions	$0	$318,346	$318,346
LANL-20170236ER	Harnessing Dark Excitons in Carbon Nanotubes through Covalent Doping Chemistry	$0	$363,137	$363,137
LANL-20170249ER	Sensitive Optical Super-resolution Neuroimaging	$0	$417,487	$417,487
LANL-20170256ER	Measuring Messenger Ribonucleic Acid and Protein Content from Single Cells: Single Molecule Fluorescence In-Situ Hybridization on a Chip	$0	$334,591	$334,591
LANL-20170279ER	"Zero-Threshold Gain" and Continuous-Wave Lasing Using Charged Quantum Dots	$0	$382,699	$382,699
LANL-20170288ER	Fluctuating Domains in Antiferromagnets for Sensing and Switching Applications	$0	$330,689	$330,689
LANL-20170290ER	Lepton Number Violation: Connecting the Teraelectron Volt Scale to Nuclei	$0	$333,911	$333,911
LANL-20170317ER	Exploring the Multi-scale Physics that Regulates Black Hole Accretion	$0	$232,168	$232,168
LANL-20170328ER	Hetero-Interfaces of Novel Two-Dimensional Dirac Semiconductors	$0	$341,071	$341,071
LANL-20170357ER	Meta-surface Enabled Passive Radiative Cooling	$0	$315,161	$315,161
LANL-20170367ER	Realization of a Laboratory Turbulent Magnetic Dynamo: A Gateway to New Laboratory Astrophysics and Inertial Confinement Fusion -Experiments	$0	$384,759	$384,759
LANL-20170393ER	Chemical Approaches to Stable, Narrow-Bandgap Perovskite Materials	$0	$329,010	$329,010
LANL-20170402ER	Inspecting America's Aging Infrastructure with Muon Radiography	$0	$249,787	$249,787

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Project ID	Project Name	Equipment	Other	FY Total
LANL-20170414ER	Life on the Edge: Microbes in Rock Varnish	$0	$319,908	$319,908
LANL-20170423ER	Probing Ionosphere and Magnetosphere Connections with an Electron Gun	$0	$346,559	$346,559
LANL-20170430ER	Quantum Effects on Cosmological Observables: Probing Physics Beyond the Standard Model	$0	$320,621	$320,621
LANL-20170435ER	Quantum-Dot-Based Infrared Photodetectors with Picosecond Temporal Resolution Operating at Room Temperature	$0	$404,402	$404,402
LANL-20170438ER	Elpasolite Planetary Ice and Composition Spectrometer (EPICS): A Low-Resource Combined Gamma-Ray and Neutron Spectrometer for Planetary Science	$0	$319,182	$319,182
LANL-20170450ER	Quantum Molecular Dynamics of Strongly Correlated Materials	$0	$305,516	$305,516
LANL-20170457ER	Beat-Wave Magnetization of a Dense Plasma	$0	$351,036	$351,036
LANL-20170460ER	Computational algorithms for modeling non-adiabatic dynamics in molecular systems	$0	$343,709	$343,709
LANL-20170490ER	Enabling Electron Excitations in the Modeling of Warm Dense Matter	$0	$291,475	$291,475
LANL-20170508DR	Optimization and Physics Inspired Machine Learning Approaches	$0	$509,467	$509,467
LANL-20170509DR	Multiscale Modeling of Biological Systems	$0	$520,229	$520,229
LANL-20170521ER	Demonstration of Electron Beam Generation with a Novel Solid-State Amplifier Driven Accelerator for Space Deployment Applications	$0	$400,461	$400,461
LANL-20170522ER	Sensing Applications of Perovskites	$0	$115,190	$115,190
LANL-20170527ECR	Next Generation Radiation Hydrodynamics for Astrophysics	$0	$136,883	$136,883
LANL-20170529ER	Aromatic Actinide Metallacycles	$0	$226,013	$226,013
LANL-20170531ER	Pellet Cracking during Fabrication of Plutonium-238 Oxide Fuel	$0	$165,105	$165,105
LANL-20170533ECR	Boosting Algae Biomass for Biofuels with Plant Substrate Utilization	$0	$151,225	$151,225
LANL-20170537ECR	Deep Learning for Multispectral and Hyperspectral Target Detection in Remote Sensing Data	$0	$172,857	$172,857
LANL-20170538ER	Ignis: A Cognitive Radio Frequency Sensing Low-Probability-of-Detection-and-Interception Modem	$0	$84,832	$84,832
LANL-20170541ECR	High Resolution Laser Velocimetry and Ranging for Materials Research	$0	$161,196	$161,196
LANL-20170549ECR	Convolutional Compressive Sensing for Scientific Imaging	$0	$167,815	$167,815
LANL-20170558ER	Direct Electrolytic Reduction of Plutonium Oxide Surrogates	$0	$306,744	$306,744
LANL-20170565ER	Active Microwave Beam Steering Using A Metasurface Approach	$0	$146,985	$146,985
LANL-20170568ER	Remote Raman and Laser-Induced Breakdown Spectroscopy Analysis of Geologic Samples Under Venus Surface Conditions	$0	$333,963	$333,963
LANL-20170569ECR	Gluon Saturation Search with Large Hadron Collider Beauty Experiment	$0	$159,464	$159,464
LANL-20170573ECR	Laser-Based Mega Electron Volt X-ray Source for Double-Shell Radiography	$0	$155,477	$155,477
LANL-20170574ECR	Large-Scale Nonlinear Optimization via Cloud Computing	$0	$59,497	$59,497
LANL-20170577ER	Enhanced X-Ray Computed Tomography for Plutonium Manufacturing	$0	$217,315	$217,315
LANL-20170578ER	Additive Manufacturing of Hierarchical Multi-Phase High Entropy Alloys for Nuclear Components	$0	$155,538	$155,538
LANL-20170583ER	Coherent Radio Frequency Collection Through Computation for CubeSat Constellations	$0	$171,929	$171,929
LANL-20170587ER	Insensitive High Explosives using 3-picrylamino-triazole	$0	$261,995	$261,995
LANL-20170591ER	Laser Additive Manufacturing of Grade 92-Steel for Radiation Tolerant Nuclear Components	$0	$197,848	$197,848
LANL-20170610ECR	New Nanomaterials with Confined Oxide/Metal Interfaces for Flexible Electrodes	$0	$41,302	$41,302
LANL-20170612ER	Revolver: A Radical Inertial Confinement Fusion Ignition Design	$0	$350,007	$350,007

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LANL-20170614ER	Climate Impacts: Capturing Feedbacks and Adaptation in Coevolving Systems	$0	$372,231	$372,231
LANL-20170615ER	Microstructure Sensitive Radiation Effects	$0	$90,068	$90,068
LANL-20170616ER	Rapid Response: Using LANL's DWave Quantum Computer	$0	$259,449	$259,449
LANL-20170621ER	Linac Coherent Light Source Harmonic Seeding Experiments to Improve Temporal Coherence of X-ray Free-Electron Lasers	$0	$153,681	$153,681
LANL-20170624ER	X-ray Split and Delay for Time-Resolved Single Target Shock Compression Studies	$0	$173,601	$173,601
LANL-20170625ER	Advanced Technology Laser Triggering of High Power Linear Induction Accelerator Pulsed Power Switches	$0	$78,691	$78,691
LANL-20170628ER	Wakefield Study for Superconducting Accelerator Cavities	$0	$130,355	$130,355
LANL-20170630ER	Adaptive Feedback for Automatic Phase Space Tuning of Electron Beams in Advanced X-ray Free-Electron Lasers	$0	$49,246	$49,246
LANL-20170637ER	Advancing Mesoscale Imaging for Dynamic Experiments at Current and Future X-ray Light Sources	$0	$204,634	$204,634
LANL-20170640ER	Advances in Near-Field Diffraction Analysis	$0	$147,928	$147,928
LANL-20170641ER	In Situ Quantification and Characterization of Phase Evolution during Metal Additive Manufacturing	$0	$135,577	$135,577
LANL-20170648ER	Sensing Swarms for Environmental Threat Reconstruction	$0	$250,698	$250,698
LANL-20170659ER	Detecting Events Through Graph-Mediated Sensor Consensus	$0	$192,255	$192,255
LANL-20170660PRD1	Neuromorphic Memcomputing via Interacting Nanomagnets	$0	$120,188	$120,188
LANL-20170661PRD1	Dark Matter and the Validity of Effective Field Theories	$0	$10,577	$10,577
LANL-20170662PRD1	First Principles Approach to Factorization Violation	$0	$139,304	$139,304
LANL-20170663PRD1	Quantifying Covalency in Californium and the Other +3 Actinides	$0	$136,764	$136,764
LANL-20170664PRD1	Novel Topological Orders in Strongly-Correlated Systems	$0	$84,593	$84,593
LANL-20170665ER	Driven Quantum Matter	$0	$176,392	$176,392
LANL-20170666PRD1	Jets in Strongly Interacting Plasmas	$0	$19,150	$19,150
LANL-20170667PRD1	A Gruneisen Approach to Quantum Criticality	$0	$75,249	$75,249
LANL-20170668PRD1	Impacts of Climate and Land Use on Global River Dynamics	$0	$73,697	$73,697
LANL-20170669ER	Radio Frequency (RF) Power Generator (klystron) and Linear Accelerator (linac) Stability Study	$0	$28,475	$28,475
LANL-20170670PRD1	Toward Controlled Synthesis of Actinide Oxide Nanocrystals: A Theoretical Perspective	$0	$119,429	$119,429
LANL-20170671PRD2	Developing a Unique Technology to Control Emerging Threats of Antibiotic-resistant Pathogens	$0	$56,600	$56,600
LANL-20170673PRD2	Forecasting Failure	$0	$31,823	$31,823
LANL-20170674PRD2	Joint Mapping of Charge and Spin Degrees of Freedom in Intermediate Valence Materials	$0	$21,611	$21,611
LANL-20170675PRD2	Controlling Quantum Information by Quantum Correlations	$0	$23,418	$23,418
LANL-20170676ER	Signatures of Gene Editing for National Security Science	$0	$38,541	$38,541
LANL-20170677PRD2	Prediction of Magnetic Properties of Actinide Complexes Using Ab Initio Methods	$0	$21,633	$21,633
LANL-20170678ER	Chemistry in Molten Salt Systems under Extreme Conditions	$0	$145,237	$145,237
LANL-20170679ER	Exploring Conditions for Dislocation Transmission Across Grain Boundaries via Phase Field Dislocation Dynamics	$0	$78,950	$78,950
LANL-20170680ER	A Dedicated Database Server for f-electron Systems for Actinide Science	$0	$95,518	$95,518
LANL-20170681ER	Secure Compositional Computation	$0	$92,465	$92,465
LANL-20170682ER	Process Tree Signature Detection	$0	$84,992	$84,992
LANL-20170683ER	Automated Design of Network Security Metrics using Self-Adaptive Hyper-Heuristics	$0	$87,986	$87,986
LANL-20170684PRD3	Design of New Materials for Energy Applications	$0	$39,720	$39,720

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Project ID	Project Name	Equipment	Other	FY Total
LANL-20170685PRD3	Tandem Dehydrogenation of Formic Acid and Olefin Hydrogenation: Steps Towards a Self-Sustaining Pressure/Volume System	$0	$29,345	$29,345
LANL-20170686PRD3	Modeling of Two-Dimensional Materials and Hybrid Perovskite Optoelectronic Devices	$0	$31,962	$31,962
LANL-20170687PRD3	Measurement of Cross Sections Crucial for Constraining Stellar Nucleosynthesis	$0	$37,719	$37,719
LANL-20170688PRD3	Engineering Deoxyribonucleic Acid Protected Silver Nanoclusters via Doping and Alloying	$0	$5,511	$5,511
LANL-20170690PRD4	Epigenetic Control of Synchronized Proliferation in Harmful Algal Blooms	$0	$5,511	$5,511
LANL-20179999ER	Post-project small differences in what was accrued versus the actual costs. The project costs that posted in FY17 are reviewed to ensure that they are appropriately charged	$0	$649,196	$649,196
Total # of Projects for LANL: 299	**Total Equipment Cost for LANL: $0**	**Total Other Cost for LANL: $115,757,656**	**Total Cost for LANL: $115,757,656**	
LBNL - L. Berkeley National Lab				
LB15001	A New Concept for High Average Power Ultrafast Lasers	$0	$596,308	$596,308
LB15005	Unconstrained Functionals for Massively Parallel Scaling of Conjugate Gradient Eigensolvers	$0	$157,472	$157,472
LB15007	Fast Numerical Methods for Green's Function in Mesoscale Simulation	$0	$59,470	$59,470
LB15015	Harnessing the Soil Microbiome for Food and Fuel Security	$0	$709,645	$709,645
LB15016	The Soil Metazoan Microbiome: A Compartment of Importance to Soil Nutrient Cycling	$0	$206,387	$206,387
LB15022	Microbiome Adaptation in Response to Environmental Challenges	$0	$581,355	$581,355
LB15025	Computational Design of Smart Complex Oxides with Tunable Quantum Phases	$0	$222,766	$222,766
LB15027	Computational Nuclear Physics Code Development for Fundamental Physics/Astrophysics	$0	$187,014	$187,014
LB15031	Confronting Beyond the Standard Model Theories with New Large Hadron Collider and Astrophysical Data	$0	$253,576	$253,576
LB15037	Interfacing Chemical and Biological Catalysis for Solar to Fuel Conversion	$0	$190,681	$190,681
LB15041	Solving Problems in Materials Theory via Quantum Networks	$0	$197,214	$197,214
LB15042	Bioscience Applications of X-Ray Scattering at Advanced Light Source-Upgrade	$0	$140,372	$140,372
LB16001	Development of a Compact Laser-Driven Ion Beam Accelerator for Discovery Plasma Science	$0	$698,606	$698,606
LB16003	High Pressure Soft X-ray Spectroscopy for Chemistry and Structure of Fluids	$0	$208,363	$208,363
LB16004	Probing Spatially-Resolved Intermittent Chemical Kinetics in Confined Spaces Using X-ray Photon Correlation Spectroscopy	$0	$288,293	$288,293
LB16005	High-Dimensional Ptychographic Imaging for Studying Nanoscale Dynamics, Chemistry and Morphology	$0	$209,330	$209,330
LB16006	In Situ Multi-modal Probing of Chemical Reactions via Windowless Micro-reactors	$0	$318,761	$318,761
LB16007	Spotlighting Catalysis: In situ and Operando Characterization of Photoelectrochemical Assemblies	$0	$218,716	$218,716
LB16008	Exploring the Limits of Low-Energy, Real-Time, Streaming Data Processing with Neuromorphic Computing	$0	$288,781	$288,781
LB16009	ExaGrid: Large-Scale, Asynchronous Co-Simulation of Advanced Electric Grid Systems	$0	$207,659	$207,659
LB16010	Exploiting Physics-Based Concurrency in Time-Dependent Extreme-Scale Multiphysics Simulations	$0	$254,657	$254,657
LB16011	Design of Quantum Chemistry Simulations for Superconducting Circuits	$0	$141,883	$141,883
LB16012	Modeling the Earth's Hydrological Cycle from Watershed to Global Scales	$0	$271,084	$271,084
LB16014	Open Framework for High-Performance Streaming Analytics	$0	$200,941	$200,941

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Project ID	Project Name	Equipment	Other	FY Total
LB16015	Neuromorphic Image Analysis and Pattern Recognition	$0	$270,523	$270,523
LB16016	Urban Integrated System: A Data and Computing Platform for Urban Systems	$0	$386,416	$386,416
LB16018	Science of Scaling - The initial focus will be on using batteries as an exemplar system to develop core competencies in the area of scaling science; capabilities that will be equally applicable to other energy systems beyond batteries (e.g., fuel cells, photo-electrochemical cells). We will develop capability in three broad areas (i) process modeling development (ii) visualization to enable accurate model verification and (iii) development of new modular processing techniques. These capabilities will be developed by taking advantage of the user facilities at the Lab, including, Materials Project, Advanced Light Source, National Energy Research Scientific Computing Center, and National Center for Electron Microscopy. Our plan is to develop core competencies in the area of computation (synthesis of materials and linking process conditions to performance), in situ visualization and modular processing of next-generation devices.	$0	$182,245	$182,245
LB16019	The Grid Initiative - Data Driven Approach for Monitoring and Control of Distribution System Assets	$0	$332,838	$332,838
LB16020	Multi-Scale Modeling of Geochemical Impacts on Fracture Evolution	$0	$188,309	$188,309
LB16021	Advanced In-Situ Experiments for Understanding Induced Seismicity	$0	$246,745	$246,745
LB16022	Identifying the Source and Magnitude of Redox Related Metal Isotope Fractionation: An Essential Tool for Earth System Science	$0	$221,210	$221,210
LB16023	Characterizing the Environmental Impact of Chemical Compounds Used in Oil and Gas Development	$0	$118,899	$118,899
LB16024	Assessing Microbial Functions at Terrestrial-Aquatic Interfaces by Metagenome-Based Metabolic Flux Analysis	$0	$214,095	$214,095
LB16025	Identification, Biomanufacturing and Characterization of Cyclic DiPeptides (CDPs), A Diverse Family of Chemicals Involved in Mediating Microbial Interactions	$0	$247,840	$247,840
LB16026	Plant Growth Promoting Microbes: Signaling and Mechanisms	$0	$266,401	$266,401
LB16027	Exploring Strong Visible Light-Matter Interactions in Correlated Oxide Materials	$0	$123,903	$123,903
LB16028	Ultrafast Electron Microscopy: Femtosecond Nanodiffraction and Picosecond Imaging	$0	$292,375	$292,375
LB16029	A Stochastic Approach to Calculate Auger Recombination and Impact Excitation Rates: Application to Core-Shell Nanocrystals	$0	$118,836	$118,836
LB16032	Toward Next Generation Gamma-Ray Tracking Arrays: Development of Inverted Coaxial Segmented High Purity Germanium Detector Technology	$0	$228,586	$228,586
LB16033	Topmetal Charge Readout Plane for Neutrinoless Double Beta Decay Searches	$0	$202,022	$202,022
LB16035	Robust Synthetic Membranes for Microbial Electrocatalysis: Separating Electron-Generating Organisms from the Catalytic Reaction Environment	$0	$279,140	$279,140
LB16036	Enabling Big Science with High Throughput Methodologies	$0	$297,407	$297,407
LB16037	Enabling Technologies for Next Generation Receivers to Measure the Polarization of Cosmic Microwave Background	$0	$340,348	$340,348
LB16038	Ultrahigh Voltage and Light Collection in Liquid Xenon Dark Matter Experiments	$0	$509,087	$509,087

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Project ID	Project Name	Equipment	Other	FY Total
LB16039	Ultra High Resolution Climate Projections to Support Climate Readiness in the San Francisco Bay Area	$0	$309,140	$309,140
LB16040	Volumetric Absorption of Solar Radiation in Liquids and Gases by Tuning the Emissivity of Surfaces	$0	$511,815	$511,815
LB16041	Design of High-Energy Density Lithium-Ion Systems	$0	$441,424	$441,424
LB16042	Transportation System Science for Energy Savings highly suboptimal from both energy efficiency and quality of service perspectives for the first simulation architecture to simultaneously optimize both long-term, large-scale transportation behavioral change and short-term network and vehicle in-use change to maximize energy savings	$0	$154,993	$154,993
LB16043	Upgrade to the Relativistic Heavy Ion Collider Accelerator - We will develop a program investigating the gluonic structure of dense matter. Cold, dense matter will be probed using electron-ion collisions at a future collider, while the gluonic structure of hot, dense matter can be studied by measuring direct photons produced in heavy ion collisions at the Large Hadron Collider. The first goal of this proposal is to establish a leading role in physics at the Electron Ion Collider. This will provide a basis for continued and enhanced block funding for Nuclear Science Dvision research, and will attract external funding for Electron Ion Collider detector research and development and construction. The second goal of this project is to produce physics now, studying the structure of hot, dense matter using the A Large Ion Collider Experiment Experiment at the Large Hadron Collider.	$0	$268,605	$268,605
LB16044	Designing Efficient Energy Conversion Pathways for Synthetic Organisms	$0	$523,367	$523,367
LB16045	Predicting the Maximum Rate of Carbosylation Based on Optimal Leaf Resource Allocation	$0	$189,977	$189,977
LB16046	Simulating Excited State Energies and Dynamics with Superconducting Qubits	$0	$472,526	$472,526
LB17001	Soft X--ray Interferometry	$0	$292,194	$292,194
LB17002	Interfacial Chemical Kinetics via Pattern-Enhanced In-Situ Soft X-Ray Scattering	$0	$269,133	$269,133
LB17003	Revealing Dynamics of the Functional Connectome	$0	$639,355	$639,355
LB17004	Developing Science Based Scalable Approaches to Groundwater Banking	$0	$762,797	$762,797
LB17005	Identifying Bioactive Compounds Across the Tree of Life: from Bacteria, to Plants, to Human Organoids	$0	$450,135	$450,135
LB17006	Impact of Gut Microbiome on Genetic Susceptibility to Chemically Induced Colon Cancer	$0	$408,881	$408,881
LB17007	Biosurfactant Production by Engineering Microbial One Carbon Conversion	$0	$364,347	$364,347
LB17008	Advancing Innovation Decision Science: Mapping Theory to Technical Change in Clean Energy	$0	$355,480	$355,480
LB17009	Remote Monitoring of Soil-Plant Biome Responses to Water and Metal Stress	$0	$301,705	$301,705
LB17010	Gas-Phase Ion Chemistry of Late Actinide and Early Transactinide Elements	$0	$152,445	$152,445
LB17011	Probing Reactive Intermediates in Microenvironments	$0	$261,616	$261,616
LB17012	Developing a Scalable Simulation and Analysis Framework for Cosmic Microwave Background-S4 on Many integrated Core-Based Supercomputers	$0	$350,989	$350,989
LB17013	Enabling Extreme-Scale Many-Query Computational Physics	$0	$227,375	$227,375
LB17014	High Performance Computing for Large-Scale Mobility Modeling	$0	$231,028	$231,028
LB17015	Continuing Digital Computing Performance Scaling Post Moore's Law	$0	$301,971	$301,971
LB17016	Acceleration of Temporal Integration for Real Time - Time Dependent Density Functional Theory	$0	$305,760	$305,760
LB17017	Scaling Interactive Science for Data-Intensive Discovery	$0	$348,384	$348,384

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Project ID	Project Name	Equipment	Other	FY Total
LB17018	Deconvoluting Tissue Heterogeneity Through Single-Cell Transcriptomics	$0	$203,024	$203,024
LB17019	A Systems Biology Approach to Dissecting Regulatory and Metabolic Networks of Filamentous Fungi Involved in Carbon Cycling	$0	$349,342	$349,342
LB17020	Discovering of the Genetic Basis of a Beneficial Microbiome to Improve Crop Productivity	$0	$454,773	$454,773
LB17021	Enhanced Seawater Desalination from Materials Architectures Derived from Porous Aromatic Frameworks	$0	$170,846	$170,846
LB17022	Chemistry in Confined Spaces to Enable Desalination and Separations.	$0	$192,152	$192,152
LB17023	Advancement of a High-Impact Desalination Technology	$0	$144,743	$144,743
LB17024	Nanometer Complementary Metal Oxide Semiconductors for Custom Computing and Future Detectors	$0	$214,463	$214,463
LB17025	Dark Fiber and Distributed Acoustic Sensing : Opportunities for Critical Infrastructure and Environmental Monitoring	$0	$302,552	$302,552
LB17026	Differentiation Within Order: Designing and Probing Bio-Inspired Optical Networks for Patterning Assemblies of Nanoparticles	$0	$143,065	$143,065
LB17027	In-Operando Imaging of Molecular Order and Dynamics in Soft Nanomaterials at Relevant Length and Time Scales	$0	$187,206	$187,206
LB17028	Lattice and Carrier Dynamics in Halide Perovskites	$0	$192,983	$192,983
LB17029	Nanoscale Magnetometry, Electrometry, and Thermometry of Exotic Quantum Materials Using Nitrogen-Vacancy Defects in Diamond	$0	$116,052	$116,052
LB17030	Multimodal Imaging and Spectroscopy of Solid-Liquid Interfaces	$0	$291,202	$291,202
LB17031	Research and Development Towards an Electron-Ion Collider	$0	$420,575	$420,575
LB17032	Advancing Germanium Detector Technologies for Sciences and Security	$0	$191,732	$191,732
LB17033	Theoretical Challenges for Electron-Ion Collider Physics	$0	$222,396	$222,396
LB17034	Germanium Charge Coupled Devices	$0	$170,894	$170,894
LB17035	Optimizing Silicon Photomultipliers for Detection of 175 Nanometer Photons in Liquid Xenon	$0	$146,811	$146,811
LB17036	Femtosecond Synchronization for Small-Scale Pump-Probe Ultrafast Experiments	$0	$280,031	$280,031
LB17037	Automated Translation of Applications to Large Scale Programming Systems	$0	$87,253	$87,253
LB17038	Single-Shot Sub-Nanosecond Microscopy	$0	$233,306	$233,306
Total # of Projects for LBNL: 90	**Total Equipment Cost for LBNL: $0**	**Total Other Cost for LBNL: $25,487,402**	**Total Cost for LBNL: $25,487,402**	
LLNL - L. Livermore National Lab				
14-ERD-067	Advanced Synthesis and Characterization Techniques for Ultrahard Film Growth	$0	$244,900	$244,900
14-ERD-077	High-Temperature Plasma-Chemistry Kinetics Test Bed	$0	$34,710	$34,710
14-ERD-091	Analysis of a Metabolically Engineered Microbial Consortium for Optimal Production of Biofuels	$0	$266,710	$266,710
15-ERD-006	Microstructure Evolution During Rapid Solidification: In Situ Characterization and Mesoscale Modeling	$0	$552,250	$552,250
15-ERD-010	Dynamic Stimulation of Geologic Resources	$0	$650,630	$650,630
15-ERD-012	Melting and Solidification in Multicomponent Materials: Constraints on the Search for Habitable Planets	$0	$507,220	$507,220
15-ERD-013	Quantum Simulations for Strongly Correlated Materials with High Atomic Numbers	$0	$495,370	$495,370
15-ERD-014	Answering Fundamental Physics Questions with the Neutrino	$0	$473,970	$473,970
15-ERD-015	Precision Gamma-Ray Signatures for Long-Lived Radioactive Nuclei	$0	$389,400	$389,400
15-ERD-017	Unraveling the Burkholderia Pathogen Infection	$0	$663,770	$663,770
15-ERD-019	Accelerated Development of Multiscale Materials	$0	$943,690	$943,690

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15-ERD-020	Chemically Stable and Optically Transparent Vapor-Deposited Plastics	$0	$454,030	$454,030
15-ERD-021	Neutrino Science with a Kiloton-Scale Water Detector	$0	$308,180	$308,180
15-ERD-022	Integrated Mesoscale Approach for Predicting Ionic Conductivity in Solid Electrolytes	$0	$510,370	$510,370
15-ERD-023	New Computational Methods for Scalable Genome Variation Discovery	$0	$564,900	$564,900
15-ERD-026	X-Ray Free-Electron Laser Science for High-Energy-Density Experiments	$0	$480,010	$480,010
15-ERD-028	Acceleration of Ptychographic Microscopy Reconstruction	$0	$234,250	$234,250
15-ERD-030	Rational Design and Optimization of Additively Manufactured Carbon-Fiber-Reinforced Composites	$0	$855,500	$855,500
15-ERD-032	Algorithm for First-Principles Molecular Dynamics of Metals at Extreme Scales	$0	$334,900	$334,900
15-ERD-034	A Dense-Plasma Focus Device as a Compact Neutron Source	$0	$401,270	$401,270
15-ERD-036	Energetic Ligands for High-Power Metal Complexes	$0	$14,030	$14,030
15-ERD-037	Physics of Laser-Assisted Advanced Manufacturing Processes	$0	$652,730	$652,730
15-ERD-038	Application-Driven Research into Multiscale Modeling of Laser-Plasma Interactions	$0	$492,450	$492,450
15-ERD-039	Failure Recovery Abstractions for Large-Scale Parallel Applications	$0	$377,260	$377,260
15-ERD-041	Decomposition Methods for Power Grid Optimization	$0	$450,930	$450,930
15-ERD-042	Tracking Water through the Critical Zone to Assess Drought Vulnerability	$0	$570,280	$570,280
15-ERD-043	Manipulating Optical and Electromagnetic Properties Through Hierarchical Metamaterials	$0	$451,700	$451,700
15-ERD-046	Single-Shock Platform for Activation Studies with a Prompt Source of Fast Neutrons	$0	$550,350	$550,350
15-ERD-050	All-Source Data Fusion for Detecting and Monitoring Threats on a Global Scale	$0	$536,000	$536,000
15-ERD-051	Integrated Physics-Based Noise Modeling of Qubit Devices	$0	$486,780	$486,780
15-ERD-052	Transport and the Equation of State for Asymmetric Plasma Mixtures	$0	$482,880	$482,880
15-ERD-053	Predictive Models Based on Disjointed Feature Sets for Applications in Biomedicine and Cyber Security	$0	$462,360	$462,360
15-ERD-054	Creation and Study of Ultrahigh-Energy-Density Matter Using Nanometer-Scale Structured Targets	$0	$276,730	$276,730
15-ERD-055	Single-Shot Optical Recorder with Picosecond Resolution and Nanosecond Record Length	$0	$246,820	$246,820
15-ERD-057	Next-Generation Films for High-Performance Optoelectronics Applications	$0	$633,050	$633,050
15-ERD-058	Advanced Fusion Target-Capsule Concepts	$0	$440,210	$440,210
15-ERD-059	Coupling Monte Carlo Neutral and Fluid Plasma Models for Edge Simulation in Magnetic Fusion	$0	$347,890	$347,890
15-ERD-062	New Physics from Collisions at the Large Hadron Collider	$0	$442,600	$442,600
15-ERD-063	Liquid Condensation and Solidification Behavior of Hydrogen Isotopes in Foams	$0	$296,140	$296,140
15-ERD-065	Collisionless Shock Formation in Laser-Generated Plasma Streams	$0	$427,780	$427,780
15-ERD-066	Self-Consistent, Three-Dimensional Calculations of Electromagnetic Pulse Propagation	$0	$408,820	$408,820
15-ERD-067	Compton-Scattering X-Ray Generation from Compact X-Band Accelerators	$0	$465,210	$465,210
15-ERD-068	Increasing Capacity of Flow-Through Electrode Capacitive Desalination with Phased Charging	$0	$247,620	$247,620
15-LW-002	X-Ray Pump-and-Probe Experiments with a Free-Electron Laser	$0	$250,390	$250,390
15-LW-013	Engineering Bacterial Cell-Like Compartments as Platforms for Synthetic Biology	$0	$63,380	$63,380
15-LW-029	Validating Large Fluid-Dynamics Simulations of Complex Geometries with Three-Dimensional Printing	$0	$340,990	$340,990

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15-LW-074	Freeze-Drying Aerosols: A Facile Route to Metal Particles with Nanometer-Scale Pores	$0	$97,070	$97,070
15-SI-002	Development of a Virtual Human Heart to Predict the Pharmacology of Novel Drugs	$0	$1,748,640	$1,748,640
16-ERD-003	Accelerated Discovery of Advanced Combustion Fuels	$0	$364,990	$364,990
16-ERD-005	In-Memory Associative Indexing: An Approach to Efficient High-Performance Computing	$0	$788,730	$788,730
16-ERD-006	Building Computerized Tomography Tools for Precision Additive Manufacturing	$0	$791,580	$791,580
16-ERD-007	Characterizing Host-Pathogen Immunity Gut-Brain Interactions	$0	$1,162,210	$1,162,210
16-ERD-008	Inferring Nuclear Fireball Properties from Experimental Data	$0	$654,580	$654,580
16-ERD-010	In Situ Probes of Granular Media Under Compression	$0	$505,050	$505,050
16-ERD-011	New Quantum Simulation Capability for Ultrahigh-Temperature, High-Energy-Density Science	$0	$463,570	$463,570
16-ERD-013	Image Analysis for Dark Energy and Space Surveillance Applications	$0	$548,290	$548,290
16-ERD-014	High-Fidelity Fracture Model for Hydraulically Fractured Shale Reservoirs	$0	$502,300	$502,300
16-ERD-016	Mechanisms of Pulsed-Laser Ablation, Damage, and Failure in Various Classes of Materials	$0	$1,105,910	$1,105,910
16-ERD-018	Modeling Spatial and Temporal Coupling in High-Contrast Grating Compressors Utilizing High-Performance Computing	$0	$570,400	$570,400
16-ERD-019	Materials Informatics for Synthesis, Optimization, and Scale-Up of Advanced Materials	$0	$767,340	$767,340
16-ERD-020	Decoding the X-Ray Cipher of the Universe in the Laboratory	$0	$432,500	$432,500
16-ERD-021	Efficient, High-Power Mid-Infrared Laser for National Security and Scientific Applications	$0	$580,780	$580,780
16-ERD-022	Nucleosynthesis for Science and Security	$0	$889,480	$889,480
16-ERD-023	Computational Framework for Data Assimilation and Uncertainty Management of Large-Dimensional Dynamics Models	$0	$598,920	$598,920
16-ERD-024	Extending Laser-Driven X-Ray Sources to High-Energy-Density Science Facilities	$0	$292,290	$292,290
16-ERD-025	Topology Optimization of Multifunctional Materials	$0	$460,290	$460,290
16-ERD-026	Methods for Advanced Cyber Security - Classified Project	$0	$698,110	$698,110
16-ERD-033	Mesocrystal Architectures	$0	$536,860	$536,860
16-ERD-034	Multimodal Learning on Big Brain Data	$0	$469,050	$469,050
16-ERD-035	The Engineered Micro-Sensor Array	$0	$520,210	$520,210
16-ERD-036	Improving Simulation Workflows: A Data Analytics Approach	$0	$548,370	$548,370
16-ERD-037	Ultrafast Shock Kinetics of High-Atomic-Number Materials with High Throughput	$0	$447,880	$447,880
16-ERD-038	Active Adaptive Control of High-Energy, High-Repetition-Rate, Short-Pulse Lasers	$0	$459,940	$459,940
16-ERD-040	Controlling Detonative Phenomena with High-Explosives Material Architecture	$0	$640,970	$640,970
16-ERD-043	Deformation Mechanisms in Body-Centered Cubic Metals at High Pressures and Strain Rates	$0	$89,680	$89,680
16-ERD-045	HDRScope-The High Dynamic-Range Oscilloscope	$0	$385,670	$385,670
16-ERD-046	Simulating X-Ray Free-Electron Laser Experiments for High-Energy-Density Science	$0	$57,810	$57,810
16-ERD-047	Parallel Two-Photon Polymerization for Sub-Micrometer Additive Manufacturing	$0	$878,410	$878,410
16-ERD-049	Laser Beam Propagation Through Deep Turbulence	$0	$871,070	$871,070
16-ERD-051	Optimizing Engineered Flow-Through Electrodes for Energy Applications	$0	$608,700	$608,700
16-FS-005	Radiation Processes in Nanometer-Scale Foams	$0	$17,650	$17,650
16-FS-006	Improved Coupling of Laser Energy to Targets	$0	$58,170	$58,170
16-FS-007	Modeling Tissue Membranes	$0	$37,940	$37,940
16-FS-008	Using Short-Lived Cosmogenic Isotopes to Determine the Age of Underground Tunnels	$0	$30,970	$30,970
16-FS-012	Coating Hollow Objects with Uniform Low-Density Films	$0	$44,880	$44,880

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16-FS-013	Simultaneous Peripheral Nerve Stimulation and Gastrointestinal System Monitoring	$0	$53,870	$53,870
16-FS-015	Detonation Capability and X-Ray Signatures of Advanced Manufactured High Explosives	$0	$45,210	$45,210
16-FS-016	Radon Collection for Electric Dipole Measurements	$0	$29,720	$29,720
16-FS-023	Modeling Mutagenic Chain Reactions in Natural Ecosystems	$0	$36,960	$36,960
16-FS-026	A "Peacock" Platform for Recording Cardiac Tissue Force	$0	$59,200	$59,200
16-FS-037	Electron-Beam-Induced Deposition of Boron Films	$0	$62,290	$62,290
16-FS-041	Approaches for Calibrating Agent-Based Models to Data	$0	$8,780	$8,780
16-FS-042	A Quantitative Methodology for Measuring Cyber Risk to Critical Infrastructure	$0	$109,970	$109,970
16-LW-013	A Flue-Temperature Carbon Dioxide Separation Membrane	$0	$292,680	$292,680
16-LW-020	Prebiotic Self-Assembly Reactions in Astrophysical Icy Materials	$0	$278,150	$278,150
16-LW-022	Extreme Nonlinear Optics of Plasmas	$0	$244,400	$244,400
16-LW-030	Enhancing Nitrogen Uptake in Sustainable Biofuels with Microbes	$0	$299,460	$299,460
16-LW-041	Directed Assembly of Block Copolymers for Optical Metamaterials at Visible Wavelengths	$0	$291,580	$291,580
16-LW-053	Measurement of Uranium Decay Rates to Advance Nuclear Forensics Chronology	$0	$291,170	$291,170
16-LW-055	Biosensors for Sensitive and Cost-Effective Detection of Uranium Contamination	$0	$256,260	$256,260
16-SI-001	The New Frontier of Nuclear Science: Nuclear Reactions and Radiochemistry at the National Ignition Facility	$0	$1,698,560	$1,698,560
16-SI-002	Forensic Science of Genetically Variant Peptides	$0	$1,954,670	$1,954,670
16-SI-003	Fabrication of Functionally Graded Optical Components Using Additive Manufacturing	$0	$1,816,540	$1,816,540
16-SI-004	Enhanced Coherence for Quantum Sensing and Simulation	$0	$2,080,760	$2,080,760
17-ERD-001	Uncovering the Origins of the Solar System with Cosmochemical Forensics	$0	$541,010	$541,010
17-ERD-002	The Origins of Matter on Near-Exascale Supercomputing	$0	$248,080	$248,080
17-ERD-003	Enhanced Surface Laser-Damage Resistance of Nonlinear Crystals	$0	$581,550	$581,550
17-ERD-004	Positioning, Navigation, and Timing with High-Accuracy Astrometry	$0	$480,880	$480,880
17-ERD-005	Science of Finishing of Novel Optical Materials	$0	$699,340	$699,340
17-ERD-006	Control of Superconducting Quantum Circuits	$0	$371,940	$371,940
17-ERD-009	High-Dimensional Spectral-Sampling Techniques	$0	$348,330	$348,330
17-ERD-010	Exploring Laser-Produced Relativistic Pair Plasma Jets	$0	$378,020	$378,020
17-ERD-011	Characterizing Carbon Nucleation in Shocked Energetic Materials	$0	$342,690	$342,690
17-ERD-013	Engineering a Therapeutic Microbe for Infection-Site Delivery of Encapsulated Antimicrobial Peptides	$0	$384,010	$384,010
17-ERD-014	Kinetics of Incipient Stages of Phase Transitions	$0	$505,550	$505,550
17-ERD-015	Fiber-Optic Acoustic Sensors for Geophysical Applications	$0	$645,070	$645,070
17-ERD-016	An Alternative Rare-Event Detector	$0	$408,600	$408,600
17-ERD-017	Fullerene-Grafted Graphene as an Electrical Energy Storage Material	$0	$384,100	$384,100
17-ERD-019	Synthetic Biology and Computational Modeling for Prediction of Viral Virulence	$0	$567,100	$567,100
17-ERD-020	Understanding Plasma Divertor Detachment in Fusion Power Reactors	$0	$395,300	$395,300
17-ERD-021	Multispectral X-Ray Computed Tomography	$0	$216,330	$216,330
17-ERD-022	Probabilistic Modeling for Nuclear Fission and Heavy-Ion Collisions	$0	$385,220	$385,220
17-ERD-023	Detecting Data-Races in High-Performance Computing	$0	$407,300	$407,300
17-ERD-024	Simulation of Biased Random Walks in an Asynchronous Graph Framework	$0	$789,230	$789,230

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Project ID	Project Name	Equipment	Other	FY Total
17-ERD-025	Effects of Pressure-Induced Ionization Potential Depression on Material Properties	$0	$386,420	$386,420
17-ERD-026	Projection-Based Model Reduction with Applications in Transport and Hydrodynamics Simulation	$0	$523,530	$523,530
17-ERD-027	Effects of Magnetic Fields on Transport in Laser-Driven Nonequilibrium Plasmas	$0	$593,770	$593,770
17-ERD-029	Understanding Material Strength Variabilities and Uncertainties for Component Qualification	$0	$258,990	$258,990
17-ERD-030	Next-Generation Search for Solar Axion Dark Matter with the International Axion Observatory	$0	$146,990	$146,990
17-ERD-031	Microbial Characterization of Combat-Patient Wounds to Improve Healing	$0	$269,220	$269,220
17-ERD-032	The Design of a Solid-State Streak Detector	$0	$474,840	$474,840
17-ERD-033	Technologies for High-Energy, Short-Pulse Laser Systems Beyond the Kilowatt Barrier	$0	$1,626,640	$1,626,640
17-ERD-034	Optically Safer, Power-Scalable Laser Systems for Defense Applications	$0	$604,230	$604,230
17-ERD-035	Multiple-Rate Integrators for Differential Equations	$0	$351,240	$351,240
17-ERD-036	Learning Interactions in Complex Biological Systems	$0	$751,680	$751,680
17-ERD-037	Rapid Closed-Loop Control of Additive Manufacturing with Machine Learning	$0	$360,200	$360,200
17-ERD-038	Investigation of Ultrahigh-Pressure Phase Transitions in Metals with a Toroidal Diamond Anvil Cell	$0	$397,850	$397,850
17-ERD-039	A Short-Pulse, Laser-Driven Particle Beam Capability	$0	$590,530	$590,530
17-ERD-040	Quantum Levitation of Fuel Capsules for Inertial-Confinement Fusion	$0	$494,890	$494,890
17-ERD-041	Modeling Thermal and Quantum Magnetic Fluctuations in Correlated Materials	$0	$321,710	$321,710
17-ERD-042	In Situ Diagnostics for Accelerated Fabrication and Manufacturing of Advanced Materials	$0	$242,170	$242,170
17-ERD-043	Computational Design of Broadly Neutralizing Vaccines for Highly Mutable Pathogens	$0	$542,440	$542,440
17-ERD-045	Probabilistic Predictions and Uncertainty Estimation for Radiological and Nuclear Effects Modeling	$0	$196,610	$196,610
17-ERD-046	Design and Optimization of Compact Multi-Mission Telescopes	$0	$431,610	$431,610
17-ERD-047	Electrodeposition of Gradient-Density Metal Films from Ionic Liquids	$0	$370,840	$370,840
17-ERD-048	Film Growth Dynamics During Pulsed Sputter Deposition	$0	$537,230	$537,230
17-ERD-050	A Diamond Total-Internal-Reflection Photoconductive Switch	$0	$434,230	$434,230
17-ERD-052	Integrating Climate Simulations and Paleontology Data to Constrain California Drought Risks	$0	$561,620	$561,620
17-ERD-054	Three-Dimensional Bio-Printed Microenvironments for Studying Cancer Metastasis	$0	$510,550	$510,550
17-ERD-056	Advanced Laser Diode Packaging	$0	$179,340	$179,340
17-ERD-059	Measuring Atmospheric Gas Using Small Satellites	$0	$422,400	$422,400
17-ERD-060	Microphysics Studies of Hohlraum Dynamics	$0	$161,430	$161,430
17-ERD-061	Anthropogenic radionuclide transient tracers: Model diagnostics and timescales of the redistribution of heat and carbon by the ocean.	$0	$106,780	$106,780
17-ERD-062	Using population genomics to improve genome editing	$0	$107,050	$107,050
17-ERD-063	Advanced Adaptive Optics Algorithms for Astronomical and X-ray Applications	$0	$78,490	$78,490
17-ERD-064	Discrete Polycrystal Plasticity Simulator Mid Career Award	$0	$66,070	$66,070
17-ERD-065	Effects of Surface Defects on the Catalytic Activity of Semiconductors for Charge-Transfer Reactions in Liquids	$0	$81,520	$81,520
17-ERD-069	New Framework to Prevent Catastrophic Damage to Laser Diodes	$0	$456,650	$456,650
17-ERD-072	An Optical Interferometry Diagnostic for Hohlraum Plasma Characterization Experiments on the National Ignition Facility	$0	$269,630	$269,630
17-ERD-075	High-Pressure Thermal Conductivity of Iron	$0	$207,320	$207,320
17-ERD-076	Exploring Laser Directed-Energy Lethality and Vulnerability	$0	$362,360	$362,360

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17-ERD-079	Study of Iron K-Alpha Spectra in a Compact X-Ray Atmosphere	$0	$142,790	$142,790
17-ERD-081	Simulations of Interpenetrating Plasmas	$0	$260,030	$260,030
17-ERD-084	Measuring the Asymptotic Behavior of Self-Generated Magnetic Fields in a Hohlraum Geometry	$0	$194,510	$194,510
17-ERD-085	Metallic Helium at Extreme Density Inside Giant Planets and White Dwarf Stars	$0	$119,620	$119,620
17-ERD-086	Hybrid Drive on the National Ignition Facility	$0	$118,020	$118,020
17-ERD-088	Probing the Interface Stability of Implosions	$0	$181,460	$181,460
17-ERD-091	Numerical Simulations of Dust-Grain Collisions with Interstellar Spacecraft	$0	$41,060	$41,060
17-ERD-096	Real-Time Decision Making in Swarm Situations Using Belief Networks	$0	$253,580	$253,580
17-ERD-099	Laser Management to Minimize Absorption on Optical Surfaces of Diode-Pumped Advectively Cooled Gas Lasers	$0	$630,830	$630,830
17-ERD-101	Robust Decentralized Signal Processing and Distributed Control of Autonomous Sensor Networks	$0	$513,360	$513,360
17-ERD-105	A Compact High-Power, Radio-Frequency Directed-Energy Source	$0	$219,410	$219,410
17-ERD-109	A High-Fluence, High-Energy X-Ray Source Using Laser Plasma Instabilities	$0	$170,430	$170,430
17-ERD-110	Measuring Astrophysically Relevant Reaction Rates in a High-Energy-Density Laboratory	$0	$101,940	$101,940
17-ERD-114	Planar Ceramic Light Guides for Solar Concentrators and Laser Amplifiers	$0	$57,380	$57,380
17-ERD-115	Detection and Attribution of Climate-Driven Impacts on Crop Yields	$0	$1,350	$1,350
17-ERD-116	Three-Dimensional Fabrication by Tomographic Holographic Lithography	$0	$167,700	$167,700
17-ERD-117	A Quantitative Methodology for Measuring Cyber Risk to Critical Infrastructure	$0	$200,960	$200,960
17-ERD-118	Foams in Hohlraums	$0	$137,760	$137,760
17-ERD-119	Next-Generation Hohlraums for High Coupling Efficiency	$0	$247,200	$247,200
17-ERD-120	A Search for Intermediate-Mass Black Hole Dark Matter	$0	$130,190	$130,190
17-ERD-121	Engineered and Instrumented Three-Dimensional Tumor-Immune Model System	$0	$488,380	$488,380
17-ERD-122	ARCHER: Advanced Radiographic Capability High Energy and Resolution	$0	$102,410	$102,410
17-FS-002	Fractionation Signatures for Device Assessment	$0	$126,480	$126,480
17-FS-005	Direct Ink Writing of Bulk Metallic Glasses	$0	$90,400	$90,400
17-FS-007	Material Logic - This project will explore the feasibility of additively manufacturing microscale mechanical logic gates (the essential components of digital circuits that operate in binary logic) with applications to materials that can perform computations.	$0	$49,580	$49,580
17-FS-008	Optimizing Application Performance in Multi-Constraint Computing Environments	$0	$149,290	$149,290
17-FS-010	Large-Scale Energy Storage in the Earth	$0	$99,380	$99,380
17-FS-012	Feasibility of Low-Energy Nuclear Physics Research Using LLNL Capabilities and Soreq Applied Research Accelerator Facility -Beams	$0	$77,950	$77,950
17-FS-018	Identification and Analysis of Temperature Gradients in X-Ray Spectroscopic Data	$0	$118,160	$118,160
17-FS-021	Optical Fibers for Water Treatment	$0	$43,310	$43,310
17-FS-027	Printed Biocatalysts for Natural Gas Upgrading	$0	$138,160	$138,160
17-FS-029	Achieving the Ultimate Sensitivity for Dark Matter Detectors	$0	$150,300	$150,300
17-FS-030	Agile, Compact Monolithic Beam Director	$0	$81,890	$81,890
17-FS-031	Thermal Conductivity Measurements in Convergent Geometry	$0	$102,410	$102,410
17-FS-035	Plasmonic Control of Short Pulses in Optical Fibers	$0	$88,420	$88,420
17-FS-036	Additive Manufacturing of Nanometer-Scale Porous Metals	$0	$164,750	$164,750
17-FS-037	Exploring a New Option for Improving Detection of Highly Enriched Uranium	$0	$18,000	$18,000
17-LW-006	Nanometer-Particle Colloid Capsule Composites	$0	$312,090	$312,090

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17-LW-009	Unraveling Force Chains and Failure in Granular Materials	$0	$261,310	$261,310
17-LW-012	Discovering Phase Behavior of Materials Interfaces with Evolutionary Algorithms	$0	$304,290	$304,290
17-LW-013	Hierarchical Nanometer-Scale Porous Copper Flow-Through Electrodes for Efficient Carbon Dioxide Reduction	$0	$282,840	$282,840
17-LW-020	Modernizing the Fission Basis	$0	$292,730	$292,730
17-LW-021	Real-Time Exhaled Breath Analysis for Biosecurity and Biomedicine	$0	$297,810	$297,810
17-LW-029	Improving Subsurface Fluid Characterization by Coupling Seismic and Electromagnetic Phenomena	$0	$182,020	$182,020
17-LW-035	Development of Integrated Systems for Discovering the Chemical Properties of the Heaviest Elements	$0	$300,340	$300,340
17-LW-038	Investigating the Role of Innate Immunity in Viral Encephalitis Caused by Rift Valley Fever Virus	$0	$296,440	$296,440
17-LW-044	Event-by-Event Determination of Antineutrino Direction	$0	$297,710	$297,710
17-LW-051	Nanometer-Scale, Particle-Based Immunotherapy for Cancer Treatment	$0	$285,840	$285,840
17-LW-059	Applying Inverse Sheath Theory to Plasma Surface Interactions in Magnetic Fusion and Space Plasmas	$0	$100,180	$100,180
17-SI-001	Advanced Multilayer Systems for National Security	$0	$1,672,680	$1,672,680
17-SI-002	An Investigational Platform of the Human Brain for Understanding Complex Neural Function	$0	$1,961,800	$1,961,800
17-SI-003	Large-Scale Multimodal Deep Learning for Nuclear Nonproliferation Analysis	$0	$2,407,620	$2,407,620
17-SI-004	Variable Precision Computing	$0	$1,359,300	$1,359,300
17-SI-005	Computational Design Automation	$0	$2,058,230	$2,058,230
Total # of Projects for LLNL: 215	**Total Equipment Cost for LLNL: $0**	**Total Other Cost for LLNL: $92,629,700**	**Total Cost for LLNL: $92,629,700**	
NNSS - Nevada National Security Site				
J1701037	X-Ray Phase Contrast Imaging	$0	$330,639	$330,639
J1701045	Laser-Generated Ultra-High-Energy Density Plasma	$0	$315,162	$315,162
J1701086	Multi-Frame X-Ray imaging using Streak Camera with Patterned Photocathode	$0	$291,410	$291,410
J1701126	Ionospheric Detection of Decoupled Nuclear Detonations	$0	($10,685)	($10,685)
J1701195	Enhanced Dynamic Materials Research	$0	$391,900	$391,900
J1701656	Systematic Studies in Dynamic Material Response	$0	$235,402	$235,402
J1702016	A multi-axial time resolved spectroscopic technique	$0	$274,649	$274,649
J1702046	X-ray Doppler Velocimetry	$0	$183,777	$183,777
J1702077	Semiconductor-Based High-Yield X-Ray Photocathode	$0	$78,045	$78,045
J1703025	Quantifying Uncertainties through Advanced Theoretical Analysis	$0	($53,725)	($53,725)
J1703067	Dynamic Test Prediction and Characterization	$0	$259,511	$259,511
J1703084	Grain-Selective Multiplexed Photonic Doppler Velocimetry Experiments	$0	$0	$0
J1703086	-Advanced Algorithms for Nuclear Weapon Performance Analysis	$0	$214,853	$214,853
J1703097	Man-Portable Dense Plasma Focus	$0	$206,623	$206,623
J1703137	Gas Gun-Configured Magnetic Flux Compression	$0	$261,815	$261,815
J1703146	Surface waves in brittle materials: experiments and simulations	$0	$287	$287
J1703287	Flexible Intelligent Multi-Node Chemical/Biological/Radiological/Nuclear Environment Simulator	$0	$129,950	$129,950
J1703333	Plastic Deformation Study Using Light Gas Gun	$0	$0	$0
J1703356	Correlation between hot spots and three-dimensional defect structure	$0	$267,837	$267,837
J1703496	Next-Generation Photo-Multiplier Detectors	$0	$235,889	$235,889
J1704024	Advanced Modeling and Uncertainty Quantification for the Aerial Measurement System	$0	$0	$0
J1704027	Algorithm Development for Targeted Isotopes	$0	$202,751	$202,751
J1704047	Enhancements to Rad/Nuke Search Algorithms	$0	$174,189	$174,189
J1705016	Time-synchronized, microsecond-gated digital video to enhance optical tracking and surveillance for an unmanned aerial vehicle payload	$0	$5	$5

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J1705027	Gas-Phased Ion-Neutral Interactions of Cerium Ions with Deuterium	$0	$215,288	$215,288
J1705044	Dynamic Recompression of Damaged Materials	$0	$0	$0
J1705086	Dynamic Surface Tracking for Velocimetry Systems	$0	$286	$286
J1705087	Spectral Reconstruction Applied to Large Polyvinyl Toluene Scintillators	$0	$111,689	$111,689
J1705097	Simultaneous Raman and Pyrometric Temperature Measurements	$0	$198,356	$198,356
J1705117	Dynamic Measurement of Chemical Composition/Reaction	$0	$220,981	$220,981
J1705126	Low power, self-organizing, reporting devices	$0	$203,579	$203,579
J1705237	Large-Area photonic Doppler velocimetry	$0	$108,297	$108,297
J1705247	Transient Radio Frequency and Optical Plasma Signatures	$0	$260,030	$260,030
J1705253	Chemically Activated Quiescent Persistent Sensors	$0	($78,561)	($78,561)
J1705366	Ultra-spectral remote imaging by scanning Fabry Perot etalons	$0	$215,151	$215,151
J1705397	Drone Video Platform	$0	$520,741	$520,741
J1705556	Ultra High Speed Velocimetery using Dispersive Frequency-Modulation Interferometry	$0	$509	$509
J1705786	Red, green, and blue wavefront sensor for turbulence mitigation	$0	$272,661	$272,661
J1705896	Multichannel Cross-Band Unmanned Aerial System Radio Relay using Polyphase Signal Processing	$0	$694	$694
J1706096	Tri-Mode Radiation Detector	$0	$2,528	$2,528
J1706155	Unmanned Aircraft System for Remote Contour Mapping	$0	$629,143	$629,143
J1706186	Silicon Strip Cosmic Muon Detectors for Homeland Security	$0	$348,596	$348,596
J1706236	Thermal Microwave Kinetic Inductance Device	$0	$779	$779
J1706255	Spatial Clustering	$0	$374	$374
J1706256	Incorporation of Technetium into Fluorescent Materials	$0	($309)	($309)
J1706287	High-Performance Digital Multichannel Analyzer	$0	$242,815	$242,815
J170FS17	Feasibility Study - Catalyst Lab Project: Augmented Reality	$0	$51,431	$51,431
J170FS26	Feasibility Study - Airborne Cadmium-Zinc-Telluride Sensors	$0	$264	$264
J170FS27	Feasibility Study - Electronic wand	$0	$45,906	$45,906
J170FS36	Feasibility Study - Standards Interface for Unmanned Aerial Systems	$0	$2,343	$2,343
J170FS37	Feasibility Study - Ultra-High-Bandwidth Communications	$0	$48,105	$48,105
J170FS47	Feasibility Study - Klynac Application Study	$0	$24,124	$24,124
J170FS56	Feasibility Study - Cluster Source	$0	$635	$635
J170FS57	Feasibility Study - Unmanned Aerial System Programming for Autopilot Simulator	$0	$41,329	$41,329
J170FS67	Feasibility Study - Apollo Gamma Imager	$0	$69,667	$69,667
J170FS77	Feasibility Study - Statistical Method for Hybrid Mie/Multi-wavelength Analysis	$0	$18,537	$18,537
Total # of Projects for NNSS : 56	**Total Equipment Cost for NNSS : $0**	**Total Other Cost for NNSS : $7,766,252**	**Total Cost for NNSS : $7,766,252**	
NREL - National Renewable Energy Lab				
0600.10001.15.01.02	Cellulosic Nanocrystals: Valuable Co-Products from Biomass to Support Biofuel Production	$0	$294,634	$294,634
0600.10001.16.01.01	Using Computational Modeling to Engineer Native Enzymes to Produce Shorter Fatty Acids for Fuels	$0	$163,573	$163,573
0600.10001.16.02.01	Enabling Synthetic Ribonucleic Acid-Technologies using Thermophiles	$0	$168,835	$168,835
0600.10001.17.01.01	Glycopolymer Forge	$0	$201,085	$201,085
0600.10001.17.02.01	Biological Upgrade of Syngas	$0	$124,300	$124,300
0600.10001.17.03.01	Pilot Plant Testing of the Side-Saddle CoTreatment Concept	$0	$22,162	$22,162
0600.10002.16.01.01	Energy Systems Design Architecture	$0	$742,690	$742,690
0600.10002.17.01.01	Plasmon-Driven Photothermochemical Water Splitting with Novel Core-Shell Nanoparticles	$0	$51,817	$51,817
0600.10003.17.01.01	Geothermal Reservoir Modeling Capabilities	$0	$24,913	$24,913
0600.10004.15.01.01	Improving the Accuracy of Lidar-Based Turbulence Measurements	$0	$127,082	$127,082

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0600.10004.15.02.01	Development of Feedforward Control Strategies for Wave Energy Conversion Technologies	$0	$231,894	$231,894
0600.10004.16.01.01	Multi-Physics Engineering Tool for Wind-Plant Design and Analysis	$0	$296,043	$296,043
0600.10004.17.01.01	Uncertainty Quantification in Wind Plant Flow and Wake Loss Models	$0	$65,019	$65,019
0600.10004.17.02.01	Innovative 10 Megawatt Offshore Floating Wind System	$0	$311,991	$311,991
0600.10004.17.03.01	Manufacturing Validation of Wind Turbine Blade Spars	$0	$469,363	$469,363
0600.10004.18.43.01	Innovative Blade Finishing at the Composites Manufacturing Education and Technology-Facility: Enabling On-Site Manufacturing	$0	$247,110	$247,110
0600.10005.15.04.01	Thermochemical Production of Bio-Polymer Precursors: Selective Conversion of Pyrolysis Vapors to Chemical Intermediates	$0	$281,069	$281,069
0600.10005.16.02.01	Biochemical Production of Bio-Polymer Precursors: New Platform Chemicals for Advanced Materials from Sugars and Lignin	$0	$637,445	$637,445
0600.10005.16.03.01	Production of Butadiene from Biomass-Derived Sugars	$0	$249,553	$249,553
0600.10005.16.05.01	Small Ribonucleic Acid and Riboswitches: A New Frontier in Biofuels Strain Engineering	$0	$233,547	$233,547
0600.10005.16.06.01	Rational Control of the Catalyst Surface: Employing Surface Bound Ligands to Direct Catalyst Selectivity	$0	$253,836	$253,836
0600.10005.17.01.01	Accelerating Lignin Valorization with Cell-free Methods	$0	$113,525	$113,525
0600.10005.17.01.02	Development of a High-Throughput, Recombineering System for Use in Diverse, Industrially-Relevant Biocatalysts	$0	$110,132	$110,132
0600.10005.17.02.01	Fundamental Design of Earth-Abundant Metal-Oxide Catalysts	$0	$219,734	$219,734
0600.10005.17.02.02	Atomic Layer Etching and Atomic Layer Deposition to Design Bifunctional Lewis Acid Catalysts for Biomass Transformation	$0	$221,419	$221,419
0600.10005.17.03.01	Techno-Economic Analysis on Coupling Hydrogen Production with Biosystems for Carbon-Carbon Coupling, Fuels and Chemical Synthesis	$0	$20,117	$20,117
0600.10005.17.04.01	Polyethylene Terephthalate Conversion to High Value Polyaramids	$0	$50,388	$50,388
0600.10007.16.07.01	Small-Scale Rapid Ignition Chemistry Screening for Biomass-Derived Streams and Molecules	$0	$295,744	$295,744
0600.10007.17.01.01	Advanced Heat Transfer Techniques for Hydrogen Pre-Cooling	$0	$212,644	$212,644
0600.10007.17.01.02	Creation of an Adaptive Remaining Lifetime Prediction Model of Power Electronics	$0	$334,050	$334,050
0600.10007.17.05.00	Intersection Visibility to Enhance Safety, Mobility, and Energy	$0	$103,002	$103,002
0600.10007.17.06.01	Advanced Packaging for Power Electronic Module	$0	$52,855	$52,855
0600.10008.15.03.01	Urban Renewable Building and Neighborhood Optimization	$0	$99,089	$99,089
0600.10008.17.01.01	Advanced Power Cycle Efficiency Improvement via Desalination-Enhanced Heat Rejection	$0	$184,895	$184,895
0600.10008.17.01.02	Non-Intrusive Optics to Improve Concentrated Solar Power Performance	$0	$45,072	$45,072
0600.10008.17.02.01	An Integrated Modular Building Systems Chassis for Expanding Technology-Driven Design, Manufacturing and Living	$0	$214,923	$214,923
0600.10009.16.01.01	Halide Perovskite, Phosphorus-Nitrogen Homojunction Solar Cells: Practical Results from Fundamental Understanding	$0	$157,720	$157,720
0600.10009.16.02.01	Strategies for Long-Range Ordering and Catalyst Intercalation in Conductive Organic Frameworks	$0	$313,260	$313,260
0600.10009.16.02.02	Developing a New Class of Core-shell Quantum Dots for Luminescent Concentrators	$0	$167,240	$167,240
0600.10009.16.03.01	Hybrid Hard-Soft Materials Matrix for Novel Non-aqueous Flow Battery	$0	$322,270	$322,270
0600.10009.16.04.01	Interfacial Energetics and Structure of Strained Two-Dimensional Molybdenum Disulfide	$0	$100,171	$100,171

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0600.10009.17.01.01	Direct Write for Self-Assembled Lateral Heterojunction Perovskite Photovoltaics	$0	$258,724	$258,724
0600.10009.17.01.02	Developing Superlattices of Perovskites (Methylammonium Lead Iodide) Containing Lead Quantum Dots	$0	$123,187	$123,187
0600.10009.17.01.03	Doped Silicon Nanocrystals for Photovoltaics	$0	$83,900	$83,900
0600.10009.17.01.04	Controlling Photocatalytic Nitrogen Fixation Mechanisms via Vacancies	$0	$27,843	$27,843
0600.10009.17.02.01	Synthesis and Characterization of Well-Defined Organic Supramolecular Structures with Size-Dependent Optoelectronic Properties	$0	$61,512	$61,512
0600.10009.17.03.01	Ultrafast Manipulation of Electron Spin for Quantum Computation	$0	$224,206	$224,206
0600.10010.17.02.01	Predictive Analytics for Grid Estimation	$0	$359,760	$359,760
0600.10011.16.03.01	Distribution System Planning for Uncertain Distributed Energy Resources Futures using Adaptive Dynamic Programming	$0	$247,340	$247,340
0600.10011.16.04.01	Distributed Inverter Controllers Seeking Reliability and Economic-Optimality of Photovoltaic-Dominant Distribution System	$0	$237,089	$237,089
0600.10011.16.04.02	Smart Home Hardware-in-the-Loop	$0	$174,540	$174,540
0600.10011.17.03.01	Potential Impacts of Resource Uncertainty on Power System Operations and Planning	$0	$264,650	$264,650
0600.10011.17.03.02	Co-Simulation of Electricity and Natural Gas Networks	$0	$49,891	$49,891
0600.10011.17.04.01	Distributed Optimization and Control of Smart Multi-Energy Districts	$0	$200,673	$200,673
0600.10011.17.04.02	Modeling and Simulation of Trans-active Energy Systems	$0	$62,351	$62,351
0600.10011.17.05.01	Energy-Water Systems Integration with the Consolidated Utility Base Energy Microgrid Platform	$0	$24,793	$24,793
0600.10011.17.05.02	Gallium Nitride: Devices, Circuits, and Systems	$0	$34,719	$34,719
0600.10012.17.01.01	High-Efficiency Perovskite Photovoltaic Module by Scalable Deposition	$0	$182,772	$182,772
0600.10012.17.02.01	Hydrogen-at-Scale - The objective of this project is to build a strong multi-directorate foundation at the National Renewable Energy Laboratory to support future Hydrogen-at-Scale work, and transform what are currently individual pockets of activity into a more cohesive strategic capability for the future.	$0	$309,639	$309,639
0600.10012.17.02.02	Lifetime-Efficiency Capability Development for Multi-Scale Energy Storage	$0	$156,690	$156,690
0600.10012.17.02.03	Vapor Phase Deposition of Hybrid Halide Perovskites	$0	$161,790	$161,790
0600.10012.17.02.04	Exploring Novel Functionality from Non-Centrosymmetric Structures	$0	$3,058	$3,058
0600.10012.17.04.00	High-Throughput Experimental Materials Science Virtual Laboratory	$0	$219,484	$219,484
0600.10014.15.01.01	Excited-State Theory for Energy Materials	$0	$106,773	$106,773
0600.10014.16.03.01	More Power, Less Weight: Portable Photovoltaic Power	$0	$255,620	$255,620
0600.10014.16.05.01	Two-Dimensional Materials for Enabling Low-Cost Epitaxial Three-Dimensional Semiconductor Devices	$0	$307,061	$307,061
0600.10014.17.01.01	In Operando X-Ray Photoelectron Spectroscopy Studies of Solid-State Lithium-Ion Battery Interfaces	$0	$198,806	$198,806
0600.10014.17.01.02	Thermoelectric Module Characterization, Validation, and Standardization	$0	$57,920	$57,920
0600.10014.17.01.03	Basic Energy Science White Paper Initial Data Development	$0	$48,584	$48,584
0600.10014.17.01.04	Evaluation of Performance Degradation Mechanisms in Thermochromic Perovskite Materials	$0	$55,402	$55,402
0600.10014.17.01.05	Metal-Mediated Manipulation of Interfaces	$0	$46,719	$46,719
0600.10014.17.01.06	Nitride Quantum Materials	$0	$54,260	$54,260
0600.10014.17.04.01	Gallium Arsenide Bismides for Next Generation Electronics	$0	$124,327	$124,327
0600.10014.17.04.02	Silicon Perovskite Multijunction Solar Cells	$0	$42,893	$42,893
0600.10014.17.05.01	Comprehensive Multi-Scale Battery Characterization	$0	$153,462	$153,462
0600.10016.17.02.01	Capacity Expansion Planning for the 21st Century	$0	$347,267	$347,267
0600.10016.17.03.01	Fast Learning for Immersive Engagement in Energy Simulations	$0	$234,581	$234,581

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Project ID	Project Name	Equipment	Other	FY Total
0600.10016.17.04.01	Automating Jobs and Economic Development Impacts for Regional Energy Deployment Systems Scenarios	$0	$40,780	$40,780
0600.10016.17.04.02	Holistic Design of Electricity Markets Pathfinder	$0	$15,510	$15,510
0600.10017.17.01.01	Resilient Renewable Energy Systems	$0	$53,531	$53,531
Total # of Projects for NREL: 80	**Total Equipment Cost for NREL: $0**	**Total Other Cost for NREL: $14,148,318**		**Total Cost for NREL: $14,148,318**
ORNL - Oak Ridge National Lab				
7351	Theory of neutron scattering in strongly correlated and disordered materials	$0	$124,356	$124,356
7362	Spatially Resolving Electron Spin Dynamics and Transport in Low-Dimensional Materials: A Spin-Dependent, Real-Space, Multi-Scale, Scanning Probes Approach	$0	$99,979	$99,979
7394	Functional domains in model membranes and protocells probed with high-performance simulation and neutron scattering	$0	$115,792	$115,792
7395	Workflow Optimization and Processing of Complex Datasets for Off-site Fusion Energy Research	$0	$46,396	$46,396
7412	Predicting Climate Feedbacks from Microbial Function in Tropical Ecosystems	$0	$53,240	$53,240
7427	Predictive computational catalysis: From electrons to reactors	$0	$50,002	$50,002
7428	Increasing advanced biofuels production from terpenes in Eucalyptus leaves	$0	$88,388	$88,388
7445	Layered Ferroics by Design	$0	$109,133	$109,133
7448	An Integrated Approach to the Design and Discovery of Fast Ionic Conducting Materials	$0	$122,707	$122,707
7465	Moderator Demonstration Facility to allow the ability to test a large-volume para-hydrogen moderator in a prototypic configuration, simultaneously measuring the neutronic performance of the moderator concept central to the anticipated Second Target Station gains	$0	$81,855	$81,855
7536	Two-Dimensional Transition Metal Based Electrode Materials for Lithium-ion Batteries	$0	$59,916	$59,916
7623	Crystal Growth of Lanthanide-Halide Metal Organic Scintillators for Applications in Radiation Detection	$0	$7,545	$7,545
7637	Spectroscopy of quantum matter under extreme pressures	$0	$68,432	$68,432
7640	Dynamically Polarized Crystallography for Second Target Station	$0	$83,522	$83,522
7641	High-Resolution Small/Wide Angle Neutron Scattering for Atomic-to-Mesoscale Structure in Complex Soft Materials and Biology	$0	$90,378	$90,378
7656	Radioactive Particle Levitator to Study the Effects of Radioactivity on the Particle Charging Behavior	$0	$16,394	$16,394
7676	Linking Structure with Function at the Mesoscale in Complex Oxides Materials.	$0	$164,470	$164,470
7677	Developing Big Data Analytics for Human Settlement Characterization and Energy Demand Prediction.	$0	$176,892	$176,892
7704	Multiscale Investigation of Gas Behavior in Structural Materials in Fusion Energy Environment: A Combined Experimental and Modeling Approach	$0	$223,160	$223,160
7707	Synthetic Control of Hybrid Nanomaterials for Energy Applications	$0	$176,348	$176,348
7728	New design criteria for large area, low power radiation detection systems based on Silicon Photomultipliers	$0	$19,529	$19,529
7763	Individual diploid genome sequencing with parental haploid resolution and structural variation identification	$0	$39,827	$39,827
7771	Concurrent multiscale algorithms for local/nonlocal coupling and its adaptivity	$0	$209,476	$209,476
7783	On the Path to Exascale: Continuous-Energy Monte Carlo Particle Transport on Advanced Computing Architectures	$0	$509,947	$509,947
7784	In-situ Real-Time Measurement of Plasma Facing Component Erosion	$0	$381,996	$381,996

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Project ID	Project Name	Equipment	Other	FY Total
7786	Impact of extreme weather events on plant species, competition and ecological function	$0	$448,446	$448,446
7792	Tunable Interfaces for Controlled Complexity	$0	$335,339	$335,339
7795	Probing the Electromechanical Response Mechanism in Nanostructured Ionic Polymers: Towards Rational Design, Tailored Synthesis, and Optimized Properties	$0	$420,835	$420,835
7803	An Open Framework for Joint Optimization/Control of Networked Microgrids	$0	$597,401	$597,401
7804	Urban Typologies: Towards an Oak Ridge National Laboratory Urban Information System	$0	$496,128	$496,128
7807	A Scalable, Resilient, and Efficient Data Service for Exascale Computing	$0	$292,989	$292,989
7812	Observing hidden structure underpinning emergent functionality in mesoscale materials	$0	$340,818	$340,818
7825	Understanding Selective Hydrogenation by In situ Neutron Vibrational Spectroscopy	$0	$291,344	$291,344
7827	A modern Foundation of Rigorous Mathematics for Uncertainty quantification of Large multiscale systems At The Extreme scale	$0	$358,600	$358,600
7828	Microfluidic Separation Processes for Nuclear Materials Research and Production	$0	$416,708	$416,708
7832	Fundamental insights into the mechanism of ionic transport in ionic materials	$0	$415,391	$415,391
7833	Using a multi-omics approach to unravel the complex control mechanisms limiting oleaginous synthesis in yeast and develop a new class of large-scale production organisms	$0	$429,898	$429,898
7836	Fundamental Neutrino Interactions at the Spallation Neutron Source	$0	$433,548	$433,548
7847	Designing and Controlling Ordered Mesocale Tilings and Tessellations	$0	$443,631	$443,631
7848	Thermodynamic limits to the scalability of cold qubits based on interface constraints.	$0	$299,994	$299,994
7852	A virtual testbed for silicon donor quantum bits	$0	$399,896	$399,896
7856	An Experimental and Computational Framework for Directed Succession: Unraveling Cobamide Control of Microbial Community Assembly, Structure and Function	$0	$386,749	$386,749
7857	Real-time Urban Activity Monitoring using Pervasive Sensor Network	$0	$315,612	$315,612
7864	Mini-Apps for Data-Intensive Discovery on Big Data Architectures	$0	$387,653	$387,653
7866	Dynamic metabolic flux control for engineering complex biological systems	$0	$374,070	$374,070
7868	Elucidating the Influence of Reversible Non-Covalent Interactions on Dynamic Properties for Rational Design of Soft Materials	$0	$384,401	$384,401
7884	Simulation based testing for next generation software integrated energy systems	$0	$303,327	$303,327
7886	Advancing additive manufacturing processes through multi-scale characterization using neutron scattering techniques correlated with mesoscale polycrystal deformation simulation	$0	$477,796	$477,796
7890	Positioning and Characterization of Single Dopants	$0	$324,827	$324,827
7897	This project proposes to develop a data-structure based and data-centric programming construct, shared data-structure centric Programming paradigm for Scientific Applications, as a solution. Shared data-structure centric Programming paradigm for Scientific Applications achieves this through (1) building simple, usable, and portable abstraction for hierarchical-heterogeneous memory (2) providing a unified programming constructs for Big-Compute and Big-Data applications and (3) providing native support for data-centric abstractions.	$0	$333,599	$333,599

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Project ID	Project Name	Equipment	Other	FY Total
7899	Accumulative Linking and Analysis of Scientific Results: A New Data-Infrastructure Paradigm to Enable Data-Driven Discoveries	$0	$356,620	$356,620
7908	Scalable Coordination and Control of Microgrid Generation, Load, and Storage using Distributed Stochastic Model Predictive Control	$0	$291,964	$291,964
7909	Development of an Urban Microclimate and Energy Planning Tool	$0	$334,464	$334,464
7918	Ultra-low Cost, Passive Wireless Sensor Networks Enabling Unprecedented Visibility, Monitoring and Control of Buildings, Grid, Energy Extraction/Delivery, and Environment	$0	$301,213	$301,213
7922	Modeling and Simulation of Tokamak Disruptions in International Thermonuclear Experimental Reactor Plasmas	$0	$447,954	$447,954
7934	Scalable Deep Learning Algorithms for Exascale Data Analytics	$0	$392,755	$392,755
7938	Rational design of deuterated conjugated polymers with controlled spin-polarized electron transport	$0	$402,636	$402,636
7950	Predicting Propagation Consequences of Perturbations in Synergistically-Interacting Infrastructure Networks	$0	$335,350	$335,350
7954	Systematic Characterization and Verification of Quantum Computing Devices	$0	$299,417	$299,417
7970	Room temperature electrochemical activation of Nitrogen	$0	$399,065	$399,065
7998	Integration of Accurate Theoretical/Computational Approaches with Experimental Techniques for the Understanding of Two-Dimensional Layered Nanomaterials	$0	$157,417	$157,417
8005	Overcoming Antibiotic Resistance: Neutron crystallographic and quantum chemical studies of a beta lactamase enzyme	$0	$54,879	$54,879
8018	From Spins to Stars: Informing Explosive Astrophysical Scenarios through Indirect Measurements on Radioactive Nuclei	$0	$187,661	$187,661
8033	Evolution of solvent production in competitive microbial communities	$0	$169,099	$169,099
8037	New advances in the Bayesian approach to inverse problems	$0	$199,546	$199,546
8042	Dissecting ancient genes conferring biological complexity at the common node of complex ecosystems and human biology	$0	$54,602	$54,602
8043	Experimentally driven deep data in Helium Ion Microscopy	$0	$159,876	$159,876
8046	Preparation of Advanced Hard-Matter Materials through Metal-Organic Framework Templating	$0	$223,706	$223,706
8085	Programming and Usability of Neuromorphic Computing	$0	$199,542	$199,542
8086	Effects of tree mortality on belowground community structure, function, and carbon cycling	$0	$248,092	$248,092
8090	Quantum Information from Ultrafast Time-Frequency Entangled Photons	$0	$203,226	$203,226
8091	Novel Mathematical and Computational Modeling for Maxwell's problems in Dispersive Media	$0	$204,884	$204,884
8092	An Ensemble-based Multivariate Approach for Verification of the Accelerated Climate Model for Energy	$0	$90,700	$90,700
8093	Developing machine learning Monte Carlo approaches for computational materials modeling	$0	$97,339	$97,339
8097	Complete characterization of fission with neutron-gamma-fragment correlations	$0	$74,270	$74,270
8133	Quantum cascade laser Mid-Infrared spectroscopy for real time online monitoring of kinetics in aqueous and organic phases in nuclear materials processing	$0	$53,787	$53,787
8134	Novel Functional Materials for Metal Ion Separation	$0	$119,664	$119,664
8150	Data Integrity and Resilient Topologies in the Smart Grid	$0	$78,290	$78,290

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Project ID	Project Name	Equipment	Other	FY Total
8155	Photonics-based Physically Unclonable Functions - a Feasibility Study	$0	$60,612	$60,612
8164	Refractory Metal Deposition onto Titanium Diboride and Silicon Carbide Particles for Armor and High Temperature Composite Applications	$0	$83,749	$83,749
8165	Intelligent Spatial Modeling Approach for De-icing Urban Roads	$0	$119,624	$119,624
8167	Understanding the interface driven magnetic properties of topological insulators using a graphics processing unit accelerated first-principles all-electron code	$0	$119,895	$119,895
8174	Geobiology: Chemical interfaces, gradient drivers and mechanisms	$0	$126,360	$126,360
8178	Bio-oil Stabilization with Supported Single-atom Catalysts	$0	$69,544	$69,544
8182	Computational Design of Novel Solid Stoppers for Generating Intense Exotic Radioactive Ion Beams at Facility for Rare Isotope Beams	$0	$103,536	$103,536
8196	Microwave-absorbing nanocomposites through employment of biologically produced magnetites	$0	$129,144	$129,144
8198	Use of Graphitic Foams for Monoblock Fusion Divertor Components	$0	$72,446	$72,446
8202	Advanced High-temperature Engineering Alloy Design: Combining Big Data and Machine Learning Approach for Accelerated Materials Development	$0	$78,495	$78,495
8203	Publication Mining for Better Materials	$0	$100,883	$100,883
8214	Origin of viscosity in aqueous solution	$0	$126,960	$126,960
8215	Detector and Source Development for Fundamental Neutron Physics at the Spallation Neutron Source	$0	$179,739	$179,739
8221	Atomic Resolution of a Protein using X-ray Fluorescence Holography	$0	$190,351	$190,351
8224	Development and Testing of Fiber-Optic Bolometers for Fusion Plasmas	$0	$39,137	$39,137
8225	An integrated approach to link microbial membrane assembly to environmental biocomplexity: connecting nanoscale structure with mesoscale function	$0	$142,483	$142,483
8227	Establishment of optogenetics capabilities for manipulation of gene expression in plants	$0	$123,211	$123,211
8232	Development of a proof-of-principle handheld directional neutron detector	$0	$4,435	$4,435
8235	An Expert System for Automated Modeling of Small-Angle Neutron Scattering Data	$0	$282,400	$282,400
8237	Integrated Computational Environment-Modeling & Analysis for Neutrons	$0	$418,842	$418,842
8241	A design basis for future iron-based superalloys	$0	$455,308	$455,308
8251	Characterization of diazotrophs in the endosphere microbiome of bioenergy crop Sorghum	$0	$407,531	$407,531
8253	Flexible Intelligent Real-time direct current-alternating current grid Emulator	$0	$359,278	$359,278
8264	Toward the Exceptionally Stable Anion Conducting Materials	$0	$439,705	$439,705
8270	Understanding the microbially-driven mechanisms behind the rapid responses of soils to short-term disturbance events that result in large nitrous oxide emission pulses	$0	$364,537	$364,537
8272	Integrating Small-Angle Neutron Scattering with Molecular Simulation to Determine Structural Ensembles of Complex Biological Systems	$0	$326,851	$326,851
8274	Time-of-flight Neutron Imaging of Nuclear Materials	$0	$385,116	$385,116
8277	Understanding High Performance Computing Applications for Evidence-based Co-design	$0	$365,885	$365,885
8291	High-Fidelity Multiphysics Nuclear Reactor Core Simulations of Molten Salt Reactors	$0	$449,639	$449,639
8294	Integrating Multimodal Optical Imaging, Analytics, Neutron Scattering and Ab Initio Calculations to Resolve Interfacial Structure and Ultrafast Dynamics	$0	$475,515	$475,515
8297	Enabling Quantum Acceleration in Scientific High Performance Computing	$0	$283,268	$283,268

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Project ID	Project Name	Equipment	Other	FY Total
8301	Designing and programming exascale memory hierarchies	$0	$399,063	$399,063
8307	Multimodal Chemical Imaging of Nanoscale Transformations Away from Equilibrium	$0	$320,197	$320,197
8309	Impact of Climate Change Drivers on Virome-Microbiome-Plant Host Dynamics in Relation to Nitrogen and Carbon Cycling	$0	$334,446	$334,446
8310	Controlled, Volumetric Combustion Synthesis as an Enabler for the Additive Manufacture of Advanced Engineering Ceramics	$0	$273,301	$273,301
8319	DataTransferKit: - Enabling Multiscale and Multiphysics Simulations at Exascale	$0	$359,824	$359,824
8321	Genome Wide Association Viriome/Microbiome Analysis	$0	$211,729	$211,729
8339	Energy-Efficient Training Protocol for Scalable Deep Learning	$0	$361,001	$361,001
8347	Dissipation Driven Quantum State Engineering On-Chip	$0	$367,286	$367,286
8350	High-Energy-Density, Organic Radical-Mediated Redox Flow Batteries	$0	$431,879	$431,879
8360	Understanding rheology of fiber reinforced soft matter structural composites: From microscopic structures to macroscopic mechanical properties	$0	$525,820	$525,820
8372	Energy Routing Technology for Automated Building Control	$0	$305,358	$305,358
8381	Next-generation neuromorphic coprocessor power consumption in the beyond exascale era	$0	$357,031	$357,031
8384	In Situ Electrochemically-Controlled Irradiation-Assisted Corrosion Fatigue Crack Growth in Austenitic Stainless Steels.	$0	$455,235	$455,235
8389	Optimizing Measurements for Environmental Model Validation Using Sampling Theory	$0	$286,324	$286,324
8391	Functional polymers as cathodes for electric energy storage applications	$0	$360,870	$360,870
8396	High Mobility Printed Semiconductor Devices Using Magnetic Field Processing	$0	$452,970	$452,970
8397	Fabricating Qubits from Low-Dimensional Materials	$0	$390,760	$390,760
8404	Deep Learning for Automated Feature Discovery to Enhance Cyber Threat Detection	$0	$418,972	$418,972
8411	Developing symmetry selective structural probes as a tool for materials design using fast electron detectors and high performance data analytics	$0	$197,602	$197,602
8420	Developing a Highly Efficient, Multiscale Modeling Framework for Hierarchical Materials	$0	$278,959	$278,959
8423	Bringing the Density Matrix Renormalization Group++ Scientific Application to Exascale	$0	$343,728	$343,728
8432	A Quantum Interconnect for Matter Quantum Bits Based on Frequency Encoded Photonic Qubits	$0	$450,717	$450,717
8440	Challenges for Analysis and Modeling of Grazing Incidence Neutron Scattering at Pulsed Sources	$0	$265,224	$265,224
8449	Data Analysis Parallel Package Maker - A Lego Set for Big Data Scientists	$0	$340,998	$340,998
8455	Supercomputers to Superalloys	$0	$423,411	$423,411
8458	A system for Rapid Cyber Hypothesis Evolution and Resolution--bringing data analytics to cyber analysts' fingertips	$0	$420,269	$420,269
8460	Research & Development for a One-Ton Neutrinoless Double-Beta Decay Search	$0	$510,335	$510,335
8475	Contributing to transportation sustainability through utilization of connected and automated vehicle technologies	$0	$211,828	$211,828
8478	A Clustered Regularly Interspaced Short Palindromic Repeats-CRISPR associated protein 9 platform for Genetic Engineering of Diverse Filamentous Fungi	$0	$43,783	$43,783
8481	Multi-index sequential Monte Carlo sampler	$0	$136,022	$136,022
8482	Mechanically-Controlled Ion Binding for Separation Applications	$0	$109,808	$109,808
8486	Over-the-Air-Coordinated Constructive Multipoint Radio Frequency Transmissions	$0	$175,987	$175,987

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Project ID	Project Name	Equipment	Other	FY Total
8495	Microelectromechanical Systems Oscillator Arrays as Micro-Chip On-Board Key Encryption Engine	$0	$166,419	$166,419
8497	Direct catalytic conversion of methane to ethanol	$0	$138,203	$138,203
8498	Nanofabrication of Diffraction Holograms for Novel Imaging & Spectroscopy Using Oak Ridge National Laboratory's New monochromated and aberration-corrected-scanning transmission electron microscope	$0	$110,427	$110,427
8502	A novel plasmon-assisted few-to-single electron nanotip source for nanoscale dynamic imaging	$0	$189,946	$189,946
8503	Structure and Modeling of Time Resolved Polarization Switching in Selected Organic Ferroelectrics	$0	$96,559	$96,559
8505	Merging ecology and materials science to trace environmental energy contamination using biogenic calcium carbonates	$0	$141,203	$141,203
8513	In Situ Closed-Cell Gas-Reaction Technology for Scanning Transmission Electron Microscope Characterization of Reaction Mechanisms in High Temperature Structural Materials	$0	$185,942	$185,942
8522	Exploring thermal transport in nanostructured materials for thermal energy conversion and management	$0	$197,769	$197,769
8529	An approach for diesel-like efficiency from Spark-ignition combustion using market fuels with increased stroke-to-bore ratio and Exhaust Gas Recirculation dilution	$0	$122,491	$122,491
8535	Simultaneous classical and quantum communication using coherent detection	$0	$183,495	$183,495
8536	Development of Model-Based Cosmic Ray Muon Tomography with Momentum Measurement for Non Destructive Assessment of Used Nuclear Fuel	$0	$108,914	$108,914
8537	Scalable First Principles Calculations for Materials with Disorder and Defects	$0	$86,775	$86,775
8541	Next Generation Multifunctional Fibers via Embedded Nanomaterials	$0	$191,447	$191,447
8563	Scalable Dimensionality Reduction for Non-negative High Order Tensors	$0	$72,682	$72,682
8578	Use of Coded Apertures as X-Ray Screens	$0	$147,078	$147,078
8585	Development and Application of Computational Methodologies for the Investigation of Soft Matter Molecular and Electronic Structure and Dynamics	$0	$292,214	$292,214
8591	Net-shaping and Additive Manufacturing of Thermoelectrics for Waste Heat Recovery	$0	$95,548	$95,548
8610	Super-resolution reconstruction for Inelastic Neutron Scattering Spectra from Direct Geometry Chopper Spectrometers	$0	$52,838	$52,838
8686	Computational Imaging for Neutron Bragg-Edge Tomography	$0	$165,809	$165,809
8689	Internal Gelation Approach to Hydrothermally Stable Engineered Catalysts	$0	$150,612	$150,612
8691	A transparent thermal insulation film	$0	$29,842	$29,842
8707	A Microfluidic Platform for Identifying Radiation/Nuclear Countermeasures for Emergency Situations.	$0	$57,497	$57,497
8708	High resolution validation of next generation turbulent flow models using neutron beams and laser fluorescence in cryogenic Helium	$0	$154,453	$154,453
8710	Investigation of Neptunium Isotope Separation by Liquid Liquid Extraction	$0	$46,026	$46,026
8711	New Multi-modal Interactive Data Visualization Techniques for Scientific Data Analysis	$0	$91,995	$91,995
8714	Developing Tip Enhanced Raman Spectroscopy Platform for Chemical and Structural Imaging at the Nanoscale	$0	$88,653	$88,653
8716	Self-healing barrier films for vacuum insulation panels	$0	$95,020	$95,020
8726	Quantification of the economic and environmental benefits of increased nitrogen use efficiency	$0	$26,731	$26,731

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Project ID	Project Name	Equipment	Other	FY Total
8727	Additive Manufacturing Of Enhanced Battery Architectures	$0	$69,017	$69,017
8729	Experimental Data Based Combinatorial Kinetic Simulations for Predictions of Enhanced Exhaust Emission Catalysis with Bifunctional Mixed-Bed Systems	$0	$76,995	$76,995
8733	Atomic Force Microscopy Beyond the Standard Quantum Limit	$0	$4,959	$4,959
8734	Novel Carbon Composite Material and Capacitive Deionization Architecture for Desalination of Low Salinity Water Sources	$0	$50,002	$50,002
8735	Biomimetic networks as adaptable neuromorphic circuits	$0	$40,456	$40,456
8739	Three-dimensional Printed Polymer Suppressors for Pilots	$0	$49,788	$49,788
8743	Novel Materials for Desulfurization of Jet Propellent-8 via Selective Adsorption	$0	$51,382	$51,382
8748	Uncovering Novel States in Quantum Topological Materials by Deep Learning of Electronic Structure Imaging	$0	$14,591	$14,591
8756	Proof of principle of acoustic-based nondestructive measurement of gas pressure and composition in sealed pressurized containers	$0	$95,100	$95,100
8765	Strategic Hire: Direct simulation of dynamic processes in porous geological systems with explicit pore representation	$0	$105,045	$105,045
8768	An Integrated Systems Biology Approach to Identify Opioid-Induced Shifts in Function of the Gut Microbiome among Lean and Obese Mice Undergoing Systemic Opioid Treatment	$0	$14,966	$14,966
8773	Social and Physical Systems in Urban Environments	$0	$77,084	$77,084
9058	Active Core Saturation Prevention in Ferromagnetic Core Loop Antennas	$0	$13,696	$13,696
9059	In-Vehicle Network Intrusion Detection by Modeling Signal Characteristics	$0	$99,377	$99,377
9060	Jesse Ault - Wigner fellow - High-fidelity cardiovascular simulation for personalized medicine	$0	$50,491	$50,491
9070	Passive Control System for Window Attachments	$0	$1,989	$1,989
9087	Development of Spatially Dependent Embedded Self-Shielding Method	$0	$11,932	$11,932
Total # of Projects for ORNL: 186	**Total Equipment Cost for ORNL: $0**	**Total Other Cost for ORNL: $40,685,372**	**Total Cost for ORNL: $40,685,372**	
PNNL - Pacific Northwest National Lab				
PN14027/2611	Multi-scale Processes Controlling Spatial Variation in Greenhouse Gas Emissions in a Subarctic Watershed	$0	$60,251	$60,251
PN14067/2651	Bridging Length Scales in Complex Oxides: From Point Defects to Defect Superstructures	$0	$39,988	$39,988
PN14076/2660	Streaming Data Characterization - create a library of existing, relevant algorithms and methods to be used in multiple domains and approaches for hypothesis generation	$0	$169,652	$169,652
PN14086/2670	Topological Analysis of Graphs in Cyber Security	$0	$149,965	$149,965
PN14087/2671	Dorci - The Defenders Role in Resilient Cyber Security	$0	$49,770	$49,770
PN15001/2676	Experimental Management for Controls of Complex Systems Test Bed	$0	$216,559	$216,559
PN15002/2677	Scalable Hierarchical Validation and Calibration for Robust Distributed Control of Large-scale Complex Systems under Uncertainty	$0	$140,024	$140,024
PN15003/2678	Visual Analytics Platform for Large-Scale Hierarchical Control System Data	$0	$189,997	$189,997
PN15004/2679	Development of Hierarchical Porous Structured Materials for Energy Storage Applications	$0	$291,884	$291,884
PN15007/2682	Resilience in Large-Scale Distributed Control Systems	$0	$139,513	$139,513
PN15009/2684	Co-Simulation Platform for Rapid Prototyping of Control Algorithms	$0	$139,992	$139,992
PN15010/2685	Cultivation-Independent Untangling of Microbial Gene Regulation Networks	$0	$218,117	$218,117

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PN15013/2688	Observing and Quantification of the Initial Stages of Nucleation and Growth in Liquids	$0	$378,165	$378,165
PN15016/2691	Impact of Environmental Stressors on Complex Biological Systems	$0	$300,611	$300,611
PN15017/2692	Digital Currency Graph Forensics to Detect Proliferation Finance Patterns	$0	$157,304	$157,304
PN15018/2693	Sequence-Defined Polymers based on a New Backbone Architecture	$0	$220,894	$220,894
PN15020/2695	Scalable Synthesis of Spinel Stabilized Metal Catalysts	$0	$269,567	$269,567
PN15027/2702	Solving the Plutonium-238 Problem - We are working to improve fabrication techniques for radioisotope heat sources that rely on plutonium-238 for heat and power. In addition, we are seeking ways to safely handle plutonium during processing techniques.	$0	$467,142	$467,142
PN15031/2706	Rendezvous: Optimization and Stochastic Algorithms for Asymmetric Resilient Infrastructure	$0	$130,492	$130,492
PN15037/2712	Signatures of Plutonium TetraFluoride and Plutonium Metal Processing	$0	$114,043	$114,043
PN15049/2724	Hot Particle Analysis Aided by a State of the Art Focused Ion Beam	$0	$139,162	$139,162
PN15061/2736	Biological Threat Signatures for Bacillus anthracis	$0	$70,935	$70,935
PN15069/2744	Microbiome Models Across Scales - from Metabolism to Succession: A Framework for Modeling, Simulation and Theory Development for Microbial Ecology	$0	$274,347	$274,347
PN15073/2748	Microbiome-Exposome Interactions- This project is addressing key gaps in our understanding of how the composition and function of mammalian microbial communities (microbiomes) are impacted by exposures to environmental agents and how these changes impact host susceptibility to the agents. This is not a human microbiome.	$0	$318,774	$318,774
PN15076/2751	Module Integration Interface for Resilient Cyber Systems	$0	$286,001	$286,001
PN15077/2752	Statistical Integration of Omics Data from Microbiomes. We will develop an infrastructure and computational tools designed to process, analyze, and visualize microbial community sequence data to address the challenge of computational analysis. This is not a human microbiome.	$0	$282,231	$282,231
PN15078/2753	Microbiome Responses to Hydrologic Regime Shifts and Subsequent Alteration to Ecosystem Function. The goal of this project is to determine how changing redox conditions (hydrologic change) impact the coupling of soil biogeochemical cycles, and if there are broad rules that transfer between ecosystems. This is not a human microbiome.	$0	$138,379	$138,379
PN15080/2755	Making, Measuring, and Modeling Materials for Quantum Computing	$0	$449,975	$449,975
PN15085/2760	Fundamental Understanding of Nucleation Processes to Assess Solution Stability and Phase Growth and Genesis	$0	$305,477	$305,477
PN15090/2765	An In-situ Investigation of boehmite (gamma-AlOOH) Dissolution under High pH (potential of hydrogen) Conditions	$0	$364,376	$364,376
PN15091/2766	Correlation of Colloidal Interactions and Macroscopic Rheology in Concentrated Electrolyte Solutions	$0	$384,944	$384,944
PN15094/2769	How do Non-linear Microbial Processes Lead to Linear Ecosystem Fluxes?	$0	$300,480	$300,480
PN15095/2770	Monitoring Diffusion of Actinide Daughters and Granddaughters in Metals for Chronometer Applications	$0	$357,481	$357,481
PN15099/2774	Electrocatalytic Reduction of Phenols and Ethers	$0	$74,303	$74,303

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PN15100/2775	Modeling the Interfacial Effects, Partitioning, and Production Routes of Epsilon Particles in Uranium Oxide	$0	$292,655	$292,655
PN16001/2778	Assessing Climate and Human-exposure Impacts of Polycyclic Aromatic Hydrocarbons and Secondary Organic Aerosol Particles	$0	$215,996	$215,996
PN16002/2779	Measurement and Verification in Controlled Complex Systems	$0	$136,522	$136,522
PN16003/2780	Dynamic Multiscale Modeling of Complex Biosystems: A Framework for Multiscale Metabolic Modeling	$0	$274,722	$274,722
PN16004/2781	Test Bed Federation Tools for Control of Complex Systems Research	$0	$217,977	$217,977
PN16005/2782	Membrane-based Separator	$0	$48,230	$48,230
PN16008/2785	Fundamental Mathematical Models for Human Interactions	$0	$272,820	$272,820
PN16009/2786	Using In situ Liquid Secondary Ion Mass Spectrometry and In situ Transmission Electron Microscopy to Determine the Mechanism and Kinetics of Lithium Ion Mobility in Solid Electrolyte Interface Layers	$0	$221,476	$221,476
PN16012/2789	Hardware Integration Platform for the Control of Complex Systems Initiative Test Bed	$0	$100,585	$100,585
PN16013/2790	Bulk Nanostructured Alloy Optimization: Designing for Processing and Thermal Stability	$0	$292,168	$292,168
PN16014/2791	Scalable Processing of Nanostructured Materials	$0	$271,601	$271,601
PN16015/2792	Three-dimensional Printing of Electrical Sensors for Biological and Chemical Detection	$0	$179,832	$179,832
PN16016/2793	A Composable Interdependence Model for Cyber-Physical Systems	$0	$205,741	$205,741
PN16017/2794	Robust Statistical Data Exploration and Analysis for Microbiome Metabolomics. This project aims to improve analysis methodologies, develop a robust and reproducible biomarker discovery process, and improve the quality and reduce the time to reach meaningful results integrating multiple heterogeneous data types. This is not a human microbiome.	$0	$230,168	$230,168
PN16018/2795	High-throughput Genome-to-Metabolome Computational Methods for Microbiome Metabolomics and Modeling	$0	$159,915	$159,915
PN16019/2796	Deciphering Microbial Communication Through Metabolites	$0	$339,111	$339,111
PN16020/2797	Carbon Rods with Unexpected Humidity-Driven Water Expulsion	$0	$233,399	$233,399
PN16022/2799	Bulk Thermally Stable Nanocomposite Processing	$0	$325,542	$325,542
PN16023/2800	Using Modified Proteins for Forensic Deconvolution of Xenobiotic Dose Quantitation and Timing	$0	$204,413	$204,413
PN16025/2802	Image Fusion - Secondary Ion Mass Spectrometry-and Microscopy	$0	$206,455	$206,455
PN16027/2804	Understanding the Role of Coastal Wetlands in Carbon Cycling - An Integrated Modeling-Observation Approach to Improve Regional Earth System Modeling	$0	$60,080	$60,080
PN16028/2805	Free Space Transistors for Advancing the Art of Software Defined Radio	$0	$156,995	$156,995
PN16030/2807	Permafrost Microbiome Responses to Hydrologic Perturbation and Subsequent Alteration to Ecosystem Function	$0	$302,241	$302,241
PN16031/2808	Probing Complex Microbiomes Using Mass Spectrometry and Sequencing Capabilities to Understand How Microbiomes are Influenced by their Environment. This is not a human microbiome.	$0	$292,306	$292,306
PN16034/2811	Provenance and Pathways Investigations of Uranium Oxide Particles Using Oxygen Isotope	$0	$213,847	$213,847
PN16036/2813	Mitigating Challenges Toward an Enduring Supply of Low-radioactivity Argon for Ongoing Pacific Northwest National Laboratory National Security and Basic Science Programs	$0	$199,162	$199,162

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PN16037/2814	Toward Enabling Complex Sensemaking from Streaming Data	$0	$23,727	$23,727
PN16038/2815	Transpire: Transparent Model-Driven Discovery of Streaming Patterns	$0	$347,491	$347,491
PN16039/2816	Temporal Modeling in Streaming Analytics	$0	$373,673	$373,673
PN16040/2817	Impediments - this project will directly support the development of methodologies and capabilities to evaluate, test, probe and own cyber enterprise networks.	$0	$435,482	$435,482
PN16042/2819	Novel Heat-treatment for Automotive Castings	$0	$40,378	$40,378
PN16044/2821	Stream Adaptive Foraging for Evidence: Human-Computer Co-assisted Signature Discovery and Evidence Generation for Streaming Data with Deep Learning	$0	$392,336	$392,336
PN16051/2828	Geopolitical Discourse Characterization through Deep Learning in Diverse Data Modalities	$0	$246,795	$246,795
PN16055/2832	Ion Implantation and Characterization of Epsilon Metal Phase Formation in Ceria (Cerium Dioxide) This project integrates synthesis, ion irradiation, microscopy and modeling to develop fundamental understanding of fission products in irradiated nuclear fuel.	$0	$268,773	$268,773
PN16056/2833	Design and Development of Coded Aperture for Video Compressive Sensing Acquisition System for Environment Transmission Electron Microscope	$0	$5,483	$5,483
PN16057/2834	Integration of an Atmospheric Flow Tube -Ionization Source with a Novel Ion Mobility Analyzer	$0	$124,819	$124,819
PN16058/2835	Particle-Filter Surface Interactions and Dynamics in the Presence of Cross-Flow	$0	$91,866	$91,866
PN16062/2839	Fundamental Insights into Gamma-Radiation Effects at Complex Oxide-Water Interfaces from First Principles Simulations	$0	$243,740	$243,740
PN16063/2840	Control Framework for Large Scale Complex Systems	$0	$217,306	$217,306
PN16064/2841	Sparsity-based Data-driven Learning Method for Complex Systems	$0	$124,921	$124,921
PN16066/2843	The Role of Hurricanes in the Carbon and Oxygen Dynamics of the Coastal Zone and Its Global Significance	$0	$248,945	$248,945
PN16067/2844	Understanding the Stability of Organic Matter-Clay Systems in Presence of Aqueous Iron(II)	$0	$45,215	$45,215
PN16071/2848	Unveiling the Dynamics Microbial Biofilm and Plant Root Interface under Extreme Conditions	$0	$204,641	$204,641
PN16073/2850	Advancing Ecosystem Understanding of Carbon Turnover and Storage through Molecular Characterization	$0	$349,870	$349,870
PN16075/2852	At the Fringe of a Shifting Carbon Paradigm with Climate Change: Unlocking the Organo-mineral Controls on the Bioavailability at the Terrestrial-aquatic Interface	$0	$180,256	$180,256
PN16076/2853	Ecosystem Transitions and Associated Greenhouse Gas Fluxes Following Salt-Water Intrusion from Relative Sea Level Rise	$0	$207,118	$207,118
PN16079/2856	Search for Lepton Number Violation	$0	$664,407	$664,407
PN16080/2857	Atomic Tritium for Project 8, the next generation experiment to measure the mass of the neutrino	$0	$241,729	$241,729
PN16081/2858	Accelerator Neutrino Physics in Liquid Argon Time Projection Chambers	$0	$63,958	$63,958
PN16083/2860	Advanced Detection Techniques for a Linear Collider Detector	$0	$4,280	$4,280
PN16086/2863	Low-Mass Dark Matter Backgrounds Research and Development	$0	$363,051	$363,051
PN16087/2864	Axion Dark Matter Experiment	$0	$244,072	$244,072
PN16090/2867	Interfacial Diffusion and Crud Formation at the Liquid:Liquid Interface of Solvent Extraction Processes	$0	$282,159	$282,159
PN16092/2869	Decomposers in Transition- This work will provide fundamental biological information required to understand and model how microorganisms transform plant residue from the soil to the atmosphere.	$0	$249,250	$249,250

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PN16093/2870	Spectrally Resolved Nanoscale Imaging of Single Molecules, Plasmons, and their Interaction	$0	$247,776	$247,776
PN16094/2871	Signatures for Early Disease Detection: Application of a Non-Invasive Multi-Modal Sensor System for Bovine and Swine	$0	$74,958	$74,958
PN16096/2873	Modeling Continuous Human Information Processing	$0	$389,722	$389,722
PN16097/2874	Cryogenic Low Energy Astrophysics with Noble liquids Detection of Dark Matter and Low Energy Neutrinos	$0	$579,155	$579,155
PN16098/2875	GoBrachy - Developing a Metabolite-Trait Association Network Model for Carbon Allocation in Brachypodium	$0	$264,946	$264,946
PN16102/2879	Low-scaling Electronic Structure Methods for Accurate Modeling Chemical Transformations in Complex Environments	$0	$268,218	$268,218
PN16103/2880	Virtual Plant-Atmosphere-Soil-System -2.0: Mechanistic Process Components of a Virtual Plant Simulator	$0	$300,638	$300,638
PN16105/2882	Fundamental Investigations of Photoelectrochemical Water Splitting of Model Oxide Electrode Surfaces	$0	$329,553	$329,553
PN16106/2883	Determining Mechanisms of Microbial Metal Mobilization in Coastal Wetland Environments	$0	$358,893	$358,893
PN16107/2884	PhenoAccess: Physiological Phenotyping of Brachypodium Accessions	$0	$330,958	$330,958
PN16108/2885	Gut-on-a-chip for Multi-Omic Studies of the Gut Microbiome	$0	$198,755	$198,755
PN16109/2886	Integrated In situ Chemical and Topographic Optical Imaging of Live Microbiomes in Transition	$0	$161,569	$161,569
PN16110/2887	Spatially Resolved Quantitative Gene Expression Analyses Applied to Transitioning Mouse Gut and Soil Microbiomes	$0	$194,359	$194,359
PN16112/2889	Virtual Plant-Atmosphere-Soil-System 1.0: Quantifying Signatures of Phenomic Expression of a Brachypodium Ecosystem as a Function of Genomic and Environmental Variables	$0	$149,899	$149,899
PN16113/2890	Understanding Polar Climate Sensitivity - This project aims to pinpoint the relative roles of atmosphere and ocean dynamic processes in determining the sensitivity of polar climates to anthropogenic forcings.	$0	$267,457	$267,457
PN17001/2891	Retro-fitting Non-traditional Microbes with State-of-the-art Synthetic Biology Tools: Towards the Next Generation of Engineered Microbial Biosensors	$0	$170,541	$170,541
PN17002/2892	Untethered - Coherent Millimeter-wave Sensing using Drones with Visual Motion Capture	$0	$153,348	$153,348
PN17003/2893	Membrane Electrode Assembly-Innovation for Fuel Cells	$0	$50,141	$50,141
PN17004/2894	Dynamic, Multimodal, Molecular Imaging of Live Biological Systems	$0	$216,943	$216,943
PN17005/2895	Volatile Organic Compound Emissions from the Plant, Soil, Microbial Ecosystem and their Climate Implications	$0	$159,789	$159,789
PN17006/2896	Molecular Phenotyping of Brachypodium to Provide Metabolic and Functional Linkages to the Plant-Atmosphere-Soil-Systems-Model	$0	$251,108	$251,108
PN17007/2897	Hydraulics of the Brachypodium-root-soil System under Variable Environmental Conditions	$0	$213,412	$213,412
PN17008/2898	Atmospheric Role of Primary Biological Particles from the Plant-Soil System	$0	$171,080	$171,080
PN17009/2899	Breaking the Curse of Dimensionality in Atmosphere Modeling: New Methods for Uncertainty Quantification and Parameter Estimation	$0	$204,123	$204,123
PN17010/2900	Response of Brachypodium Associated Microbiomes to Drought and/or Elevated Carbon Dioxide Illuminated by Biogeochemical and Molecular Measurements	$0	$236,791	$236,791
PN17011/2901	Development of High-throughput Metabolomics Technologies: Application to Studying the Flowering Time in Arabidopsis thaliana	$0	$198,571	$198,571

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PN17012/2902	Computational Methods to Rapidly Design Glasses with Targeted Properties for Application to Nuclear Waste Vitrification	$0	$139,540	$139,540
PN17013/2903	Predicting the Predictions: A Visual Analytic Workflow for Data-Driven Reasoning about Climate Model Predictions	$0	$172,477	$172,477
PN17014/2904	Towards Polarization-Switched Solid-State Molecular Pumps	$0	$205,062	$205,062
PN17015/2905	Non-intrusive Electrical and Electromagnetic Methods to Detect the Soil Conditions within and Beneath an Engineered Surface Barrier	$0	$154,114	$154,114
PN17016/2906	Distributed Deep Learning and System Identification for Community Detection and Classification	$0	$199,314	$199,314
PN17017/2907	Embedding a Nervous System in Solid Metal Parts with Ultrasonic Three-Dimensional Printing	$0	$204,155	$204,155
PN17018/2908	Evaluation of Computational Approaches for Delineating Boundaries of Aquifer Exemptions	$0	$139,784	$139,784
PN17019/2909	Development of Integrated Framework for High-accuracy Excited-state Simulations of Dynamical Processes	$0	$113,055	$113,055
PN17020/2910	Data-Driven Decision Science	$0	$148,399	$148,399
PN17021/2911	Acid-Base Catalysis for Converting Electrocatalytic Hydrogeneation Intermediates	$0	$100,540	$100,540
PN17022/2912	Fundamentals of Electrocatalytic Hydrogen Addition	$0	$416,098	$416,098
PN17023/2913	Reactor and Process Design - This project is focused on developing scalable reactors for catalytic processes that can be deployed where complex feedstocks are already gathered.	$0	$246,963	$246,963
PN17024/2914	Synthesis of Tunable Electro-catalysts for Biomass Conversion	$0	$277,755	$277,755
PN17025/2915	Learning Control for Building Systems	$0	$199,984	$199,984
PN17026/2916	Theoretical Investigation of Low Temperature Electrocatalytic Hydrogen Addition	$0	$222,217	$222,217
PN17027/2917	Modeling of Used Nuclear Fuel Canister Mitigation and Repair Techniques	$0	$157,207	$157,207
PN17028/2918	Probiotics and Secondary Bile Acids as Regulators of the Gut Microbe Interactome	$0	$151,528	$151,528
PN17029/2919	Chemical Bonding in Uranium Oxides Studied by Uranium-233and Uranium-235- Nuclear Quadrupole Resonance Spectroscopy	$0	$260,020	$260,020
PN17030/2920	Dynamic Three-Dimensional High-resolution Imaging of Biogeochemical Activity in Intermediate-scale Experiments	$0	$117,802	$117,802
PN17031/2921	Towards a Better Understanding for Mineral Nanoparticle Assembly by Coupling Colloidal and Hydrodynamic Forces and Its Application to Superlattice Formation of Nanocrystals	$0	$473,932	$473,932
PN17032/2922	Peptoid-based Biomimetic Materials with Tunable Structures and Functions	$0	$449,653	$449,653
PN17033/2923	MinT-Net: Novel and Scalable Network-enabled Comparative Tools for Stress Studies of Microbiomes in Transition	$0	$147,653	$147,653
PN17034/2924	Towards an Understanding of the Role of Hydration and Hydrodynamic Forces in Modeling Synthesis	$0	$280,142	$280,142
PN17035/2925	Electrocatalytic Hydrogenation Process Development	$0	$440,741	$440,741
PN17036/2926	Investigation of the Signatures of Additively Manufactured Objects Using Advanced Chemistry and Materials Science Techniques to Identify Counterfeits	$0	$319,566	$319,566
PN17037/2927	Standardized Contracts for Energy and Reserves from Responsive Loads	$0	$99,973	$99,973
PN17038/2928	Deception Detection, Tracking and Factuality Assessment in Social and News Media	$0	$240,716	$240,716
PN17039/2929	Radiological Atomic Force Microscopy: Coupled Radiation Source/Liquid-cell Atomic Force Microscopy-to Study Radiation-induced Interfacial Processes	$0	$203,965	$203,965

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PN17040/2930	Campus as a Laboratory - The major focus of this project is the development of new test bed capabilities and enhancement of existing test bed while being flexible, scalable, and expandable so that advanced/new control technologies (for example, self-healing inside buildings, managing distributed energy resources, and demand response) can be experimentally tested and built.	$0	$232,993	$232,993
PN17041/2931	Scalable Verification of Controllers for Complex Infrastructure Networks	$0	$148,345	$148,345
PN17042/2932	Concurrent Design and Control of Complex Systems: Controllability, Observability and Performance Metrics	$0	$189,428	$189,428
PN17043/2933	Phase Field Modeling of Microstructure Development in Plutonium Oxalate Precipitation	$0	$211,754	$211,754
PN17044/2934	Fungal Synbio Platform for Plug-and-Play Consortium Engineering	$0	$148,730	$148,730
PN17045/2935	Surface Modifications of Laminar Graphene Oxide Water Separation Membranes	$0	$297,584	$297,584
PN17046/2936	Hierarchical Framework Materials by Advanced Materials Design	$0	$314,927	$314,927
PN17047/2937	Utilizing High Resolution Ion Mobility Separations in Multi-Omic Analyses of Biologically Important Isomers	$0	$119,897	$119,897
PN17048/2938	Ethanol Conversion to Fuels and Co-products via Ketones with Five or More Carbons in the Chain (C5+ Ketones)	$0	$100,507	$100,507
PN17049/2939	Multiplex Pathogen Detection	$0	$69,642	$69,642
PN17050/2940	Development of a New Mass Spectrometry Proteome Imaging Platform by Integrating Online Nano-Proteomics with Nanowell Sample Handling	$0	$119,917	$119,917
PN17051/2941	Multimodal Approach for Rapid, Robust, Reliable and Economic Environmental Monitoring	$0	$190,077	$190,077
PN17052/2942	Low-Cost Rechargeable Aqueous Zinc Batteries	$0	$100,008	$100,008
PN17053/2943	Flexible Microbial Biogas Conversion Technology for Sustainable Animal Nutrition	$0	$98,984	$98,984
PN17054/2944	SQUINT: Streaming Query User Interface	$0	$364,067	$364,067
PN17055/2945	A Probe-based Microtiter Plate Assay for Characterization of Protein Binding Partners of Small Molecules	$0	$137,149	$137,149
PN17056/2946	DYnamic Network Analysis via Motifs	$0	$268,095	$268,095
PN17057/2947	Integrated Control Testing under Complexity	$0	$238,151	$238,151
PN17058/2948	Decision Support Framework for Assessing Stream Temperature Effects on Fisheries Resources in the Columbia River Basin	$0	$114,672	$114,672
PN17059/2949	Stochastic Distribution Control for Complex Networked Traffic Flow Systems	$0	$306,335	$306,335
PN17060/2950	Observational Study on Understanding the Security and Efficacy of First Responder Communication	$0	$98,696	$98,696
PN17061/2951	Mimicking the Function of the Enzyme Scaffold	$0	$146,234	$146,234
PN17062/2952	Tell Me Why – Enriching Resilient Action Recommendation with Explanations	$0	$134,067	$134,067
PN17063/2953	Developing In situ Capabilities for Interfacial Characterization using Synchrotron Light Source	$0	$50,876	$50,876
PN17064/2954	Deep Learning applied to Accelerator Neutrino Physics in Liquid Argon Time Proportional Chambers	$0	$366,707	$366,707
PN17065/2955	BIFROST: Bounded Informational FRamework to Optimize Streaming sysTems	$0	$364,334	$364,334
PN17066/2956	Application-Hardware Codesign for Post-Moore's Era: A Study of Application-Specific Hardware Design for Computational Chemistry	$0	$70,420	$70,420
PN17067/2957	EvoGraph: Highly Efficient Large-Scale Graph Processing on Accelerator-based Supercomputers	$0	$57,416	$57,416
PN17068/2958	Reducing Emissions Associated with Vehicle Cold Start via the Coupling of Exothermic Carbonization Reactions with Conventional Aftertreatment Catalysis	$0	$50,892	$50,892
PN17069/2959	Mastering the Macromolecular-materials Interface for Energy Science	$0	$421,701	$421,701

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PN17070/2960	Probing Collective Phenomena at Solid-Liquid Interfaces Under Reaction Conditions	$0	$145,771	$145,771
PN17071/2961	Marine Mesocosms For The Study Of Climate Effects On Eelgrass And Microbial Communities	$0	$138,132	$138,132
PN17072/2962	PICO-40L (40 Liter Version of the PICO Physics Collaboration Experiment) Bubble Chamber Research and Development	$0	$208,079	$208,079
PN17073/2963	Small Research and Development efforts that align with Department of Energy/Department of Homeland Security mission space.	$0	$100,031	$100,031
PN17074/2964	Development of Computer Techniques for Understanding, Modeling, and Application of Multiscale Phenomena	$0	$249,685	$249,685
PN17075/2965	Tunable Irradiation Testbed	$0	$50,162	$50,162
PN17076/2966	Active Millimeter-wave Holographic Imaging and Instrumentation for Feature Localization	$0	$74,055	$74,055
PN17077/2967	ShAPE Processing for Improved Corrosion and Creep Resistance Properties	$0	$225,891	$225,891
PN17078/2968	Data-driven Cities and Regions: Towards a Computational Framework for Urban Science	$0	$55,410	$55,410
PN17079/2969	CyberCore - This project proposes to investigate indicators of cyber events and their subsequent automated reactions to mitigate cyber threats and to improve incident command system resilience; ultimately, this technology will enable automated detection and response techniques that provide key situational awareness and automated adaptation for cyber security conditions.	$0	$58,634	$58,634
PN17080/2970	Quantum Defects in Synthesized Diamond Aerogel and Diamond Nanoparticles	$0	$305,840	$305,840
PN17081/2971	Virtual Fish for Biological Design of Hydropower Turbines	$0	$149,671	$149,671
PN17082/2972	Fungal Solid State Fermentation for Citric Acid and Enzyme Co-products that Derive Value from Agricultural Waste	$0	$54,723	$54,723
PN17083/2973	Production of Para-xylene Enabling 100% Renewable Polyethylene Terephthalate	$0	$123,342	$123,342
PN17084/2974	Ultrasensitive Nanoscale Chemical Imaging with Controllably Tailored Electromagnetic Waves	$0	$135,197	$135,197
PN17085/2975	Development of Second Generation Aggregators for Cleanup of Crude Oil in Sea Water: Mixed Fatty Acid-modified Sawdust Materials	$0	$61,413	$61,413
PN17086/2976	Deep Learning for Scientific Discovery - We will leverage deep learning in four mission-relevant areas: a) biomedical sciences, b) cyber systems, c) optimization of exascale resources, and d) neutrino physics. This effort will also invest in theory research. We have identified additional relevant PNNL mission areas in which to test the breadth of the applicability of deep learning, ranging from smart manufacturing to catalysis. We will rapidly mature our understanding of where and when deep learning is applicable.	$0	$459,608	$459,608
PN17087/2977	Nuclear Trafficking Objective: Materials Processing Characterization	$0	$93,620	$93,620
PN17088/2978	Application of Nalu to Simulate Wind Plant Inflow - Develop new Pacific Northwest National Laboratory capability to apply the Nalu computational fluid dynamics code to simulate inflow conditions for real-world wind farms.	$0	$43,864	$43,864
PN17089/2979	Ion Manipulation at Atmospheric Pressure	$0	$94,922	$94,922
PN17090/2980	Theoretical Studies of Metal Complex Degradation Products and Their Associated Signatures in the Plutonium Separations Process	$0	$92,149	$92,149
PN17091/2981	Copper-philic coating for Development of an in-situ Antimicrobial Coating	$0	$49,646	$49,646

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Project ID	Project Name	Equipment	Other	FY Total
PN17092/2982	Solid-Phase Processing - This project will address key scientific and fundamental processing unknowns associated with solid phase processing as a means to produce extreme-performance materials.	$0	$326,623	$326,623
PN17093/2983	Experimental and Theoretical Investigation of Core Level X-ray Photoemission Line Shapes for Unstable Transition Metal Cations	$0	$29,925	$29,925
PN17094/2984	Molecular Mechanisms of Drought Mortality and Survival	$0	$93,240	$93,240
PN17095/2985	PACiFiC: Proactive Adaptive Cybersecurity Framework for Control	$0	$675,581	$675,581
PN17096/2986	Nucleation and Crystal Growth in Two-Dimensional Confinement	$0	$26,358	$26,358
PN17097/2987	Developing High Energy Cathode Material for Near-to-Market Advanced Li-ion Batteries	$0	$45,933	$45,933
PN17098/2988	Development of Physics-compatible Stochastic Models for Multiphysics Systems with Nonlinear Field Variables	$0	$39,803	$39,803
PN17099/2989	Understanding Fundamental Design Principles Underlying How Biological Systems Adapt to Engineered Functions	$0	$242,524	$242,524
PN17100/2990	Elemental Analysis of Rare Earths in Microfluidic Devices Capable of Employing Electrophoresis Based Separations	$0	$44,001	$44,001
PN17101/2991	Determining Radiolytic Transient Intermediates and Interfacial Species and Their Roles in Aluminum Oxyhydroxide Reactivity	$0	$79,825	$79,825
PN17103/2993	Signatures of Warfighter Response to Pathogen-, Toxin- and Activity-Induced Stress	$0	$120,484	$120,484
PN17104/2994	Monitoring of Terrestrial Aquatic Ecosystems with Hyperspectral Imagery	$0	$124,418	$124,418
PN17105/2995	Patterns and Mechanisms of Coastal Forest Loss in Relation to Sea-level Variability, Drought, and Heat-waves	$0	$71,972	$71,972
PN17106/2996	Process-based Understanding of Perturbation Impacts in Tidally-influenced Nearshore Terrestrial-aquatic Interfaces	$0	$210,594	$210,594
PN17107/2997	Understanding How Saltwater Intrusion Interacts with Plant Communities to Affect Soil Greenhouse Gas Fluxes in Coastal Forests	$0	$206,283	$206,283
PN17108/2998	Developing Isotachophoresis for Nuclear Safeguards	$0	$28,868	$28,868
PN17109/2999	Characterization of Radiation Induced Defects Across Scales	$0	$12,130	$12,130
Total # of Projects for PNNL: 211	**Total Equipment Cost for PNNL: $0**	**Total Other Cost for PNNL: $42,836,565**	**Total Cost for PNNL: $42,836,565**	
PRINCE - Princeton Plasma Physics Lab				
PPPL-041	Development of a Plasma Data Management Program	$0	$33,453	$33,453
PPPL-044	Development of a Suite of Atomistic Codes for Fusion, Advanced Materials and Warm Dense Matter Applications	$0	$23,557	$23,557
PPPL-045	Predicting and Mitigating Runaway Electrons in Tokamaks	$0	$143,598	$143,598
PPPL-046	Simulations of Plasma Turbulence With Lithium or Other Walls	$0	$188,387	$188,387
PPPL-048	The Efficacy of Lithium Conditioning and Liquid Lithium Surfaces in Devices with Metallic Plasma Facing Components	$0	$91,823	$91,823
PPPL-051	Low Temperature Plasma for Synthesis and Functionalization of Graphene	$0	$158,712	$158,712
PPPL-054	Large Scale Multi-Physics Simulation of a Blanket Module	$0	($2,980)	($2,980)
PPPL-055	Investigation of a Plasma Mass Filter	$0	$91,060	$91,060
PPPL-056	Large-data statistical approach for predicting disruptions in tokamaks using a Joint European Torus disruption-relevant database	$0	$173,834	$173,834
PPPL-058	Superconducting Magnet Studies	$0	$253,958	$253,958
PPPL-059	Advanced Centrifuge Development for Industrial Applications	$0	$83,694	$83,694

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Project ID	Project Name	Equipment	Other	FY Total
PPPL-060	Establishing the Feasibility of the Lithium Vapor Box Divertor	$0	$112,441	$112,441
PPPL-061	Development of Plasma-Surface Interaction Science for Direct Power Extraction Applications	$0	$98,083	$98,083
PPPL-062	Study and Control of Fast Flowing Liquid Metal Divertor	$0	$33,219	$33,219
PPPL-063	Full Wave Calculations in the Scrape-off Layer of Tokamak	$0	$130,766	$130,766
PPPL-064	Stellarator Core Designs for a Net-Energy Breakeven (Qeng = 1) Fusion Plant	$0	$1,212	$1,212
PPPL-065	Development of New Initiatives for Space Instrumentation and Space Plasma Physics Research at Princeton Plasma Physics Lab	$0	$146,508	$146,508
PPPL-066	Permeation barriers in high atomic number materials used for fusion-reactor plasma-facing components	$0	$26,710	$26,710
PPPL-067	Proton Beam X-ray Diagnostics	$0	$112,828	$112,828
PPPL-068	Gyrokinetic total-f simulation of edge and divertor transport in stellarators with the X-point included gyrokinetic codes	$0	$61,803	$61,803
PPPL-069	Global numerical studies of magnetic reconnection in rotating plasmas with magnetic and flow shear	$0	$85,079	$85,079
PPPL-070	Definition of a next-step liquid-metal-wall toroidal confinement facility	$0	$158,892	$158,892
PPPL-071	Future Stellarator Configuration Investigation	$0	$318,400	$318,400
PPPL-072	A Flowing LIquid metal Torus - FLIT	$0	$162,209	$162,209
PPPL-073	Conceptual Design of Multi-Modal Three-Dimensional Field Control Coils	$0	$83,335	$83,335
Total # of Projects for PRINCE: 25	**Total Equipment Cost for PRINCE: $0**	**Total Other Cost for PRINCE: $2,770,581**	**Total Cost for PRINCE: $2,770,581**	
PTX - Pantex Plant				
16-3601	Less Than Lethal Technologies	$0	$402,956	$402,956
16-3606	Develop Continuous-Flow Reactor Capabilities	$0	$28,440	$28,440
16-3612	Investigations Into High Explosive Machining Parameters	$0	$273,409	$273,409
16-3615	Additive Manufacturing For Energetic Materials	$0	$295,615	$295,615
16-3616	Formulation Controller Recipe Development	$0	$3,238	$3,238
16-3617	Resonant Acoustic Mixing For Small-Scale Synthesis & Formulation Processes	$0	$32,106	$32,106
16-3618	Special Nuclear Material-Cart For Transport Across Ramps & Buildings	$0	$168,921	$168,921
16-3619	Autonomous Mobile Bay Equipment Retriever	$0	$178,302	$178,302
16-3625	Microreactor Technology Development	$0	$637,206	$637,206
16-3629	Modeling Explosive Impact Sensitivity	$0	$215,981	$215,981
16-3638	Thermal Modeling High Explosive-Machining	$0	$169,099	$169,099
16-3641	Establishment of Dust Ignition Test Capability	$0	$85,836	$85,836
16-3644	Conductive Polymers Using Additive Manufacturing	$0	$158,568	$158,568
16-3647	Insensitive, High Temperature, High Performance Explosive	$0	$90,896	$90,896
16-4213	Pantex Plant Electrical System Study	$0	$6,595	$6,595
17-0112	Additive Manufacturing ~~(AM)~~ Machine Accuracy Study with Y-12	$0	$47,209	$47,209
17-0215	Torque Striping	$0	$23,951	$23,951
17-0411	Aerotech Controller Integration	$0	$23,505	$23,505
17-0612	Sandia Additively Manufactured Mock Support	$0	$177	$177
17-0613	Voltage Breakdown of Shoes	$0	$16,763	$16,763
17-4502	Light Enhancement Coating Automation	$0	$110,594	$110,594
17-4504	Air Driven Wet Sieving Of Explosives	$0	$96,563	$96,563
17-4507	Fourier-Transform Near-Infrared Diffuse Reflectance Spectroscopy For Rapid Formulation Analysis	$0	$87,941	$87,941
17-4508	Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry for High Molecular Weight Polymers	$0	$46,559	$46,559
17-4510	Port Glass Replacement Suitability Study	$0	$100,549	$100,549
17-4516	Investigation and Implementation Of Nascent Firing Set Technologies	$0	$133,076	$133,076
17-4519	Projectile Impact System Upgrade	$0	$110,046	$110,046
17-4521	Electric Gun Assembly & Characterization	$0	$210,082	$210,082
17-4522	High Fidelity Test Fire Data Analysis & Automation	$0	$256,026	$256,026
17-4537	Online Gas Analysis	$0	$163,881	$163,881

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Project ID	Project Name	Equipment	Other	FY Total
18-5200	Improved Characterization of Critical Electrical Properties and Hazards for Lightning	$0	$74,839	$74,839
PX13016	Precision Computer Numerically Controlled Mill-Lathe Machining	$0	$1,561,767	$1,561,767
PX14014	Microcalorimetry - Decomposition	$0	$15,587	$15,587
PX14015	Determination - Vinyl Kel-F800 (a Fluorocarbon Polymer) / FK-800 (a Resin)	$0	$13,933	$13,933
PX15010	Non-Contact Gauging System	$0	$116,388	$116,388
PX15016	Cyber Lock System Evaluation	$0	$53,749	$53,749
PX15025	Enhanced Diagnostic Techniques For Explosive Testing Applications	$0	$211,761	$211,761
PX15032	Relationship Between Explosive Properties & Raman Spectra	$0	$64,560	$64,560
PX15033	Laser Ignition Of Explosives	$0	$713	$713
PX15034	Viability Of Infrared -Imaging With Fiber Optics Bundles	$0	$58,054	$58,054
RR-16331	Burning Ground Monitoring	$0	$1,113	$1,113
Total # of Projects for PTX: 41	**Total Equipment Cost for PTX: $0**	**Total Other Cost for PTX: $6,346,554**	**Total Cost for PTX: $6,346,554**	

SLAC - SLAC National Accelerator Laboratory

13-011	Experimental Screening of Electrocatalysts for carbon dioxide-Reduction	$0	$1,122	$1,122
15-010	Interfacial Photo Electrochemistry Using Oxide Heterostructures	$0	($5)	($5)
16-009	Center for Laboratory Astrophysics where the rapidly expanding experimental capabilities with the Matter in Extreme Conditions -Instrument to develop the expansion of the high-power ultra short-pulse optical lasers	$0	$931	$931
16-013	Monolithic Area Detector for Soft X-rays and Charged Particles	$0	($706)	($706)
16-014	Ultrafast 11 electron volts -Source for Time-Resolved Photoemission	$0	$10,906	$10,906
16-025	Hybrid Organic/Inorganic Perovskite Films Solar Absorbers: What is the role of defect?	$0	($641)	($641)
16-026	Battery Electrode/Electrolyte Studies	$0	$5,098	$5,098
16-030	Ultrafast Electron Diffraction- Experiments	$0	$6,123	$6,123
16-031	Cross-Platform Multiple Length Scale Imaging System for Energy Storage Materials	$0	$641	$641
17-001	Large Underground Xenon (LUX)/LUX-ZEPLIN (LZ) Dark Matter Search	$0	$539,458	$539,458
17-002	Development of Combined X-ray absorption fine structure spectroscopy /Fourier transform infra-red- In Situ Cell For Insight Into Catalyst Function	$0	$61,312	$61,312
17-003	Molecular Basis of Ecosystems Nitrogen Cycling: A Strategic SLAC Biosciences Program	$0	$297,753	$297,753
17-004	Real Time Control of Subsurface Fractures and Fluid Flow	$0	$204,199	$204,199
17-005	Stimulated X-Ray Emission Spectroscopy – A Powerful New Tool to Study Transition Metal Centers at X-Ray Free Electron Lasers	$0	$95,196	$95,196
17-006	Charged Particle Beam Manipulation Using carrier-envelope phase-Stable Coherently Combined Discretely Polarized Laser Pulses	$0	$116,216	$116,216
17-007	Electrochemical Heat Harvesting & Cooling	$0	$156,065	$156,065
17-008	Modeling Acceleration in Laser-Driven Shocks	$0	$177,079	$177,079
17-009	Structural Characterization of Electrolyte and Polymer Gated Electronics to Better Control Device Properties	$0	$122,350	$122,350
17-010	Emergent Spintronics In Complex Oxide Heterostructures	$0	$65,600	$65,600
17-011	A Radio For Hidden Photon Dark Matter	$0	$177,016	$177,016
17-012	Carbon dioxide to Methanol-Conversion	$0	$64,515	$64,515
17-013	Lead-Free Perovskites As Solar-Cell Absorbers	$0	$63,992	$63,992
17-014	Multi-dimensional Interconnects	$0	$49,686	$49,686
17-015	Exploring the Scientific Capability of Momentum-Resolved Resonant Inelastic Soft X-ray Scattering for Material Science Research	$0	$33,238	$33,238

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Project ID	Project Name	Equipment	Other	FY Total
17-016	Scattering Studies and Crystal Growth of Quantum Materials	$0	$121,187	$121,187
17-017	Megawatt Terahertz Optical Parametric Amplifier	$0	$186,177	$186,177
17-018	New Initiative for Pioneering Research in Biology, Chemistry, and Material Science with State-of-the-Art Soft X-ray Spectroscopy	$0	$128,053	$128,053
17-019	Beyond the Current Limitations of Water Splitting Catalysts	$0	$78,904	$78,904
17-020	Integrated Electrochemical-Biological System for the Production of Fuels and Chemicals from carbon dioxide	$0	$153,234	$153,234
17-021	Accelerating Nanocrystal Synthetic Development	$0	$147,467	$147,467
17-022	Quantum Optics and Biological Probes with Silicon Vacancies in Chemical Vapor Deposition Grown Diamond	$0	$443,019	$443,019
Total # of Projects for SLAC : 31	**Total Equipment Cost for SLAC : $0**	**Total Other Cost for SLAC : $3,505,185**	**Total Cost for SLAC : $3,505,185**	
SNL - Sandia National Lab				
180812	Bio-Emulative Metal-Organic-Framework-Based Lignin Degradation Catalysts	$0	$482,025	$482,025
180814	Predictive Pathogen Biology: Genome-Based Prediction of Pathogenic Potential and Countermeasures Targets	$0	$694,063	$694,063
180818	In Situ Compressed Sampling and Reconstruction of Exascale Unstructured Mesh Datasets	$0	$389,230	$389,230
180819	Memristor-Based Processing-in-Memory-and-Storage	$0	$487,851	$487,851
180820	Advanced Data Structures for Improved Cyber Resilience and Awareness in Untrusted Environments	$0	$539,596	$539,596
180821	Topological Design Optimization of Convolutes in Next Generation Pulsed Power Devices	$0	$340,879	$340,879
180823	Identification of Markers of High Reynolds Averaged Navier Strokes Uncertainty for Model Improvement in Engineering Flows	$0	$200,353	$200,353
180830	Confidence in Cyber Modeling and Simulation	$0	$393,496	$393,496
180840	Exploitation of Optical Polarimetry for Remote Sensing	$0	$383,225	$383,225
180841	Pinned Photodiode Pixel Development Enabling High Performance Visible Focal Plane Arrays	$0	$356,897	$356,897
180842	Biologically-Enabled Remote Sensing for Real-Time Detection and Threat Response	$0	$412,225	$412,225
180845	Hyperspectral Hypertemporal Database for Predictive End-to-End Remote Sensing Tool and Signature Simulation	$0	$344,034	$344,034
180852	An Ultra-low Size, Weight, and Power Multi-Mission Bi-Static Sensor	$0	$297,917	$297,917
180856	Engineering Efficient Human-System Interaction in Defense Systems-of-Systems	$0	$349,448	$349,448
180857	Trusted Materials using Orthogonal Testing	$0	$311,028	$311,028
180861	Reconfigurable Structure Coupler for Antenna Mode Excitation	$0	$166,003	$166,003
180862	Advanced Fuel-Injection System for Rapid Control of High-Efficiency Low-Temperature Combustion Engines using Gasoline and other Gasoline-Like Fuels, Including Biofuels	$0	$281,354	$281,354
180865	Nanocomposite Barrier Films for Enhanced Thin Film Photovoltaic Stability	$0	$292,185	$292,185
180867	Aggregating Distributed Energy Resources as Secure Virtual Power Plants	$0	$619,485	$619,485
180869	Multiscale Multiphysics for Subsurface Science and Engineering of Shale	$0	$120,124	$120,124
180872	Multi-objective Optimization of Solar-Driven, Hollow-Fiber Membrane Distillation Systems	$0	$58,181	$58,181
180874	Understanding Hot Spot Initiation Using Electronic Ultrafast Sum Frequency Spectroscopy	$0	$533,692	$533,692
180875	Magnetic Sensing to Determine Material Flows within Opaque Vessels	$0	$347,858	$347,858

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180876	Experiments to Elucidate Fundamental Breakup Mechanisms of Molten Components in Shock Driven Flows	$0	$544,780	$544,780
180877	Developing Strong, Concurrent, Multiphysics, Multiscale Coupling to Understand the Impact of Microstructural Mechanisms on the Structural Scale	$0	$562,398	$562,398
180878	Multiscale Now! A Novel Hierarchical Approach for Multiscale Structural Reliability Predictions of Ultra-High Consequence Systems	$0	$464,064	$464,064
180882	Self-Tuning Seismic Sensor Data Processing	$0	$133,572	$133,572
180883	Novel Method to Characterize and Model the Multiaxial Constitutive and Damage Response of Energetic Materials	$0	$89,549	$89,549
180884	Revolutionary Size, Weight, and Power Capability from Ultra-Wide-Bandgap Power Electronics	$0	$5,336,554	$5,336,554
180885	Hardware Acceleration of Adaptive Neural Algorithms for Dynamic and Intelligent Threat Detection	$0	$5,445,266	$5,445,266
180897	Dual-Particle Imaging System with Neutron Spectroscopy for Safeguard Applications	$0	$46,767	$46,767
180898	A New Class of Metal Organic Framework Optoelectronic Materials	$0	$528,619	$528,619
180899	Compliant Nanoepitaxy: The Next Materials Revolution	$0	$608,599	$608,599
180900	Engineered Reliability via Intrinsic Thermomechanical Stability of Nanocrystalline Alloys	$0	$551,914	$551,914
180901	Additive Manufacturing: Predicting the Performance and Reliability of Laser Engineered Materials	$0	$744,676	$744,676
180906	Magnetic Josephson Junction Memory and three-dimensional Integration for Scalable, High Performance, Low Power Computing	$0	$555,912	$555,912
180907	Electrochemical Detection of Single Molecules in Nanogap Electrode Fluidic Devices	$0	$564,306	$564,306
180919	Atom Traps on a Microfabricated Optical Waveguide Platform for Quantum-Limited Spin-Squeezed Magnetometry and Quantum Information Applications	$0	$596,096	$596,096
180920	Beyond Graphene: Boron Nitride-Based Semiconductor Alloys for Next-Generation Optoelectronics	$0	$539,117	$539,117
180922	Controlling Nanoparticle Assembly to Engineer New Materials	$0	$202,946	$202,946
180923	Emergent Phenomena in Oxide Nanostructures	$0	$233,318	$233,318
180924	Sandia's Rotary Vapor Compression Cycle Technology: A Pathway to Ultrahigh Efficiency Building Air Conditioning, Heating, and Refrigeration	$0	$124,301	$124,301
180926	Direct Mechanical Ignition of Reactive Materials for Improved Safety and Performance	$0	$592,944	$592,944
180928	Defect Characterization for Material Assurance in Metal Additive Manufacturing	$0	$710,480	$710,480
180929	Additive Manufacturing of Porous Materials	$0	$635,956	$635,956
180930	Microenergetic Logic for Safety Applications	$0	$808,870	$808,870
180931	Trust Verification Platform (Trust of Third Party Digital Design Tools using Formal Methods)	$0	$457,887	$457,887
180932	Compact Models for Defect Diffusivity in Semiconductor Alloys	$0	$480,109	$480,109
180935	Measuring Plasma Formation, Field Strength, and Current Loss in Pulsed Power Diodes	$0	$443,255	$443,255
181198	Application of Enhanced Photocurrent Models and Single Event Effects	$0	$189,181	$189,181
181202	Optimizing Microgrid Energy Delivery Under High Uncertainty	$0	$42,235	$42,235
181204	Additive Manufacturing of Metallic Components by Laser Powder Forming	$0	$62,943	$62,943
181205	Lithium Oxysilicate Compounds as Stable Analogs for Understanding Lithium-Phosphorous-Sulfur High Rate Lithium-Ion Separators: Moving Solid Electrolytes into High Rate Applications	$0	$68,016	$68,016
183780	Graph Learning in Knowledge Bases	$0	$12,701	$12,701
186113	Visible Quantum Nanophotonics	$0	$206,964	$206,964

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Project ID	Project Name	Equipment	Other	FY Total
186363	Enabling Explosives and Contraband Detection with Neutron Resonant Attenuation	$0	$172,583	$172,583
186364	Discovery of Antiviral Inhibitors Against the Chikungunya Virus nsP2 Protease Domain (nsP2 is a viral protein)	$0	$111,396	$111,396
186366	Sampling-Based Algorithms for Estimating Structure in Big Data	$0	$115,213	$115,213
186839	Validating Hydrogen Concentration Fields at Crack Tips	$0	$207,277	$207,277
188288	Vertically-Injected Ultraviolet Laser Diodes	$0	$250,664	$250,664
189614	Smart Sensor Technologies	$0	$4,365,606	$4,365,606
190245	NanoCRISPR: A Revolutionary Therapeutic Platform for Rapidly Countering Emerging and Genetically-Enhanced Biological Threats (CRISPR = Clustered Regularly Interspaced Short Palindromic Repeats)	$0	$5,061,025	$5,061,025
190958	Analyzing and Understanding of Transporters to Control Lignin Transformation into Fuel	$0	$482,720	$482,720
190959	Unmasking Hidden Compounds within Hyperspectral Images	$0	$164,790	$164,790
190960	Modular Abiotic/Biotic Systems for Understanding and Directing Biological Function	$0	$463,034	$463,034
190961	Exploiting the Microbial Achilles Heel for New Broad Spectrum Anti-Microbials	$0	$473,042	$473,042
190962	Engineering 'Green' Algae: Reducing Metabolic Waste for High Biomass Productivity	$0	$509,404	$509,404
190963	Quantum Optimization and Approximation Algorithms	$0	$332,058	$332,058
190964	Heimdallr: Automated Binary Analysis via Symbolic Execution	$0	$259,156	$259,156
190965	Adverse Event Prediction Using Graph-Augmented Temporal Analysis	$0	$586,798	$586,798
190966	Counter Adversarial Graph Analytics	$0	$655,780	$655,780
190967	Modeling Human Comprehension of Data Visualizations	$0	$499,852	$499,852
190968	Subsystem Reduced-Order Modeling and Network Uncertainty Quantification for Rapid, Agile, Extreme-Scale Simulation	$0	$530,245	$530,245
190970	Optimal Control and Design of Qubits	$0	$137,491	$137,491
190971	Green Monopropellant System Design and Characterization for Threat Signature Analyses	$0	$499,002	$499,002
190974	Optical Technology	$0	$372,395	$372,395
190976	Patterns of Life Algorithm Development Via Semantic Graphs	$0	$355,323	$355,323
190978	Realistic Internet of Things–Signal Control	$0	$178,737	$178,737
190979	High Fidelity Simulations of Large-Scale Wireless Networks	$0	$329,814	$329,814
190980	Inferential and Feature Selection Methods for Video Imaging	$0	$314,883	$314,883
190988	Hybrid Classifiers Using Statistics and Machine Learning	$0	$523,976	$523,976
190989	Creating Data for Validating Machine Learning Methods	$0	$299,773	$299,773
190990	Social-Media Account Resolution and Verification	$0	$214,594	$214,594
190991	Multimodal Data Integration Under Uncertainty	$0	$468,664	$468,664
190992	Radio frequency Enabled Cyber: Incorporating Radio-Frequency Channel Effects in Modeling of Wireless Networked Information Systems	$0	$250,984	$250,984
190993	Implementing Neural Adaptive Filtering in Detection Systems	$0	$281,816	$281,816
190994	Shot Noise Limited Imaging with Lock-In Based Focal Plane Arrays	$0	$327,009	$327,009
190995	Alternate Focal Plane Array Architectures	$0	$284,948	$284,948
190996	Microsystems Enabled Passive Radio Frequency Signal Processing	$0	$215,349	$215,349
190997	Assessment of Non-Traditional Phenomenologies for Proliferation Detection	$0	$364,187	$364,187
190998	Microscale Transient Detection	$0	$236,147	$236,147
190999	Multitarget-Multisensor Tracking	$0	$402,047	$402,047
191000	Advanced Materials and Devices for Communications	$0	$257,423	$257,423

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191001	Measurement of the Optical Opacity of Warm Dense Gas Mixtures to Support High Fidelity Modeling and Interpretation of the Optical and Thermal Emission from Conventional and Nuclear Fireballs	$0	$379,925	$379,925
191004	Exploiting Social Media Sensor Networks through Novel Data Fusion Techniques	$0	$170,340	$170,340
191005	Development and Demonstration of Alternative Precision Navigation Capabilities in Global Positioning System-Denied Environments	$0	$521,618	$521,618
191006	Understanding Photon / Free Carrier Interaction in Low Vapor Pressure Signals on Ultra-Thin Silicon Integrated Circuits	$0	$302,019	$302,019
191009	Accurate Characterization Of Real Networks from Inaccurate Measurements	$0	$305,262	$305,262
191011	Field Programmable Gate Array Trust and Vulnerability Assessment Guided by Network Criticality Metrics	$0	$312,208	$312,208
191017	A Fundamental Study on the Physicochemical Process of Soot Particle Inception	$0	$876,933	$876,933
191018	Waste Water for Power Generation via Energy Efficient Selective Silica Separations	$0	$452,962	$452,962
191051	Water Treatment System for Resilient Energy Production	$0	$496,691	$496,691
191053	Investigating the Chemistry, Physics, Wear and Aging in Rolling Electrical Contact	$0	$503,615	$503,615
191054	Nuclear Power Plant Cyber Security Discrete Dynamic Event Tree Analysis	$0	$396,352	$396,352
191055	High-Resolution Modeling and Measurements in the Arctic	$0	$424,794	$424,794
191056	Fundamentals of Pellet-Clad Debonding	$0	$617,280	$617,280
191057	Co-optimization to Integrate Power System Reliability Decisions with Resiliency Decisions	$0	$168,573	$168,573
191060	Understanding Soot Development and Thermal Stratification in Combustion Engines through Hyperspectral Non-linear Optical Diagnostics	$0	$621,481	$621,481
191068	High-Throughput Material Characterization via 6-Degrees of Freedom Loading and Material Parameter Feedback	$0	$587,355	$587,355
191069	Big-Data Multi-Energy Iterative Volumetric Reconstruction Methods for As-Built Validation & Verification Applications	$0	$503,094	$503,094
191072	High-Density Signal Interface Electromagnetic Radiation Prediction for Electromagnetic Compatibility Evaluation	$0	$83,624	$83,624
191074	Reduced Order Models of Structures Incorporating Complex Materials	$0	$189,968	$189,968
191076	Turbulent Flow Uncertainty Quantification using Machine Learning Techniques	$0	$706,147	$706,147
191085	Detection of Soluble Ligand-Tuned Molecular Tags for Subterranean Fluid Flow Monitoring Using Resonance Raman Spectroscopy	$0	$400,201	$400,201
191087	High Fidelity Hybrid Method for In Situ Borehole Stress Determination	$0	$429,374	$429,374
191092	Development of a Downhole Technique for Measuring Enthalpy in Geothermal Reservoirs	$0	$201,412	$201,412
191129	Digital Rock Physics for Multi-Scale Experiments and Modeling of Fractured Porous Media	$0	$366,723	$366,723
191133	Chemical-Mechanical Modeling of Subcritical-to-Critical Fracture in Geomaterials	$0	$466,701	$466,701
191137	Real Time Degassing of Rock during Deformation	$0	$203,944	$203,944
191144	Changing the Engineering Design and Qualification Paradigm in Component Design and Manufacturing (Born Qualified)	$0	$4,085,861	$4,085,861
191150	Arming and Firing System Charge State Determination using Unintended Radiated Electromagnetic Emissions	$0	$475,308	$475,308
191151	Improving Render Safe Capabilities for National Security from Chemical and Biological Dissemination Devices	$0	$427,107	$427,107

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Project ID	Project Name	Equipment	Other	FY Total
191152	Airborne Defense Against the Small Unmanned Aircraft Systems-Threat	$0	$689,500	$689,500
191154	System Theoretic Framework for Mitigating Risk Complexity in the Nuclear Fuel Cycle	$0	$370,626	$370,626
191160	Improved Analytics for Dynamic three-dimensional Security Systems	$0	$290,089	$290,089
191161	Eyes on the Ground: Visual Verification for On-Site Inspection	$0	$504,486	$504,486
191162	Automated Generation of Tailored Malware Execution Environments	$0	$323,515	$323,515
191165	Instrumentation Infrastructure for Cyber Emulations	$0	$323,162	$323,162
191166	Using Data Science to Improve Theorems of Human Performance in National Security Domains	$0	$323,310	$323,310
191175	Rapid Automated Pathogen Identification by Enhanced Ribotyping	$0	$566,911	$566,911
191176	Modeling Metal/Metal Compound Combustion for Energetic Material Enhancement	$0	$205,396	$205,396
191183	Applying Biological Immune-System Concepts to Improve Electronic Biosurveillance System Performance	$0	$418,679	$418,679
191184	Polarimetry for Extended Persistence and Range in Fog for Infrastructure Protection	$0	$471,967	$471,967
191185	Compressive Optical Physical Unclonable Function for Secure Communication	$0	$420,758	$420,758
191186	Understanding Transport and Aging Mechanisms to Optimize Sandia's Ion-Conducting Electrolytes for Energy Applications	$0	$574,242	$574,242
191187	Electrochemical Model of Humidity-Driven Corrosion	$0	$198,697	$198,697
191188	Interfacial Effects on the Microstructure and Morphology of Energetic Materials	$0	$232,975	$232,975
191191	High Power Solid-State Lithium-ion Batteries Through Interface Engineering	$0	$562,060	$562,060
191194	Cooperative Self-Assembly for Structure and Morphology Control of Energetic Materials	$0	$554,783	$554,783
191196	Quantum Nanofabrication: Mechanisms and Fundamental Limits	$0	$598,958	$598,958
191197	Ferroelectric Tunnel Junctions: A Physics-Based Solution to Reliable Resistive Memory	$0	$471,647	$471,647
191198	Scandium Aluminum Nitride for Advanced Piezoelectric Sensors, Actuators, and Filters	$0	$474,684	$474,684
191199	Highly Efficient Solar-Blind Single Photon Detectors	$0	$496,913	$496,913
191203	A New Paradigm in Chem/Bio Threat Detection: Evaluating Threats Based on Biological Function Rather than Chemical Form	$0	$409,386	$409,386
191204	Optimization of Sputtered Aluminum Nitride for the Seeding of Metal Organic Chemical Vapor Deposition Gallium Nitride Films	$0	$158,128	$158,128
191210	Developing a Solid State Technology for Electron Spin Qubits on Liquid Helium	$0	$599,419	$599,419
191211	A Platform for Quantum Information and Large-Scale Entanglement with Rydberg Atoms in Programmable Optical Potentials	$0	$253,557	$253,557
191221	Topological Photonics: The Quest for Ultimate Photon Control	$0	$200,762	$200,762
191223	A New All-Dielectric Nanolaser	$0	$245,304	$245,304
191225	Mediated Flow Batteries	$0	$120,801	$120,801
191227	Bridging the Gap: Evaluating Compatibility and Reliability of Interfaces between Additively Manufactured and Conventional Gas Transfer System Components	$0	$168,499	$168,499
191229	Advanced Neutron Generator	$0	$807,398	$807,398
191232	Multi-Material Additive Manufacturing for Trusted Ceramic Packages with Embedded Capacitors	$0	$646,224	$646,224
191234	Creating Robust and Secure Free-Space Optical Systems for Information and Power Transmission in Confined Environments	$0	$433,157	$433,157

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191235	Time-Resolved X-Ray Diffraction Measurements on Laser-Compressed Polycrystalline Samples Using a Multi-Pulse, Short-Pulse Laser Generated X-Ray Source	$0	$802,770	$802,770
191237	Current Loss in 0.1 - 100 Terawatt Vacuum Transmission Lines: Next-Generation Experiments and Physics-Based Simulations	$0	$992,029	$992,029
191238	Development of a 200-kilovolt, Low-Inductance, Low-Jitter, Low-Prefire-Rate Spark-Gap Switch	$0	$274,071	$274,071
191239	Adjoint-Based Methods for Optimization and Uncertainty Quantification in Particle Transport	$0	$464,291	$464,291
191240	Correlating the Structural and Electrical Performance of Microelectronics during a Radiation Event	$0	$655,062	$655,062
191313	Realizing the Power of Near-Term Quantum Technologies	$0	$302,831	$302,831
192762	Novel Microelectromechanical-System-Enabled Nanofracking of Subsurface Minerals	$0	$733,136	$733,136
192786	A Compact, Spectrally-Tunable Source of Entangled Photon-Pairs for Quantum Sensing	$0	$402,065	$402,065
192870	Synthetic Aperture Radar Targeting for Prompt Global Strike Missions	$0	$246,698	$246,698
193231	Developing Fugitive Emissions Sensor Networks: New Optimization Algorithms for Monitoring, Measurement and Verification	$0	$383,328	$383,328
193378	Fluxional Monomers for Enhanced Thermoset Materials	$0	$193,566	$193,566
193407	Additively Manufactured Shock Absorbing Engineered Materials	$0	$142,236	$142,236
193418	Geomechanics of Induced Seismicity in Carbon Dioxide Reservoirs	$0	$107,795	$107,795
193419	Development of Detection and Mitigation Algorithms for False Data Injection Cyberattacks against Nuclear Facilities	$0	$85,416	$85,416
193422	Understanding the Physics of Silicon-Germanium Heterojunction Bipolar Transistors for Cutting-edge Electronics at Deep Cryogenic Temperatures	$0	$98,819	$98,819
193424	Motion and Trajectory Algorithms for Visual Information Foraging in Intelligence Analysis Workflows	$0	$161,089	$161,089
194773	A Case Study on Neural Inspired Dynamic Memory Management Strategies for High Performance Computing	$0	$149,363	$149,363
194774	Understanding the Hierarchy of Dense Subgraphs in Stationary and Temporally Varying Setting	$0	$115,843	$115,843
195557	Artificial Diffusion: Rapid Disease Detection by Driven Magnetic Polybeads	$0	$39,640	$39,640
195868	Electromagnetic (Optical/Radio Frequency) Signatures Associated with Atmospheric Discharges and Plasma Generation in Explosive Events	$0	$249,001	$249,001
195880	Coupled Electron-Photon Monte Carlo Radiation Transport for Next-Generation Computing Systems	$0	$193,264	$193,264
195881	Sequential Design of Experiments for Accelerated Life Testing	$0	$145,956	$145,956
195883	Microstructural Modeling of Brittle Materials for Enhanced Performance and Reliability	$0	$186,439	$186,439
195968	Efficient-Track-Before-Detect with Minimal Prior Knowledge	$0	$366,899	$366,899
196390	Event Correlation using Spatio-Temporal Point Processes	$0	$254,960	$254,960
199972	Three-Dimensional Multicolor Superresolution Microscopy for Imaging the Machinery of Cells and Capturing Biochemical Interfaces	$0	$253,199	$253,199
199973	Selection of Ribosomes from Infected Mammalian Cells to Identify Viral Pathogens	$0	$426,636	$426,636
199974	Diagnostic Tool for Measuring Early Chemical Signatures of Pond Crash	$0	$479,172	$479,172
199975	Big Data, Machine Learning and Dynamic Complex System Modeling to Improve Algae Cultivation	$0	$600,286	$600,286

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199977	A Disaggregated Memory Architecture for Future High-Performance Computing	$0	$346,384	$346,384
199979	Assembly, Test, and Evaluation of integrated Complementary Metal Oxide Semiconductor/Silicon Photonics Circuits	$0	$223,789	$223,789
199981	Compatible Particle Methods: a New Paradigm for Structure-Preserving Discretization Without a Mesh	$0	$630,607	$630,607
199982	Multi-Level Memory Algorithmics for Large, Sparse Problems	$0	$574,225	$574,225
199983	Fast and Robust Linear Solvers Based on Hierarchical Matrices	$0	$505,670	$505,670
199984	Diffusion Maps: A Unified Framework for Reasoning About Imperfect Data	$0	$412,350	$412,350
199986	Parallel Tensor Decompositions for Massive, Heterogeneous, Incomplete Data	$0	$616,974	$616,974
199988	Stochastic Optimization to Enhance Resiliency and Response Strategies in Critical Infrastructure	$0	$533,547	$533,547
199991	Characterizing the Relationship between Side-Channel Leakage and Temperature	$0	$110,218	$110,218
199992	Latent, Passive, Low-Energy X-ray Exposure Indicator	$0	$294,868	$294,868
200013	Exploring Active Metal Spectroscopic Emissions in Explosive Detonations for Improved Weapon Discrimination	$0	$237,284	$237,284
200014	Enhanced Single-Frame Closely-Spaced Object Processing	$0	$163,844	$163,844
200015	The Chemical Composition of Vaporized Ground Materials	$0	$118,934	$118,934
200016	Exploring the Effects of Silicon Ultra-thinning on Integrated Circuit Behavior	$0	$278,159	$278,159
200018	Assessment of Post-Quantum Cryptographic Algorithms - Classified Project	$0	$306,074	$306,074
200019	Featureless Radio-Frequency/Microwave Structures	$0	$205,642	$205,642
200020	Improved Mobile Device Positioning via Contextual Awareness	$0	$285,478	$285,478
200022	Advanced Synthetic Aperture Radar Exploitation	$0	$120,041	$120,041
200058	Landscape Monitoring using High-Resolution Remotely Sensed Imagery	$0	$284,768	$284,768
200059	Scalable, Targeted Code Analysis using Application Programming Interface Abstraction	$0	$261,115	$261,115
200060	Enabling Novel, Game-Changing Radar Sensing via Ultra-Wideband Polarimetry	$0	$181,146	$181,146
200061	Ionospheric Impacts on Space-Based Radars: Characterization and Mitigation	$0	$228,097	$228,097
200062	Assessing Novel Applications of Magneto-Optical Kerr Effect Microscopy	$0	$245,546	$245,546
200063	Additively Manufactured, Athermal, Broadband, and Light-Weight Optical Telescope	$0	$244,517	$244,517
200064	Automated Analysis of Data Structures for Program Understanding	$0	$254,213	$254,213
200065	Persistent Tracking of Dismounts by Multichannel Radar	$0	$180,271	$180,271
200066	Novel Approach for Uniform, Localized Die Thinning	$0	$200,030	$200,030
200067	Broadband Extremely Low-Profile Antennas	$0	$116,948	$116,948
200068	Understanding the Scientific Basis Behind Assumptions in Aerothermal Modeling	$0	$235,180	$235,180
200069	Ultra Low Level Security Introspection of Computer Operating Systems	$0	$279,138	$279,138
200070	Rapid Abstraction in Confined Environments	$0	$314,724	$314,724
200071	Creating an Interprocedural Analyst-Oriented Data Flow Representation for Binary Program Analysis	$0	$275,875	$275,875
200074	Visible Atmospheric Processing using Optical-flow Routines	$0	$284,339	$284,339
200098	A Novel Joint Hierarchical Model For Hyper-Spectral Target Prediction	$0	$313,189	$313,189
200105	Entity Resolution at Large Scale: Benchmarking and Algorithmics	$0	$236,290	$236,290
200106	Neural Inspired Computation Remote Sensing Platform	$0	$279,145	$279,145
200113	Mitigation of Cyber Proliferation	$0	$330,275	$330,275
200114	Compact Low-Power Chemical Detector	$0	$322,112	$322,112

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200115	Low-Cost, Large Area Neutron Sensor	$0	$200,209	$200,209
200133	Waveform-Agile Multi-Channel Cognitive Digital Radar for Multi-Mission Intelligence Surveillance and Reconnaissance and Radio-Frequency-Enabled Cyber	$0	$450,013	$450,013
200134	A 1 volt, 1 watt, 100 gigahertz Electro-optic Modulator on Silicon for Space Applications	$0	$386,318	$386,318
200135	Spiking/Processing Array (SPARR) for Wide Dynamic Range and High Resolution Photonic Sensing	$0	$190,342	$190,342
200136	Multilayered Solid State Neutron Detector for Nonproliferation Applications	$0	$300,996	$300,996
200137	Avalanche Photodiode Arrays for High Dynamic Range Infrared Detection	$0	$338,836	$338,836
200138	Extreme Power Radio-Frequency Amplifiers	$0	$383,339	$383,339
200140	Geospatially Aware System of Systems Decision Capability	$0	$224,928	$224,928
200142	Resilience Analytics for Space Assets and Supporting Infrastructure	$0	$225,011	$225,011
200143	Donor Quantum-Dot Four-Qubit Assessment Platform	$0	$260,448	$260,448
200145	Cryogenic Ingress and Egress of Optical Signals for Cyber	$0	$283,781	$283,781
200147	Diversity for Microelectronics Lifecycle Security	$0	$294,906	$294,906
200149	Deciphering Atmospheric Ice Nucleation using Molecular-Scale Microscopy	$0	$200,958	$200,958
200150	Developing Process-Microstructure-Property Correlation of Radiation-Tolerant Nanoporous and Nanostructured Materials for High Irradiation Environments	$0	$553,691	$553,691
200151	Novel Zoned Wasteforms for High-Priority Radionuclide Waste Streams	$0	$460,478	$460,478
200152	Enhancing Power Plant Safety through Coupling Plant Simulators to Cyber Digital Architecture Model	$0	$467,451	$467,451
200165	A New Method to Contain Molten Corium in Catastrophic Nuclear Reactor Accidents	$0	$473,538	$473,538
200166	In-Cylinder Diagnostics to Overcome Efficiency Barriers in Natural Gas Engines	$0	$494,091	$494,091
200167	Bio-Inspired Ion-Selective Electrodialysis Membranes	$0	$593,306	$593,306
200168	Exploring Fundamental Limitations of Manganese Oxide Cathodes for Reversible Zinc/Manganese Dioxide Batteries	$0	$387,130	$387,130
200169	Passive Magnetoelastic Smart Sensors for a Resilient Energy Infrastructure	$0	$255,554	$255,554
200170	Discovering the Physics of Blast and Fluid Structure Interactions: A Novel Experimental-Computational Approach	$0	$648,436	$648,436
200171	Design of Acoustic Metamaterials for Shock and Vibration Control in Weapon Systems	$0	$643,222	$643,222
200172	Physics of Discharge Initiation from Complex Surfaces	$0	$496,837	$496,837
200173	Robust Approaches to Quantification of Margin and Uncertainty for Sparse Data	$0	$103,465	$103,465
200174	Illumination of Damage with High-Strength Alloys in Abnormal Mechanical Environments	$0	$362,836	$362,836
200175	Residual Stress Inversion using Ultrasonic Surface Waves, X-Ray Diffraction, and Sacrificial Material	$0	$576,616	$576,616
200176	Uncertainty Quantification of Microstructural Material Variability Effects	$0	$698,484	$698,484
200177	Pushing Continuum Reactive Capabilities through Novel Sub-Grid and Statistical Methods	$0	$534,401	$534,401
200178	Scalable Track Detection in Synthetic Aperture Radar Coherent Change Detection Images	$0	$102,422	$102,422
200179	Alkylammonium Lead-Halide Perovskite for Combined Fast Neutron Detection and Gamma-Ray Spectroscopy	$0	$102,799	$102,799
200180	Integrated Geomechanics and Geophysics in Induced Seismicity: Mechanisms and Monitoring	$0	$390,840	$390,840
200181	Monitoring and Repair of Damaged Cement-Geomaterial Interfaces in High Pressure High Temperature Repository and Borehole Scenarios	$0	$401,173	$401,173

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200182	Attribution of Methane Emissions in the Arctic and Continental United States	$0	$410,202	$410,202
200183	Prediction and Inference of Multi-scale Electrical Properties of Geomaterials	$0	$390,821	$390,821
200184	Enabling Modular Architectures with Radiation-Hard Bus-Based Power Delivery	$0	$4,651,526	$4,651,526
200185	Inferring Proliferation from Supply Chain Signals	$0	$498,206	$498,206
200186	Controlling the Activity of Gene Editing Tools	$0	$502,744	$502,744
200187	Information Extraction and Logical Reasoning for Derivative Classification Assistance	$0	$402,950	$402,950
200188	Cognitive Information Environments for International Safeguards Inspections	$0	$361,714	$361,714
200189	Efficient and Scalable Modeling of Non-Traditional Devices for Emulytics	$0	$563,778	$563,778
200190	Polarized Radar for Detection and Automatic Non-Visual Assessment of Unmanned Aerial Systems	$0	$348,747	$348,747
200191	Quantifying Uncertainty in Emulations	$0	$372,373	$372,373
200193	A Novel Approach to Foot and Mouth Disease Early Detection, Epizootic Surveillance, and Differentiating Infection from Vaccination Status	$0	$528,290	$528,290
200194	Highly Sensitive Atomic Electrometry for Non-Invasively Detecting and Diagnosing Electronics	$0	$463,612	$463,612
200195	Xenon Atom Trap Trace Analysis Enabled by Optical Isotopic Enrichment	$0	$373,018	$373,018
200196	Engineered Materials for Deactivation of Chemical Agents in Non-Aqueous, Non-Corrosive Environments	$0	$363,372	$363,372
200197	Enabling Hydrogen Infrastructure through Surface Passivation of Structural Materials	$0	$639,690	$639,690
200198	Studying Crystallization Mechanisms to Control Film Growth and Functional Performance	$0	$485,745	$485,745
200199	Engineering Next-Generation Zero Thermal Expansion Composite Materials for Additive Manufacturing Technologies	$0	$262,039	$262,039
200200	Predicting the Friction Behavior of Body-Centered Cubic Metal and Alloys	$0	$527,353	$527,353
200201	Mechanistic Origins of Stochastic Rupture in Metals	$0	$515,163	$515,163
200202	Making Density Functional Theory Work for all Materials	$0	$208,945	$208,945
200203	Magnetic Nanocomposites for High Performance Inductor Materials	$0	$617,180	$617,180
200204	Investigating Phase Evolution in Chemical Wavefronts Subject to High Heating Rates	$0	$586,789	$586,789
200226	Rad Hard Devices Science Using Quasi-Electric Fields	$0	$437,803	$437,803
200227	Additional Processing of Commercial Fin Field Effect Transistor Devices and Their Radiation Properties	$0	$287,822	$287,822
200228	Near Infrared Nanophotonics through Dynamic Control of Carrier Density in Conducting Ceramics	$0	$548,735	$548,735
200229	Active and Nonreciprocal Radio-Frequency Acoustic Microsystems	$0	$646,696	$646,696
200230	What is Happening in Narrow-Band-Gap Devices? - Radiation Induced Defects and Recombination	$0	$392,536	$392,536
200231	A Truly Micro-scale Low Cost, Size, Weight, and Power Gyroscope based on Optomechanical Oscillation	$0	$505,053	$505,053
200232	Digital Electronics at the Atomic Limit	$0	$505,073	$505,073
200233	MilliKelvin High-Electron-Mobility Transistor Amplifiers for Low Noise, High Bandwidth Measurement of Quantum Devices	$0	$198,650	$198,650
200236	Developing Thermally Activated Acid Release Agents	$0	$153,891	$153,891
200237	Understanding Silicon-Decorated Nanoporous-Carbon Anodes for High-Performance Lithium-Ion Energy Storage	$0	$240,337	$240,337
200238	Engineering Spin-Orbit Interaction in Silicon	$0	$251,221	$251,221
200240	Electro-optical Control over Silicon Vacancy Center Emission in Diamond	$0	$595,026	$595,026
200241	Nanocomposite Films with Tunable Physical Properties as Robust Corrosion Barriers	$0	$487,432	$487,432
200242	Targeting a 100X Reduction from Design to Analysis: An Agile Workflow for Stronglink Design	$0	$563,332	$563,332

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200243	Agile Component Design Through Integrated Diagnostics and Computational Optimization	$0	$634,729	$634,729
200245	Rectenna Thermal Power Supply	$0	$396,663	$396,663
200248	Dynamic Strain Aging in Additive Manufactured Alloys and Components	$0	$617,191	$617,191
200253	Novel Materials to Enable Future Weapon Architectures	$0	$441,433	$441,433
200254	Non-Destructive Evaluation for Encapsulated Component Qualification	$0	$677,388	$677,388
200256	Advanced Positional Awareness Employing eXtremely Cold Atoms	$0	$432,176	$432,176
200257	A Silicon/compound semiconductor Photonics Platform for Optical Data Communications and High Functionality Photonics	$0	$563,221	$563,221
200260	Investigation of 10-28 nanometers Commercial Integrated Circuits for use in Nuclear Weapon Radiation Environments	$0	$350,335	$350,335
200264	Single Event Effects in Sandia's Semiconductor Devices and Acceptance Testing in Integrated Circuits	$0	$460,845	$460,845
200265	Polynomial Chaos methods in Xyce for Embedded Uncertainty Quantification Circuit Analysis	$0	$514,515	$514,515
200267	Development of Fast Pulse Intense Neutron Generation Capability by Beam-Target Interaction on Hermes-III for Radiation Effects Testing	$0	$389,395	$389,395
200268	Stochastic Shock in Advanced Materials	$0	$771,644	$771,644
200269	Benchmarking three-dimensional Magnetohydrodynamic Simulations of Electrothermal Instability Growth	$0	$643,934	$643,934
200271	High-Energy X-Ray Detectors using Fast, High-atomic number Semiconductors	$0	$359,513	$359,513
200275	Prediction and Design of Nonlinear Systems and their Emergent Behavior	$0	$291,431	$291,431
200276	Towards Multi-Fluid Multi-Physics Continuum Plasma Simulation for Modeling Magnetically-Driven Experiments on Z Machine	$0	$580,408	$580,408
201095	Detecting Defects in three-dimensional Integrated Devices with Magnetic-field Probe	$0	$49,824	$49,824
201112	A Hydrogen and Helium Isotope Nanoprobe	$0	$98,738	$98,738
201113	Temporal Cyber Attack Detection	$0	$98,744	$98,744
201234	Can IBM Watson be Taught to be a Nonproliferation Analyst Tool?	$0	$332,032	$332,032
201319	Cell Gels - Building Reversible Networks from Boronic Acid and Cell Membrane Chemistry	$0	$81,584	$81,584
201545	Mechanical Communication using Piezoelectric-Magnetoelastic Transducers	$0	$566,510	$566,510
201876	Engineering Microbial Assassins to Target Bacterial Pathogens	$0	$72,268	$72,268
201879	Efficient, Predictive Tomography of Multi-Qubit Quantum Processors	$0	$78,430	$78,430
201939	Tools and Techniques for PRESTIGE (PRactical Evaluation and Synthesis of Trust In Government systEms)	$0	$1,518,270	$1,518,270
203202	Nano-Engineering of Detector Surfaces to Offer Unprecedented Imager Sensitivity to Soft X-rays and Low Energy Electrons	$0	$261,010	$261,010
203429	Topological Quantum Material for Quantum Computation	$0	$1,220,712	$1,220,712
203433	A Domain-Specific Language for High-Consequence Control Software	$0	$261,357	$261,357
203537	An Exascale Computational Simulation Capability for Pervasive Fracture & Failure of Structures	$0	$236,420	$236,420
203538	Quantum Frequency Conversion in Lithium Niobate Microsystems	$0	$107,332	$107,332
203539	Mitigating Charge Carrier Generation in Silicon to Enhance Backside Laser Failure Analysis	$0	$331,046	$331,046
204390	Controlled Phase Gate with Rydberg Atoms	$0	$46,179	$46,179
204391	Tunable Impedance Spectroscopy Sensors via Selective Nanoporous Materials	$0	$99,091	$99,091

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204392	Carbon Monofluoride Based High Voltage Thermal Battery Cathode	$0	$54,427	$54,427
204400	Hydrothermal Sintering of Coordination Polymers for High Energy Density Dielectrics	$0	$54,370	$54,370
204404	Increasing Yield of Actionable Information from Observational Human Subjects Studies	$0	$68,988	$68,988
204405	Extending Hypersonic Diagnostics to the Third Dimension	$0	$94,805	$94,805
204724	Renewable Hydrogen Production via Thermochemical/Electrochemical Coupling	$0	$99,555	$99,555
204725	Inkjet Printing Metal Organic Frameworks for Next Generation Electronics and Optoelectronics	$0	$197,711	$197,711
204941	Fingerprinting Microstructural Controls on Larger-scale Deformation and Fluid Flow in Porous Media	$0	$113,133	$113,133
204977	Signatures of Genome Editing	$0	$919,755	$919,755
205750	Magneto-Inks: Increasing Materials Reliability in Engineered Devices	$0	$104,108	$104,108
206338	System of System Model Development for Evaluating Electro Magnetic Pulse Resilient Grid Mitigation Strategies	$0	$91,990	$91,990
206533	Peridynamic Theory as a New Paradigm for Multiscale Modeling of Sintering	$0	$38,805	$38,805
206536	Testing the Possibility of Magnetic Contrast Imaging Based on Circular and Linear Dichroism using Photoemission Electron Microscopy	$0	$82,596	$82,596
206537	Achieving Optimum Performance in Soft Ferromagnetic Alloys through Additive Manufacturing	$0	$63,321	$63,321
206538	Validation of Electron-Photon-Phonon Interaction Model for Laser-Triggered Sprytron	$0	$72,352	$72,352
206541	In Situ Battery Spectroscopy: A Novel Approach to Investigate Unmodified Working Batteries	$0	$60,313	$60,313
206542	Evaluating the Capability of High-Altitude Infrasound Platforms to Cover Gaps in Existing Networks	$0	$96,627	$96,627
206817	Investigation of Novel Glass/Ceramic Composite Electrode Structure for Alkali Ion Batteries	$0	$117,306	$117,306
206818	Physics of Impinging Water Droplets on Inclined Glass Surfaces	$0	$39,619	$39,619
206861	Improved Industrial Control Systems Resilience Through Automated Detection and Response	$0	$221,391	$221,391
206870	"Proof-of-Work" for Securing the Internet-of-Things Networks	$0	$53,380	$53,380
206985	Spectral Dominance: Expanding Radio Frequency Antenna Bands into the Optical Regime	$0	$51,026	$51,026
Total # of Projects for SNL: 344	**Total Equipment Cost for SNL: $0**	**Total Other Cost for SNL: $150,525,045**	**Total Cost for SNL: $150,525,045**	
SRNL - Savannah River National Lab				
LDRD-2014-00029	Direct lithium tritium Electrolysis in a Metallic Lithium Fusion Blanket	$0	($5,507)	($5,507)
LDRD-2014-00079	Next Generation Betavoltaic Cells – Increasing Power Density	$0	$4,743	$4,743
LDRD-2014-00099	Smart Manufacturing: replacing analytical sample control with model predictive control	$0	$25,826	$25,826
LDRD-2014-00100	Low Temperature Waste Form Process Intensification	$0	$3,674	$3,674
LDRD-2014-00127	Electrodialysis for Intensification of Aqueous Polishing and Other Separations	$0	$17,447	$17,447
LDRD-2015-00002	Development of Liquid Phase Water Detritiation Technology	$0	$116,430	$116,430
LDRD-2015-00010	Characterization of High Explosives Detonations Via Laser-Induced Plasmas	$0	$11,380	$11,380
LDRD-2015-00014	Functionalized Magnetic Mesoporous Silica Nanoparticles for Uranium and Technetium Removal: Defining Engineering Parameters for Applications	$0	$15	$15
LDRD-2015-00040	Magnetically induced heat generation for controlled hydrogen isotope release from nano-hydrides	$0	$6,607	$6,607
LDRD-2015-00057	Multi-Component Separation and Purification of Natural Gas	$0	$2,438	$2,438

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LDRD-2015-00058	Graphene-Based Gas Separation Membranes	$0	$7,286	$7,286
LDRD-2015-00059	Resilient Electrical Grid Syncrophasor	$0	$3,338	$3,338
LDRD-2016-00015	Advanced Ultrafast Spectroscopy for Chemical Detection of Nuclear Fuel Cycle Materials	$0	$397,544	$397,544
LDRD-2016-00023	Hyperspectral Analysis	$0	$205,027	$205,027
LDRD-2016-00025	Non-Platinum Group Metal Fuel Cell Catalysts	$0	$266,363	$266,363
LDRD-2016-00026	Plutonium Anion Exchange Process Intensification	$0	$213,618	$213,618
LDRD-2016-00029	Hydrogen Isotope Separation by Nanosized Palladium - Isoelectronic Rhenium-Silver Alloys	$0	$3,459	$3,459
LDRD-2016-00031	Characterization of the Environmentally Induced Chemical Transformation of Uranium Tetrafluoride	$0	$232,462	$232,462
LDRD-2016-00034	On-line Underground Cable Diagnostic System Using Time Domain Reflectrometry and Cable Signal Subtraction	$0	$257,205	$257,205
LDRD-2016-00035	Metal Hydride Thermal Energy Storage Material Development for Dish-Stirling Systems	$0	$194,728	$194,728
LDRD-2016-00037	Problematic Contaminants (Technetium-99, Mercury) for Tank Waste Treatment and Disposal	$0	$240,817	$240,817
LDRD-2016-00038	Selective Adsorption /Purification of Natural Gas Using Tunable Adsorbents	$0	$231,291	$231,291
LDRD-2016-00048	Use of Diffusive Gradients in Thin Films as an alternative monitoring tool for inorganic environmental contaminants	$0	$207,461	$207,461
LDRD-2016-00049	Understanding the Effect of Impurities on the Plutonium Ionization Efficiency with Thermal Ionization Mass Spectrometry	$0	$5,309	$5,309
LDRD-2016-00052	Microencapsulation of Plutonium Oxide in a low-water cement-based waste form	$0	$285,341	$285,341
LDRD-2016-00053	Explore Innovative Chemistry of Natural Gas Conversion to Dimethyl Ether	$0	$369,484	$369,484
LDRD-2016-00054	Lithium Isotope Electrochemical Separation in the Molten State	$0	($5,178)	($5,178)
LDRD-2016-00062	Synthesis of Zeolite Materials for Noble Gas Separation	$0	$416,611	$416,611
LDRD-2016-00066	Mercury Removal and Stabilization in the Subsurface using Vapor Phase Sulfur	$0	$74,699	$74,699
LDRD-2016-00070	A Next Generation Digital Counting System For Low-Level Tritium Studies	$0	$4,993	$4,993
LDRD-2016-00071	Advanced Atmospheric Modeling Techniques for Non-Proliferation Applications	$0	$149,137	$149,137
LDRD-2016-00074	Development of advanced processing technologies for plutonium oxide production	$0	$6,860	$6,860
LDRD-2016-00081	Effects of power line noise on Supervisory Control And Data Acquisition system stability	$0	$243,056	$243,056
LDRD-2016-00107	Solid State nuclear magnetic resonance evaluation of Carbon Dots and fluidic lithium borohydride on Carbon-60	$0	$4,375	$4,375
LDRD-2017-00003	Location Authentication Platform to Increase Defense-In Depth for Transactive Controlling of Buildings	$0	$142,177	$142,177
LDRD-2017-00005	Silver-iodine Secondary Waste Stabilization: Multiscale Evaluation	$0	$385,776	$385,776
LDRD-2017-00012	Power Hardware-in-the-Loop Testing of Distribution Solid State Transformer Controlling a Battery Energy Storage System at the Electrical Grid Research Innovation and Development Facility	$0	$244,431	$244,431
LDRD-2017-00014	Functionalized Porous Zero-Valent Iron for Remediation/Removal of Technetium from Aqueous Systems	$0	$270,726	$270,726
LDRD-2017-00015	Understanding of local structure-function relationships of zeolites used in industry through polarized Raman Spectroscopy	$0	$297,673	$297,673
LDRD-2017-00017	Dissolution of Used Nuclear Fuel using a tributyl phosphate/n-paraffin Solvent	$0	$298,197	$298,197
LDRD-2017-00025	Reduced Graphene Oxide as Filament Material for Thermal Ionization Mass Spectrometry with a Focus on Plutonium and Uranium Analysis	$0	$251,788	$251,788
LDRD-2017-00028	Room Temperature Sieving of Hydrogen Isotopes Using two-dimensional Materials	$0	$399,937	$399,937

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LDRD-2017-00030	Evaluation and Uncertainty of a New Method to Detect Suspected Nuclear and Weapons of Mass Destruction Activity	$0	$190,406	$190,406
LDRD-2017-00032	Virtual/Augmented Reality Robotic Interface	$0	$213,395	$213,395
LDRD-2017-00035	Organically Bound Tritium Behavior in Trees and Plants	$0	$235,830	$235,830
LDRD-2017-00037	Wire Arc Additive Manufacturing	$0	$373,326	$373,326
LDRD-2017-00050	Designing a Slag Composition to Optimize Technecium-99 Retention in Oxidized Grouts	$0	$275,814	$275,814
LDRD-2017-00058	Advanced Cloud Forecasting for Solar Energy's Impact on Grid Modernization	$0	$129,301	$129,301
LDRD-2017-00068	Self-Propagating Solution Synthesis of gadolinium zirconate Pyrochlores for Plutonium Disposition	$0	$279,903	$279,903
LDRD-2017-00070	Optimization of Handheld Gas Samplers	$0	$179,180	$179,180
LDRD-2017-00076	Synchrotron-Based Microstructural Characterization Method Development for Plutonium Oxides	$0	$245,247	$245,247
LDRD-2017-00088	Cross-cutting High Surface Area Graphene-Based Frameworks with Controlled Pore Structure and Dopants	$0	$270,969	$270,969
LDRD-2017-00098	Controllable Electromagnetic Pulse Test Bed for Extra High Voltage Transformers	$0	$51,881	$51,881
LDRD-2017-00099	Dynamic Precision Timing Using Iridium Satellite Constellation	$0	$254,834	$254,834
LDRD-2017-00101	Toward Next Generation Monitoring and Prediction of Corrosion/Radiation Damage	$0	$23,224	$23,224
LDRD-2017-00102	Use of Process Imaging to Improve the Performance of Centrifugal Contactors	$0	$32,380	$32,380
LDRD-2017-00103	Process Imaging Techniques for Improving Coalescer Performance	$0	$41,010	$41,010
Total # of Projects for SRNL: 57	**Total Equipment Cost for SRNL: $0**	**Total Other Cost for SRNL: $9,285,744**	**Total Cost for SRNL: $9,285,744**	
SRP - Savannah River Site				
SR14008	Degradation Resistant Carbon Nanotube Reinforced Elastomer for Tritium Service	$0	$58,777	$58,777
SR15012	Evaluation of Alternate Societa Apparecchi Elettrici e Scientifici (Italian company) Hydrogen Getters	$0	$10,717	$10,717
SR15029	Evaluation of Potential Inline Analytical Capabilities	$0	$12,475	$12,475
SR16009	Durable Water Splitting Using Thermochemical Cycles of Nanostructured Metal Oxides	$0	$183,071	$183,071
SR16017	Lanthanum Nickel Aluminum .75 Bed Life Extension	$0	$151,124	$151,124
SR16022	Passivation of Stainless Steel Components by Electropolishing and Vacuum Heat Treatment	$0	$238,758	$238,758
SR16026	Two-Dimensional Materials for the Passivation of Stainless Steel Surfaces	$0	$202,212	$202,212
SR16031	Development of Future Thermal Cycling Absorption Process Replacement Capabilities	$0	$621,317	$621,317
SR16032	Enhanced Pinch Weld Electrode	$0	$128,954	$128,954
SR17007	Comprehensive Automated Pinch Weld System	$0	$143,113	$143,113
SR17011	Puncture-cut Resistant Glovebox Gloves with Low Tritium and Oxygen Permeation	$0	$330,359	$330,359
SR17018	Enhanced Process to Demonstrate Helium-3 Recovery from Other Sources	$0	$12,387	$12,387
SR17024	Characterization and Tritium Aging of Lanthanum Nickel Aluminum.85 for Regenerative Testing	$0	$166,587	$166,587
SR17042	Universal Unloading Station	$0	$62,241	$62,241
Total # of Projects for SRP: 14	**Total Equipment Cost for SRP: $0**	**Total Other Cost for SRP: $2,322,092**	**Total Cost for SRP: $2,322,092**	
TJNAF - Thomas Jefferson National Accelerator Facility				
2016-LDRD-2a	Generation and Characterization of Magnetized Bunched Electron Beam from Direct Current Photogun for Jefferson Lab Electron-Ion Collider Cooler	$0	$261,236	$261,236
2016-LDRD-4a	Nuclear Gluons with Charm at the Electron-Ion Collider	$0	$178,779	$178,779
2017-LDRD-04	Geometry Tagging for Heavy Ions at the Jefferson Lab Electron-Ion Collider	$0	$140,919	$140,919
2017-LDRD-11	Phenomenological Study of Hadronization in Nuclear and High-Energy Physics Experiments	$0	$98,769	$98,769
Total # of Projects for TJNAF : 4	**Total Equipment Cost for TJNAF : $0**	**Total Other Cost for TJNAF : $679,703**	**Total Cost for TJNAF : $679,703**	

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Y-12 - Y-12 National Security Complex				
PD15A540	Additive Machine Tool Install & Research & Development Testing	$0	$1,554,420	$1,554,420
PD15E610	Mercury Stabilization for Off-Site Disposal	$0	$33,662	$33,662
PD15F170	Enhanced Programmability for Alpha 1 Machining	$0	$147,963	$147,963
PD15M340	Gas Content in Microwave Melted Castings	$0	$253,976	$253,976
PD15M650	Residual strains and texture in uranium foil and alloy casting	$0	$299,339	$299,339
PD15N360	Development of New Uranium Quantitative Holdup Equipment & Analysis Software	$0	$213,325	$213,325
PD15N610	All Optical Determination of Isotopic Enrichment of Actinides	$0	$109,964	$109,964
PD15Q250	Develop servo card interface for Coordinate Measuring Machine controller	$0	$22,041	$22,041
PD15Q630	High Precision Isotope Ratio by Femtosecond Laser Induced Breakdown Spectroscopy	$0	$139,378	$139,378
PD15S060	Advanced Thermal Decomposition/Distillation	$0	$24,722	$24,722
PD15S140	Lithium Purification Chemistry	$0	$423,468	$423,468
PD15S370	Modern Lithium Crusher	$0	$89,361	$89,361
PD15W830	Tactical Wireless Evolution	$0	$68,400	$68,400
PD16E970	Novel Screening Method for Dust Explosions	$0	$398,618	$398,618
PD16M480	Thermal Spray Crucible Coatings for Microwave	$0	$87,511	$87,511
PD16N080	Manufacturing Innovation Network	$0	$470,167	$470,167
PD16N230	Chalcopyrite based Neutron Radiography	$0	$259,053	$259,053
PD16Q240	Boltless Conflat Flange Containers	$0	$130,731	$130,731
PD16Q250	Bulk-sample Direct Contact Inductively Coupled Plasma Mass Spectrometry	$0	$13,200	$13,200
PD16Q260	Complex Matrix Beryllium Sample Preparation Development and Analytical Benchmarking	$0	$148,079	$148,079
PD16Q290	Dual Resolution Three-Dimension Surveillance Microscope	$0	$194,016	$194,016
PD16Q440	Hand-held Laser Induced Breakdown Spectroscopy Evaluation	$0	$229,911	$229,911
PD16Q500	Phased Array Ultrasonic Testing - Wheel Probe and Software Prove-In	$0	$340,118	$340,118
PD16Q890	Computed Tomography Testing and development	$0	$466,293	$466,293
PD16Q930	Direct Particle Size Analysis of Dry Materials	$0	$99,934	$99,934
PD16S000	Automated field calibration moisture standard	$0	$462,840	$462,840
PD16S500	Zone Refining - Remove Oxygen contamination from Lithium Hydride using a zone melting technique.	$0	$137,395	$137,395
PD16S640	Near Net Shape Lithium Hydroxide	$0	$54,430	$54,430
PD16S750	Dry Powder Processing Humidity Control	$0	$185,632	$185,632
PD16S830	Lithium Processing in Ionic Solutions	$0	$463,065	$463,065
PD16S950	Plug Detection for Lithium Process	$0	$199,616	$199,616
PD16U040	Uranium Dioxide Passivation scale-up	$0	$39,045	$39,045
PD16U090	Oxide Conversion Facility- Low Level Switches	$0	$15,012	$15,012
PD16U360	Production Prototype Bulk Metal Burner for Low Enriched Uranium and Highly Enriched Uranium	$0	$148,173	$148,173
PD16U570	Special Oxide Centrifuge Data Needs for Nuclear Criticality Safety	$0	$293,230	$293,230
PD16U600	Calciner Demonstration	$0	$1,082,410	$1,082,410
PD16U610	Organic Treatment Improvement	$0	$107,231	$107,231
PD17A020	Dual Use Electron Beam Welder	$0	$1,486,978	$1,486,978
PD17F270	Machining Upgrades - Continue activities initiated under the Interim Machining Capabilities project and demonstrate upgraded machining capabilities that can be used to support Y-12 production needs in the interim period before the new machining facilities become available.	$0	$530,568	$530,568
PD17Q020	Monitoring Purity of Gas Streams used at Y-12 without Laboratory Analysis	$0	$112,486	$112,486
PD17Q040	Local tomography for large field-of-view and linescan imagers	$0	$140,941	$140,941
PD17RR00	Plant Directed Research & Development Rapid Response	$0	$382,511	$382,511
PD17S690	Passivation of Lithium Powders	$0	$89,208	$89,208
PD17S940	Oxygen Analysis in Salt through Karl Fischer Titration	$0	$125,154	$125,154

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PD17S990	Pressure Generators - To continue to develop and demonstrate methods for production of different pressure generating materials for Defense Programs for application to the next generation weapon systems.	$0	$733,821	$733,821
PD17U240	Direct Electrolytic Reduction and Electrorefining	$0	$3,553,476	$3,553,476
PD17U250	Lab-scale Vacuum Arc Remelt for Uranium Alloy Development	$0	$803,250	$803,250
PD17U260	Formation & Evaluation of Energetic Nitrates	$0	$272,091	$272,091
PD17W150	Maintenance Advanced Technology Initiative	$0	$1,500,620	$1,500,620
PD17W160	Predictive Analytics and Interactive Dashboard	$0	$157,804	$157,804
PD17W170	Security Operations Center - This project will apply recent advances in machine learning within the Splunk big data framework to create algorithms that improve anomaly detection for insider threat identification and early warning of cyber attacks, which will provide a prioritized event dashboard for analysts.	$0	$235,508	$235,508
PD17W420	Security Upgrades - The objective of this project is to evaluate or develop technologies in the Y12 environment for possible incorporation into the site's security posture to address emerging threats or improve operational efficiencies. Y12 is charged with minimizing the security footprint, become more efficient, and responsive to change while maintaining productivity, safety and security.	$0	$352,472	$352,472
PDX16019	Autonomous Mobile Bay Equipment Retriever	$0	$666,539	$666,539
PDX16053	Pantex 5-Axis Mill and Coordinate Measuring Machine	$0	$66,636	$66,636

Total # of Projects for Y-12: 54 **Total Equipment Cost for Y-12: $0** **Total Other Cost for Y-12: $20,615,792** **Total Cost for Y-12: $20,615,792**

***The negative project costs reflected in 'Other' column are rare but can occur due to related to refunds, credits, or reversed accruals.**