



U.S. DEPARTMENT OF
ENERGY

Fiscal Year 2016
Report to Congress on
Laboratory Directed
Research and Development
at the DOE National
Laboratories

Report to Congress

United States Department of Energy
Washington, DC 20585

Message from the Chief Financial Officer

As 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 2016*. The report provides the FY 2016 LDRD expenditures by laboratory and weapons production plant, as well as information on the impact and importance of the LDRD Program in advancing the diverse missions of the Federal Government.

In FY 2016, 1,788 LDRD projects at the DOE national laboratories cost \$565.5 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 Harold Rogers**
Chairman, House Committee on Appropriations
- **The Honorable Nita M. Lowey**
Ranking Member, House Committee on Appropriations
- **The Honorable Mike Simpson**
Chairman, House Subcommittee on Energy and Water Development, Committee on Appropriations
- **The Honorable Marcy Kaptur**
Ranking Member, House Subcommittee on Energy and Water Development
- **The Honorable Thad Cochran**
Chairman, Senate Committee on Appropriations
- **The Honorable Barbara Mikulski**
Vice Chairwoman, Senate Committee on Appropriations
- **The Honorable Lamar Alexander**
Chairman, Senate Subcommittee on Energy and Water Development, Committee on Appropriations
- **The Honorable Dianne Feinstein**
Ranking Member, Senate Subcommittee on Energy and Water Development
- **The Honorable John McCain**
Chairman, Senate Committee on Armed Services

- **The Honorable Jack Reed**
Ranking Member, Senate Committee on Armed Services
- **The Honorable Jeff Sessions**
Chairman, Senate Subcommittee on Strategic Forces
- **The Honorable Joe Donnelly**
Ranking Member, Senate Subcommittee on Strategic Forces
- **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, House Subcommittee on Strategic Forces
- **The Honorable Jim Cooper**
Ranking Member, House Subcommittee on Strategic Forces

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

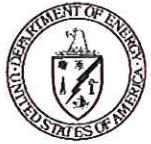
Sincerely,

Alison L. Boore
By Joseph S. Hezir

Executive Summary

As requested in the FY 2001 Energy and Water Development Appropriations Conference Report (H.R. 106-988), the Department of Energy (DOE) has prepared a *Report on Laboratory Directed Research and Development (LDRD) for FY 2016*. The report provides the FY 2016 LDRD expenditures by laboratory, as well as information on the impact and importance of the LDRD Program in advancing the diverse missions of the Federal Government. The Report also includes information on DOE's Plant Directed Research, Development and Demonstration, and the Site Directed Research, Development and Demonstration Programs by weapons production plants.

In FY 2016, 1,788 LDRD projects at the DOE national laboratories cost \$565.5 million. The Department continues to believe that LDRD is a vital asset in the recruitment of a world-class scientific workforce and is critical to the maintenance and development of scientific capabilities that serve DOE's energy and security missions.



FY 2016 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 2016 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 with 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 2016, 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.



Ernest J. Moniz
Secretary of Energy
December 2016

I. Legislative Language

This report responds to the Conference Report (H. Rept. No. 106-988) accompanying the Fiscal Year (FY) 2001 Energy and Water Development Appropriations Act, which requested the DOE Chief Financial Officer “develop and execute a financial accounting report of LDRD expenditures by laboratory and weapons production plant.” It also responds to the National Defense Authorization Act for FY 1997 (Public Law 104-201), 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.” 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 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

The Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq., in Section 31, 42 U.S.C. 2051), directs the Department of Energy (DOE) to ensure the continued conduct of research and development (R&D) and to 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

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.

Development (LDRD) and formally established it at the DOE national laboratories. Today, the 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 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 NNSN'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 2016 LDRD Financial Reporting

In accordance with Section 309 of Division D of the Energy and Water Development Appropriation Act, 2014, (Public Law 113-76) 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 2016 Laboratory Costs and LDRD Costs at DOE Laboratories

<u>Laboratory</u>	<u>DOE-Funded Work (\$M)</u>	<u>Reimbursable Work (RW) (\$M)</u>	<u>Total Lab Certified Cost Base (\$M)</u>	<u>LDRD Costs (\$M)</u>	<u>LDRD Rate (%)</u>	<u>Projects</u>
Ames Lab	51.1	1.1	52.2	1.0	1.92%	9
Argonne National Lab	552.3	119.9	672.2	33.7	5.01%	135
Brookhaven National Lab	438.5	33.0	471.5	11.5	2.44%	48
Fermi National Accelerator Lab	319.8	1.3	321.1	3.3	1.03%	19
Idaho National Lab	778.9	213.3	992.2	17.8	1.79%	71
Los Alamos National Lab	1,761.7	187.1	1,948.8	114.3	5.87%	276
L. Berkeley National Lab	585.1	97.2	682.3	24.6	3.61%	85
L. Livermore National Lab	1,191.6	258.0	1,448.6	85.8	5.92%	182
National Renewable Energy Lab	312.4	37.4	349.8	12.2	3.49%	70
Oak Ridge National Lab	927.7	276.8	1,204.5	44.2	3.67%	184
Pacific Northwest National Lab	576.2	239.3	815.5	39.7	4.87%	218
Princeton Plasma Physics Lab	86.1	2.0	88.1	3.1	3.52%	26
SLAC National Accelerator Lab	212.1	15.9	228.0	7.0	3.07%	34
Sandia National Lab	1,862.6	1,002.2	2,864.8	159.2	5.56%	366
Savannah River National Lab	155.0	27.3	182.3	7.5	4.11%	60
Thomas Jefferson National Accelerator Facility	115.9	6.0	121.9	0.6	0.49%	5
TOTAL LDRD	9,927.0	2,517.8	12,443.8	565.5	4.54%	1,788

LDRD is a cost of doing business 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 P.L. 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 2016 LDRD program cost at the national laboratories was \$565.5 million, which represents 4.54 percent of total cost base at these laboratories.

Each national laboratory conducted a review of the FY 2016 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 2016 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 the Conference Report 107-258 accompanying the Energy and Water Development Appropriations Act, 2002, that requested the Department to notify other Federal agencies that a portion of SPPs will be used to fund LDRD projects. In addition, with the creation of the 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 Acting 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 2016 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 2016 PDRD expenditures by site.

Table 2. FY 2016 PDRD Expenditures

<u>Plant</u>	<u>DOE-Funded Work (\$M)</u>	<u>Reimbursable Work (RW) (\$M)</u>	<u>Total Plant Certified Cost Base (\$M)</u>	<u>PDRD Costs (\$M)</u>	<u>PDRD Rate (%)</u>	<u>Projects</u>
Kansas City Plant	533.3	261.9	795.2	23.7	2.98%	169
Pantex Plant	629.1	0.0	629.1	7.8	1.24%	38
Savannah River Plant	193.6	0.0	193.6	3.5	1.80%	15
Y-12 Plant	847.1	0.0	847.1	21.7	2.56%	88
TOTAL PDRD	2,203.1	261.9	2,465.0	56.7	2.30%	310

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 2016 SDRD Program expenditures.

Table 3. FY 2016 SDRD Expenditures

<u>Site</u>	<u>DOE-Funded Work (\$M)</u>	<u>Reimbursable Work (RW) (\$M)</u>	<u>Total Site Certified Cost Base (\$M)</u>	<u>SDRD Costs (\$M)</u>	<u>SDRD Rate (%)</u>	<u>Projects</u>
Nevada National Security Site	339.2	66.9	406.1	8.9	2.19%	57

VI. Scientific Productivity and Performance

LDRD provides DOE national laboratories the flexibility to support the formulation of their own new theories, hypotheses, and approaches; build new and enhance existing S&T capabilities; and identify and develop technology applications with the potential to advance the DOE mission. Over the years, LDRD projects have realized major science and technology breakthroughs that have been reported widely in the scientific community. The subsequent sections provide examples of key performance results of the LDRD Program for the last several fiscal years.

VII. Workforce Development

The LDRD Program is instrumental in the laboratories' ability to attract promising young scientists and engineers to careers aimed at advancing DOE's mission, thus providing the basis for continually refreshing the laboratory research staff, as well as for the education and training of the next generation of scientists. This includes support for both undergraduate and graduate students working on LDRD projects, technical staff retention resulting from opportunities to retain and hone scientific skills via LDRD, and a range of university collaborations stimulated via LDRD projects. Furthermore, the LDRD Program plays an important role in supporting early-career post-doctoral researchers at the laboratories, as shown in Table 4.

Table 4. Post-Doctoral Researchers Supported by LDRD at the DOE Laboratories in FY 2016

Total # in FY 2016	Total Post-doctoral Count		
	Total # Post-doctoral Researchers at the National Laboratories	Total # of Post-doctoral Researchers Partially or Fully Supported by LDRD Funding ³	% of Post-doctoral Researchers Partially or Fully Supported by LDRD Funding
3,310	1034	31.2%	

VIII. Publications

Publication in the open literature is an important component of any research and development program, especially those that involve the most fundamental scientific studies. Because these reports must first pass through expert reviews by peers in the relevant fields, they are demonstrative of the scientific quality of the knowledge produced through R&D.⁴ The table below provides aggregate numbers of publications for FY 2013-2015 derived from LDRD activities at the DOE laboratories. These statistics demonstrate that LDRD is producing a high volume of outstanding science.

Table 5. Peer-Reviewed Publications, Derived from LDRD Projects

Fiscal Year	Total Publication Count		
	2013	2014	2015
Total # Peer Reviewed Publications	2,109	2,056	2,422

IX. Intellectual Property

As early as 1980, under the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480) and the Bayh-Dole Act of 1980 (P.L. 96-517), Congress identified technology transfer as a mission of the Federal Government, and expressly authorized DOE to make innovative technologies available to the commercial sector through a variety of mechanisms. Since then, DOE has encouraged its national laboratories to find ways to bring the knowledge, intellectual property, facilities, and capabilities they have developed to the market place in order to meet public and private needs.

³ The number of post-doctoral researchers supported by LDRD in FY 2016 includes postdoctoral researchers at the DOE/NNSA laboratories that spent 10 percent or more of their time at a laboratory working on LDRD during the fiscal year.

⁴ There is no standard value for publications across technical fields (e.g., chemists typically publish numerous short papers, mathematicians publish less frequently but more in-depth, and geologists publish accounts of field work).

LDRD projects are a productive component in advancing the DOE technology transfer mission. One example of LDRD's productivity is the number of invention disclosures and patents—a useful indicator in measuring technological strength and innovation—that stem from LDRD projects. The table below illustrates the distribution of patents and invention disclosures for FY 2013-2015.

Table 6. Patents Filed/Granted and Invention Disclosures, Derived from LDRD Projects

Fiscal Year	Total Intellectual Property Count		
	2013	2014	2015
Total # Patents	181	160	188
Total # Invention Disclosures	524	376	428

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.⁵ 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.

⁵The 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.

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Project ID	Project Name	Equipment	Other	FY Total
AMES - Ames Laboratory				
FY2014-SAD-0709	Sensitizers for Dynamic Nuclear Polarization Nuclear Magnetic Resonance Spectroscopy	\$0	\$177,116	\$177,116
FY2015-JCUI-2608	Improving Ductility of High-Silicon Electrical Steel	\$0	\$48,134	\$48,134
FY2015-MPR-0812	Studies of Novel Materials Using Dynamic Nuclear Polarization Nuclear Magnetic Resonance Spectroscopy	\$0	\$179,783	\$179,783
FY2016-FZHA-0501	Graphical Processing Unit accelerated Software for Materials Simulation and Discovery	\$0	\$98,271	\$98,271
FY2016-MTAN-0815	Development of a Novel Modular Thermal Conductivity Measurements Setup	\$0	\$141,574	\$141,574
FY2016-RPRO-0815	Frequency-domain Magnetic Susceptibility Under Pressure and at Ultra-low Temperatures	\$0	\$89,955	\$89,955
FY2016-SBUD-0420	Resonance Ultrasound Spectroscopy of Correlated Materials and Materials at the Edge of Stability	\$0	\$24,499	\$24,499
FY2016-SGUP-0424	In-situ characterization of mechanochemical reactions	\$0	\$71,150	\$71,150
FY2016-VTAU-0423	Development of a high pressure cell for magnetization measurements	\$0	\$83,898	\$83,898
Total # of Projects for AMES: 9	Total Equipment Cost for AMES: \$0	Total Other Cost for AMES: \$914,380	Total Project Cost for AMES: \$914,380	
ANL - Argonne National Lab				
P/ANL2013-165	Integrating Simulation and Observation: Discovery Engines for Big Data	\$0	\$490,483	\$490,483
P/ANL2013-184	Hierarchical Modeling of Self Assembly in Nanostructured Soft Materials at Equilibrium and Far from Equilibrium	\$0	\$74,960	\$74,960
P/ANL2013-216	Directed Assembly and Three-dimensional Characterization of Block Copolymers in Semi-thick Films	\$0	\$283,994	\$283,994
P/ANL2013-219	Transition Edge Sensors for Fundamental Physics	\$0	\$114,282	\$114,282
P/ANL2014-018	Dynamics of Spin Ice	\$0	\$176,042	\$176,042
P/ANL2014-019	Exploring the Universe with Full-Sky Simulations of the Cosmic Microwave Background	\$0	\$138,602	\$138,602
P/ANL2014-025	New Paradigms for High Temperature Superconductivity in Acene-based Materials	\$0	\$184,530	\$184,530
P/ANL2014-046	Plastic Artificial Leaves for Water Splitting	\$0	\$211,742	\$211,742
P/ANL2014-051	Carbon Nano-network as Next Generation Support for Catalysis and Electrocatalysis	\$0	\$190,425	\$190,425
P/ANL2014-054	Thin Film Skyrmill Spin Textures	\$0	\$187,474	\$187,474
P/ANL2014-077	Directly Probing Nanoscale Dynamics in Shear Thickening Complex Fluids	\$0	\$193,175	\$193,175
P/ANL2014-081	Lead-assisted Corrosion/Cracking Mechanisms at the Interface between Lead-containing Solution and Nickel Oxide Surface	\$0	\$197,877	\$197,877
P/ANL2014-084	Probing the Chemistry of Atmospheric Dust Particles Using X-ray Spectromicroscopy: Implications for Climate Science	\$0	\$171,658	\$171,658
P/ANL2014-095	Tuning the Transport Properties of Coupled Majorana	\$0	\$166,756	\$166,756
P/ANL2014-108	Single Cell Structural Genomics of Uncultured Sediment Archaea on the Trail for Novel Proteases	\$0	\$171,155	\$171,155
P/ANL2014-120	Grid Level Energy Storage for Integration of Renewable Energy	\$0	\$249,759	\$249,759
P/ANL2014-127	Development of a Novel Analyzer Systems for Resonant Inelastic X-ray Scattering with better than 10 megelectronvolts resolution	\$0	\$96,708	\$96,708
P/ANL2014-128	Length-scale Bridging Computational Scheme for Structure and Transport	\$0	\$314,418	\$314,418
P/ANL2014-129	The Design and Synthesis of Novel Oxides: Coupling Materials Informatics with a Next-Generation Deposition System Employing In Situ X-Ray Scattering and Photoemission Spectroscopy	\$0	\$314,162	\$314,162
P/ANL2014-132	Identifying Patterns and Association among Hyperspectral Data and Meteorological and Biological Measurements for Investigating Near-Surface Atmosphere-Biosphere Interactions	\$0	\$97,594	\$97,594
P/ANL2014-134	Three Dimensional Coherent Diffraction Imaging Using Polychromatic Hard X-rays	\$0	\$286,066	\$286,066
P/ANL2014-137	High-Temperature Superconducting prototype undulator	\$0	\$212,012	\$212,012
P/ANL2014-139	Fast Electronic Structure Methods for Rapid Reaction Screening for Inorganic Materials Synthesis and Particle Formation	\$0	\$197,925	\$197,925
P/ANL2014-141	Minimizing Environmental Microbial Community Complexity at the Bench: Isolating and Characterizing Minimal Stable Communities Over Time	\$0	\$200,277	\$200,277
P/ANL2014-145	Developing Remote Automated Sensors to Direct Sampling of Aerobic-Anaerobic Switching in Floodplain Ecosystems to Characterize the Response of Microbial Carbon Metabolism at High Temporal Resolution.	\$0	\$275,633	\$275,633
P/ANL2014-151	Developing Predictive Models of Wide Bandgap Semiconductor Synthesis and Processing	\$0	\$489,379	\$489,379
P/ANL2014-157	Development of the technology to enable high-throughput Biology at Speed, a Novel Experimental Framework	\$0	\$251,614	\$251,614
P/ANL2014-160	Developing An Integrated Sensor Network for Science	\$0	\$172,014	\$172,014
P/ANL2014-161	Bridging the Electronic and Atomistic Scales: Force Field Development for Reactive Interfaces from First Principles	\$0	\$384,279	\$384,279
P/ANL2014-167	Improving and Validating Models of the Urban-Climate Connection with Dense Sensor Networks	\$0	\$131,566	\$131,566
P/ANL2014-169	Magneto-Dielectric Composite Substrates Comprised of High Aspect-Ratio Magnetic Nanofibers for Smart Antennas Operating at Microwave Frequency	\$0	\$223,683	\$223,683
P/ANL2014-174	Advanced Pipeline for High-throughput Digitization of Large-scale Collections	\$0	\$92,168	\$92,168
P/ANL2014-175	Automation of In Situ Crystallization Plate Screening and Data Collection at Room Temperature	\$0	\$198,703	\$198,703
P/ANL2014-177	Development of a Computational Fluid Dynamics Multiphase Boiling Capability to predict the Critical Heat Flux in Nuclear Reactor Fuel Assemblies	\$0	\$203,961	\$203,961
P/ANL2014-181	Procurement and Requisition Integrated System - Data Knowledge-based Extreme-scale Resilience	\$0	\$327,699	\$327,699
P/ANL2014-182	Dynamic Data Mirroring for Data-Intensive Science	\$0	\$155,345	\$155,345
P/ANL2014-183	Impact of Radiation and Surface Turbulent Fluxes on the Transition from Stratocumulus to Cumulus Cloud Regime	\$0	\$70,448	\$70,448
P/ANL2014-185	Enabling Sodium-ion Batteries for Grid Storage	\$0	\$126,499	\$126,499

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Project ID	Project Name	Equipment	Other	FY Total
P/ANL2014-191	Defect-localized Spins in Semiconductors for Quantum Optoelectronics	\$0	\$349,962	\$349,962
P/ANL2014-192	Computational Spectroscopy of Heterogeneous Interfaces	\$0	\$311,484	\$311,484
P/ANL2014-194	Crime on the Urban Edge: Simulating the Interface between Transnational and Local Crime	\$0	\$294,438	\$294,438
P/ANL2015-015	Detection of Dark Matter Directionality by means of Columnar Recombination	\$0	\$199,722	\$199,722
P/ANL2015-078	Josephson Plasma Wave-Based Ultra-High Frequency Electronics	\$0	\$159,444	\$159,444
P/ANL2015-091	Next Generation Natural Gas Adsorbent through Rational Design and Modeling	\$0	\$220,932	\$220,932
P/ANL2015-096	Understanding Atomic Scale Uranium Interactions Under Severe Accident Conditions	\$0	\$165,198	\$165,198
P/ANL2015-121	Development of Advanced Oxygen Consumption Nano-Composite Thermochromic Materials for High Performance Smart Windows	\$0	\$295,603	\$295,603
P/ANL2015-129	Economic and Technical Aspects of Nuclear Energy Competitiveness in the Current U.S. Deregulated Electricity Markets	\$0	\$248,802	\$248,802
P/ANL2015-136	Nuclear Materials under Extreme Conditions	\$0	\$247,189	\$247,189
P/ANL2015-139	Implementing a New Extreme-Scale Parallel Programming Model with a Full Sample Application	\$0	\$258,154	\$258,154
P/ANL2015-141	Using Hard X-rays to Accelerate the Synthesis of Materials	\$0	\$288,901	\$288,901
P/ANL2015-144	Framework for Integrating Multi-Modal Imaging of Materials for Energy Storage	\$0	\$332,942	\$332,942
P/ANL2015-145	Understanding Embrittlement in Cast Austenitic Stainless Steels and Stainless Steel Welds	\$0	\$201,547	\$201,547
P/ANL2015-147	Development of a Compact 352 Megahertz/150 Kilowatt Continuous Wave Solid State Radio Frequency Power Amplifier System for Accelerators	\$0	\$298,286	\$298,286
P/ANL2015-149	Integrated Imaging, Modeling, and Analysis of Ultrafast Energy Transport in Nanomaterials	\$0	\$385,000	\$385,000
P/ANL2015-150	Unraveling Mesoscale Spatial-temporal Correlations in Materials Using Coherent X-ray Probes	\$0	\$346,290	\$346,290
P/ANL2015-151	Chemical Vapor Processing for Additive Manufacturing	\$0	\$239,505	\$239,505
P/ANL2015-153	The VeloCIProbe: Ultra-High-Resolution Ptychographic Hard X-ray Nanoprobe	\$0	\$284,662	\$284,662
P/ANL2015-154	Integrated Imaging to Understand and Advance Photocatalysis	\$0	\$336,698	\$336,698
P/ANL2015-157	Sustainable Transportation: Novel Bio-derived Fuel Additives for Improved Vehicle Efficiency	\$0	\$298,238	\$298,238
P/ANL2015-159	Large-scale Modeling and Simulation for an Adaptive and Resilient Power Grid	\$0	\$255,064	\$255,064
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	\$249,569	\$249,569
P/ANL2015-164	Next-Generation Mossbauer Spectroscopy	\$0	\$250,290	\$250,290
P/ANL2015-167	Coherent X-ray Studies of Materials Synthesis and Dynamics	\$0	\$418,565	\$418,565
P/ANL2015-168	The Computational Design of New Functional Materials from Complex Transition Metal Oxides	\$0	\$102,189	\$102,189
P/ANL2015-169	Agent-based Behavioral Modeling of Ebola Spread in Chicago and other Large Urban Areas	\$0	\$389,539	\$389,539
P/ANL2015-170	Biomimetic Approaches for Water Smart Landscapes	\$0	\$89,735	\$89,735
P/ANL2015-171	Genome Engineering of Environmental P. Fluorescens to Investigate Bacterial Interactions with Plant and Other Microbes	\$0	\$225,621	\$225,621
P/ANL2015-172	Determining Mechanical Properties of Material Systems using Parameter-Free Metadynamics	\$0	\$105,596	\$105,596
P/ANL2015-173	Isotope Geochemistry via Sn Isotope Fractionation using Inelastic X-Ray Scattering of Synchrotron Radiation	\$0	\$34,002	\$34,002
P/ANL2015-174	Conversion of Carbon Molecule Paraffins into Liquid-Phase Products	\$0	\$329,024	\$329,024
P/ANL2015-175	Magnetic Phases in Highly Oxidized, Low-Dimensional Oxides	\$0	\$140,325	\$140,325
P/ANL2015-176	Connected & Automated Vehicles development an integrated model combining both traffic flow models and advanced vehicle models	\$0	\$694,285	\$694,285
P/ANL2015-177	Integration of Multiple Infrastructure Dependencies and Interdependencies into Infrastructure Hazard Analysis	\$0	\$794,808	\$794,808
P/ANL2015-178	Towards Iontronics: First- Principles Strategies for Coupling Electronic and Ionic Properties in Complex Oxides	\$0	\$94,479	\$94,479
P/ANL2015-179	Illuminating Linkages Between Microbial Diversity and Biogeochemical Cycling in a Redox Dynamic Environment	\$0	\$322,237	\$322,237
P/ANL2015-180	Functional Analysis of Proteins from a Key Signaling Network Involved in Plant Growth Promoting Bacteria	\$0	\$452,264	\$452,264
P/ANL2015-181	Fine Resolution Reconstruction of Large Volumes of Brain	\$0	\$1,487,732	\$1,487,732
P/ANL2015-182	Developing New Schemes for Nuclear Resonant Scattering Measurements at and Upgraded Advanced Photon Source	\$0	\$142,435	\$142,435
P/ANL2015-183	Implementing New Microscopy Capabilities at the Advanced Photon Source	\$0	\$106,357	\$106,357
P/ANL2015-184	Development of Novel X-ray Tools for Understanding Extreme-pressure Magnetism and Electronic Ordering at Fourth-generation Synchrotron Storage Rings	\$0	\$244,245	\$244,245
P/ANL2015-185	Development of a Cryogenic Correlative Confocal Light Microscope for Integrated Imaging	\$0	\$126,787	\$126,787
P/ANL2016-001	Structure and Dynamics of Chiral Molecules and Radicals	\$0	\$143,294	\$143,294
P/ANL2016-010	A Theory of Out-of-Equilibrium Phase Transitions	\$0	\$164,796	\$164,796
P/ANL2016-020	Nano-mechanical Delivery of Biomolecules into Live Bacterial Cells	\$0	\$186,945	\$186,945
P/ANL2016-023	Real-time Monitoring of Material Structure Evolution in Additive Manufacturing Processes	\$0	\$177,327	\$177,327
P/ANL2016-027	A Novel Gas-Filled Microchannel Plate X-ray Polarimetry Imager	\$0	\$231,694	\$231,694
P/ANL2016-048	A Missing Protein in the Bacterial Methylmercury Pathway	\$0	\$198,469	\$198,469
P/ANL2016-054	Perovskite Halide-based Intermediate-Band Solar Cells	\$0	\$253,841	\$253,841
P/ANL2016-063	Efficient Droplet-Based Environmental Mechanical Energy Harvesting Through Reverse Electrowetting	\$0	\$196,391	\$196,391
P/ANL2016-069	Genetic algorithm Optimization of Interface structure from Electron Microscopy	\$0	\$154,729	\$154,729

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Project ID	Project Name	Equipment	Other	FY Total
P/ANL2016-082	Top Down Fabrication of Large Area Monolayers of two-dimensional Materials	\$0	\$193,455	\$193,455
P/ANL2016-092	Spin Vortex-based Non-volatile Superconducting Memory	\$0	\$190,971	\$190,971
P/ANL2016-094	Ordered Core-shell Nanostructure for Transverse Thermoelectric Applications	\$0	\$180,242	\$180,242
P/ANL2016-098	Images from Inner Space: Exposing Quantum Mechanics within Nucleons and Nuclie	\$0	\$220,212	\$220,212
P/ANL2016-120	New Thin Film Oxide, Chalcogenide and Oxy-chalcogenide Materials Discovery	\$0	\$987,904	\$987,904
P/ANL2016-121	Plasmonic Grating-Launched Nanoscale Light Source for Optical Spectroscopy on Atomically-Resolved Systems	\$0	\$139,742	\$139,742
P/ANL2016-123	New Lithium Rich Semiconductors for Neutron Detection	\$0	\$148,483	\$148,483
P/ANL2016-126	Advanced Control Algorithms For Improving Energy Consumption of Connected and Automated Vehicles	\$0	\$179,226	\$179,226
P/ANL2016-131	Supported Single-Site Catalysts for Selective Alkane Oxidation	\$0	\$305,697	\$305,697
P/ANL2016-133	Managing Emission and Thermal Absorption	\$0	\$332,537	\$332,537
P/ANL2016-135	Event-based Monte Carlo Transport Methods for Next-Generation Node Architectures	\$0	\$154,982	\$154,982
P/ANL2016-136	A Novel Interferometric Terahertz Phase Imager for National Security Applications	\$0	\$100,710	\$100,710
P/ANL2016-139	Models to Observations - a Digital Atmospheric Library	\$0	\$311,047	\$311,047
P/ANL2016-140	Development of Analysis Methods for Non-Destructive Evaluation of Concrete Degradation in Light Water Reactors	\$0	\$355,317	\$355,317
P/ANL2016-143	Detectors for Cosmic Microwave Background Experiments	\$0	\$517,002	\$517,002
P/ANL2016-148	Re-form: Leveraging Field Programmable Gate Array Reconfigurability and Floating-point Capabilities for Next-generation Computing Systems	\$0	\$275,192	\$275,192
P/ANL2016-150	A Conveyer Belt of Nanoliter to Picoliter Droplets for Hard X-ray Pump-probe Experiments	\$0	\$261,036	\$261,036
P/ANL2016-152	Integrated Water-Energy Systems Assessment Framework for Water-Energy Sustainability and Resilience	\$0	\$482,828	\$482,828
P/ANL2016-156	Understanding the Resiliency of Interdependent Infrastructures Using Multi-scale Agent-based Simulation	\$0	\$395,230	\$395,230
P/ANL2016-157	Data-driven Multiscale Coupled Urban Systems Modeling	\$0	\$640,728	\$640,728
P/ANL2016-158	Developing a Program for the Production of Medical Isotopes using the Argonne Electron Linear Accelerator	\$0	\$502,115	\$502,115
P/ANL2016-159	Additive Manufacturing for Nuclear Energy Applications	\$0	\$192,387	\$192,387
P/ANL2016-163	Data-Intensive Computing and the Cosmic Frontier	\$0	\$296,074	\$296,074
P/ANL2016-164	Resolving Land-Atmosphere Interactions at Kilometer Scales: Model and Measurement Needs for Next Generation Earth System Models	\$0	\$21,805	\$21,805
P/ANL2016-165	Establishing a Proof-of-concept for Protein Function Discovery Initiative	\$0	\$344,408	\$344,408
P/ANL2016-167	Superconducting Materials for using the Universe as our Lab	\$0	\$404,539	\$404,539
P/ANL2016-170	Cross-Correlating Ground-Based Optical Surveys with the Cosmic Microwave Background	\$0	\$352,293	\$352,293
P/ANL2016-171	Synthetic Sky Catalogs for Space Based Cosmology Missions	\$0	\$207,093	\$207,093
P/ANL2016-172	Hydrodynamic Simulations with Hardware/Hybrid Accelerated Cosmology Code on Next-Generation Supercomputers	\$0	\$143,042	\$143,042
P/ANL2016-173	Fabrication and Testing of a Borosilicate Microchannel Plate Thermal Neutron Detector with Optimized Geometry	\$0	\$303,632	\$303,632
P/ANL2016-175	Virtual Engine Research Institute and Fuels Initiative 2.0: Next-Generation Engine/Fuel Simulation Codes	\$0	\$344,121	\$344,121
P/ANL2016-179	Development of a Pre-Conceptual Design of a New Tracking System for Charged Particle Tracking System Detector	\$0	\$117,951	\$117,951
P/ANL2016-180	In situ Polarized Spectroscopy of Optically Transparent thermally Reduced Graphene Oxide - Polymer Solar Cells	\$0	\$173,472	\$173,472
P/ANL2016-181	The Search for Weyl Semimetals	\$0	\$142,263	\$142,263
P/ANL2016-182	Core-shell Nanowire Magnetic/Ferroelectric Multiferroic Heterostructure for Voltage Tunable Radio Frequency Devices	\$0	\$120,516	\$120,516
P/ANL2016-183	Understanding and Controlling Charge, Spin, Pseudospins and Lattice Degrees of Freedom in Layered Transition Metal Dichalcogenides	\$0	\$173,534	\$173,534
P/ANL2016-184	Investigation of Solid-Liquid Interfaces in Energy Materials Interfacing Multi-scale Modeling with Experimental Characterization	\$0	\$154,555	\$154,555
P/ANL2016-185	Charge Transport in Nanostructured Materials from ab initio Simulations	\$0	\$153,664	\$153,664
P/ANL2016-186	Ultrafast Spectroscopy of Nanometer-scale Heterojunctions Fabricated by Self-assembly	\$0	\$134,836	\$134,836
P/ANL2016-187	Coherent X-ray Investigations of Defect Dynamics in Next-Generation Nanostructured Materials	\$0	\$139,426	\$139,426
P/ANL2016-188	Understanding the Structure of Matter by studying how to overcome the disadvantages of present magnetic materials in microwave devices	\$0	\$149,865	\$149,865
P/ANL2016-189	Highly Anisotropic Magnetic Materials for Microwave Applications	\$0	\$49,553	\$49,553
P/ANL2016-190	Hybrid Silicon Nanolasers	\$0	\$6,609	\$6,609
P/ANL2016-191	Exploring Next Generation Coherent X-ray Science	\$0	\$163,749	\$163,749
P/ANL2016-240	Recovery of Critical Materials from Post-Consumer Electronics	\$0	\$48,100	\$48,100

Total # of Projects for ANL: 135 Total Equipment Cost for ANL: \$0 Total Other Cost for ANL: \$33,762,841 Total Project Cost for ANL: \$33,762,841

BNL - Brookhaven National Lab				
BNL13-006	Time resolved imaging of X-rays and charged particles	\$0	\$229,737	\$229,737
BNL13-020	Synthetic Control of Lipid Biosynthesis in Plant Vegetative Tissue	\$0	\$74,445	\$74,445
BNL13-022	Tracking Lithium Electrochemical Reaction in Individual Nanoparticles at National Synchrotron Light Source II	\$0	\$225,589	\$225,589
BNL13-024	Elucidating the Role of Nanostructured Domains in Copper Indium Gallium Diselenide Photovoltaic Device Performance	\$0	\$4,313	\$4,313
BNL13-031	Modulation Enhanced Diffraction: a new tool for powder diffraction and total scattering studies	\$0	\$3,644	\$3,644

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Project ID	Project Name	Equipment	Other	FY Total
BNL13-032	Development of At Wavelength Metrology Tools	\$0	\$24,943	\$24,943
BNL13-033	Multidimensional imaging data analysis: from Images to science	\$0	\$28,229	\$28,229
BNL13-034	Atomic resolution elemental mapping using X-ray assisted Scanning Tunneling Microscopy	\$0	\$8,698	\$8,698
BNL14-005	1st Light: Elucidating Solid Interfaces in Energy Storage Systems	\$0	\$509,519	\$509,519
BNL14-021	In Situ Investigation of the Strain Distribution in Next-Generation three-Dimensional Transistors Using X-Ray Nanodiffraction	\$0	\$97,486	\$97,486
BNL14-024	Enable Early Sciences in National Synchrotron Light Source II with Experiment-Driven Big Data Stream System	\$0	\$1,274,655	\$1,274,655
BNL14-028	Tissue-specific metabolic models in plants	\$0	\$342,572	\$342,572
BNL14-035	Operando studies catalytic reactions: Probing model and technical catalysts at high pressures using soft X-rays	\$0	\$196,787	\$196,787
BNL14-036	Correlative microscopy, spectroscopy and diffraction with a micro-reactor	\$0	\$106,722	\$106,722
BNL14-037	Imaging Electronic Texture in High-Temperature Superconductors	\$0	\$214,053	\$214,053
BNL15-003	Bunch-by-Bunch Beam Position Monitor for Relativistic Heavy Ion Collider	\$0	\$123,885	\$123,885
BNL15-005	Advanced Coherent Electron Cooling	\$0	\$287,524	\$287,524
BNL15-006	Design, fabrication and test of a Superconducting Radio Frequency cavity prototype for Relativistic Heavy Ion Collider Energy Recovery Linac	\$0	\$268,614	\$268,614
BNL15-009	Nanoconfined Polymer Electrolytes for Rechargeable Lithium-Metal Batteries	\$0	\$225,006	\$225,006
BNL15-010	Hydrocarbon chemistry on zeolite model systems: towards a detailed understanding of energy-relevant chemical transformations	\$0	\$264,032	\$264,032
BNL15-011	Revealing the structure and dynamics of discrete meso-architectures	\$0	\$217,019	\$217,019
BNL15-020	A new frontier for improving processes for regional and global climate modeling	\$0	\$295,000	\$295,000
BNL15-025	Growth of Self-activated scintillators for dual gamma and neutron detection	\$0	\$242,267	\$242,267
BNL15-031	Inelastic X-Ray Scattering determination of the inter- and intra-particle dynamics of nanoparticle superlattices	\$0	\$144,566	\$144,566
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	\$211,839	\$211,839
BNL15-037	In-situ microscopy investigation of complex manganese oxides for energy storage	\$0	\$214,149	\$214,149
BNL15-038	Segmented Adaptive-Gap Undulator with Different Period Lengths in Segments for Production of High Flux and Brightness Hard X-rays at National Synchrotron Light Source II	\$0	\$362,487	\$362,487
BNL16-004	Chiral magnetic effect: from quark-gluon plasma at Relativistic Heavy Ion Collider to Dirac semimetals at National Synchrotron Light Source II	\$0	\$196,591	\$196,591
BNL16-006	Serial Micro Crystallography at Full Flux	\$0	\$139,389	\$139,389
BNL16-007	Three-Dimensional Ptychography imaging without rotation using highly convergent X-ray beam	\$0	\$111,081	\$111,081
BNL16-010	Single-shot electron beam slicing technology towards ultra-fast imaging	\$0	\$193,522	\$193,522
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	\$283,330	\$283,330
BNL16-021	Characterization of photo-cathodes and photoelectrons in liquid noble gases	\$0	\$247,849	\$247,849
BNL16-022	Investigation of Silicon Photomultipliers for use in Nuclear and Particle Detectors	\$0	\$335,240	\$335,240
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	\$311,922	\$311,922
BNL16-024	Improved X-ray Spectroscopy Detectors	\$0	\$302,052	\$302,052
BNL16-026	Microwave Kinetic Inductance Detectors: from Cosmology to National Synchrotron Light Source II	\$0	\$264,062	\$264,062
BNL16-027	Detector Calibration and Material Analysis - Expanding the Capabilities at National Synchrotron Light Source II	\$0	\$340,227	\$340,227
BNL16-029	Higher-Order-Mode damping for full luminosity of Electron Relativistic Heavy Ion Collider	\$0	\$402,154	\$402,154
BNL16-034	Advanced Silicon Detectors Research and Development	\$0	\$185,135	\$185,135
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	\$240,516	\$240,516
BNL16-037	Exploring hadron structure with ab initio lattice QuantumChromoDynamics calculations and making predictions for Electron Relativistic Heavy Ion Collider	\$0	\$13,502	\$13,502
BNL16-038	Preconceptual Design Study for Large Scale Structure Experiment post Large Synoptic Survey Telescope/Dark Energy Spectroscopic Instrument	\$0	\$24,868	\$24,868
BNL16-039	Machine Learning Assisted Material Discovery	\$0	\$294,882	\$294,882
BNL16-041	Dynamic Visualization and Visual Analytics for Scientific Data at National Synchrotron Light Source II	\$0	\$402,455	\$402,455
BNL16-043	Deep Structured Analysis for Image Datasets from Center for Functional Nanomaterials and National Synchrotron Light Source II	\$0	\$483,905	\$483,905
BNL16-045	Catalysis Program in Carbon Dioxide Activation	\$0	\$337,305	\$337,305
BNL16-046	Strong-Strong Beam-Beam Interaction Studies for a Ring-Ring Based Electron Ion Collider	\$0	\$193,814	\$193,814
Total # of Projects for BNL : 48		Total Equipment Cost for BNL : \$0	Total Other Cost for BNL : \$11,501,581	Total Project Cost for BNL : \$11,501,581

FERMI - FERMI National Accelerator Lab				
FNAL-LDRD-2014-010	Cosmic Microwave Background Detector Development at Fermilab	\$0	\$773,106	\$773,106
FNAL-LDRD-2014-012	Development of High Temperature Superconductors Based Rapid-Cycling Accelerator Magnets	\$0	\$154,586	\$154,586
FNAL-LDRD-2014-016	High Frequency Gallium Nitride Driver	\$0	\$58,288	\$58,288
FNAL-LDRD-2014-025	The Sinuous Target - Generate a new, engineered material for use in high-power accelerator targets	\$0	\$112,227	\$112,227

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FNAL-LDRD-2014-027	From Magic to Method: Characterizing High Voltage in Liquid Argon Time projection chambers with the Breakdown in liquid argon cryostat for high voltage experiments	\$0	(\$5,884)	(\$5,884)
FNAL-LDRD-2014-028	Deployment and operation of prototype charge-couple device array at Reactor Site for detection of Coherent Neutrino-Nucleus Interaction	\$0	\$2,057	\$2,057
FNAL-LDRD-2014-038	Application-Oriented Network Traffic Analysis based on Graphic Processing Units	\$0	\$190,222	\$190,222
FNAL-LDRD-2015-009	High Energy Physics Pattern Recognition with an Automata Processor	\$0	\$230,073	\$230,073
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	\$155,644	\$155,644
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	\$173,978	\$173,978
FNAL-LDRD-2015-021	Transverse and Longitudinal Profile Diagnostics for H- Beams using Fiber Lasers and Synchronous Detection	\$0	\$33,961	\$33,961
FNAL-LDRD-2015-029	Superconducting radio frequency cavities to reach more gradients and enable operation of accelerators	\$0	\$695,079	\$695,079
FNAL-LDRD-2015-031	A comprehensive investigation of a "transformational" integrable optics test storage ring as a "smart" rapid cycling synchrotron for high-intensity beams	\$0	\$110,171	\$110,171
FNAL-LDRD-2016-001	Beam Precision Time Profile Monitor	\$0	\$69,559	\$69,559
FNAL-LDRD-2016-004	Development of an ultra low energy threshold particle detector	\$0	\$72,237	\$72,237
FNAL-LDRD-2016-007	Tuning Axion Detectors with Non-Linear Dielectrics	\$0	\$123,406	\$123,406
FNAL-LDRD-2016-008	Novel Methods for High Performance Superconducting Coating on Copper	\$0	\$97,993	\$97,993
FNAL-LDRD-2016-010	Preparing High Energy Physics reconstruction and analysis software for exascale era computing	\$0	\$189,465	\$189,465
FNAL-LDRD-2016-021	Implement open source High Energy Physics Non Structured Query Language database	\$0	\$46,206	\$46,206
Total # of Projects for FERMI : 19		Total Equipment Cost for FERMI : \$0	Total Other Cost for FERMI : \$3,282,374	Total Project Cost for FERMI : \$3,282,374

INL - Idaho National Lab

I14-009	Development of a Capability for High Temperature Flow, Heat Transfer, and Thermal Energy Storage with Multiple Applications	\$0	\$597,290	\$610,753
I14-010	Use of Linear Variable Differential Transformer-Based Methods to Detect Real-Time Geometry Changes during Irradiation Testing	\$0	\$280,777	\$284,896
I14-025	Minor Actinide and Lanthanide Separations in Alternative Media	\$0	\$363,107	\$378,102
I14-026	Multiscale modeling on delayed hydride cracking in zirconium: hydrogen transport and hydride nucleation	\$0	\$198,622	\$198,622
I14-031	Multidimensional Multiphysics Modeling of Fuel Behavior During Accident Conditions	\$0	\$544,607	\$545,203
I14-032	Controller Area Network Bus Security Across Multi-Sector Platforms	\$0	\$333,391	\$347,095
I14-037	Development of Advanced Nuclear Material Characterization Technology for Security Applications	\$0	\$168,807	\$214,323
I14-041	Uranium Nitride - Uranium Silicide composite ceramic fuel production via Spark Plasma Sintering	\$0	\$127,879	\$148,393
I14-045	End-to-End Radiation Detector Enhancements for Improved Safety and Security in Safeguarded Facilities	\$0	\$94,892	\$152,239
I14-075	Developments of tools and methodologies for uncertainties quantification and validation for the multi-physics fuel performance simulation	\$0	\$315,401	\$315,538
I14-078	Extended Stability Gamma-Gamma Prime Containing Nickel-Base Alloys, post doc	\$0	\$345,605	\$348,458
I14-079	Second Generation Switchable Polarity Solvent Draw Solutes for Forward Osmosis, post doc	\$0	\$248,672	\$250,548
I14-086	Development of a Microgrid/Smartgrid Testbed for Super Lab Initiative with Load Variability Characterization and Control for Renewable Energy Integration, post doc	\$0	\$15,844	\$15,889
I14-093	All Hazards Critical Infrastructure Knowledge Framework	\$0	\$161,558	\$165,613
I14-094	Specific Manufacturing Capability Advanced Armor Materials and Systems Research & Development	\$0	\$151,994	\$237,535
I14-095	In Situ Measurement of Electrolyte Chemistry in Battery Cells During Operation, post doc	\$0	\$95,029	\$100,866
I14-098	Irradiation Effects of Uranium Dioxide	\$0	\$328,805	\$345,562
I14-104	Development of a Multiphysics Algorithm for Analyzing the Integrity of Nuclear Reactor Containment Vessels Subjected to Extreme Thermal and Overpressure Loading Conditions	\$0	\$358,531	\$359,148
I14-106	Understanding The Growth of Ultralong Carbon Nanotubes	\$0	\$120,311	\$124,760
I15-002	Experimental Scenarios of Adversity and Recovery in Aqueous Separations.	\$0	\$267,553	\$301,217
I15-013	Simulation Based Analysis of Procedures and Accident Management Guidelines	\$0	\$224,887	\$225,011
I15-023	Development of Stochastic Three Dimensional Soil Response Capability in the Multiphysics Object Oriented Simulation Environment to Provide Design and Beyond Design Basis Seismic Motions	\$0	\$81,577	\$82,256
I15-032	Development of new method for high temperature thermal conductivity measurements of nuclear materials	\$0	\$167,387	\$249,737
I15-039	Transient Modeling of Integrated Nuclear Energy Systems with Thermal Energy Storage and Component Aging and Preliminary Model Validation via Experiment	\$0	\$382,070	\$382,070
I15-040	Acoustic telemetry infrastructure for in-pile Advanced Test Reactor and treat monitoring	\$0	\$291,327	\$300,744
I15-060	Development of Efficient Transient Reactor Test Facility Modeling Capabilities with Graphite Data Improvement	\$0	\$445,701	\$445,701
I15-083	Visualizing Highly Dense Geospatial Data	\$0	\$147,245	\$149,682
I15-094	Evaluation and Demonstration of the Integration of Safeguards, Safety, and Security by Design	\$0	\$91,171	\$92,504
I15-096	End-to-End Dynamic Program Analysis for Industrial Control Systems with Concolic Execution	\$0	\$63,768	\$65,259

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I15-100	Real time Process Simulator	\$0	\$271,610	\$304,652
I15-111	Adversary Signature Development and Threat Analysis	\$0	\$121,297	\$122,171
I15-125	Phosphoranimines for Advanced Battery Applications, Post Doc	\$0	\$248,185	\$249,616
I15-128	Microstructural Evolution and Mesoscale Coupled Flow-Reaction-Fracturing Processes in Organic Rich Nanoporous Shales, Post Doc	\$0	\$477,161	\$477,933
I15-135	Dynamic Simulations for Large Scale Electric Power Networks in Real Time Environment using Multiple Real Time Digital Power System Simulators	\$0	\$353,533	\$362,705
I15-140	Expanding the Utility of Advanced Chemical Physics Models for Electrolytes	\$0	\$200,481	\$199,921
I15-141	Interfacing Multiphysics Object Oriented Simulation Environment Components to Enhance Capability	\$0	\$98,184	\$98,184
I15-142	New in core neutron diagnostics-develop and characterize a new technology for neutron dosimetry	\$0	\$87,822	\$87,822
I15-144	Electrolyte Reduction of used Oxide Fuel in Molten Salt	\$0	\$251,556	\$251,877
I15-145	Advanced Neutron and X-Ray Imaging at the Transient Reactor Test Facility	\$0	\$198,125	\$198,186
I15-146	A transient kinetic approach to understanding how surface composition impacts a multistep reaction mechanism on complex metal oxide materials	\$0	\$518,165	\$649,018
I16-002	Carbon Feedstock Dissolution and Separation Using Ionic Liquids	\$0	\$241,964	\$257,445
I16-003	Recycling of Tantalum-containing Waste Materials to Recover Tantalum Metal	\$0	\$155,302	\$155,596
I16-009	Change Detection System for Nuclear Applications	\$0	\$48,857	\$49,192
I16-010	Development of a fully coupled radiation damage production and evolution simulation capability	\$0	\$402,077	\$402,757
I16-013	Micromechanistic approach and critical experiments for quantitative predictions of delayed hydride-cracking In zirconium alloys	\$0	\$278,647	\$278,653
I16-017	Evaluation of load following capabilities of existing and new nuclear power reactors in the grid with large scale of renewable energy sources	\$0	\$449,674	\$450,888
I16-026	Computationally Efficient Prediction of Containment Thermal Hydraulics using Multi-Scale Simulation: Feasibility Study	\$0	\$160,731	\$160,731
I16-033	Investigation of Gadolinium-Nanocrystal Gels for Scintillator use in Neutron Detection	\$0	\$38,584	\$49,921
I16-036	Neutron microscope to enable high-resolution neutron tomography at INL	\$0	\$344,539	\$360,409
I16-040	Integration of Prognostic Techniques and Probabilistic Safety Assessment for Online Risk Monitoring	\$0	\$315,910	\$328,828
I16-046	Development of a Synergistic Approach To Study Irradiated Materials Using Coupled Experiments and Simulation	\$0	\$229,678	\$229,679
I16-050	Stress Corrosion Cracking Testing in Supercritical Carbon Dioxide	\$0	\$149,821	\$149,821
I16-055	Object-Oriented Simulation Environment	\$0	\$506,670	\$507,532
I16-058	Predicting Radiation-Induced Microstructural Change via Implementation and Validation of Multiscale Cluster Dynamics in Multiphysics object-oriented simulation environment	\$0	\$94,495	\$94,495
I16-070	Characterization of Neutron Beamlines at Neutron Radiography Reactor	\$0	\$103,019	\$147,888
I16-071	Evaluation of Advanced Digital Neutron Imaging Systems for PIE of Nuclear Fuel	\$0	\$51,057	\$98,939
I16-081	Modeling Thermite Reactions	\$0	\$78,414	\$78,507
I16-085	Production of Fluoroanion Targets for Accelerator Mass Spectrometry	\$0	\$247,190	\$267,269
I16-096	Supporting operator performance and situation awareness in highly automated nuclear power plants	\$0	\$139,070	\$138,829
I16-098	Analysis by Accelerator Mass Spectrometry: Capability Development	\$0	\$146,759	\$197,200
I16-106	Risk Analysis Method Integrating Physical, Cyber and Infrastructure Dependencies	\$0	\$141,405	\$141,464
I16-129	Application of Radioactive Isotope Dilution Technique on Determination of Molten Salt Mass for Electrochemical Recycling Process	\$0	\$150,261	\$150,635
I16-133	Secure Supervisory Control and Data Acquisition Communication System	\$0	\$161,558	\$184,574
I16-149	In-core Qualification of Developmental Instrumentation	\$0	\$224,216	\$246,169
I16-152	Wireless Radio Frequency Signal Identification and Protocol Reverse Engineering	\$0	\$206,661	\$264,712
I16-176	Development of Direct Carbon Fuel Cells	\$0	\$163,259	\$301,044
I16-187	Micro-Scale Technique to Evaluate Grain Boundary Cohesion of Irradiated Alloys	\$0	\$299,198	\$299,198
I16-215	Electrochemical Manufacturing Processes	\$0	\$220,438	\$303,991
I16P6-002FP	Kinetic-based Scale-Up Science for an Energy Efficient Route to Ethylene	\$0	\$171,612	\$196,865
I16P6-003FP	Phenomena Identification and Ranking Table Technique Applied to the MegaPower Heat Pipe Reactor Concept	\$0	\$345,866	\$345,866
I16P6-007FP	Consequence-driven Cyber-informed Engineering Methodology Pilot	\$0	\$36,869	\$36,869

Total # of Projects for INL: 71 Total Equipment Cost for INL: \$0 Total Other Cost for INL: \$17,315,275 Total Project Cost for INL: \$17,315,275

KCP - Kansas City Plant				
19663	Plant Directed Research & Development Metals Additive Manufacturing Machine	\$0	\$1,283,024	\$1,283,024
24680	Direct Write Thick Film Circuit Equipment for Antenna Technologies	\$0	(\$38)	(\$38)
24750	High Temperature Thermal Analysis Equipment - In-situ Thermo-Physical Analysis	\$0	\$29,302	\$29,302
24801	Vibration Channels for an Environmental Test Fixture for Shock Response Testing	\$0	\$0	\$0
24803	MLab Additive Manufacturing Machine for Miniature Builds	\$0	\$11,594	\$11,594
24807	Low Value Equipment Plant Directed Research & Development_Microreactor Pump	\$0	\$27,736	\$27,736
24826	Additive Manufacturing Metallography Analysis Equipment	\$0	\$32,880	\$32,880
24857	Low Value Equipment Plant Directed Research & Development_Radar 2021_704719	\$0	\$431,583	\$431,583
24859	Low Value Equipment Plant Directed Research & Development_Fatigue Tester	\$0	\$298,802	\$298,802
24864	Low Value Equipment Plant Directed Research & Development_Residual Gas Analyzer	\$0	\$71,233	\$71,233
24865	Low Value Equipment Plant Directed Research & Development_Laser Sintering	\$0	\$383,271	\$383,271
	Low Value Equipment Plant Directed Research & Development_Ceramic Processing Equipment	\$0	\$389,318	\$389,318
24889	Plant Directed Research & Development Additive Manufacturing Powder Sieve	\$0	\$39,678	\$39,678
24911	Low Value Equipment Plant Directed Research & Development_Oscilloscope Printed Circuit Board Physical Unclonable Function	\$0	\$19,549	\$19,549

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24918	Low Value Equipment Plant Directed Research & Development _Cryogenic System	\$0	\$51,730	\$51,730
24922	Low Value Equipment Plant Directed Research & Development,_University of Kansas Radar Test Equipment	\$0	\$468,697	\$468,697
24954	Low Value Equipment Plant Directed Research & Development_Extruder for Additive Manufacturing	\$0	\$163,368	\$163,368
24955	Low Value Equipment Plant Directed Research & Development_Launch Simulator	\$0	\$202,920	\$202,920
704330	Gas Transfer System Laser and Deep Tungsten Inert Gas - utilizes additions within the weld wire during gas tungsten arc welding	\$0	\$6,533	\$6,533
704343	Microfluidics and Capsules - to create materials that would be too difficult or impossible to produce due to their size and difficult to control reactions	\$0	\$7,041	\$7,041
704362	Common Tester Architecture Technology - explore an alternative approach to utilizing a web-based application and database	\$0	(\$287)	(\$287)
704439	Test Equipment Additive Manufacturing - making interface hardware that is adaptive and inexpensive	\$0	\$732	\$732
704460	Direct Write Thick Film Circuit for reducing the cost and duration of development schedules through the investment of direct digital manufacturing	\$0	(\$642)	(\$642)
704464	Multi-Machine Qualification- seeks to improve the method in which products are qualified	\$0	\$2,728	\$2,728
704472	Optical Trigger Source Develop - the packaging of a laser has an effect on its performance and reliability	\$0	(\$1,328)	(\$1,328)
704476	Composite Structures - to develop the processes for fabricating structural composite coupons and parts	\$0	(\$358)	(\$358)
704486	Printed Circuit Board Physical Unclonable Function - to improve product security and confidence	\$0	\$144,299	\$144,299
704492	Through Substrate Via Plant Directed Research & Development - to fabricate a through-silicon via on a new application specific integrated circuit	\$0	\$22,357	\$22,357
704493	Application Specific Integrated Circuit Trusted/Counterfeit Test - to develop Laser Terahertz Emission Microscopy	\$0	\$158,294	\$158,294
704499	Pre-Oxide/Glass-Ceramic Sealing - to investigate what effect temperature, time, environment and oxide thickness have on glass-ceramic seals	\$0	\$5,292	\$5,292
704502	Expert Feature Extraction from Digital X-ray Images	\$0	\$177,633	\$177,633
704507	Testing Inorganic Starting Material to support quality control and development efforts	\$0	\$30,423	\$30,423
704524	Shock & Vibration Dynamics - to implement experimental tools to develop validation metrics for numerical models	\$0	\$275	\$275
704529	Silicone Nanocomposites for Advanced Materials Development for Specific Thermal and Mechanical Properties	\$0	\$286,000	\$286,000
704533	Physics/Model Based Assembly Model - virtually testing new designs and processes for assembly modeling	\$0	(\$115)	(\$115)
704537	Additive Manufacturing Part Testing	\$0	(\$47)	(\$47)
704553	Additive Manufacturing - Metals - develop a simulation system to evaluate part warpage before machine execution	\$0	\$115,323	\$115,323
704558	Multi-Dimensional Analysis of Tester and Calibration Data for Enhanced Tester Health and Preemptive Response	\$0	\$1,700	\$1,700
704564	Silicone Supply Security - to develop in-house expertise and a climate of silicone materials experts	\$0	\$986	\$986
704569	Silicone Polymer Scale Down Capability - how processing parameters effect silicone products though small scale studies	\$0	\$1,487	\$1,487
704587	University Senior Design Projects to Support Plant Directed Research and Development	\$0	\$141,668	\$141,668
704589	Center of Excellence Technology & Roadmap Planning	\$0	\$2,625,901	\$2,625,901
704590	Plant Directed Research & Development Test Cell for Eddy Current Displacement, Measurement Accuracy and Multi-Physics Systems	\$0	(\$624)	(\$624)
704596	Variable Focal-Length Lenses with Instantaneous, Direct-View Variable Magnification	\$0	(\$2,797)	(\$2,797)
704599	Lead-Free Material for Lightening Arrestor Connector Functionality - to evaluate potential synthesis and characterization techniques of non-lead based materials	\$0	\$126,043	\$126,043
704603	Shape Optimization - evaluate global shape optimization techniques to enhance the Forging Advisor simulation tool	\$0	(\$647)	(\$647)
704604	Model Based Enterprise Development helps innovate new product introduction, product realization velocity and product quality	\$0	(\$119)	(\$119)
704608	High Temperature Thermal Analysis - to develop high temperature thermal analysis capability	\$0	\$70,323	\$70,323
704609	Advancement of Welding Simulation to include Fluid Effects	\$0	\$123,102	\$123,102
704610	Gamma Ray Imaging - Investigate efficient gamma ray imaging designs optimized for imaging sources at short ranges	\$0	\$268,057	\$268,057
704614	Thick Physical Vapor Deposition Films for Current Viewing Resistor and Force Sensor	\$0	\$386,974	\$386,974
704615	Powder Coating of Low Temperature Non-conductive Materials	\$0	\$87,323	\$87,323
704617	Alternative Security Technology 2 - Evaluating the use of an alternative technology. This is a classified project	\$0	\$280	\$280
704618	Additive Manufacturing Surety Technology 3 - Evaluating the use of an alternative technology. This is a classified project	\$0	\$430,272	\$430,272
704619	Selective Laser Melting Material Feasibility Studies & Development	\$0	\$2,062	\$2,062
704621	Additive Manufacturing Metal Surface Finish for Part Property Modification	\$0	\$235	\$235
704624	Plant Directed Research & Development Virtual Machine Tester - to investigate the most optimum method to add test software's to an existing tester	\$0	(\$57)	(\$57)
704627	Zero Power Sensors that are passive but become active when exposed to particular stimulants	\$0	\$3,134	\$3,134
704628	Development of Three-Dimensional Scanning Processes Utilizing Non-Contact Techniques	\$0	\$7,283	\$7,283

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704633	Additive Manufacturing of Spin Test Tooling - with titanium and stainless steels could enable unique spin test tool approaches	\$0	\$11,505	\$11,505
704634	Application Specific Direct Write and Electrophoretic Deposition Techniques - evaluate the application of aerosol jet, ink filament writing for microelectronic assembly	\$0	(\$4)	(\$4)
704636	Additive Manufacturing: Speed Function Optimization for Arcam Electron Beam Melting	\$0	\$100,996	\$100,996
704637	Titanium Hermetic Materials - rigorous materials selection evaluation to assess potential insulator compositions and titanium base alloys for hermetic applications	\$0	\$88,783	\$88,783
	Selective Laser Melting Electron Beam Melting Characterization			
704639		\$0	\$16,510	\$16,510
704640	Selective Laser Melting Electron Beam Melting Geometry	\$0	\$6,002	\$6,002
704643	Miniature Microwave Circuit	\$0	\$9,092	\$9,092
704644	Combined Environment Test Platform capable of single-axis high onset rotational acceleration, vibration and temperature testing	\$0	\$5,482	\$5,482
	Intra-Tester Wireless Development for Transmission of Data			
704646		\$0	\$860	\$860
704648	Zero Trust Network Development for Encryption	\$0	\$6,405	\$6,405
704651	Non-Contact Measurement for In-Situ Verification during Fabrication or Final Inspection	\$0	\$4,735	\$4,735
704652	Gas Transfer System Laser in Vacuum	\$0	\$124,815	\$124,815
704653	Near Field Communication for Manufacturing	\$0	\$503	\$503
	Optimization of Digital Radio Frequency Memory Technology in order to optimize performance of applications			
704654		\$0	\$222,681	\$222,681
704660	Ultraviolet Photodiode Fabricated Using Graphene and Zinc Oxide Nanowires	\$0	\$235,746	\$235,746
704661	Low Frequency Magnetic Sensors via Novel Magnetic Thin Films for Magnetic Sensitivity	\$0	\$292,527	\$292,527
704662	Molecular Modeling of Polymers Utilizing Applications of Molecular Dynamics, Quantum Mechanics and Dissipative Particle Dynamics.	\$0	\$298,287	\$298,287
704663	Noncontact Vibration Velocity Using Doppler Shift Technologies	\$0	\$1,611	\$1,611
704664	Helical Electromagnetic Launcher Research Integration for Calibration of Accelerometers	\$0	\$263,137	\$263,137
704665	Additive Manufacturing Metal Qualification of Titanium and Aluminum	\$0	\$478,072	\$478,072
704666	Automated Battery Tester for Simultaneous Measurement and Data Formatting	\$0	\$1,168	\$1,168
704667	Three-Dimensional Printing Metallic Connectors & Backshells - to investigate additive manufacture printing	\$0	\$4,300	\$4,300
704669	Rapid Software Defined Radio Development & Deployment	\$0	\$241,938	\$241,938
704670	Thermal Acoustic Generator - to use the traveling sound wave generator to drive piezo devices and create an electrical power source	\$0	\$10	\$10
704671	Additive Manufacturing Carbon Nanotube Reinforced Metal Matrix Composites	\$0	\$22,793	\$22,793
704672	Infrared Vision: Component & Circuit Board Inspection - to greatly reduce rework costs and improve quality	\$0	\$79,104	\$79,104
704674	Safety Project Maturation - to investigate the possibility of manufacturing assemblies using additive manufacturing techniques	\$0	\$9,342	\$9,342
704676	Additive Manufacture of Stronglinks: Proof of Concept - to investigate the use of additive manufacturing to build micro-mechanical products	\$0	\$384,316	\$384,316
	Plant Directed Research & Development Proposal - to determine the behavior of software/firmware from machine language code once it has been programmed into a device.			
704679		\$0	\$120,046	\$120,046
704680	Orbital Situational Awareness - Development of an embedded system that can provide enhanced satellite coverage	\$0	(\$1,075)	(\$1,075)
704682	Statistical Analysis - Detection and Prevention of Product and Technology Non-Conformance	\$0	\$42,263	\$42,263
704685	Plant Directed Research & Development Lead Engineering Account Manager Account	\$0	\$72,369	\$72,369
704686	Quick Response Project for Early Readiness Level Feasibility Studies	\$0	\$19,961	\$19,961
704687	Doppler Radar Sensor Using Ruggedized Sensor Packages	\$0	(\$612)	(\$612)
704688	Future Manufacturing Process Models Utilizing Finite Elemental Analysis	\$0	(\$1,084)	(\$1,084)
704689	Deposition and Testing of Thin, Metallic and Non-Metallic Coatings on Three-Dimensional Parts	\$0	\$1,184	\$1,184
704690	Adjustable Linear Test Slab for Vertical and Horizontal Robust Testing	\$0	(\$3,668)	(\$3,668)
704691	Quick Configurable Secure Wire System Using Wireless Sensor Technologies	\$0	\$223,320	\$223,320
704692	Intelligent Materials Using Photonic Materials on Various Substrates	\$0	\$94,755	\$94,755
704693	Microelectronic Packaging/Packaging Technology Improvements to Solder Joints in an Upper Stacked Configuration	\$0	\$589	\$589
704695	Plant Directed Research & Development Massachusetts Institute of Technology Project	\$0	\$335,897	\$335,897
704696	Polymer Additive Manufacturing - Improving Polymer Interlayer Performance	\$0	\$168	\$168
704697	Packaging and Radio Frequency for the Future Electrical Systems	\$0	\$2,398	\$2,398
704700	Firmware Validation as a Reverse Engineering Tool	\$0	\$90,504	\$90,504
704701	Additive Manufacturing Raw Material Analysis	\$0	\$175,932	\$175,932
704702	Thin Wall Deformation - to develop a stress relief process that will allow machining to meet flatness and contour requirements of product	\$0	\$109,961	\$109,961
704703	Remote Collaboration using Augmented Reality - primary focus on the evaluation of current remote collaboration offerings and the development of custom applications	\$0	\$132,558	\$132,558
704704	Environmental Powered Sensor System	\$0	\$154,848	\$154,848
704705	High Speed One-Shot Pulse Measurement accuracy	\$0	\$7,270	\$7,270
704706	Additive Manufacturing/Metals - Investigate the feasibility of alternative methods for material deposition through the use of finite element analysis tools	\$0	\$121,992	\$121,992
704707	Model-Based Design For Additive Manufacturing - investigate and determine suitability rules based on geometry, tolerances, material, and machine type.	\$0	\$71,760	\$71,760
704709	Achilles III - researching and developing a new Additive Manufacturing capability	\$0	\$277,888	\$277,888

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704711	Techniques for Dynamic Non-Contact Applications	\$0	\$196,962	\$196,962
704712	Analog to Digital Converter to Field Programmable Gate Array Digital Signal Processing & Analysis	\$0	\$104,739	\$104,739
704715	Secure Assembly 1 - evaluate the use of an alternative technology	\$0	\$228,449	\$228,449
704716	Integrated Computational Materials Engineering Development	\$0	\$385,813	\$385,813
704717	Characterization and Testing of Carbon Fiber From Asphaltenes	\$0	\$159,148	\$159,148
704719	Radar 2021	\$0	\$1,532,666	\$1,532,666
704720	Multi-Chip Modules- Land Radio Frequency Integrated Circuits Packaging	\$0	\$194,366	\$194,366
704721	Turning Video into Audio Technology	\$0	\$6,351	\$6,351
704722	Adopting Orphaned Models for Topology Optimization	\$0	\$81,552	\$81,552
704724	Develop High Speed Machining	\$0	\$13,681	\$13,681
704725	Evaluation of Disturbances to Power Lines via Monitoring Techniques	\$0	\$266,929	\$266,929
704726	Solid State High Voltage Switch	\$0	\$123,758	\$123,758
704727	Magnetorheological Fluid Damping - to create a surface which has variable damping characteristics in the context of impact testing	\$0	\$129,466	\$129,466
704728	Advanced Modeling Capabilities	\$0	\$344,429	\$344,429
704729	Embedded Sensing & Inventory - to determine the viability of low frequency wireless communication	\$0	\$125,570	\$125,570
704731	Molded Safing Wheel Ferrites	\$0	\$138,272	\$138,272
704732	Ultrasonic spectroscopy for Delamination Failure	\$0	\$96,700	\$96,700
704733	Cloud Based Centralized Repository and Language Translation Service	\$0	\$34,320	\$34,320
704734	Tailorable Resonant Plate Shock Test System	\$0	\$193,709	\$193,709
704735	Radio Frequency Module	\$0	\$207,543	\$207,543
704736	Secure Wireless Communication - investigate possibility of deploying visible light communications	\$0	\$4,512	\$4,512
704737	Bad USB Research - investigate vulnerability affecting foundational aspects	\$0	\$149,641	\$149,641
704739	Smart Compression Pads	\$0	\$287,995	\$287,995
704740	Size Red Laser Triangulation	\$0	\$19,971	\$19,971
704741	Augmented Reality Vision: Assembly/Inspection	\$0	\$332,625	\$332,625
704743	Baby Blatz - The effects of machine parameters on part properties and characteristics	\$0	\$222,682	\$222,682
704744	Investigate Perimeter Technologies via Video Analytics - Sight Logix	\$0	\$64,035	\$64,035
704747	Next Generation Nuclear Enterprise Tester Architecture Tester	\$0	\$25,242	\$25,242
704751	Develop parameters for Precipitation Hardening Steel for Additive Manufacturing	\$0	\$90,834	\$90,834
704752	Parameter Set Migration for Additive Manufacturing	\$0	\$305,702	\$305,702
704754	Additive Manufacturing Metal Heat Treatment	\$0	\$136,355	\$136,355
704755	Digital Radiographic Methods	\$0	\$60,564	\$60,564
704756	Energetics with Additive Manufacturing	\$0	\$20,038	\$20,038
704757	Deployable Adaptive Cellular	\$0	\$90,585	\$90,585
704760	Frequency Response Inspection	\$0	\$304,907	\$304,907
704761	Manufacturing/System Engineering - develop plan to implement industry standards and approaches	\$0	\$54,467	\$54,467
704762	Exploratory Research of Tester Data	\$0	\$53,158	\$53,158
704763	Alternate Pinch Weld Electrode	\$0	\$28,325	\$28,325
704765	IDEA projects - short term initiatives to evaluate the feasibility of ideas that could turn into full time Plant Directed Research & Development projects	\$0	\$526,948	\$526,948
704766	Plant Directed Research & Development Broadband Receiver	\$0	\$411,689	\$411,689
704767	Direct Laser Melt Sintering Additive Manufacturing Material & Study	\$0	\$310,404	\$310,404
704768	Cryogenic Modeling	\$0	\$79,443	\$79,443
704769	Small Scale Supercomputing	\$0	\$81,089	\$81,089
704770	Copper Development for Additive Manufacturing	\$0	\$85,935	\$85,935
704771	Development of Polymer Additive Manufacturing Lab Capabilities	\$0	\$37,513	\$37,513
704772	National Security Campus Tech Sessions - develop training for critical technical skills	\$0	\$49,121	\$49,121
704773	Advance Techniques & Applications for Computed Tomography	\$0	\$199,637	\$199,637
704774	Unique Chip Identifier	\$0	\$30,518	\$30,518
704775	Densification of Non-Ox Ceramics	\$0	\$153,856	\$153,856
704776	Controlled Structural Damping	\$0	\$27,132	\$27,132
704777	Design & Manufacturing of Cryogenic Systems	\$0	\$91,685	\$91,685
704778	Nanocellulose Metal Matrix Composites	\$0	\$278,714	\$278,714
704779	Augmented Reality for Office of Secure Transportation Operations	\$0	\$114,977	\$114,977
704783	Vector Following Launch Simulation	\$0	\$64,086	\$64,086
704784	Laser Sintering Research & Development System	\$0	\$10,799	\$10,799
704785	Selective Laser Melt Support	\$0	\$18,316	\$18,316
704841	Development of Electromagnetic Compatibility Analysis capabilities	\$0	\$5,296	\$5,296
704844	De-embedded Measurement Traceability Investigation	\$0	\$8,941	\$8,941

Total # of Projects for KCP: 169 Total Equipment Cost for KCP: \$0 Total Other Cost for KCP: \$23,493,486 Total Project Cost for KCP: \$23,493,486

LANL - Los Alamos National Lab				
LANL-20130019DR	Illuminating the Origin of the Nucleon Spin	\$0	\$1,789,463	\$1,789,463
LANL-20130058DR	High Performance Atom-Based Sensors for Fields and Rotations	\$0	\$59,298	\$59,298
LANL-20130783PRD2	Theoretical investigation of nucleon and nuclear structure at very high energies	\$0	\$75,905	\$75,905
LANL-20130785PRD2	Efficient Carbon Nanotube Growth on Graphene-Metal Surfaces	\$0	\$103,313	\$103,313
LANL-20130792PRD2	Mixing and Diffusion in Granular Flows	\$0	\$55,414	\$55,414
LANL-20130805PRD3	Topological Insulators	\$0	\$8,166	\$8,166
LANL-20130808PRD3	Probing and Modifying Intertube Interactions in Semiconducting Carbon Nanotubes	\$0	\$4,533	\$4,533
LANL-20130812PRD3	Understanding and Controlling Magnetism in Multiferroics with Terahertz Pulses	\$0	\$57,694	\$57,694
LANL-20130814PRD4	Ultrafast Vacuum Ultraviolet Spectroscopy of Complex Materials	\$0	\$6,672	\$6,672

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LANL-20140000PRD4	Bayesian Information Gap Decision Analysis	\$0	\$158,261	\$158,261
LANL-20140002DR	Discovery Science of Hydraulic Fracturing: Innovative Working Fluids and Their Interactions with Rocks, Fractures, and High Value Hydro-carbons	\$0	\$1,498,119	\$1,498,119
LANL-20140005DR	Photoactive Energetic Materials for Quantum Optical Initiation	\$0	\$1,439,772	\$1,439,772
LANL-20140011DR	Optical and Laser Spectroscopy of Thorium-229 Electronic and Nuclear Transitions for the Development of Solid State Nuclear Quantum Sensors	\$0	\$1,461,526	\$1,461,526
LANL-20140013DR	Information-Driven Materials Discovery and Design	\$0	\$1,666,417	\$1,666,417
LANL-20140015DR	Probing New Sources of Time-Reversal Violation with Neutron electric dipole moment (EDM)	\$0	\$1,694,927	\$1,694,927
LANL-20140025DR	Multiferroic Response Engineering in Mesoscale Oxide Structures	\$0	\$1,478,872	\$1,478,872
LANL-20140029DR	First Direct Measurement of High-Z/Low-Z Plasma Interface Evolution in Isochorically Heated Dense Plasma	\$0	\$1,637,218	\$1,637,218
LANL-20140033DR	Remote Raman-Laser-Induced Breakdown Spectroscopy Signature Integration	\$0	\$1,656,068	\$1,656,068
LANL-20140046DR	The Role of Short-lived Actinide Isomers in High Fluence Environments	\$0	\$1,465,478	\$1,465,478
LANL-20140049DR	Explosives Signatures for Detection: Nonlinear gigahertz to terahertz Responses	\$0	\$1,359,453	\$1,359,453
LANL-20140051DR	Exploring Mechanisms of Catalysis on Plutonium Surfaces	\$0	\$1,739,553	\$1,739,553
LANL-20140074DR	Next Generation Quantum Molecular Dynamics	\$0	\$1,510,617	\$1,510,617
LANL-20140114DR	Mesoscale Materials Science of Ductile Damage In 4 Dimensions: Towards the Computational Design of Damage-Tolerant Materials	\$0	\$1,386,782	\$1,386,782
LANL-20140121DR	Combating Antibiotic Resistance: Targeting Efflux Pump Systems at Multiple Scales	\$0	\$1,632,876	\$1,632,876
LANL-20140177ER	Spin-state Transitions as a Route to Multifunctionality	\$0	\$330,233	\$330,233
LANL-20140180ER	Hybrid Shock Ignition as an Alternate Concept for Fusion Energy	\$0	\$328,162	\$328,162
LANL-20140200ER	Time Resolved Phonon Spectroscopy for Cryogenic Bolometer Readout	\$0	\$353,542	\$353,542
LANL-20140216ER	Deciphering the Algal Phytoplasm	\$0	\$343,193	\$343,193
LANL-20140237ER	Measuring Winds in the Stratosphere Using Passive Acoustic Sensors	\$0	\$285,677	\$285,677
LANL-20140252ER	Quantum Kinetics of Neutrinos in the Early Universe and Supernovae	\$0	\$306,448	\$306,448
LANL-20140261ER	Beyond the Chemical Reaction Zone: Detonation Product Gases in the Warm Dense Regime	\$0	\$271,655	\$271,655
LANL-20140269ER	Designing the Next Generation Compton Light Source	\$0	\$303,785	\$303,785
LANL-20140270ER	From the Finite Element Method to the Virtual Element Method.	\$0	\$326,431	\$326,431
LANL-20140271ER	Topological Kondo Insulators	\$0	\$338,308	\$338,308
LANL-20140293ER	Semiclassical Modeling of Non-adiabatic Processes in Molecular Materials	\$0	\$304,461	\$304,461
LANL-20140302ER	Large Fluctuations in Stochastic Dynamical Systems	\$0	\$308,769	\$308,769
LANL-20140307ER	Intrinsically Disordered Proteins: New Tools for Old Controversies	\$0	\$327,043	\$327,043
LANL-20140309ER	Electromagnetic Field Control of Cold Molecular Collisions	\$0	\$274,634	\$274,634
LANL-20140323ER	Accelerating Time Integration for Multi-scale Simulations	\$0	\$304,152	\$304,152
LANL-20140348ER	Making nano-Magnesium Oxide a Reality	\$0	\$357,378	\$357,378
LANL-20140351ER	Combined Klystron and Linac	\$0	\$36,488	\$36,488
LANL-20140355ER	Automated Identification and Reverse Engineering of Malware	\$0	\$294,335	\$294,335
LANL-20140362ER	Matter Wave Circuits	\$0	\$417,963	\$417,963
LANL-20140371ER	Toward Tunable Functionalities Using Epitaxial Nanoscaffolding Films	\$0	\$363,475	\$363,475
LANL-20140389ER	Temporal Graphs	\$0	\$321,197	\$321,197
LANL-20140396ER	Chemical Shift Signatures of Nuclear Material	\$0	\$314,252	\$314,252
LANL-20140406ER	Solid-State Gamma-Ray Detectors Based on Quantum Dots	\$0	\$332,956	\$332,956
LANL-20140433ER	Signatures of Reactor Operations from Plutonium Production samples	\$0	\$315,426	\$315,426
LANL-20140444ER	Multi-scale Probabilistic Resuspension Modeling of Spores and Radionuclides from Outdoor Surfaces	\$0	\$335,114	\$335,114
LANL-20140446ER	Direct-gap Group-IV Nanocrystals: Cheap, Versatile Materials for Solar Cells	\$0	\$338,825	\$338,825
LANL-20140456ER	Metal and Semiconductor Nanocrystal Superlattices Under Pressure: Multiscale Tuning of Structure and Function	\$0	\$318,806	\$318,806
LANL-20140458ER	Efficient Method for Large Scale Simulations of Fermionic Gases Interacting with Classical Fields	\$0	\$299,973	\$299,973
LANL-20140483ER	First Direct Observation of Weibel Instability in Collisionless Shocks	\$0	\$343,863	\$343,863
LANL-20140495ER	Interactions of Electrons with Quantum-Confining Systems Probed by Scanning Tunneling Spectroscopy	\$0	\$335,115	\$335,115
LANL-20140504ER	New Chemistry Towards High Purity Uranium and Thorium Nitrides	\$0	\$345,026	\$345,026
LANL-20140540ER	Unraveling Interfacial Charge and Energy Transfer Processes in Single Layer Two-Dimensional Transition Metal Dichalcogenides	\$0	\$374,332	\$374,332
LANL-20140546ER	Discovery and Implication of Negative Ions in the Earth's Magnetosphere	\$0	\$460,395	\$460,395
LANL-20140558ER	Viral Disarmament: A Trojan Protein Approach	\$0	\$354,716	\$354,716
LANL-20140565DR	Optimization and Control of Dynamic Networks	\$0	\$513,920	\$513,920
LANL-20140566DR	Quantitative Biology: From Molecules to Cellular Function	\$0	\$510,428	\$510,428
LANL-20140568DR	Research Enabling a Next Generation Neutron Lifetime Measurement	\$0	\$618,819	\$618,819
LANL-20140580ECR	Laser-Driven Neutron Source for Detection of Nuclear Material	\$0	\$174,579	\$174,579
LANL-20140581ECR	Microscopic Fission Model for Data Needs	\$0	\$30,955	\$30,955
LANL-20140591ER	Multi-Gigaelectronvolt Electron Radiography	\$0	\$296,944	\$296,944
LANL-20140605ECR	Relativistic Electrons in Magnetized Plasmas	\$0	\$226,834	\$226,834
LANL-20140616ER	Photocathodes in Extremes: Understanding and Mitigating High Gradient Effects on Semiconductor Cathodes in x-ray free electron laser	\$0	\$232,717	\$232,717
LANL-20140622ECR	Attosecond Dynamics of Correlated Electrons in f-Electron Materials	\$0	\$53,600	\$53,600
LANL-20140624ECR	Deciphering Nature's Chemical Toolbox: Decoding the Logic of Biosynthetic Assembly Lines	\$0	\$58,306	\$58,306
LANL-20140629ECR	Deployment and Installation Technologies for Distributed Measurement Systems in Inconvenient/Hazardous Environments	\$0	\$74,107	\$74,107
LANL-20140630ER	Microstructure Based Continuum Process Modeling of Weapons Metals	\$0	\$401,691	\$401,691
LANL-20140639ER	Solute and Microstructure Prediction during Processing	\$0	\$504,203	\$504,203

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Project ID	Project Name	Equipment	Other	FY Total
LANL-20140643ER	In situ X-ray Imaging and Diffraction to Understand the Mechanics of Initiation Mechanisms in Explosive Single Crystals	\$0	\$301,198	\$301,198
LANL-20140645ER	Enabling Mesoscale Science: Nonlocal Dislocation-Flux Crystal Plasticity under Shock Loading Conditions	\$0	\$290,291	\$290,291
LANL-20140650ER	Embedded Fiber Sensor Approach for Dynamic Pressure and Temperature Measurements in Explosives	\$0	\$228,135	\$228,135
LANL-20140658PRD1	Design Principles for High Performance Organic Photovoltaics	\$0	\$45,334	\$45,334
LANL-20140659PRD1	Synthesis of Novel Energetic Materials	\$0	\$79,127	\$79,127
LANL-20140661PRD1	Investigating Structure-Directing Agents in Nonconventional Nanowire Synthesis Using a Transmission-Electron-Microscope Flow-Cell Holder	\$0	\$68,055	\$68,055
LANL-20140662PRD1	Tracking Microbial Activity to Predict the Impacts of Climate Change on Ecosystem Function	\$0	\$37,208	\$37,208
LANL-20140664PRD2	Complexes Containing Redox-Active Ligands for the Synthesis of Fuels from Readily-Available Carbon Sources	\$0	\$60,302	\$60,302
LANL-20140665PRD2	Investigating Properties of Quark-Gluon Plasma using Jets and Heavy Quark Production at Relativistic Heavy Ion Collider	\$0	\$207,935	\$207,935
LANL-20140666PRD2	Bottom-up Chemical Synthesis of Large, Well-Defined, and Organo-Processable Nanographene-based Triarylamine for Optoelectronic Applications	\$0	\$175,764	\$175,764
LANL-20140667PRD2	Thermodynamics and Information Processing at the Nanoscale	\$0	\$128,858	\$128,858
LANL-20140668PRD2	Quantum Control of Tailor-designed Photoactive Energetic Materials	\$0	\$183,443	\$183,443
LANL-20140670PRD2	Petabyte-Scale Computational Analyses of Genomic Data to Elucidate Aging Mechanisms	\$0	\$184,094	\$184,094
LANL-20140671PRD2	New Tools to Probe Matter with an Electron-Ion Collider	\$0	\$142,597	\$142,597
LANL-20140672PRD2	Access to Industrially Important Optically Active beta-X-alcohols via Direct Enantioselective Ester Hydrogenation	\$0	\$254,681	\$254,681
LANL-20140673PRD2	Electric Dipole Moments of Hadrons from Lattice Quantum Chromodynamics	\$0	\$124,955	\$124,955
LANL-20140674PRD3	Multi-wavelength Studies of Explosive Astrophysical Transients	\$0	\$120,029	\$120,029
LANL-20140675PRD3	Ultrafast Carrier Dynamics in Novel Two-Dimensional Nanomaterials	\$0	\$109,693	\$109,693
LANL-20140676PRD3	New Room Temperature Multiferroic Thin Films Enabled by Strain Engineering	\$0	\$102,906	\$102,906
LANL-20140677PRD3	Synthesis and X-ray Spectroscopy of Actinide Thiocyanates	\$0	\$103,090	\$103,090
LANL-20140678PRD3	Search for the Topological States in Flourine-electron Systems	\$0	\$43,339	\$43,339
LANL-20140679PRD3	Rational Design of Multiferroics and Influence of Cationic Disorder on Multiferroicity in Perovskites	\$0	\$129,963	\$129,963
LANL-20140681PRD4	Anaerobic, Solvothermal Synthesis of Lanthanide and Actinide Kagome Antiferromagnets	\$0	\$102,069	\$102,069
LANL-20140682PRD4	Studies on Functional Materials: Design and Optimization	\$0	\$33,630	\$33,630
LANL-20140683PRD4	Probing and Controlling the Surface States of Topological Insulators	\$0	\$123,752	\$123,752
LANL-20140684PRD4	Three-Dimensional Nitrogen-Doped Porous Nanographene for High-Performance Supercapacitor	\$0	\$3,930	\$3,930
LANL-20140685PRD4	Linking scaling and mortality theory to understand climate impacts on vegetation	\$0	\$162,302	\$162,302
LANL-20150030ER	Global Tree Mortality Prediction Based on Hydraulic Function Failure	\$0	\$345,122	\$345,122
LANL-20150033DR	Space Hazards Induced near Earth by Large Dynamic Storms - Understanding, Modeling, Predicting	\$0	\$1,656,871	\$1,656,871
LANL-20150044DR	First Measurement of a Nanosecond-Pulsed Neutron Diagnosed Subcritical Assembly	\$0	\$871,184	\$871,184
LANL-20150050DR	Chemical Signatures of Detonation Born From Extreme Conditions	\$0	\$1,516,103	\$1,516,103
LANL-20150057DR	Aging in Delta Plutonium Alloys: A Fundamental Approach	\$0	\$1,223,813	\$1,223,813
LANL-20150058DR	Multi-Scale Kinetics of Self-Regulating Nuclear Reactors	\$0	\$1,764,676	\$1,764,676
LANL-20150080ER	Fighting Back Against Pathogens: Discovery and Validation of Novel Drug Targets	\$0	\$326,245	\$326,245
LANL-20150082DR	A New Approach to Mesoscale Functionality: Emergent Tunable Superlattices	\$0	\$1,524,055	\$1,524,055
LANL-20150088DR	Next-Generation Double Beta Decay Experiment	\$0	\$941,193	\$941,193
LANL-20150090DR	Integrated Biosurveillance	\$0	\$1,523,392	\$1,523,392
LANL-20150098DR	Scalable Codeign Performance Prediction for Computational Physics	\$0	\$1,743,952	\$1,743,952
LANL-20150109DR	Meso-Photonic Materials for Tailored Light-Matter Interactions	\$0	\$1,627,425	\$1,627,425
LANL-20150127ER	Mapping Relativistic Electron Precipitation: Where and When?	\$0	\$320,684	\$320,684
LANL-20150215DR	Cyberphysical Systems and Security	\$0	\$857,711	\$857,711
LANL-20150226ER	Enhanced Photosynthesis through Carbon Concentrating Mechanisms	\$0	\$357,641	\$357,641
LANL-20150236ER	Exploiting Cross-sensitivity by Bayesian Decoding of Mixed Potential Sensor Arrays	\$0	\$314,253	\$314,253
LANL-20150242ER	Ocean Acidification Over the Last 13,000 Years	\$0	\$310,842	\$310,842
LANL-20150300ER	Ultra-sensitive Parallel Micro-Imaging with Atomic Magnetometer	\$0	\$351,424	\$351,424
LANL-20150322ER	Development of pH Responsive Protein Switches to Regulate Energy Capture and Conversion Processes in Photosynthesis	\$0	\$311,679	\$311,679
LANL-20150323ER	Saggregated Fuel-Oxidizer Propulsion for CubeSat Deployment	\$0	\$239,078	\$239,078
LANL-20150337ER	Practical Antennas from Disruptive Technology	\$0	\$308,545	\$308,545
LANL-20150375ER	Thin-Film Heat Switch for Active Thermal Management of CubeSat Payloads.	\$0	\$255,555	\$255,555
LANL-20150394DR	Cold Cathodes for Next Generation Electron Accelerators: Methodologies for Radically Improving Performance and Robustness	\$0	\$1,944,690	\$1,944,690
LANL-20150397DR	Critical Watersheds: Climate Change, Tipping Points, and Water Security Impacts	\$0	\$844,407	\$844,407
LANL-20150414ER	Coupled Arbitrary Lagrangian Eulerian-Adaptive Mesh Refinement for Three-Dimensional Unstructured Grids	\$0	\$326,306	\$326,306
LANL-20150431ER	Sub-Grid Meso-Scale Model for Twinning and Slip Processes	\$0	\$330,628	\$330,628
LANL-20150437ER	Superconducting Nuclear Recoil Sensor for Directional Dark Matter Detection	\$0	\$317,998	\$317,998
LANL-20150454ER	Methane Coupling Chemistry Promoted by Catalysts Containing Inexpensive Metals	\$0	\$335,707	\$335,707
LANL-20150467ER	Globally Optimal Sparse Representations	\$0	\$335,421	\$335,421
LANL-20150476ER	Neutrinos and Fundamental Symmetries in Nuclei	\$0	\$284,217	\$284,217
LANL-20150485ER	Enabling Automatic Parallelism and Transparent Fault Tolerance	\$0	\$323,929	\$323,929
LANL-20150498ER	Inserting Nonlinear/Material Coupling Portable Document Format Information into Turbulent Mixing Models	\$0	\$325,854	\$325,854

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LANL-20150504ER	Higher Order Spin Noise Spectroscopy: from Foundation of Quantum Mechanics to Applications.	\$0	\$361,645	\$361,645
LANL-20150508ER	Assessing the Quantum Physics Impacts on Future X-ray Free-electron lasers	\$0	\$332,894	\$332,894
LANL-20150520ER	Transport Properties of Magnetized High-Energy Density Plasmas	\$0	\$327,643	\$327,643
LANL-20150532ER	Three-Dimensional Porous Nanographene for Highly Efficient Energy Storage	\$0	\$387,306	\$387,306
LANL-20150557ER	Long-time Dynamics using Trajectory Splicing	\$0	\$304,971	\$304,971
LANL-20150567ER	Controlled Helium Release from Composite Plasma Facing Materials through Interface Design	\$0	\$336,974	\$336,974
LANL-20150568ER	Magnetic Rayleigh-Taylor Instability	\$0	\$304,595	\$304,595
LANL-20150575ER	Fundamental Actinium Science In Search of Radiotherapeutics	\$0	\$359,276	\$359,276
LANL-20150577ER	Enhancing the Long-Baseline Neutrino Experiment Oscillation Sensitivities with Neutron Measurements	\$0	\$569,168	\$569,168
LANL-20150594ER	Spatial and Extreme Value Processes for Bridging Micro- and Macro-Scales in Materials	\$0	\$317,865	\$317,865
LANL-20150604ER	Precision 'Bottom-Up' Fabrication of Non-classical Photon Sources	\$0	\$349,505	\$349,505
LANL-20150612ER	Perovskite Solar Cells: The Next Frontier in Energy Harvesting	\$0	\$403,910	\$403,910
LANL-20150613ER	Defect-Induced Emergent Magnetism in (Nonmagnetic) Complex Oxides and their Interfaces	\$0	\$335,613	\$335,613
LANL-20150623ER	Energetic Materials Cocrystal Engineering: Toward Superior Munitions	\$0	\$250,084	\$250,084
LANL-20150628ER	Majorana Fermions for Quantum Information	\$0	\$303,066	\$303,066
LANL-20150646DR	Nuclear Science for Signatures, Energy, Security, Environment	\$0	\$1,410,348	\$1,410,348
LANL-20150647DR	Signature Development in LANL's Earth and Space Sciences	\$0	\$1,534,927	\$1,534,927
LANL-20150656ECR	Electron Transport in Warm and Hot Dense Matter	\$0	\$221,721	\$221,721
LANL-20150659ECR	Controlling the Electronic Structure of Emerging Atomically Thin Materials Through Heterostructuring	\$0	\$221,893	\$221,893
LANL-20150664ECR	Trojan Horse Drug Development Approach: Targeting Gene Dosage Control to Induce Bacterial Suicide	\$0	\$220,522	\$220,522
LANL-20150673ECR	Hand-held Laser-Ultrasound Two-Dimensional Scanner	\$0	\$238,037	\$238,037
LANL-20150683ECR	A Step toward Nuclear Reaction Studies for Applications at Facility for Rare Isotope Beams (FRIB)	\$0	\$263,681	\$263,681
LANL-20150690ECR	Optimization of Compton Source Performance through Electron Beam Shaping	\$0	\$208,637	\$208,637
LANL-20150691ECR	Reducing Data Dimensionality in Seismic Inversion	\$0	\$293,019	\$293,019
LANL-20150693ECR	Toward a Coupled Multi-physics Modeling Framework for Induced Seismicity	\$0	\$212,235	\$212,235
LANL-20150696ECR	A Novel Crystal Plasticity Model that Explicitly Accounts for Energy Storage and Dissipation at Material Interfaces	\$0	\$221,419	\$221,419
LANL-20150700PRD1	A Physics-Based Numerical Model for Next-Generation Laminar Flow Batteries	\$0	\$76,179	\$76,179
LANL-20150701PRD1	Ultra-Sensitive Micro-Magnetic Imaging Endoscope	\$0	\$145,491	\$145,491
LANL-20150702PRD1	Uniaxial Pressure to Elucidate Complex Electronic States in Actinides	\$0	\$139,286	\$139,286
LANL-20150703PRD1	Resolving Kinetic Scales in Three-Dimensional Global Magnetosphere Simulations	\$0	\$43,461	\$43,461
LANL-20150704PRD1	Photophysical Properties of Self-Assembled Nanoclusters	\$0	\$70,757	\$70,757
LANL-20150705PRD2	Development of Radiation Detector Simulation Framework and Safeguards Instrumentation	\$0	\$130,743	\$130,743
LANL-20150707PRD2	Dynamic Strength and Phase Transition Kinetics in Geophysical Materials	\$0	\$183,036	\$183,036
LANL-20150708PRD2	Low-cost High-resolution Sensing and Health Monitoring of Urban Infrastructure	\$0	\$195,098	\$195,098
LANL-20150709PRD2	In-situ, Three-Dimensional Characterization of Solidification in Metals	\$0	\$179,220	\$179,220
LANL-20150710PRD2	New Physics in New Materials	\$0	\$137,898	\$137,898
LANL-20150711PRD2	Remediation Process Simulation-Optimization Under Complex Uncertainties	\$0	\$159,874	\$159,874
LANL-20150712PRD2	Neutron Star Mergers Revisited	\$0	\$144,446	\$144,446
LANL-20150713PRD2	Dendritic microstructure selection in cast metallic alloys	\$0	\$138,661	\$138,661
LANL-20150717PRD2	Studying nuclear astrophysics and inertial fusion with gamma-rays	\$0	\$189,415	\$189,415
LANL-20150741PRD3	A Kinetic Theory Based Study of Type II Core-Collapse Supernovae	\$0	\$151,403	\$151,403
LANL-20150742PRD3	Additively Manufactured High Explosive Materials with Controlled Mesostructure for Tuned Detonation Performance.	\$0	\$141,854	\$141,854
LANL-20150743PRD3	Catalytic Generation of Gas Using Formic and Oxalic Acids for Pressure/Volume Work	\$0	\$118,098	\$118,098
LANL-20150744PRD3	Climate Correlates of Tree Mortality	\$0	\$131,350	\$131,350
LANL-20150750ER	Materials Dynamics via Large-Scale Molecular Dynamics and Embedded Scale-Bridging Simulations	\$0	\$488,179	\$488,179
LANL-20150751ER	Extreme-Scale Kinetic Plasma Modeling of Turbulence and Mix Using Vector Particle-In-Cell (VPIc)	\$0	\$507,347	\$507,347
LANL-20150752ER	Deep Sparse Columnar Neural Network	\$0	\$438,043	\$438,043
LANL-20150755ER	Advancing Regenerative Medicine with Trinity: Defining a New State-of-the-Art for Biomolecular Simulation	\$0	\$275,715	\$275,715
LANL-20150758PRD3	Ab Initio Modeling of Organometal Halide Perovskites for Photovoltaic Applications	\$0	\$134,546	\$134,546
LANL-20150759PRD3	Novel Routes to Emergent Functionality in Multiferroics	\$0	\$154,517	\$154,517
LANL-20150760PRD4	Macroporous/Nanoporous Hierarchical Carbon Structure for High-Performance Energy Storage Devices	\$0	\$113,595	\$113,595
LANL-20150761PRD4	Hyperspectral Three-Dimensional tracking and imaging microscopy	\$0	\$101,376	\$101,376
LANL-20150762PRD4	Investigating Complex Superconducting Phases via Field-Rotating Transport and Thermodynamic Measurements	\$0	\$157,735	\$157,735
LANL-20150763PRD4	Characterizing Irregular Flows and Mass Transport in Microscopic Pore Spaces	\$0	\$126,201	\$126,201
LANL-20150764PRD4	Record-Low Lasing Thresholds Using Colloidal Type-II Quantum Wells	\$0	\$105,793	\$105,793
LANL-20160002DR	New Technologies for a Tabletop Accelerator	\$0	\$152,206	\$152,206
LANL-20160007DR	Cosmic Positrons from Pulsar Winds and Dark Matter: New TeV Theories and New TeV High Altitude Water Cherenkov observations	\$0	\$1,508,993	\$1,508,993
LANL-20160011DR	Using Extinct Radionuclides for Radiochemical Diagnostics	\$0	\$1,693,651	\$1,693,651
LANL-20160013DR	10 gigahertz Bandwidth Synthetic Aperture Radar Technology Development for Satellite Deployment	\$0	\$1,546,571	\$1,546,571
LANL-20160037DR	Dark Matter Search with a Neutrino Experiment	\$0	\$1,544,665	\$1,544,665

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Project ID	Project Name	Equipment	Other	FY Total
LANL-20160044DR	Foldamers: Design of Monodisperse Macro-Molecular Structure by Selection of Synthetic Heteropolymer Sequence	\$0	\$1,580,380	\$1,580,380
LANL-20160054DR	Countering Pathogen Interference with Human Defenses	\$0	\$1,623,984	\$1,623,984
LANL-20160069DR	Hybrid Quantum-Classical Computing	\$0	\$1,350,736	\$1,350,736
LANL-20160081ER	Search for Low Mass Dark Photons in High Energy Collisions at Fermilab	\$0	\$348,497	\$348,497
LANL-20160085DR	Topology and Strong Correlations: A New Paradigm	\$0	\$1,756,680	\$1,756,680
LANL-20160095ER	Development of a Continuous Flow Reactor for the Conversion of Biomass Hydrolysates to Fuels and Feedstocks	\$0	\$288,054	\$288,054
LANL-20160103DR	Additive Manufacturing of Mesoscale Energetic Materials: Tailoring Explosive Response through Controlled Three-Dimensional Microstructure.	\$0	\$1,809,472	\$1,809,472
LANL-20160144ER	Probing Critical Behavior in Hydraulic Injection Reservoirs and Active Seismic Regions	\$0	\$399,188	\$399,188
LANL-20160156ER	Predicting High Temperature Dislocation Physics in Heat Conduction Problem Crystal Structures	\$0	\$250,982	\$250,982
LANL-20160172ER	Quantum Optics of Solitary Covalent Dopants in Carbon Nanotubes	\$0	\$426,813	\$426,813
LANL-20160173ER	The Cosmogenic Origins of 60Iron	\$0	\$305,994	\$305,994
LANL-20160180ER	Transient Thermal Conduction in Nonlinear Molecular Junctions	\$0	\$277,948	\$277,948
LANL-20160183ER	Shining Light on the Dense Gluon Structure of Large Nuclei	\$0	\$296,409	\$296,409
LANL-20160189ER	Efficient Exploration of High-Dimensional Model Structural Uncertainties	\$0	\$233,798	\$233,798
LANL-20160220ER	Rigorous Development of Atomic Potential Functions in Terms of Strain Functionals	\$0	\$296,782	\$296,782
LANL-20160231ER	Radio Frequency Scintillation Prediction Driven by Direct Measurement of Ionospheric Spatial Irregularities	\$0	\$254,567	\$254,567
LANL-20160255ER	Investigations of the Magnetic Characteristics of Iron-Only Clusters	\$0	\$282,613	\$282,613
LANL-20160261ER	Molecular Actinide Nitrides	\$0	\$395,622	\$395,622
LANL-20160284ER	Stimuli-Responsive Coordination Polymersomes	\$0	\$302,256	\$302,256
LANL-20160317ER	Global Optimization Methods for Structural Bioinformatics	\$0	\$302,445	\$302,445
LANL-20160320ER	High Efficiency, Low-cost Perovskite Solar Cell Modules	\$0	\$317,262	\$317,262
LANL-20160340ER	Using Therapeutic Bacteria to Treat Human Diseases	\$0	\$318,682	\$318,682
LANL-20160357ER	Near-unity, Stable, Scalable Down-conversion of High-power Light Sources	\$0	\$278,552	\$278,552
LANL-20160361ER	A Rigorous Multiscale Method to Couple Kinetic and Fluid Models	\$0	\$346,776	\$346,776
LANL-20160369ER	Nonequilibrium Dynamics and Controlled Transport in Skyrme Lattices in Nanostructures	\$0	\$348,293	\$348,293
LANL-20160373ER	Tracking Microbial Effects on Water-Uptake and Productivity of Plants	\$0	\$314,680	\$314,680
LANL-20160393ER	Expediting the Genetic Engineering of Microalgae for Industrial Production	\$0	\$330,130	\$330,130
LANL-20160439ER	Selective Extraction of Medically-Relevant Radionuclides from Proton-Irradiated Thorium Targets	\$0	\$309,121	\$309,121
LANL-20160440ER	Time-of-Flight Ion Mass Spectrometer Subsystem for Space and Planetary Missions	\$0	\$296,972	\$296,972
LANL-20160448ER	A Multiscale, Non-stochastic Approach to Model Collisions in Particle Systems	\$0	\$305,780	\$305,780
LANL-20160458ER	Bridging Knowledge Gaps in Simulations of Inertial Confinement Fusion Implosions	\$0	\$302,109	\$302,109
LANL-20160459ER	Narrow Spectrum Gamma-Ray Production Through Inverse Compton Scattering with a Free-Electron Laser	\$0	\$246,031	\$246,031
LANL-20160462ER	Range-Resolved Measurement of Atmospheric Greenhouse Gases for Treaty Verification and Climate Science	\$0	\$286,376	\$286,376
LANL-20160472ER	Kinetic Modeling of Next-Generation High-Energy High-Intensity Laser-Ion Accelerators as an Enabling Capability	\$0	\$278,054	\$278,054
LANL-20160501ER	Connecting Interface Structure and Functionality in Oxide Composites	\$0	\$284,888	\$284,888
LANL-20160518ER	Novel Antennas Based on Atomic Magnetometers	\$0	\$371,849	\$371,849
LANL-20160519ER	Controlling the Functionality of Materials through Interfacial Colloidal Gelation	\$0	\$279,381	\$279,381
LANL-20160528ER	Emergent and Adaptive Polymers	\$0	\$301,366	\$301,366
LANL-20160549ER	Nuclear Physics Techniques to Significantly Advance Cancer Imaging and Treatment	\$0	\$70,581	\$70,581
LANL-20160572ER	Exotic States in U-based Superconductors	\$0	\$353,803	\$353,803
LANL-20160584ER	Accumulator for Low-Energy Laser-Cooled Particles	\$0	\$312,197	\$312,197
LANL-20160587DR	Frontiers in Quantum Science	\$0	\$504,614	\$504,614
LANL-20160588DR	Systems Out of Equilibrium	\$0	\$478,746	\$478,746
LANL-20160595ECR	Real-Time, Real-World Time Series Forecasting Using Internet Data	\$0	\$87,604	\$87,604
LANL-20160599ECR	Assimilation Algorithms for Data Fusion in Large-scale Non-linear Dynamical Systems	\$0	\$102,558	\$102,558
LANL-20160601ECR	Spallation Neutrons for Radionuclide Production	\$0	\$135,824	\$135,824
LANL-20160604ECR	Formation, Stability, and Chemistry of Tetravalent Actinide Nanocrystals	\$0	\$91,492	\$91,492
LANL-20160606ECR	Discovering Biosignatures in Manganese Deposits on Mars	\$0	\$110,926	\$110,926
LANL-20160608ECR	Next-Generation Sea Level Predictions with Novel Ice Sheet Physics	\$0	\$158,981	\$158,981
LANL-20160616ECR	New States of Matter in Weyl Semimetals	\$0	\$135,475	\$135,475
LANL-20160619ECR	Microstructural Characterization of Shock-Recovered Explosives for Mesoscale Model Development	\$0	\$115,035	\$115,035
LANL-20160629ECR	Imaging the Dome of Santa Maria del Fiore Using Cosmic Rays	\$0	\$194,869	\$194,869
LANL-20160641PRD2	Revealing the Particle Nature of Dark Matter with Cosmic Gamma Rays	\$0	\$100,725	\$100,725
LANL-20160642PRD1	Laboratory Study of Fracturing and Hydraulic Conductivity through Heterogeneous Materials in Compressive Stress Environments	\$0	\$101,127	\$101,127
LANL-20160643PRD2	Tensor Networks and Anyons: Novel Techniques for Novel Physics	\$0	\$14,041	\$14,041
LANL-20160644PRD1	Quantum Entanglement at Modern Colliders	\$0	\$11,551	\$11,551
LANL-20160645PRD1	Precision Theoretical Analysis of Reactions with Protons Polarized in a Strong Magnetic Field	\$0	\$16,572	\$16,572
LANL-20160646PRD2	Discovering Highly Conducting Oxides by Combining High-Pressure and Thin-Film Techniques	\$0	\$115,620	\$115,620
LANL-20160647PRD2	Coupling Kinetic to Fluid Scales in Space and Laboratory Plasmas	\$0	\$129,556	\$129,556
LANL-20160648PRD2	Theory of Spin and Valley Dynamics in Two-Dimensional Dirac Semiconductors	\$0	\$81,206	\$81,206
LANL-20160649ER	Multi-Scale Model for Supercomputer Reliability Based on Field Data	\$0	\$51,899	\$51,899
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	\$51,675	\$51,675

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Project ID	Project Name	Equipment	Other	FY Total
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	\$156,245	\$156,245
LANL-20160652PRD2	Using X-Rays with Protons for a Material-Identification Capability at Proton Radiography	\$0	\$84,877	\$84,877
LANL-20160653PRD2	Plasmonics-Transformed Quantum Emitters Through Theory-Guided Synthesis	\$0	\$76,994	\$76,994
LANL-20160654PRD2	Climate, Hydrology and Forest Disturbances in Southern and Western Watersheds	\$0	\$85,850	\$85,850
LANL-20160655PRD2	On the Origin of Colossal Ion Conductivity	\$0	\$23,517	\$23,517
LANL-20160656ER	Genomics and Biomanufacturing	\$0	\$80,204	\$80,204
LANL-20160658ER	Quantifying the Value of Real-time Social Internet Data for Diverse Forecasting of Dynamic Phenomena: Feasibility study	\$0	\$103,807	\$103,807
LANL-20160659ER	Homogenization and Multi-Phase Strength Research Proposal	\$0	\$87,109	\$87,109
LANL-20160660ER	Flow Cells for Scalable Energy Conversion and Storage Systems	\$0	\$130,591	\$130,591
LANL-20160661ER	Feasibility Study for Preliminary Design Review	\$0	\$67,681	\$67,681
LANL-20160662PRD2	Development and Application of Multi-scale Models for Disease Forecasting	\$0	\$26,055	\$26,055
LANL-20160663ER	Improved Micro-Mirror Arrays for MEMS-Based Adaptive Hyperspectral Imaging Sensor Validation	\$0	\$59,284	\$59,284
LANL-20160664DR	Rapid Response to Future Threats	\$0	\$611,680	\$611,680
LANL-20160665ER	Exploring Advanced Diagnostics with high resolution X-ray	\$0	\$86,764	\$86,764
LANL-20160666ER	New Ligands and Catalysts for the Hydrogenation of Renewable Compounds Containing Ketonic Substrates	\$0	\$94,062	\$94,062
LANL-20160668ER	A Discrete Element Method Sea-Ice Model for Global Climate Simulation	\$0	\$99,033	\$99,033
LANL-20160669ER	Reduced Data Corruption through Erasure Codes	\$0	\$83,113	\$83,113
LANL-20160670PRD3	Physiological and Structural Acclimation to Climate Change In Forest Ecosystems	\$0	\$43,634	\$43,634
LANL-20160671PRD3	Atom-Efficient Upgrading of Bio-Derived Isopropanol/Acetone Mixtures	\$0	\$24,964	\$24,964
LANL-20160672PRD3	Evolution of Water and Carbon Dioxide at Mars: Implications for its Past and Future	\$0	\$53,636	\$53,636
LANL-20160673PRD3	Strain and Dimensional Tuning of Heavy-Fermion Superconductors	\$0	\$30,610	\$30,610
LANL-20160674PRD3	Radiation Effects and Plasma Interactions in Tungsten Based Materials	\$0	\$28,286	\$28,286
LANL-20160678PRD4	Additive Manufacturing of Composite Lithium Containing Neutron Scintillators	\$0	\$5,444	\$5,444
LANL-20169999ER	Post-project small differences in what was accrued versus the actual costs. The project costs that posted in FY16 are reviewed to ensure that they are appropriately charged	\$0	\$279,422	\$279,422
Total # of Projects for LANL: 276		Total Equipment Cost for LANL: \$0	Total Other Cost for LANL: \$112,282,326	Total Project Cost for LANL: \$112,282,326

LBNL - L. Berkeley National Lab				
LB14003	Novel Accelerator Techniques for Diffraction Limited Light Sources	\$0	\$814,944	\$814,944
LB14005	Design of Mesoscale Catalyst Networks	\$0	\$213,961	\$213,961
LB14007	Computational-Experimental Studies of Aerosol Transformations from the Liquid to Glassy State	\$0	\$162,970	\$162,970
LB14024	Next Generation Cosmic Microwave Background Detector Arrays: Enabling a Factor 10-100 Increase in Array Size	\$0	\$224,630	\$224,630
LB14026	Codesigning Big Iron for Big Data	\$0	\$376,437	\$376,437
LB14027	Reinventing Pre-clinical and Environmental Testing Paradigms	\$0	\$522,974	\$522,974
LB14031	Neuro/Nano Technology for Brain Mapping	\$0	\$725,119	\$725,119
LB14033	Hard X-Ray Photoemission for Materials Science	\$0	\$220,697	\$220,697
LB15001	A New Concept for High Average Power Ultrafast Lasers	\$0	\$622,991	\$622,991
LB15002	Tender Resonant X-Ray Scattering: A Spatio-Chemical Probe for Materials, Biology and Energy Sciences	\$0	\$352,578	\$352,578
LB15005	Unconstrained Functionals for Massively Parallel Scaling of Conjugate Gradient Eigensolvers	\$0	\$245,569	\$245,569
LB15007	Fast Numerical Methods for Green's Function in Mesoscale Simulation	\$0	\$65,045	\$65,045
LB15008	Extreme Data Analysis for Cosmology	\$0	\$248,940	\$248,940
LB15011	The International Database of Efficient Appliances: A New Tool for Optimizing Energy-Efficiency Policy	\$0	\$169,369	\$169,369
LB15012	Small-Scale Power Generation	\$0	\$137,873	\$137,873
LB15013	Behavior Analytics: Using Data Science to Draw Insights from Smart Meter Data	\$0	\$93,399	\$93,399
LB15014	Novel Magnetic Field Mapping Technology For Small And Closed Aperture Undulators	\$0	\$233,864	\$233,864
LB15015	Harnessing the Soil Microbiome for Food and Fuel Security	\$0	\$835,149	\$835,149
LB15016	The Soil Metazoan Microbiome: A Compartment of Importance to Soil Nutrient Cycling	\$0	\$255,352	\$255,352
LB15017	Dynamic Fracture Simulation of Geomaterials at Multiple Length Scales	\$0	\$191,874	\$191,874
LB15019	Frequency-Modulated Hydraulic Fracturing for Secure and Efficient Reservoir Permeability Enhancement	\$0	\$202,979	\$202,979
LB15020	Discovery and Transfer of Novel Pathways for Phosphate Solubilization	\$0	\$208,820	\$208,820
LB15021	Tackling Microbial-Mediated Plant Carbon Decomposition Using Function-Driven Genomics	\$0	\$157,348	\$157,348
LB15022	Microbiome Adaptation in Response to Environmental Challenges	\$0	\$794,720	\$794,720
LB15025	Understanding Radiation-Induced Photo-Electron Chemistry in High-Cross Section Organometallic Resist Materials	\$0	\$279,431	\$279,431
LB15026	Computational Design of Smart Complex Oxides with Tunable Quantum Phases	\$0	\$233,992	\$233,992
LB15027	Computational Nuclear Physics Code Development for Fundamental Interactions/Astrophysics	\$0	\$186,246	\$186,246
LB15028	Multi-disciplinary Research to Enhance Understanding of Transport, Risks, and Mitigation of Radioisotopes for Improved Radiological Resilience	\$0	\$466,984	\$466,984
LB15029	Advanced Computational Tools for High Resolution Cryo-Electron Microscopy	\$0	\$255,386	\$255,386
LB15030	Searches for the Supersymmetric Particles at the Large Hadron Collider in Run-2 and Beyond	\$0	\$214,788	\$214,788
LB15031	Confronting Beyond the Standard Model Theories with New LHC and Astrophysical Data	\$0	\$251,402	\$251,402

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Project ID	Project Name	Equipment	Other	FY Total
LB15032	ESnet Operating System- provide a flexible environment for network operators and science applications to compute locality, and addresses the need for real-time data access, data replication and decisions between on-demand vs. allocation model of computing	\$0	\$286,385	\$286,385
LB15033	Clay Interlayer Stratification: Deconstructing Drivers of Mass Transport in Shales	\$0	\$151,063	\$151,063
LB15035	Next-Generation Neutrino and Rare-Event Detection	\$0	\$234,563	\$234,563
LB15036	Optical and Electrical Characterization of 2-Dimensional Nanosheets without Naturally Layered Structure	\$0	\$109,518	\$109,518
LB15037	Interfacing Chemical and Biological Catalysis for Solar to Fuel Conversion	\$0	\$195,832	\$195,832
LB15038	Simulating Quantum Chemistry with Superconducting Circuits	\$0	\$508,183	\$508,183
LB15039	High-Performance Chemical Identification for Hyperspectral Data Science	\$0	\$212,039	\$212,039
LB15041	Solving Problems in Materials Theory via Quantum Networks	\$0	\$224,719	\$224,719
LB15042	Life Science Applications of X-ray Scattering at ALS Upgrade	\$0	\$139,028	\$139,028
LB16001	Development of a Compact Laser-driven Ion Beam Accelerator for Discovery Plasma Science Applications	\$0	\$560,928	\$560,928
LB16002	High-Performance Advanced Particle Accelerator Simulator	\$0	\$350,983	\$350,983
LB16003	High Pressure Soft X-ray Spectroscopy of Fluids	\$0	\$205,741	\$205,741
LB16004	Probing Spatially-Resolved Intermittent Chemical Kinetics in Confined Spaces Using X-ray Photon Correlation Spectroscopy	\$0	\$287,277	\$287,277
LB16005	High-Dimensional Ptychographic Imaging for Studying Nanoscale Dynamics, Chemistry and Morphology at the ALS and ALS-U	\$0	\$193,528	\$193,528
LB16006	In Situ Multi-modal Probing of Chemical Reactions via Windowless Micro-reactors	\$0	\$339,005	\$339,005
LB16007	Spotlighting Catalysis: In situ and Operando Characterization of Photoelectrochemical Assemblies	\$0	\$222,960	\$222,960
LB16008	Kalman Filters on TrueNorth	\$0	\$344,254	\$344,254
LB16009	ExaGrid; Large-Scale, Asynchronous Co-Simulation of Advanced Electric Grid Systems	\$0	\$204,954	\$204,954
LB16010	Exploiting Physics-Based Concurrency in Time-Dependent Extreme-Scale Multiphysics Simulations	\$0	\$269,297	\$269,297
LB16011	Design of Quantum Chemistry Simulations for Superconducting Circuits	\$0	\$274,710	\$274,710
LB16012	Modeling the Earth's Hydrological Cycle from Watershed to Global Scales	\$0	\$210,164	\$210,164
LB16013	Optimal Design for Computationally Expansive Black-Box Applications	\$0	\$173,143	\$173,143
LB16014	Open Framework for High-Performance Streaming Analytics	\$0	\$209,003	\$209,003
LB16015	Neuromorphic Image Analysis and Pattern Recognition	\$0	\$326,502	\$326,502
LB16016	URBan Integrated System: A Data and Computing Platform for Urban Systems	\$0	\$392,521	\$392,521
LB16017	Low-Energy, Low-Cost Forward Osmosis Water Desalination via Ionic Liquids/Water Phase Separation	\$0	\$372,417	\$372,417
LB16018	Accelerating Technology Development by Disruptive Scaling and Manufacturing Processes	\$0	\$272,365	\$272,365
LB16019	Intelligent Distribution Grid Analytics: Distribution Phasor Measurement Unit and Operational Data Counseling For Resilience and Reliability Applications	\$0	\$338,914	\$338,914
LB16020	Multi-Scale Modeling of Geochemical Impacts on Fracture Evolution	\$0	\$194,996	\$194,996
LB16021	Advanced In-Situ Experiments for Understanding Induced Seismicity	\$0	\$259,143	\$259,143
LB16022	Metal Isotope Fingerprint of Redox Reactions	\$0	\$184,579	\$184,579
LB16023	Characterizing the Environmental Impact of Chemical Compounds Used in Oil and Gas Development	\$0	\$231,550	\$231,550
LB16024	Assessing Microbial Functions at Terrestrial-Aquatic Interfaces by Metagenome-Based Metabolic Flux Analysis	\$0	\$208,660	\$208,660
LB16025	Identification, Biomanufacturing and Characterization of Cyclic DiPeptides, A Diverse Family of Chemicals Involved in Mediating Microbial Interactions	\$0	\$243,048	\$243,048
LB16026	Plant Growth Promoting Microbes: Signaling and Mechanisms	\$0	\$266,604	\$266,604
LB16027	Exploring Strong Visible Light-Matter Interactions in Correlated Oxide Materials. The project seeks advances in the mesoscale science of light absorption, charge transport, and other aspects of electronic and energy materials.	\$0	\$115,732	\$115,732
LB16028	Defect Dynamics and Surface Structure Evolution of Tungsten Studied with Ultrafast Electron Diffraction	\$0	\$258,948	\$258,948
LB16029	Application to Core-Shell Nanocrystals	\$0	\$111,841	\$111,841
LB16030	Controlling Quantum Phenomena in Van der Waals Heterostructures: Excitons, Valleys, and Superconductivity	\$0	\$191,464	\$191,464
LB16031	Sequences and Codes in Multivariate Metal-Organic Frameworks	\$0	\$378,274	\$378,274
LB16032	Toward Next Generation Gamma-Ray Tracking Arrays: Development of Inverted Coaxial Segmented HPGe Detector Technology	\$0	\$214,023	\$214,023
LB16033	Topmetal Charge Readout Plane for Neutrinoless Double Beta Decay Searches	\$0	\$182,215	\$182,215
LB16034	The Next Generation Low-Mass Solid-State Pixel Detector	\$0	\$251,695	\$251,695
LB16035	Robust Synthetic Membranes for Microbial Electrocatalysis: Separating Electron-Generating Organisms from the Catalytic Reaction Environment	\$0	\$292,754	\$292,754
LB16036	Enabling Big Science with High Throughput Methodologies	\$0	\$281,631	\$281,631
LB16037	Enabling Technologies for Next Generation Receivers to Measure the Polarization of Cosmic Microwave Background	\$0	\$383,355	\$383,355
LB16038	Ultrahigh Voltage and Light Collection in Liquid Xenon Dark Matter Experiments	\$0	\$446,745	\$446,745
LB16039	Ultra High Resolution Climate Projections to Support Climate Readiness in the San Francisco Bay Area	\$0	\$304,485	\$304,485
LB16040	Volumetric Absorption of Solar Radiation in Liquids and Gases by Tuning the Emissivity of Surfaces	\$0	\$637,839	\$637,839
LB16041	Design of High-Energy Density Lithium-Ion Systems.	\$0	\$415,360	\$415,360

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Project ID	Project Name	Equipment	Other	FY Total
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	\$156,078	\$156,078
LB16043	Upgrade to the Relativistic Heavy Ion Collider accelerator	\$0	\$345,896	\$345,896
LB16044	Designing Efficient Energy Conversion Pathways for Synthetic Organisms	\$0	\$367,585	\$367,585
LB16045	Predicting the Maximum Rate of Carbonylation Based on Optimal Leaf Resource Allocation	\$0	\$78,167	\$78,167
Total # of Projects for LBNL: 85		Total Equipment Cost for LBNL: \$0	Total Other Cost for LBNL: \$24,578,494	Total Project Cost for LBNL: \$24,578,494

LLNL - L. Livermore National Lab

13-ERD-020	Detection of Novel Infectious Agents from Clinical Samples Through Immunoglobulin M and Toll-Like Receptor Capture	\$0	\$169,120	\$169,120
14-ERD-001	A Coupled Seismic and Acoustic Simulation Capability	\$0	\$421,290	\$421,290
14-ERD-005	Biological Printing of Vascularization for Artificially Grown Tissue	\$0	\$410,400	\$410,400
14-ERD-006	Atmospheric Source Reconstruction with Uncertainty Quantification	\$0	\$310,960	\$310,960
14-ERD-010	Enzyme-Embedded, Microstructural Reactors for Industrial Biocatalysis	\$0	\$481,290	\$481,290
14-ERD-013	Parallel Time Integration for High-Performance Computing	\$0	\$460,030	\$460,030
14-ERD-014	Picosecond Laser Interactions with Materials: Mechanisms, Material Lifetime, and Performance Optimization	\$0	\$736,560	\$736,560
14-ERD-018	Time-Dependent Measurement of Carbon Condensation and Void Collapse in Detonating High Explosives	\$0	\$537,960	\$537,960
14-ERD-020	Internet Protocol version 6 Protocol Research - Examining security vulnerabilities	\$0	\$420,460	\$420,460
14-ERD-024	Enabling Multiscale Simulations of Atmospheric Flow over Complex Terrain in Earth System Models	\$0	\$577,400	\$577,400
14-ERD-025	Structural Freestanding Films with Atomic-Scale Thickness	\$0	\$652,660	\$652,660
14-ERD-028	Application of Imposed Magnetic Fields to Ignition and Thermonuclear Burn at the National Ignition Facility	\$0	\$1,029,180	\$1,029,180
14-ERD-031	Advanced Double-Shell Target Designs for Inertial Fusion Energy	\$0	\$264,060	\$264,060
14-ERD-034	Nuclear Fission in a Plasma	\$0	\$130,070	\$130,070
14-ERD-038	Wetlands as a Source of Atmospheric Methane: A Multiscale and Multidisciplinary Approach	\$0	\$569,380	\$569,380
14-ERD-039	Improved Sensor Performance Using Innovative Algorithms	\$0	\$212,270	\$212,270
14-ERD-040	Thermal Management of High-Heat-Flux Laser Diodes Using Liquid-to-Vapor Phase Change	\$0	\$716,500	\$716,500
14-ERD-041	From Topological Surfaces to Magnetic Collapse of f-Shell Electron Quantum Materials	\$0	\$534,130	\$534,130
14-ERD-042	Understanding the Creation and Reduction of Surface Microscale Roughness During Processing of Glass Optics	\$0	\$831,470	\$831,470
14-ERD-048	Cyclodextrin-Based Nanometer-Scale Scaffolds for Capture and Catalytic Degradation of Chemical Warfare Agents	\$0	\$368,900	\$368,900
14-ERD-051	Real-Time Microseismic Processing for Induced Seismicity Hazard Detection	\$0	\$422,380	\$422,380
14-ERD-056	Real-Time Adaptive X-Ray Optics	\$0	\$522,730	\$522,730
14-ERD-058	Superluminal Radiating System	\$0	\$919,560	\$919,560
14-ERD-062	Planetary-Scale Agent Simulations	\$0	\$826,660	\$826,660
14-ERD-064	Multifunctional Metamaterials	\$0	\$209,010	\$209,010
14-ERD-065	Computation Power at Scale - Exploring approaches to influence the design of new exascale computing systems to maximize performance per watt of power	\$0	\$361,820	\$361,820
14-ERD-067	Advanced Synthesis and Characterization Techniques for Ultrahard Film Growth	\$0	\$742,530	\$742,530
14-ERD-070	Multichannel Air-Guiding Fibers to Transport Extreme Lasers and Enable High-Flux Particle Accelerators	\$0	\$558,810	\$558,810
14-ERD-076	Exploiting the Gemini Planet Imager: Revolutionary Exoplanet Science and Advanced Adaptive Optics	\$0	\$381,640	\$381,640
14-ERD-077	High-Temperature Plasma-Chemistry Kinetics Test Bed	\$0	\$544,450	\$544,450
14-ERD-078	Short-Wavelength, High-Power Fiber Laser Sources	\$0	\$325,490	\$325,490
14-ERD-081	Rapid Detection and Characterization of Emerging Foreign Animal Disease Pathogens	\$0	\$641,930	\$641,930
14-ERD-082	Improving Resonance Ionization Mass Spectrometry for Next-Generation Nuclear Forensics	\$0	\$430,140	\$430,140
14-ERD-084	High-Average-Power Diffraction Pulse-Compression Gratings Enabling Next-Generation Ultrafast Laser Systems	\$0	\$307,770	\$307,770
14-ERD-087	Optimal Fabrication Methodologies for Additive Manufacturing	\$0	\$327,850	\$327,850
14-ERD-091	Analysis of a Metabolically Engineered Microbial Consortium for Optimal Production of Biofuels	\$0	\$375,880	\$375,880
14-ERD-094	Extending Atomistic Simulation to Mesoscale in Time and Length	\$0	\$359,910	\$359,910
14-ERD-095	Statistical and Dynamical Approaches to Probabilistic Decadal Climate Prediction	\$0	\$381,960	\$381,960
14-ERD-098	Laser-Matter Coupling Mechanisms Under Varying Chemical and Particulate Surface Configurations	\$0	\$628,360	\$628,360
14-ERD-100	The Livermore Brain: Massive Deep-Learning Networks Enabled by High-Performance Computing	\$0	\$1,297,970	\$1,297,970
14-ERD-101	Plasma Interactions with Mixed Materials and Impurity Transport	\$0	\$611,950	\$611,950
14-ERD-103	Modeling Materials Under Strongly Driven Conditions - Developing and applying computational techniques to describe material behavior under strongly driven conditions	\$0	\$381,980	\$381,980
14-LW-077	New Steady-State Viral Culturing Platform for Infectious-Disease Therapeutics	\$0	\$298,070	\$298,070
14-LW-079	Detecting and Partitioning Carbon Dioxide Fluxes	\$0	\$144,870	\$144,870
14-SI-001	In Vitro Chip-Based Human Investigational Platform	\$0	\$2,260,440	\$2,260,440
14-SI-002	Scalable High-Order Computational Multiphysics at Extreme Scale	\$0	\$934,270	\$934,270

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Project ID	Project Name	Equipment	Other	FY Total
14-SI-003	Physical States and Processes in Inertial-Confinement Fusion: Matter at Extreme Energy Density	\$0	\$1,211,850	\$1,211,850
14-SI-004	Deterministic Multifunctional Materials and Manufacturing Initiative	\$0	\$2,892,130	\$2,892,130
14-SI-005	Cooperative Constellations: Resilient, Persistent, and Flexible Satellite Systems	\$0	\$1,993,300	\$1,993,300
15-ERD-006	Microstructure Evolution During Rapid Solidification: In Situ Characterization and Mesoscale Modeling	\$0	\$556,520	\$556,520
15-ERD-009	Revisiting Phase-Locking Laser Diode Arrays	\$0	\$518,950	\$518,950
15-ERD-010	Dynamic Stimulation of Geologic Resources	\$0	\$646,700	\$646,700
15-ERD-012	Melting and Solidification in Multicomponent Materials: Constraints on the Search for Habitable Planets	\$0	\$494,500	\$494,500
15-ERD-013	Quantum Simulations for Strongly Correlated Materials with High Atomic Numbers	\$0	\$463,700	\$463,700
15-ERD-014	Answering Fundamental Physics Questions with the Neutrino	\$0	\$456,520	\$456,520
15-ERD-015	Precision Gamma-Ray Signatures for Long-Lived Radioactive Nuclei	\$0	\$435,620	\$435,620
15-ERD-017	Unraveling the <i>Burkholderia</i> Pathogen Infection	\$0	\$798,890	\$798,890
15-ERD-019	Accelerated Development of Multiscale Materials	\$0	\$913,930	\$913,930
15-ERD-020	Chemically Stable and Optically Transparent Vapor-Deposited Plastics	\$0	\$569,310	\$569,310
15-ERD-021	Neutrino Science with a Kiloton-Scale Water Detector	\$0	\$320,920	\$320,920
15-ERD-022	Integrated Mesoscale Approach for Predicting Ionic Conductivity in Solid Electrolytes	\$0	\$539,560	\$539,560
15-ERD-023	New Computational Methods for Scalable Genome Variation Discovery	\$0	\$400,270	\$400,270
15-ERD-026	X-Ray Free-Electron Laser Science for High-Energy-Density Experiments	\$0	\$499,400	\$499,400
15-ERD-028	Acceleration of Ptychographic Microscopy Reconstruction	\$0	\$277,980	\$277,980
15-ERD-030	Rational Design and Optimization of Additively Manufactured Carbon-Fiber-Reinforced Composites	\$0	\$952,420	\$952,420
15-ERD-032	Algorithm for First-Principles Molecular Dynamics of Metals at Extreme Scales	\$0	\$424,680	\$424,680
15-ERD-034	A Dense Plasma Focus Device as a Compact Neutron Source	\$0	\$433,960	\$433,960
15-ERD-036	Energetic Ligands for High-Power Metal Complexes	\$0	\$244,420	\$244,420
15-ERD-037	Physics of Laser-Assisted Advanced Manufacturing Processes	\$0	\$868,100	\$868,100
15-ERD-038	Application-Driven Research into Multiscale Modeling of Laser-Plasma Interactions	\$0	\$622,010	\$622,010
15-ERD-039	Failure Recovery Abstractions for Large-Scale Parallel Applications	\$0	\$409,610	\$409,610
15-ERD-041	Decomposition Methods for Power Grid Optimization	\$0	\$450,620	\$450,620
15-ERD-042	Tracking Water through the Critical Zone to Assess Drought Vulnerability	\$0	\$478,590	\$478,590
15-ERD-043	Manipulating Optical and Electromagnetic Properties Through Hierarchical Metamaterials	\$0	\$500,300	\$500,300
15-ERD-046	Single-Shock Platform for Activation Studies with a Prompt Source of Fast Neutrons	\$0	\$566,790	\$566,790
15-ERD-050	All-Source Data Fusion for Detecting and Monitoring Threats on a Global Scale	\$0	\$606,160	\$606,160
15-ERD-051	Integrated Physics-Based Noise Modeling of Qubit Devices	\$0	\$505,240	\$505,240
15-ERD-052	Transport and the Equation of State for Asymmetric Plasma Mixtures	\$0	\$491,540	\$491,540
15-ERD-053	Predictive Models Based on Disjoint Feature Sets for Applications in Biomedicine and Cyber Security	\$0	\$486,500	\$486,500
15-ERD-054	Creation and Study of Ultrahigh-Energy-Density Matter Using Nanometer-Scale Structured Targets	\$0	\$287,350	\$287,350
15-ERD-055	Single-Shot Optical Recorder with Picosecond Resolution and Nanosecond Record Length	\$0	\$358,540	\$358,540
15-ERD-056	Photonic Processors for High-Fidelity Diagnostics	\$0	\$594,920	\$594,920
15-ERD-057	Next-Generation Films for High-Performance Optoelectronics Applications	\$0	\$690,210	\$690,210
15-ERD-058	Advanced Fusion Target Capsule Concepts	\$0	\$482,130	\$482,130
15-ERD-059	Coupling Monte Carlo Neutral and Fluid Plasma Models for Edge Simulation in Magnetic Fusion	\$0	\$459,020	\$459,020
15-ERD-062	New Physics from Collisions at the Large Hadron Collider	\$0	\$309,430	\$309,430
15-ERD-063	Liquid Condensation and Solidification Behavior of Hydrogen Isotopes in Foams	\$0	\$473,440	\$473,440
15-ERD-065	Collisionless Shock Formation in Laser-Generated Plasma Streams	\$0	\$354,200	\$354,200
15-ERD-066	Self-Consistent, Three-Dimensional Calculations of Electromagnetic Pulse Propagation	\$0	\$434,410	\$434,410
15-ERD-067	Compton-Scattering X-Ray Generation from Compact X-Band Accelerators	\$0	\$910,590	\$910,590
15-ERD-068	Increasing Capacity of Flow-Through Electrode Capacitive Desalination with Phased Charging	\$0	\$455,840	\$455,840
15-ERD-069	Capture Cross Sections for Isotopes Far from Stability	\$0	\$25,380	\$25,380
15-FS-005	Unified Description of Quantum Many-Body Systems	\$0	\$39,360	\$39,360
15-FS-007	Optimizing High Harmonic Generation in Ionized Plasma for Seeding of X-Ray Free-Electron Lasers	\$0	\$43,800	\$43,800
15-FS-013	Advanced Manufacturing Approaches for Long-Wave Diffraction Gratings	\$0	\$29,070	\$29,070
15-FS-014	Numerical Performance and Parallel Scalability of Multiple-Rate Integrators Based on Discrete-Event Simulation	\$0	\$84,940	\$84,940
15-LW-002	X-Ray Pump-and-Probe Experiments with a Free-Electron Laser	\$0	\$296,540	\$296,540
15-LW-013	Engineering Bacterial Cell-Like Compartments as Platforms for Synthetic Biology	\$0	\$236,100	\$236,100
15-LW-018	Spin-Based Broadband Terahertz Radiation from Topological Insulators	\$0	\$306,050	\$306,050
15-LW-023	Nanometer-Scale Particle Platform for Drug Delivery to the Brain	\$0	\$307,530	\$307,530
15-LW-029	Validating Large Fluid-Dynamics Simulations of Complex Geometries with Three-Dimensional Printing	\$0	\$297,070	\$297,070
15-LW-067	Hydrogen Diffusion in Earth's Upper Mantle	\$0	\$302,250	\$302,250
15-LW-074	Freeze-Drying Aerosols: A Facile Route to Metal Particles with Nanometer-Scale Pores	\$0	\$297,190	\$297,190
15-LW-083	Ultralight Mechanical Metamaterials with Ordered Hierarchies	\$0	\$296,350	\$296,350
15-LW-095	Particle Acceleration from Laser-Driven Collisionless Shocks	\$0	\$237,730	\$237,730
15-SI-002	Development of a Virtual Human Heart to Predict the Pharmacology of Novel Drugs	\$0	\$1,824,780	\$1,824,780
16-ERD-003	Accelerated Discovery of Advanced Combustion Fuels	\$0	\$171,070	\$171,070
16-ERD-005	In-Memory Associative Indexing	\$0	\$664,910	\$664,910
16-ERD-006	Building Computerized Tomography Tools for Precision Additive Manufacturing	\$0	\$580,540	\$580,540
16-ERD-007	Characterizing Host-Pathogen Immunity Gut-Brain Interactions	\$0	\$698,290	\$698,290

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Project ID	Project Name	Equipment	Other	FY Total
16-ERD-008	Inferring Nuclear Fireball Properties from Experimental Data	\$0	\$583,310	\$583,310
16-ERD-010	In Situ Probes of Granular Media Under Compression	\$0	\$454,940	\$454,940
16-ERD-011	New Quantum Simulation Capability for Ultrahigh-Temperature, High-Energy-Density Science	\$0	\$440,120	\$440,120
16-ERD-013	Image Analysis for Dark Energy and Space Surveillance Applications	\$0	\$486,230	\$486,230
16-ERD-014	High-Fidelity Fracture Model for Hydraulically Fractured Shale Reservoirs	\$0	\$517,130	\$517,130
16-ERD-016	Mechanisms of Pulsed-Laser Ablation, Damage, and Failure in Various Classes of Materials	\$0	\$1,181,280	\$1,181,280
16-ERD-018	Modeling Spatial and Temporal Coupling in High-Contrast Grating Compressors Utilizing High-Performance Computing	\$0	\$494,420	\$494,420
16-ERD-019	Materials Informatics for Synthesis, Optimization and Scale-Up of Functional Materials	\$0	\$297,340	\$297,340
16-ERD-020	Decoding the X-Ray Cipher of the Universe in the Laboratory	\$0	\$403,130	\$403,130
16-ERD-021	Efficient, High-Power Mid-Infrared Laser for National Security and Scientific Applications	\$0	\$737,780	\$737,780
16-ERD-022	Nucleosynthesis for Science and Security	\$0	\$623,820	\$623,820
16-ERD-023	An Extreme-Scale Computational Framework for Data Assimilation and Uncertainty Management of Large-Dimensional Dynamics Models	\$0	\$590,570	\$590,570
16-ERD-024	Extending Laser-Driven X-Ray Sources to High-Energy-Density Science Facilities	\$0	\$283,380	\$283,380
16-ERD-025	Topology Optimization of Multifunctional Materials	\$0	\$449,260	\$449,260
16-ERD-026	Morpheus computer project focused on computer security	\$0	\$740,640	\$740,640
16-ERD-033	Mesocrystal Architectures	\$0	\$623,960	\$623,960
16-ERD-034	Multimodal Learning on Big Brain Data	\$0	\$332,230	\$332,230
16-ERD-035	The Engineered Microsensor Array	\$0	\$613,200	\$613,200
16-ERD-036	Improving Simulation Workflows: A Data Analytics Approach	\$0	\$551,240	\$551,240
16-ERD-037	Ultrafast Shock Kinetics of High-Atomic-Number Materials with High Throughput	\$0	\$314,990	\$314,990
16-ERD-038	Active Adaptive Control of High-Energy, High-Repetition-Rate, Short-Pulse Lasers	\$0	\$514,700	\$514,700
16-ERD-039	Scalable Computational Learning Architectures	\$0	\$733,490	\$733,490
16-ERD-040	Controlling Detonative Phenomena with High-Explosives Material Architecture	\$0	\$503,890	\$503,890
16-ERD-041	Ultrafast Absorption Spectroscopy of Aluminum Plasmas	\$0	\$98,280	\$98,280
16-ERD-042	Tailoring Material Properties Using Modulated Laser Beams	\$0	\$90,760	\$90,760
16-ERD-043	Deformation Mechanisms in Body-Centered Cubic Metals at High Pressures and Strain Rates	\$0	\$99,860	\$99,860
16-ERD-044	Vibrational and Optical Properties of High-Pressure Hydrogen from First Principles	\$0	\$70,020	\$70,020
16-ERD-045	The High Dynamic-Range Oscilloscope	\$0	\$153,160	\$153,160
16-ERD-046	Simulating X-Ray Free-Electron Laser Experiments for High-Energy-Density Science	\$0	\$63,560	\$63,560
16-ERD-047	Parallel Two-Photon Polymerization for Submicron Additive Manufacturing	\$0	\$199,600	\$199,600
16-ERD-048	A New Architectural Approach for Diode-Pumped Advective-Cooling Gas Lasers	\$0	\$647,520	\$647,520
16-ERD-049	Laser Beam Propagation Through Deep Turbulence	\$0	\$151,110	\$151,110
16-ERD-051	Optimizing Engineered Flow-Through Electrodes for Energy Applications	\$0	\$299,300	\$299,300
16-FS-001	Universal Number format and computation system: A Novel Approach for Enabling High-Performance Computing Environments	\$0	\$125,190	\$125,190
16-FS-002	Development of a Fission-Proxy Method for Measuring 14-megaelectron volt Neutron Fission Yields	\$0	\$123,130	\$123,130
16-FS-004	Chemical Amplifiers for Radiation Detection	\$0	\$95,240	\$95,240
16-FS-005	Radiation Processes in Nanometer-Scale Foams	\$0	\$83,350	\$83,350
16-FS-006	Improved Coupling of Laser Energy to Targets	\$0	\$47,720	\$47,720
16-FS-007	Modeling Tissue Membranes	\$0	\$66,780	\$66,780
16-FS-008	Using Short-Lived Cosmogenic Isotopes to Determine the Age of Underground Tunnels	\$0	\$95,130	\$95,130
16-FS-010	Advancing Static Ultrahigh Pressures with Focused Ion-Beam Toroidal Anvils	\$0	\$97,020	\$97,020
16-FS-012	Coating Hollow Objects with Uniform Low-Density Films	\$0	\$77,680	\$77,680
16-FS-013	Simultaneous Peripheral Nerve Stimulation and Gastrointestinal System Monitoring	\$0	\$10,270	\$10,270
16-FS-015	Detonation Capability and X-Ray Signatures of Advanced Manufactured High Explosives	\$0	\$65,860	\$65,860
16-FS-016	Radon Collection for Electric Dipole Measurements	\$0	\$57,440	\$57,440
16-FS-020	Hydrogen Production with Hydrogenase Enzymes Using Nanometer-Scale Lipoprotein Particles	\$0	\$124,520	\$124,520
16-FS-022	A Compressed Ultrafast Photography Diagnostic for Laser-Driven Experiments	\$0	\$98,010	\$98,010
16-FS-023	Modeling Mutagenic Chain Reactions in Natural Ecosystems	\$0	\$88,120	\$88,120
16-FS-024	Simulation of Biased Random Walks in an Asynchronous Graph Framework: Walks on Dynamic Graphs	\$0	\$174,620	\$174,620
16-FS-025	Helium Age-Dating of Fuel-Cycle Materials for Nuclear Forensics	\$0	\$57,660	\$57,660
16-FS-026	A "Peacock" Platform for Recording Cardiac Tissue Force	\$0	\$69,680	\$69,680
16-FS-028	In Situ Imaging of Particle Formation and Dynamics in Reactive Material Deflagrations	\$0	\$110,210	\$110,210
16-FS-030	Liquid-Cell Electrochemical Transmission Electron Microscope	\$0	\$91,690	\$91,690
16-FS-035	High-Powered-Impulse Magnetron Sputtering for Creating Optical Films	\$0	\$116,470	\$116,470
16-FS-037	Electron-Beam-Induced Deposition of Boron Films	\$0	\$58,810	\$58,810
16-FS-038	Room-Temperature Liquid Semiconductors	\$0	\$128,840	\$128,840
16-FS-039	Total Internal-Reflection Photoconductive Switch	\$0	\$149,920	\$149,920
16-FS-040	Thermo-Cavitation Biological Sample Processing for Cellular Lysis	\$0	\$120,510	\$120,510
16-FS-041	Approaches for Calibrating Agent-Based Models to Data	\$0	\$94,400	\$94,400
16-FS-042	A Quantitative Methodology for Measuring Cyber Risk to Critical Infrastructure	\$0	\$53,060	\$53,060
16-FS-043	Ultrahigh Brightness Quantum-Controlled Electron Beams	\$0	\$124,880	\$124,880
16-LW-013	A Flue-Temperature Carbon Dioxide Separation Membrane	\$0	\$300,460	\$300,460
16-LW-020	Prebiotic Self-Assembly Reactions in Astrophysical Icy Materials	\$0	\$297,450	\$297,450
16-LW-022	Extreme Nonlinear Optics of Plasmas	\$0	\$300,040	\$300,040
16-LW-030	Enhancing Nitrogen Uptake in Sustainable Biofuels With Microbes	\$0	\$300,440	\$300,440
16-LW-041	Directed Assembly of Block Copolymers for Optical Metamaterials at Visible Wavelengths	\$0	\$305,450	\$305,450

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Project ID	Project Name	Equipment	Other	FY Total
16-LW-053	Measurement of Uranium Decay Rates to Advance Nuclear Forensics Chronology	\$0	\$283,900	\$283,900
16-LW-055	Biosensors for Sensitive and Cost-Effective Detection of Uranium Contamination	\$0	\$262,870	\$262,870
16-SI-001	The New Frontier of Nuclear Science: Nuclear Reactions and Radiochemistry at the National Ignition Facility	\$0	\$1,676,020	\$1,676,020
16-SI-002	Forensic Science of Genetically Variant Peptides	\$0	\$1,707,050	\$1,707,050
16-SI-003	Fabrication of Functionally Graded Optical Components Using Additive Manufacturing	\$0	\$1,746,110	\$1,746,110
16-SI-004	Enhanced Coherence for Quantum Sensing and Simulation	\$0	\$2,100,540	\$2,100,540
Total # of Projects for LLNL: 182		Total Equipment Cost for LLNL: \$0	Total Other Cost for LLNL: \$85,841,300	Total Project Cost for LLNL: \$85,841,300
NNSS - Nevada National Security Site				
J1701023	Ultrafast All-Optical Framing Technology	\$0	\$183	\$183
J1701044	Ionospheric Plasma Coupling to Low-Frequency Electromagnetic Radiation	\$0	(\$8,252)	(\$8,252)
J1701045	Laser-Generated Ultra-High-Energy Density Plasma	\$0	\$409,619	\$409,619
J1701086	Multi-Frame X-Ray Imaging using Streak Camera with Patterned Photocathode	\$0	\$293,292	\$293,292
J1701126	Ionospheric Detection of Decoupled Nuclear Detonations	\$0	\$519,502	\$519,502
J1701195	Enhanced Dynamic Materials Research	\$0	\$631,407	\$631,407
J1701223	Solid-state Neutron Detectors using Uranium Oxides	\$0	\$1,533	\$1,533
J1701656	Systematic Studies in Dynamic Material Response	\$0	\$210,345	\$210,345
J1702016	A multi-axial time resolved spectroscopic technique for magnetic field, electron density and temperature measurements in dense magnetized plasmas	\$0	\$265,411	\$265,411
J1702025	High Miller-Index Crystal Exploration	\$0	\$809	\$809
J1702035	High Yield X-Ray Photocathodes	\$0	\$191,928	\$191,928
J1702046	X-ray Doppler Velocimetry	\$0	\$113,285	\$113,285
J1703015	Advanced Data Analysis Techniques	\$0	\$411	\$411
J1703025	Quantifying Uncertainties through Advanced Theoretical Analysis	\$0	\$348,867	\$348,867
J1703046	Searchable, Secure Long-Term Data Storage	\$0	\$4,333	\$4,333
J1703084	Grain-Selective Multiplexed Photonic Doppler Velocimetry Experiments	\$0	\$1,533	\$1,533
J1703086	Advanced Algorithms for Nuclear Weapon Performance Analysis - this is a classified project	\$0	\$190,705	\$190,705
J1703146	Surface waves in brittle materials: experiments and simulations	\$0	\$235,690	\$235,690
J1703165	Shock Propagation & Failure Mechanisms Characterization	\$0	\$6,256	\$6,256
J1703184	Optimizing Dense Plasma Focus Neutron Output using Particle-in-Cell and Magnetohydrodynamics Models	\$0	\$3,561	\$3,561
J1703223	Neutron Resonance Spectroscopy	\$0	(\$705)	(\$705)
J1703333	Plastic Deformation Study Using Light Gas Gun	\$0	\$3,682	\$3,682
J1703356	Correlation between hot spots and Three-Dimensional defect structure in single- and polycrystalline high explosive materials	\$0	\$145,468	\$145,468
J1703496	Next-Generation Photo-Multiplier Detectors using Transmissive III-Nitride Semiconductor Electrodes	\$0	\$180,171	\$180,171
J1704024	Advanced Modeling and Uncertainty Quantification for the Aerial Measurement System	\$0	\$107	\$107
J1704025	Networked Radiation Detection System	\$0	(\$2,872)	(\$2,872)
J1704106	Pedestrian Mapping with Spectral Backpacks for GPS-denied Areas	\$0	\$153,430	\$153,430
J1705016	Time-synchronized, microsecond-gated digital video to enhance optical tracking and surveillance for an unmanned aerial vehicle payload	\$0	\$224,401	\$224,401
J1705044	Dynamic Recompression of Damaged Materials	\$0	\$428	\$428
J1705045	Optical Ranging for Shocked Surfaces	\$0	\$2,734	\$2,734
J1705054	Laser-induced breakdown spectrometry as a Surrogate for Large Scale Detonations and Means to Characterize Intermediates	\$0	\$3,279	\$3,279
J1705055	Grooved Graded Density Impactor	\$0	\$4,806	\$4,806
J1705086	Dynamic Surface Tracking for Velocimetry Systems	\$0	\$219,872	\$219,872
J1705126	Low power, self-organizing, reporting devices: situational awareness using distributed sensor arrays	\$0	\$295,651	\$295,651
J1705193	An Experimental and Theoretical Investigation into the Chemical Properties of Uranium and Thorium Ions in the Gas-Phase and on Surfaces	\$0	\$2,423	\$2,423
J1705224	New Methods to Quantify Thermodynamic and Phase Properties of Shocked Materials	\$0	(\$2,869)	(\$2,869)
J1705253	Chemically Activated Quiescent Persistent Sensors	\$0	\$78,561	\$78,561
J1705324	Ultra-High Sensitivity Fiber-Optic Links	\$0	\$483	\$483
J1705366	Ultra-spectral remote imaging by scanning Fabry Perot etalons	\$0	\$137,040	\$137,040
J1705556	Ultra High Speed Velocimetry using Dispersive Frequency-Modulation Interferometry	\$0	\$154,873	\$154,873
J1705726	Ultra Low Power Sensor	\$0	\$149,644	\$149,644
J1705786	Red, green, blue wavefront sensor for turbulence mitigation	\$0	\$207,403	\$207,403
J1705896	Multi-Channel Cross-Band Unmanned Aerial System Radio Relay using Polyphase Signal Processing	\$0	\$246,094	\$246,094
J1706075	Concurrent Transceiver with Ultra-High-Speed Fourier	\$0	\$905	\$905
J1706095	Enhanced Radiation Detection	\$0	\$111,598	\$111,598
J1706096	Tri-Mode Radiation Detector	\$0	\$170,387	\$170,387
J1706155	Unmanned Aircraft System for Remote Contour Mapping	\$0	\$730,336	\$730,336
J1706186	Silicon Strip Cosmic Muon Detectors for Homeland Security	\$0	\$356,864	\$356,864
J1706215	Transition Edge Sensor	\$0	(\$158)	(\$158)
J1706234	Predictive Radiological Background Distributions from Geologic Data	\$0	\$519	\$519
J1706236	Thermal Microwave Kinetic Inductance Device	\$0	\$283,019	\$283,019
J1706254	Incorporation of technetium into fluorescent materials	\$0	\$20,266	\$20,266
J170FS16	Feasibility Study - Investigate terrestrial gamma ray flashes	\$0	\$8,945	\$8,945
J170FS26	Feasibility Study - Airborne high resolution and gamma imaging sensors development	\$0	\$48,254	\$48,254
J170FS36	Feasibility Study - Investigate a standards interface for unmanned aerial sensor platforms	\$0	\$14,629	\$14,629

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Project ID	Project Name	Equipment	Other	FY Total
J170FS46	Feasibility Study - Investigate new algorithm development for targeted Isotopic Identification	\$0	\$28,997	\$28,997
J170FS56	Feasibility Study - Investigate generating metal cluster ions using laser vaporization and Ionization	\$0	\$24,185	\$24,185
Total # of Projects for NNSS : 57	Total Equipment Cost for NNSS : \$0	Total Other Cost for NNSS : \$7,423,268	Total Project Cost for NNSS : \$7,423,268	
NREL - National Renewable Energy Lab				
6001010	Laboratory, Plant or Site Directed Research and Development Project Crosswalk	\$0	\$126,507	\$126,507
6271401	Next Generation in planta Expression of Glycoside Hydrolases: Reduction in Plant Cell Wall Recalcitrance	\$0	\$193,478	\$193,478
6271403	An Evolutionary Approach to Increase the Tolerance to Biomass Hydrolysates in Clostridium Thermocellum	\$0	\$72,101	\$72,101
6271501	Enhance Understanding of Cellulose Biosynthesis Mechanisms	\$0	\$224,333	\$224,333
6271503	Cellulosic Nanocrystals: Valuable Co-Products from Biomass to Support Biofuel Production	\$0	\$277,037	\$277,037
6271601	Enabling Synthetic Ribonucleic Acid Technologies using Thermophiles	\$0	\$55,411	\$55,411
6271602	Using Computational Modeling to Engineer Native Enzymes to Produce Shorter Fatty Acids for Fuels	\$0	\$48,836	\$48,836
062C1502	Computational Steering and Modeling Using the Energy Systems Integration Facility's Insight Center	\$0	\$286,776	\$286,776
062C1601	Compute Efficient Software Design on Upcoming High-Performance Computing Hardware	\$0	\$48,163	\$48,163
062C1602	Create Software Capabilities for Wind Plant Flow Physics	\$0	\$55,108	\$55,108
062C1603	Energy Systems Design Architecture	\$0	\$207,497	\$207,497
6501501	Development of Feed-Forward Control Strategies for Wave Energy Conversion Technologies	\$0	\$250,268	\$250,268
6501502	Improving the Accuracy of Lidar-Based Turbulence Measurements	\$0	\$150,966	\$150,966
6501601	Multi-Physics Engineering Tool for Wind-Plant Design and Analysis	\$0	\$252,111	\$252,111
6501602	Hardware-in-the-loop Grid Wind Plant Simulation	\$0	\$93,787	\$93,787
6501603	Capitalizing on the National Renewal Energy Lab's Data Analytics Opportunities in Wind Technology	\$0	\$50,530	\$50,530
6511501	Fatty Acid Decarboxylase Engineering for Continuous Hydrocarbon Fuel Production	\$0	\$174,337	\$174,337
6511502	Adipic Acid as a Next-Generation Platform Chemical from Biomass	\$0	\$224,877	\$224,877
6511503	Growth of Algae on Solid Supports for Enhanced Harvestability and Thermocatalytic Processing	\$0	\$225,172	\$225,172
6511505	Thermochemical Production of Bio-Polymer Precursors: Selective Conversion of Pyrolysis Vapors to Chemical Intermediates	\$0	\$267,360	\$267,360
6511601	Production of Butadiene from Biomass-Derived Sugars	\$0	\$214,648	\$214,648
6511602	Rational Control of the Catalyst Surface: Employing Surface Bound Ligands to Direct Catalyst Selectivity	\$0	\$233,206	\$233,206
6511603	Small Ribonucleic Acid and Riboswitches; A New Frontier in Biofuels Strain Engineering	\$0	\$195,525	\$195,525
6511604	Biochemical Production of Bio-Polymer Precursors: New Platform Chemicals for Advanced Materials from Sugars and Lignin	\$0	\$261,721	\$261,721
6511605	Commercial Production of High Octane Biofuel	\$0	\$86,849	\$86,849
6511606	Hybrid Artificial Photosynthesis and Biological Conversion	\$0	\$119,935	\$119,935
6541501	Optimal Dispatch and Megawatt-Scale Power Hardware-in-the-Loop for Frequency Response Batteries	\$0	\$186,440	\$186,440
6541502	Use Connected and Intelligent Urban Mobility to Reduce Transportation Energy Use and Carbon Emissions	\$0	\$431,655	\$431,655
6541601	Small-Scale Rapid Ignition Chemistry Screening for Biomass-Derived Streams and Molecules	\$0	\$262,672	\$262,672
6541602	Small Scale Fuel Cell Grid Integration With Renewable Hydrogen Generation	\$0	\$73,371	\$73,371
6551501	Firming Net Zero Energy Buildings: Supervisory Control Development and Value Demonstration for Small Commercial Buildings	\$0	\$256,680	\$256,680
6551503	Urban Renewable Building and Neighborhood Optimization	\$0	\$119,582	\$119,582
6551601	Increasing Chemical Degradation Resistance of Alloys for High-Temperature Technologies	\$0	\$44,401	\$44,401
6551701	An Integrated Modular Building Systems Chassis for Expanding Technology-Driven Design, Manufacturing and Living	\$0	\$13,375	\$13,375
6591403	Next-Generation Thermoelectric Materials for Direct Solar Power Conversion	\$0	\$180,645	\$180,645
6591501	Crystallographic Feedback for Low-Defect Hybrid Organic/Inorganic Perovskite Films as Photovoltaic Absorbers	\$0	\$223,988	\$223,988
6591502	Bipolar Membrane Fuel Cell Development	\$0	\$274,409	\$274,409
6591601	Hybrid Hard-Soft Materials Matrix for Novel Non-Aqueous Flow Battery	\$0	\$253,266	\$253,266
6591602	Interfacial Energetics and Structure of Strained Two-Dimensional Molybdenum Disulfide	\$0	\$101,776	\$101,776
6591603	Strategies for Long-Range Ordering and Catalyst Intercalation in Conductive Organic Frameworks	\$0	\$258,128	\$258,128
6591604	Halide Perovskite, boundary Interface between Two Types of Semiconductor Material Homojunction Solar Cells: Practical Results from Fundamental Understanding	\$0	\$113,100	\$113,100
6591605	Developing a New Class of Core-Shell Quantum Dots for Luminescent Concentrators	\$0	\$42,642	\$42,642
065C1601	Cybersecurity Through Improved Situational Awareness	\$0	\$77,405	\$77,405
065D1404	Electricity Market Design for High Renewable Energy Futures	\$0	\$78,262	\$78,262
065D1501	Renewable Power Plant Inertial Equivalency and its Service for Grid Stability	\$0	\$245,269	\$245,269
065D1502	Optimal Inverter Dispatch: Facilitating High Photovoltaic Penetration with Optimization and Grid Informatics	\$0	\$189,452	\$189,452

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Project ID	Project Name	Equipment	Other	FY Total
065D1503	An Advanced Methodology for Increasing Temporal Fidelity of Systems Emulated Using Remote Power Hardware-in-the-Loop	\$0	\$162,741	\$162,741
065D1601	Distributed Inverter Controllers Seeking Reliability and Economic Optimality of Photovoltaic-Dominant Distribution System	\$0	\$205,076	\$205,076
065D1602	Distribution System Planning for Uncertain Distributed Energy Resource Futures using Adaptive Dynamic Programming	\$0	\$215,188	\$215,188
065D1603	Look-Ahead State Estimation-Based Distribution Locational Marginal Price, an Exploration of the Future Electricity Retail Market	\$0	\$310,795	\$310,795
065D1604	Smart Home Hardware-in-the-Loop	\$0	\$270,167	\$270,167
065D1605	Size Systems	\$0	\$47,866	\$47,866
065F1601	Commissioning of New Multi-Technology Coating Station and Capability Demonstration across Multiple Material Sets	\$0	\$180,713	\$180,713
065F1602	Establishing a Research Base for Grid Storage	\$0	\$241,003	\$241,003
065F1603	Developing Roll-to-Roll Processing of Highly Stable Fluorinated Organic Photovoltaic Absorbers	\$0	\$113,281	\$113,281
065J1601	Silicon-Based Mechanically Stacked Tandem Solar Cells	\$0	\$44,273	\$44,273
065J1602	Evaluate the Potential of a Low-Cost Germanium on Silicon Substrate	\$0	\$30,441	\$30,441
065J1603	Introduce New Capabilities and Address Gaps in Module Prototyping Capabilities	\$0	\$81,668	\$81,668
065K1501	Rapid and Accurate Determination of Structural Phase Maps from Experimental Data	\$0	\$223,115	\$223,115
065K1504	Improve Excited-State Theory for Energy Materials	\$0	\$137,734	\$137,734
065K1601	Two-Dimensional Materials for Enabling Low-Cost Epitaxial Three-Dimensional Semiconductor Devices	\$0	\$120,354	\$120,354
065K1602	More Power, Less Weight: Portable Photovoltaic Power System	\$0	\$234,746	\$234,746
065K1603	Bridging the Gap between Module and Cell Level Studies: Building out the National Renewal Energy Lab's Reliability Research and Assessment Capabilities	\$0	\$117,225	\$117,225
065K1604	Comprehensive Three-Dimensional Tomographic and Electrical Characterization of Polycrystalline Solid-Oxide Fuel Cell Electrolytes	\$0	\$83,666	\$83,666
6641402	Energy Services Test Bed Experiments: Humans-in-the-Loop	\$0	\$759,551	\$759,551
066A1501	Modeling Electricity Sector Vulnerabilities Related to Water Temperatures	\$0	\$200,630	\$200,630
066A1502	Demand-Side Participation in Electricity Grid Integration Models	\$0	\$260,193	\$260,193
066A1601	Energy-Water Microgrid Demonstration and Design	\$0	\$38,652	\$38,652
066A1602	Photovoltaic Module Recycling and Materials Recovery: Developing the National Renewal Energy Lab's Capability for Integrated Techno-Economic and Environmental Analysis for Research & Development Prioritization	\$0	\$44,641	\$44,641
067A1601	Innovations for Low-Energy Data Center Cooling	\$0	\$83,206	\$83,206
Total # of Projects for NREL: 70		Total Equipment Cost for NREL: \$0	Total Other Cost for NREL: \$12,029,982	Total Project Cost for NREL: \$12,029,982

ORNL - Oak Ridge National Lab				
6789	Thermo-Mechanical Integrity of Critical Engineering Structures by High Spatial Resolution Neutron Diffraction	\$0	\$67,296	\$67,296
6802	Predictive Soft Matter Materials Simulation	\$0	\$56,973	\$56,973
6813	New Paradigms in Passive Polymer Membranes for Carbon Dioxide Separation	\$0	\$49,988	\$49,988
6826	Direct catalytic conversion of methane to methanol	\$0	\$70,146	\$70,146
6837	Neutron Scattering Studies of Select Uranium Compounds	\$0	\$59,884	\$59,884
6840	Pattern Discovery and Predictive Modeling on Heterogeneous Graphs using Cray's Urika Analytics Platform	\$0	\$35,510	\$35,510
6895	Sustainable Energy through Complex Oxide Materials: Multivalent Oxygen Sponges for Efficient, Low Temperature Catalysts	\$0	\$54,578	\$54,578
6917	To the Nation's Health: Computational National Healthcare Model for Value-Based-Purchasing Cost Projections	\$0	\$53,149	\$53,149
6984	A genome-enabled approach for predicting plant functional traits in dynamic vegetation models	\$0	\$60,145	\$60,145
6988	Revealing the structural organization of membranes in living cells by small-angle neutron scattering	\$0	\$73,661	\$73,661
7004	Untangling the role of boundaries, defects, and interfaces in two-dimensional inorganic materials: a combined theoretical and experimental approach	\$0	\$89,833	\$89,833
7019	Rational Design of Novel Porous Polymeric Organic Framework Materials	\$0	\$78,372	\$78,372
7223	Unconventional Magnetism and Superconductivity in Non-centrosymmetric Heavy Fermion Compounds Studied by Neutron Scattering	\$0	\$35,565	\$35,565
7244	High Yield Process For Lignin-Based Activated Carbon Fibers	\$0	\$18,010	\$18,010
7285	Chemical and Radiation Induced Volumetric Expansion of Minerals Composite in Interaction with Cement-like Materials	\$0	\$126,617	\$126,617
7319	Quantum key distribution in conventional optical fiber networks using untrusted devices	\$0	\$418,005	\$418,005
7325	Optimizing High Flux Isotope Reactor Isotope Production Through the Investigation of a Sensitivity-Informed Target Design Process Using High-Fidelity Modeling and Simulation Capabilities	\$0	\$435,370	\$435,370
7329	National Extreme Events Data and Research Center- Transforming the national capability for resilience to extreme weather and climate events	\$0	\$347,083	\$347,083
7331	Development of a wide-angle neutron velocity selector for the neutrons scattered at the sample position at inverted geometry spectrometers	\$0	\$339,167	\$339,167
7332	Transformational Integrated Fusion Neutronics Modeling and Simulation	\$0	\$404,872	\$404,872
7339	Application Data Structure Layout and Access Pattern Port Planning for Exascale Memory Architectures	\$0	\$328,566	\$328,566
7345	Transformational Fabrication Technologies for Nuclear Applications: Demonstration of Hybrid Structures for High Flux Isotopic Reactor Control Plates	\$0	\$400,313	\$400,313
7347	CloneX: Discrete Event Cloning at Exascale	\$0	\$338,470	\$338,470

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Project ID	Project Name	Equipment	Other	FY Total
7351	Theory of neutron scattering in strongly correlated and disordered materials	\$0	\$349,142	\$349,142
7362	Spatially Resolving Electron Spin Dynamics and Transport in Low-Dimensional Materials: A Spin-Dependent, Real-Space, Multi-Scale, Scanning Probes Approach	\$0	\$367,901	\$367,901
7365	A high performance, data-driven simulator of the American population for modeling urban dynamics.	\$0	\$320,275	\$320,275
7374	Development of novel neutron spin-echo methods for ultra-high resolution spectroscopy at the Oak Ridge National Lab	\$0	\$462,959	\$462,959
7393	Improve quantum-enhanced plasmonic ultra-trace sensors	\$0	\$403,896	\$403,896
7394	Functional domains in model membranes and protocells probed with high-performance simulation and neutron scattering	\$0	\$482,991	\$482,991
7395	Workflow Optimization and Processing of Complex Datasets for Off-site Fusion Energy Research	\$0	\$403,799	\$403,799
7396	Scalable Data and Informatics for Connected Vehicles Leveraged to Enhance Efficiency	\$0	\$316,887	\$316,887
7398	Nonlinear Nanophotonics with Ultrastrong Plasmonic Coupling	\$0	\$432,314	\$432,314
7399	Fine-resolution Modeling of Urban-Energy Systems' Water Footprint in River Networks	\$0	\$326,863	\$326,863
7406	High Resolution Solid State Neutron Detectors for Second Target Station	\$0	\$356,315	\$356,315
7409	In Situ Multi-scale Visual Analytics for Transformative Extreme Scale Science	\$0	\$329,261	\$329,261
7412	Predicting Climate Feedbacks from Microbial Function in Tropical Ecosystems	\$0	\$397,074	\$397,074
7417	Algorithms for Context-Specific Analysis of Heterogeneous Unstructured Big Health Data	\$0	\$396,275	\$396,275
7427	Predictive computational catalysis: From electrons to reactors	\$0	\$518,921	\$518,921
7428	Increasing advanced biofuels production from terpenes in Eucalyptus leaves	\$0	\$322,302	\$322,302
7443	Interrogating monolignol transport using a multimodal imaging approach	\$0	\$294,436	\$294,436
7445	Layered Ferrries by Design	\$0	\$449,774	\$449,774
7448	An Integrated Approach to the Design and Discovery of Fast Ionic Conducting Materials	\$0	\$519,990	\$519,990
7451	Integrated Framework for Urban Climate Adaptation Tool	\$0	\$335,488	\$335,488
7457	Off-grid Building Management System	\$0	\$1,402,443	\$1,402,443
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	\$308,068	\$308,068
7475	Extreme Scale Analytics for Near Real-Time Information Extraction in Multimodal Data	\$0	\$380,085	\$380,085
7476	Exploring Structure and Functionality of Oxides in Real Space: 'Deep Data' in Atomic Resolution Imaging	\$0	\$398,599	\$398,599
7499	Investigation of Hydrogen Behavior in Tungsten for Fusion Reactor Divertors	\$0	\$32,633	\$32,633
7510	Large-Scale Cluster State Generation for Fault Tolerant Quantum Computation	\$0	\$108,129	\$108,129
7536	Two-Dimensional Transition Metal Based Electrode Materials for Lithium-Ion Batteries	\$0	\$164,631	\$164,631
7541	Advanced Calibration Development for Inverse Heat Conduction: Exploiting High Thermal Conductivity Nanomaterials and Integrated Thermocouple Technologies	\$0	\$119,051	\$119,051
7542	Multiscale Model for Plant-Soil Hydraulic Coupling at the Watershed Scale	\$0	\$196,305	\$196,305
7549	Detection of Explosives Materials Underwater	\$0	\$49,980	\$49,980
7555	Enhanced ferroelectric response near the morphotropic phase-boundary in lead-free investigated with neutron scattering and piezo-force microscopy	\$0	\$59,594	\$59,594
7568	Mission-Critical Heavy Element Separations using Electrolysis and Superionic Conduction	\$0	\$60,068	\$60,068
7620	Synthesis of Novel Semiconductors through High Pressure Indentation	\$0	\$59,428	\$59,428
7623	Crystal Growth of Lanthanide-Halide Metal Organic Scintillators for Applications in Radiation Detection	\$0	\$169,927	\$169,927
7631	Development and Investigation of Advanced Monte Carlo Fission Source Convergence Acceleration Methodologies	\$0	\$124,454	\$124,454
7635	Leveraging high-throughput sequencing and genetic mapping to determine genetic loci and genetic networks underlying genome-wide transcript variation in Populus	\$0	\$89,891	\$89,891
7637	Spectroscopy of quantum matter under extreme pressures	\$0	\$831,617	\$831,617
7640	Dynamically Polarized Crystallography for Spectroscopy	\$0	\$1,406,973	\$1,406,973
7641	High-Resolution Small/Wide Angle Neutron Scattering for Atomic-to-Mesoscale Structure in Complex Soft Materials and Biology	\$0	\$706,397	\$706,397
7651	Structural Health Monitoring of Compression Connectors in Overhead Transmission Lines Using a Smart Patch	\$0	\$47,296	\$47,296
7656	Radioactive Particle Levitator to Study the Effects of Radioactivity on the Particle Charging Behavior	\$0	\$77,166	\$77,166
7669	Multimodal Imaging of Belowground Plant Root Distribution and Dynamics	\$0	\$119,101	\$119,101
7670	Experimental and Computational Evaluation of Optical Materials for Instrumentation in Extremely High Temperature Irradiation Environments	\$0	\$90,214	\$90,214
7676	Linking Structure with Function at the Mesoscale in Complex Oxides Materials.	\$0	\$225,959	\$225,959
7677	Developing Big Data Analytics for Human Settlement Characterization and Energy Demand Prediction.	\$0	\$183,935	\$183,935
7685	Simulation and algorithm development for three-dimensional residual stress measurements with energy dependent neutrons	\$0	\$82,942	\$82,942
7695	Detection of Ionizing Radiation via Stimulated Emission	\$0	\$129,871	\$129,871
7701	High-efficiency passive solar concentrator	\$0	\$29,696	\$29,696
7703	Fast Evaluation of Collision Operators for Modeling Non-Equilibrium Transport	\$0	\$91,337	\$91,337
7704	Multiscale Investigation of Gas Behavior in Structural Materials in Fusion Energy Environment: A Combined Experimental and Modeling Approach	\$0	\$277,703	\$277,703
7707	Synthetic Control of Hybrid Nanomaterials for Energy Applications	\$0	\$187,803	\$187,803
7728	New design criteria for large area, low power radiation detection systems based on Silicon Photomultipliers	\$0	\$133,794	\$133,794
7729	A plasma source for transient heat load investigations	\$0	\$116,745	\$116,745

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Project ID	Project Name	Equipment	Other	FY Total
7732	Production of Renewable Chemical Building Blocks via Electro-Fermentation	\$0	\$99,258	\$99,258
7735	Chemical Reactivity of Solids: Chemical Dynamics of the Atomic Structure of Solids Using Time-of-Flight Neutron Total Scattering	\$0	\$83,503	\$83,503
7739	Virtual Experiments in Neutron Spectroscopy	\$0	\$159,562	\$159,562
7745	Irradiation effect on thermoelectric materials	\$0	\$5,967	\$5,967
7747	Colloquium: A Tool For Modeling Hybrid Quantum Computing's High Performance Computing Potential	\$0	\$110,713	\$110,713
7757	Quantum Communications Networks, Scaling Laws and Resource Requirements	\$0	\$144,357	\$144,357
7758	Correlotypes: Determining complex genotypic profiles responsible for complex phenotypes	\$0	\$200,595	\$200,595
7759	Highly Permeable Graphene Oxide Membranes for Water Vapor Separation	\$0	\$157,154	\$157,154
7760	Develop an Eddy Covariance Capable Optical Oxygen Sensor	\$0	\$74,998	\$74,998
7762	Automated Extractor Generation for Packed Malware	\$0	\$77,699	\$77,699
7763	Individual diploid genome sequencing with parental haploid resolution and structural variation identification	\$0	\$134,957	\$134,957
7767	Berry phase imaging development: a novel modality for back-reflectance imaging of scattering samples	\$0	\$76,825	\$76,825
7771	Concurrent multiscale algorithms for local/nonlocal coupling and its adaptivity	\$0	\$257,025	\$257,025
7776	Magnetoelectric multiferroic nanocomposites going beyond complex oxide perovskites	\$0	\$218,583	\$218,583
7783	On the Path to Exascale: Continuous-Energy Monte Carlo Particle Transport on Advanced Computing Architectures	\$0	\$399,693	\$399,693
7784	In-situ Real-Time Measurement of Plasma Facing Component Erosion	\$0	\$324,292	\$324,292
7786	Impact of extreme weather events on plant species, competition and ecological function	\$0	\$433,992	\$433,992
7792	Tunable Interfaces for Controlled Complexity	\$0	\$375,958	\$375,958
7795	Probing the Electromechanical Response Mechanism in Nanostructured Ionic Polymers: Towards Rational Design, Tailored Synthesis, and Optimized Properties	\$0	\$437,832	\$437,832
7803	An Open Framework for Joint Optimization/Control of Networked Microgrids	\$0	\$562,995	\$562,995
7804	Urban Typologies: Towards an Oak Ridge National Lab Urban Information System	\$0	\$524,897	\$524,897
7807	A Scalable, Resilient, and Efficient Data Service for Exascale Computing	\$0	\$293,994	\$293,994
7812	Observing hidden structure underpinning emergent functionality in mesoscale materials	\$0	\$277,387	\$277,387
7825	Understanding Selective Hydrogenation by In situ Neutron Vibrational Spectroscopy	\$0	\$325,957	\$325,957
7827	A modern Foundation of Rigorous Mathematics for Uncertainty quantification of Large multiscale systems At The Extreme scale	\$0	\$405,233	\$405,233
7828	Microfluidic Separation Processes for Nuclear Materials Research and Production	\$0	\$317,890	\$317,890
7832	Fundamental Insights into the mechanism of ionic transport in ionic materials	\$0	\$430,580	\$430,580
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	\$366,342	\$366,342
7836	An Oak Ridge National Lab Experimental Neutrino Program	\$0	\$519,345	\$519,345
7847	Designing and Controlling Ordered Mesoscale Tilings and Tessellations	\$0	\$379,985	\$379,985
7848	Thermodynamic limits to the scalability of cold qubits based on interface constraints.	\$0	\$302,858	\$302,858
7852	A virtual testbed for silicon donor qubits	\$0	\$456,479	\$456,479
7856	An Experimental and Computational Framework for Directed Succession: Unravelling Cobamide Control of Microbial Community Assembly, Structure and Function	\$0	\$420,821	\$420,821
7857	Real-time Urban Activity Monitoring using Pervasive Sensor Network	\$0	\$359,980	\$359,980
7864	Mini-Apps for Data-Intensive Discovery on Big Data Architectures	\$0	\$396,521	\$396,521
7866	Dynamic metabolic flux control for engineering complex biological systems	\$0	\$369,788	\$369,788
7868	Elucidating the Influence of Reversible Non-Covalent Interactions on Dynamic Properties for Rational Design of Soft Materials	\$0	\$395,844	\$395,844
7884	Simulation based testing for next generation software integrated energy systems	\$0	\$325,093	\$325,093
7886	Advancing additive manufacturing processes through multi-scale characterization using neutron scattering techniques correlated with mesoscale polycrystal deformation simulation	\$0	\$449,060	\$449,060
7890	Positioning and Characterization of Single Dopants	\$0	\$283,353	\$283,353
7897	SharP: SHARed data-structure centric Programming paradigm for Scientific Applications	\$0	\$347,869	\$347,869
7899	Accumulative Linking and Analysis of Scientific Results: A New Data-Infrastructure Paradigm to Enable Data-Driven Discoveries	\$0	\$411,424	\$411,424
7908	Scalable Coordination and Control of Microgrid Generation, Load, and Storage using Distributed Stochastic Model Predictive Control	\$0	\$349,079	\$349,079
7909	Development of an Urban Microclimate and Energy Planning Tool	\$0	\$368,540	\$368,540
7918	Ultra-low Cost, Passive Wireless Sensor Networks Enabling Unprecedented Visibility, Monitoring and Control of Buildings, Grid, Energy Extraction/Delivery, and Environment	\$0	\$225,966	\$225,966
7922	Modeling and Simulation of Tokamak Disruptions in International Thermonuclear Experimental Reactor Plasmas	\$0	\$339,935	\$339,935
7934	Scalable Deep Learning Algorithms for Exascale Data Analytics	\$0	\$389,061	\$389,061
7938	Rational design of deuterated conjugated polymers with controlled spin-polarized electron transport	\$0	\$423,597	\$423,597
7950	Predicting Propagation Consequences of Perturbations in Synergistically-Interacting Infrastructure Networks	\$0	\$351,838	\$351,838
7954	Systematic Characterization and Verification of Quantum Computing Devices	\$0	\$299,919	\$299,919
7970	Room temperature electrochemical activation of nitrogen	\$0	\$417,851	\$417,851
7998	Integration of Accurate Theoretical/Computational Approaches with Experimental Techniques for the Understanding of Two-Dimensional Layered Nanomaterials	\$0	\$175,888	\$175,888
8005	Overcoming Antibiotic Resistance: Neutron crystallographic and quantum chemical studies of a beta lactamase enzyme	\$0	\$112,526	\$112,526

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8013	Ion decoupling in layered electrolytes of boron nitride and ionically assembled polyethylene oxide-Li ⁺ complexes	\$0	\$184,270	\$184,270
8018	From Spins to Stars: Informing Explosive Astrophysical Scenarios through Indirect Measurements on Radioactive Nuclei	\$0	\$238,686	\$238,686
8025	Power Measurement Framework for Cyber Defense	\$0	\$208,969	\$208,969
8033	Evolution of solvent production in competitive microbial communities	\$0	\$205,075	\$205,075
8035	Additive Manufactured Bimetallic Gradients for High Demand Applications	\$0	\$183,923	\$183,923
8037	New advances in the Bayesian approach to inverse problems	\$0	\$298,734	\$298,734
8042	Dissecting ancient genes conferring biological complexity at the common node of complex ecosystems and human biology	\$0	\$100,992	\$100,992
8043	Experimentally driven deep data in Helium Ion Microscopy	\$0	\$198,783	\$198,783
8046	Preparation of Advanced Hard-Matter Materials through Metal-Organic Framework Templating	\$0	\$129,614	\$129,614
8078	The Potential for Generation of Hydrochloric Acid by Supercritical Carbon Dioxide in Contact with Concentrated Brine	\$0	\$190,180	\$190,180
8085	Programming and Usability of Neuromorphic Computing	\$0	\$222,668	\$222,668
8086	Effects of tree mortality on belowground community structure, function, and carbon cycling	\$0	\$189,278	\$189,278
8090	Quantum Information from Ultrafast Time-Frequency Entangled Photons	\$0	\$218,801	\$218,801
8091	Novel Mathematical and Computational Modeling for Maxwell's problems in Dispersive Media	\$0	\$214,915	\$214,915
8092	An Ensemble-based Multivariate Approach for Verification of the Accelerated Climate Model for Energy	\$0	\$99,255	\$99,255
8093	Developing machine learning Monte Carlo approaches for computational materials modeling	\$0	\$80,220	\$80,220
8097	Complete characterization of fission with neutron-gamma-fragment correlations	\$0	\$121,703	\$121,703
8133	Quantum cascade laser mid infrared spectroscopy for real time online monitoring of kinetics in aqueous and organic phases in nuclear materials processing	\$0	\$134,929	\$134,929
8134	Novel Functional Materials for Metal Ion Separation	\$0	\$67,885	\$67,885
8150	Data Integrity and Resilient Topologies in the Smart Grid	\$0	\$72,598	\$72,598
8155	Photonics-based Physically Unclonable Functions - a Feasibility Study	\$0	\$118,177	\$118,177
8158	Understanding Performance and Optimization of Micro-propellers	\$0	\$178,441	\$178,441
8164	Refractory Metal Deposition onto titanium diboride and silicon carbide Particles for Armor and High Temperature Composite Applications	\$0	\$106,702	\$106,702
8165	Intelligent Spatial Modeling Approach for De-icing Urban Roads	\$0	\$67,512	\$67,512
8166	Passive Solar Tracker for optimizing solar energy systems	\$0	\$88,762	\$88,762
8167	Understanding the interface driven magnetic properties of topological insulators using a graphics processing unit accelerated first-principles all-electron code	\$0	\$66,620	\$66,620
8174	Geobiology: Chemical interfaces, gradient drivers and mechanisms	\$0	\$377,902	\$377,902
8178	Bio-oil Stabilization with Supported Single-atom Catalysts	\$0	\$120,091	\$120,091
8180	Development of Multimodal Spatially Resolved Imaging on a Combined Atomic Force Microscope/Focused Ion Beam Time-of-Flight Secondary Ion Mass Spectrometer Platform	\$0	\$98,507	\$98,507
8182	Computational Design of Novel Solid Stoppers for Generating Intense Exotic Radioactive Ion Beams at the Facility for Rare Isotope Beams	\$0	\$95,487	\$95,487
8185	Develop Electrostatically Tunable Optical Transmission Graphene Device in the Visible and Infrared Range	\$0	\$189,966	\$189,966
8196	Microwave-absorbing nanocomposites through employment of biologically produced magnetites	\$0	\$62,647	\$62,647
8198	Use of Graphitic Foams for Monoblock Fusion Divertor Components	\$0	\$115,626	\$115,626
8202	Advanced High-temperature Engineering Alloy Design: Combining Big Data and Machine Learning Approach for Accelerated Materials Development	\$0	\$111,518	\$111,518
8203	Publication Mining for Better Materials	\$0	\$72,761	\$72,761
8204	Fluorescent Air Leak Detection System for Building Enclosures	\$0	\$30,011	\$30,011
8210	Graphite Foam Characterization for Space Applications	\$0	\$29,502	\$29,502
8214	Origin of viscosity in aqueous solution	\$0	\$50,504	\$50,504
8215	Neutron Source	\$0	\$70,622	\$70,622
8219	Additive Manufacturing Science of Multi-Phase Metallic Hybrid Materials	\$0	\$240,640	\$240,640
8221	Atomic Resolution of a Protein using X-ray Fluorescence Holography	\$0	\$21,371	\$21,371
8224	Development and Testing of Fiber-Optic Bolometers for Fusion Plasmas	\$0	\$108,995	\$108,995
8225	An integrated approach to link microbial membrane assembly to environmental biocomplexity: connecting nanoscale structure with mesoscale function	\$0	\$44,768	\$44,768
8227	Establishment of optogenetics capabilities for manipulation of gene expression in plants	\$0	\$64,635	\$64,635
8231	Deep-learning Enabled Clinical Cancer Surveillance for Exascale Computing	\$0	\$150,019	\$150,019
8232	Development of a proof-of-principle handheld directional neutron detector	\$0	\$25,871	\$25,871
8307	Multimodal Chemical Imaging of Nanoscale Transformations Away from Equilibrium	\$0	\$49,721	\$49,721
8411	Developing symmetry selective structural probes as a tool for materials design using fast electron detectors and high performance data analytics	\$0	\$139,918	\$139,918
8474	Elucidating the role of interfacial water on material structure and function through a novel multiscale-measurement approach	\$0	\$146,869	\$146,869
8475	Contributing to transportation sustainability through utilization of connected and automated vehicle technologies	\$0	\$105,871	\$105,871
8478	Clustered Regularly Interspaced Short Palindromic Repeats - Associated Proteins platform for Genetic Engineering of Diverse Filamentous Fungi	\$0	\$133,622	\$133,622
8482	Mechanically-Controlled Ion Binding for Separation Applications	\$0	\$94,185	\$94,185
8486	Over-the-Air-Coordinated Constructive Multipoint Radio Frequency Transmissions	\$0	\$13,808	\$13,808

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8488	High-Purity, Enriched-Isotope, Chemistry, Purification and Characterization of Semiconductor Gases	\$0	\$840,327	\$840,327
8495	Microelectromechanical System Oscillator Arrays as Micro-Chip On-Board Key Encryption Engine	\$0	\$19,581	\$19,581
Total # of Projects for ORNL: 184	Total Equipment Cost for ORNL: \$0	Total Other Cost for ORNL: \$43,954,166		Total Project Cost for ORNL: \$43,954,166
PNNL - Pacific Northwest National Lab				
PN13092/2573	Localized Surface Plasmon Resonance Spectroscopy, Microscopy, and Sensing	\$0	\$219,852	\$219,852
PN13098/2579	Tin (Sn) Project - This project seeks to develop a new type of highly-efficient low-background radiation detection capability for assay of environmental radionuclides.	\$0	\$289,840	\$289,840
PN13100/2581	Optical properties modification in complex oxide epitaxial films via alloy formation	\$0	\$258,902	\$258,902
PN13101/2582	Exploring and Engineering Phototrophic-Heterotrophic Partnerships	\$0	\$221,052	\$221,052
PN13102/2583	Signatures of Environmental Perturbation - Microbial Community and Organic Matter Resilience	\$0	\$74,202	\$74,202
PN14001/2585	Low Background Liquid Scintillation Counter	\$0	\$322,068	\$322,068
PN14003/2587	Ultra-low Background Polymers for Structural Applications in Radiation Detectors	\$0	\$309,345	\$309,345
PN14006/2590	Dark Matter Physics - The nature of the dark matter that makes up 85% of the matter in the universe is unknown. This project focuses on analysis of current data and future experiments to address this scientific priority in the field of cosmology and particle physics	\$0	\$134,123	\$134,123
PN14007/2591	Determining Groundwater Residence Time through Ultra-Low Measurements of ³⁹ Ar and other Radiotracers	\$0	\$225,053	\$225,053
PN14012/2596	High Information Content Polymers and their Assembly into Structural Motifs	\$0	\$347,808	\$347,808
PN14015/2599	Analytics Integration and Validation Framework - The goal of this project is to enable the integration of multidisciplinary research efforts and their products into a unified framework for the discovery and validation of complex signatures	\$0	\$23,131	\$23,131
PN14018/2602	Predictive Understanding of Self-Assembly: Particle-Mediated Growth	\$0	\$359,700	\$359,700
PN14019/2603	High Aspect Ratio Functional Composites for Thermal Optical Applications	\$0	\$199,516	\$199,516
PN14022/2606	Platform for Large-Scale Determination of Protein-Ligand Binding	\$0	\$179,878	\$179,878
PN14023/2607	Combined microscale ¹³ C and ¹⁸ O measurements at cutting-edge sensitivities and spatial resolution	\$0	\$188,121	\$188,121
PN14025/2609	Fundamental mechanisms of nucleation and growth of particles in solution	\$0	\$484,323	\$484,323
PN14026/2610	Robust Hierarchical Zeolite Frameworks - The goal of the study is to provide a molecular description on the formation and arrangement processes during synthesis of microporous crystalline silicates and use that knowledge as basis for the synthesis of nano-sized and mesoscopically structured zeolites with tailored chemical and textural properties	\$0	\$390,414	\$390,414
PN14027/2611	Multi-scale processes controlling spatial variation in greenhouse gas emissions in a subarctic watershed	\$0	\$198,002	\$198,002
PN14030/2614	Global Forensic Chemical Exposure Assessment for the Environmental Exposome	\$0	\$199,368	\$199,368
PN14040/2624	Aggregate Load Modeling and Control for Power Grid Regulation Services	\$0	\$187,806	\$187,806
PN14041/2625	Complex Systems Control Testbed - This project provides an experimental and testing infrastructure in which distributed control methodologies and tools can be validated and verified	\$0	\$225,869	\$225,869
PN14042/2626	Distributed Control of Large-Scale Complex Systems	\$0	\$199,448	\$199,448
PN14044/2628	Agent-Based Testbed for Complex Building Control Systems	\$0	\$181,168	\$181,168
PN14045/2629	Decision Theory for Incentive Compatible Mechanism Design	\$0	\$190,461	\$190,461
PN14046/2630	High-Level Modeling Specification for Simulation of Control Systems	\$0	\$150,446	\$150,446
PN14047/2631	Impacts of Communication Network on Distributed Control	\$0	\$215,062	\$215,062
PN14050/2634	Graphene Oxide Based Structured Laminar Membranes	\$0	\$334,496	\$334,496
PN14066/2650	Development of a Novel Microscopy Platform for Fundamental Studies of Ice Nucleation on Atmospheric Particles.	\$0	\$185,100	\$185,100
PN14067/2651	Bridging length scales in complex oxides: From point defects to defect superstructures	\$0	\$215,773	\$215,773
PN14068/2652	Simultaneous ¹⁴ C and ³ H Age Dating of Environmental Organic Matter	\$0	\$306,791	\$306,791
PN14076/2660	Streaming Data Characterization - The goal of this project is to create a library of existing, relevant algorithms and methods in streaming data analysis and enable them to be used in multiple domains and approaches for hypothesis generation	\$0	\$196,872	\$196,872
PN14077/2661	Development of an Ultra-small Volume Detection and Sample Delivery System for Exploring Microscale Heterogeneity with Nuclear Magnetic Resonance	\$0	\$46,641	\$46,641
PN14081/2665	Rhizosphere Underground: Unraveling the Role of Microbes in Stabilizing Carbon Pools in Soils	\$0	\$65,137	\$65,137
PN14082/2666	Quantifying Carbon Fluxes and Underlying Mechanisms Using Multiple Data Sets with a Joint Land-atmosphere Ensemble Kalman Filter Data Assimilation System	\$0	\$199,211	\$199,211
PN14083/2667	Developing Signatures that Relate Fecal Microbiome Characteristics with Gastric Bypass Surgery Outcomes	\$0	\$82,700	\$82,700
PN14085/2670	Topological Analysis of Graphs in Cyber Security	\$0	\$255,221	\$255,221
PN14087/2671	Dorc - The Defenders Role in Resilient Cyber Security	\$0	\$111,258	\$111,258
PN14089/2673	Multiscale modeling and uncertainty quantification for complex non-linear systems	\$0	\$334,017	\$334,017
PN14090/2674	Optically Resonant Subwavelength films for Tags and Seals	\$0	\$109,834	\$109,834
PN14091/2675	Extreme Ultraviolet Laser Ionization Mass Spectroscopy	\$0	\$185,388	\$185,388
PN15001/2676	Experimental Management for Controls of Complex Systems Test Bed	\$0	\$204,768	\$204,768
PN15002/2677	Scalable Hierarchical Validation & Calibration for Robust Distributed Control of Large-scale Complex Systems under Uncertainty	\$0	\$125,033	\$125,033
PN15003/2678	Visual Analytics Platform for Large-Scale Hierarchical Control System Data	\$0	\$148,344	\$148,344
PN15004/2679	Development of hierarchical porous structured materials for energy storage applications	\$0	\$314,902	\$314,902

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Project ID	Project Name	Equipment	Other	FY Total
PN15005/2680	Integration and Demonstration of Scalable Power System Simulation for Carbon Capture Simulation Initiative Test Bed	\$0	\$115,001	\$115,001
PN15007/2682	Resilience in Large-Scale Distributed Control Systems	\$0	\$210,586	\$210,586
PN15009/2684	Co-Simulation Platform for Rapid Prototyping of Control Algorithms	\$0	\$189,920	\$189,920
PN15010/2685	Cultivation-independent untangling of microbial gene regulation networks	\$0	\$202,793	\$202,793
PN15011/2686	Compression Statistics for Analysis of Streaming Data	\$0	\$265,661	\$265,661
PN15012/2687	Laser-ablation based multimodal tool for nuclear forensics	\$0	\$134,650	\$134,650
PN15013/2688	Observing and Quantification of the Initial Stages of Nucleation and Growth in Liquids	\$0	\$639,705	\$639,705
PN15015/2690	Bio-Inspired Selective Conversion of Methane to Methanol	\$0	\$200,158	\$200,158
PN15016/2691	Impact of Environmental Stressors on Complex Biological Systems	\$0	\$202,070	\$202,070
PN15017/2692	Digital Currency Graph Forensics to Detect Proliferation Finance Patterns	\$0	\$274,680	\$274,680
PN15018/2693	Sequence-Defined Polymers based on a New Backbone Architecture	\$0	\$302,838	\$302,838
PN15019/2694	Detection of Production at the Source - Research reactors are often the first technology that a nation intent on producing unauthorized plutonium will procure. Larger research reactors can produce a significant quantity a year if properly configured. This research will determine if such a reconfiguration will produce revealing transient operating signatures	\$0	\$200,239	\$200,239
PN15020/2695	Scalable Synthesis of Spinel Stabilized Metal Catalysts	\$0	\$249,990	\$249,990
PN15022/2697	Cognitive Depletion in Streaming Environments	\$0	\$299,019	\$299,019
PN15023/2698	Incremental Maintenance of Knowledge Graphs - Knowledge graph construction and maintenance is an expensive process involving manual curation by domain experts. This project is working to construct knowledge bases that are evolving over time and can be useful for creating and validating hypotheses	\$0	\$495,355	\$495,355
PN15024/2699	Scalable Feature Extraction and Sampling for Streaming Data Analysis	\$0	\$449,307	\$449,307
PN15025/2700	User-centric hypothesis definition - This research aims to reveal effective techniques for visual communication of machine learning output to non-expert users in a streaming environment	\$0	\$336,303	\$336,303
PN15027/2702	Solving the Plutonium-238 Problem	\$0	\$381,687	\$381,687
PN15028/2703	Atomistic view of solid-liquid interfaces using in-situ X-ray Probes	\$0	\$627,269	\$627,269
PN15029/2704	High Resolution and Three-Dimensional Imaging of Nanomaterials	\$0	\$200,170	\$200,170
PN15030/2705	Discovering Coherent Elastic Neutrino Nucleus Scattering in Mini-Cryogenic Low Energy Astrophysics with Noble liquids (Dark Matter Experiment) at Fermilab	\$0	\$104,228	\$104,228
PN15031/2706	Rendezvous: Optimization and Stochastic Algorithms for Asymmetric Resilient Infrastructure	\$0	\$209,468	\$209,468
PN15036/2711	Integrated Adaptive Resilient Asymmetric Data Security	\$0	\$85,733	\$85,733
PN15037/2712	Signatures of plutonium tetrafluoride and plutonium metal processing	\$0	\$173,757	\$173,757
PN15044/2719	Deuterium Tritium Neutron Generator Based Standard to Replace 252Californium	\$0	\$159,925	\$159,925
PN15046/2721	Multidimensional Membrane Theory to Predict Power System Oscillations	\$0	\$171,092	\$171,092
PN15049/2724	Hot Particle Analysis Aided by a State of the Art Focused Ion Beam	\$0	\$199,698	\$199,698
PN15050/2725	Digital Signatures - This project seeks to identify a set of computationally efficient signature types that will indicate whether different classes of software are currently running in a cloud infrastructure	\$0	\$198,131	\$198,131
PN15051/2726	Modeling underwater sound in coastal environment to accelerate development of renewable ocean energy	\$0	\$202,745	\$202,745
PN15052/2727	Development of a Pacific Northwest National Lab Underground Nuclear Explosion Simulation Tool	\$0	\$108,757	\$108,757
PN15055/2730	Dynamics of Supported Noble metal Nanoparticles in the Presence of Oxidizing Environment: Application of Compressive Sensing in Environmental Transmission Electron Microscopy	\$0	\$77,962	\$77,962
PN15059/2734	Understanding Cellular Communication and Controlling Directional Flow of Nutrients	\$0	\$199,987	\$199,987
PN15061/2736	Biological threat signatures for Bacillus anthracis	\$0	\$162,952	\$162,952
PN15064/2739	Image Analysis using Active Learning on Shape and Texture Features	\$0	\$41,870	\$41,870
PN15065/2740	Climate-Related Chemistry of Internally Mixed Atmospheric Particles	\$0	\$123,334	\$123,334
PN15066/2741	Molecular Fingerprint of Ammonium Nitrate and Fuel Oil Detonation	\$0	\$112,907	\$112,907
PN15068/2743	Soil organic carbon/mineral association and aggregation processes	\$0	\$254,859	\$254,859
PN15069/2744	Microbiome Model Across Scales - from Metabolism to Succession: A Framework for Modeling, Simulation and Theory Development for Microbial Ecology	\$0	\$326,493	\$326,493
PN15071/2746	Gamma-gamma Coincidence Analysis Algorithms	\$0	\$149,243	\$149,243
PN15072/2747	Nonstationary Climate Considerations- Floods and Consequences	\$0	\$30,712	\$30,712
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	\$280,181	\$280,181
PN15076/2751	Module Integration Interface for Resilient Cyber Systems	\$0	\$382,865	\$382,865
PN15077/2752	Statistical Integration of Omics Data from Microbiomes. This is not a human microbiome.	\$0	\$284,748	\$284,748
PN15078/2753	Microbiome responses to hydrologic regime shifts and subsequent alteration to ecosystem function. This is not a human microbiome.	\$0	\$275,514	\$275,514
PN15080/2755	Making, Measuring, and Modeling Materials for Quantum Computing	\$0	\$964,663	\$964,663
PN15081/2756	Optically Stimulated Luminescence Data Storage	\$0	\$85,672	\$85,672
PN15084/2759	Aperture - The research is focused on the environmental control of stomatal response in plant leaves with the objective of engineering bioenergy crops for improved water-use efficiency	\$0	\$45,617	\$45,617
PN15085/2760	Fundamental Understanding of Nucleation Processes to Assess Solution Stability and Phase Growth and Genesis	\$0	\$393,296	\$393,296

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PN15087/2762	Universal Liquid Transmission Electron Microscopy Microfluidic Cells based on Salvi for Predictive Materials	\$0	\$79,457	\$79,457
PN15088/2763	Electrolytes Enabling Low Temperature Battery Operation	\$0	\$123,222	\$123,222
PN15089/2764	RhizoControl: Does the Rhizospheric Microbiome Influence the Plant Metabotype? A Plant Gnotobiotics Approach	\$0	\$141,841	\$141,841
PN15090/2765	An In-situ Investigation of gamma-Aluminum Oxide Hydroxide Dissolution under High pH Conditions	\$0	\$446,316	\$446,316
PN15091/2766	Correlation of Colloidal Interactions and Macroscopic Rheology in Concentrated Electrolyte Solutions	\$0	\$304,319	\$304,319
PN15092/2767	Microbial Community Dynamics and Plant Phenomics with Single-Cell Gene Expression and Imaging Mass Spectrometry	\$0	\$49,845	\$49,845
PN15094/2769	Non-linear microbial processes possible lead to linear ecosystem fluxes	\$0	\$311,227	\$311,227
PN15095/2770	Monitoring Diffusion of Actinide Daughters and Granddaughters in Metals for Chronometer Applications	\$0	\$320,373	\$320,373
PN15096/2771	Discovery of Cyber/Physical Qualifiers' Relationship and Relevance to Probabilities of Detection/Non-Detection Mitigations	\$0	\$103,296	\$103,296
PN15099/2774	Electrocatalytic reduction of phenols and ethers	\$0	\$85,962	\$85,962
PN15100/2775	Modeling the Interfacial Effects, Partitioning, and Production Routes of Epsilon Particles in Uranium Oxide	\$0	\$322,059	\$322,059
PN15101/2776	Estimation of Battery State of Health using Utility and Literature Data - This research developed a model to estimate the remaining energy capacity of a Lithium-Ion battery cell or system. This work allows estimation of battery state of health to enable end users to use large scale batteries reliably.	\$0	\$39,937	\$39,937
PN15102/2777	Unmask Signatures of Cell Perturbation Hidden in the Normal Variability Between Cells	\$0	\$115,175	\$115,175
PN16001/2778	Assessing climate and human-exposure impacts of polycyclic aromatic hydrocarbons and secondary organic aerosols particles	\$0	\$180,935	\$180,935
PN16002/2779	Measurement and Verification in Controlled Complex Systems	\$0	\$119,658	\$119,658
PN16003/2780	Dynamic Multiscale Modeling of Complex Biosystems: A Framework for Multiscale Metabolic Modeling	\$0	\$316,007	\$316,007
PN16004/2781	Test Bed Federation Tools for Control of Complex Systems Research	\$0	\$69,275	\$69,275
PN16005/2782	Membrane-based Separator - developing an improved method for separating gases using an inorganic membrane that can operate over a wide temperature range and is compatible with most gases.	\$0	\$99,553	\$99,553
PN16006/2783	Developing Multi-Criteria Assessment Methods under Uncertainty - exploring linkages between climate change mitigation and other societal goals, enabling quantification of synergies and trade-offs among different objectives.	\$0	\$93,893	\$93,893
PN16007/2784	Understanding the Nucleation, Growth, and Deposition of Ligated Metal Clusters Using Mass Spectrometry	\$0	\$106,680	\$106,680
PN16008/2785	Fundamental Mathematical Models for Human Interactions	\$0	\$236,050	\$236,050
PN16009/2786	Combining Isotopic measurements using <i>in situ</i> liquid secondary ion mass spectrometry and <i>in situ</i> transmission electron microscope to determine the mechanism and kinetics of Lithium-ion mobility in solid-electrolyte interphase layers	\$0	\$152,763	\$152,763
PN16010/2787	Proteomic Signatures of Wild versus Lab-Adapted Pathogens	\$0	\$103,976	\$103,976
PN16011/2788	Visualizing viral and nanoparticle interactions with cells across scales and modalities	\$0	\$151,692	\$151,692
PN16012/2789	Hardware Integration Platform for the Control of Complex Systems Initiative Test Bed	\$0	\$126,625	\$126,625
PN16013/2790	Bulk Nanostructured Alloy Optimization: Designing for Processing and Thermal Stability	\$0	\$322,492	\$322,492
PN16014/2791	Scalable Processing of Nanostructured Materials	\$0	\$322,476	\$322,476
PN16015/2792	Three-Dimensional Printing of Electrical Sensors for Biological and Chemical Detection	\$0	\$151,725	\$151,725
PN16016/2793	A Composable Interdependence Model for Cyber-Physical Systems	\$0	\$82,029	\$82,029
PN16017/2794	Robust Statistical Data Exploration and Analysis for Microbiome Metabolomics. This is not a human microbiome.	\$0	\$149,970	\$149,970
PN16018/2795	High-throughput Genome-to-Metabolome Computational Methods for Microbiome Metabolomics and Modeling	\$0	\$169,899	\$169,899
PN16019/2796	Deciphering Microbial Communication Through Metabolites	\$0	\$289,497	\$289,497
PN16020/2797	Carbon Rods with Unexpected Humidity-Driven Water Expulsion	\$0	\$243,434	\$243,434
PN16021/2798	Electrochemical Processes to Transform Waste Carbon Dioxide to Fuels and Chemicals	\$0	\$94,672	\$94,672
PN16022/2799	Bulk Thermally Stable Nanocomposite Processing	\$0	\$736,330	\$736,330
PN16023/2800	Using Modified Proteins for Forensic Deconvolution of Xenobiotic Dose Quantitation and Timing	\$0	\$199,462	\$199,462
PN16024/2801	Optimal Management of Building Loads and Energy Storage for Grid and End-user Services	\$0	\$150,067	\$150,067
PN16025/2802	Image Fusion - Secondary Ion Mass Spectrometry and Microscopy	\$0	\$224,975	\$224,975
PN16026/2803	Development of new high-temperature piezoelectric materials for in-core diagnostics and prognostics	\$0	\$132,906	\$132,906
PN16027/2804	Understanding the Role of Coastal Wetlands in Carbon Cycling - An Integrated Modeling-Observation Approach to Improve Regional Earth System Modeling	\$0	\$208,940	\$208,940
PN16028/2805	Free Space Transistors for Advancing the Art of Software Defined Radio	\$0	\$156,944	\$156,944
PN16029/2806	Demonstration of Asymmetric Resilient Technologies for Cybersecurity	\$0	\$305,123	\$305,123
PN16030/2807	Permafrost microbiome responses to hydrologic perturbation and subsequent alteration to ecosystem function	\$0	\$271,709	\$271,709
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	\$263,159	\$263,159
PN16032/2809	Development of predictive models on the impacts of heat waves and coincident variability in regional water availability on the reliability of the Western Electric Grid reliability	\$0	\$89,758	\$89,758
PN16033/2810	Development of lithium-ion battery electrolytes for low temperature applications	\$0	\$119,935	\$119,935

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Project ID	Project Name	Equipment	Other	FY Total
PN16034/2811	Provenance and Pathways Investigations of Uranium Oxide Particles Using Oxygen Isotope	\$0	\$237,465	\$237,465
PN16035/2812	Polymeric Ionic Liquids for Lubricants - A Breakthrough in Molecular Design	\$0	\$69,905	\$69,905
PN16036/2813	Mitigating challenges toward an enduring supply of low-radioactivity argon for ongoing Pacific Northwest National Lab national security and basic science programs	\$0	\$105,806	\$105,806
PN16037/2814	Toward Enabling Complex Sensemaking from Streaming Data	\$0	\$332,133	\$332,133
PN16038/2815	Transpire: Transparent Model-Driven Discovery of Streaming Patterns	\$0	\$307,278	\$307,278
PN16039/2816	Temporal Modeling in Streaming Analytics	\$0	\$288,548	\$288,548
PN16040/2817	Impediments - this project will directly support the development of methodologies and capabilities to evaluate, test, probe and own cyber enterprise networks.	\$0	\$403,968	\$403,968
PN16041/2818	Visual Analytics Environment for the Smart Grid	\$0	\$73,790	\$73,790
PN16042/2819	Novel Heat-treatment for Automotive Castings	\$0	\$110,387	\$110,387
PN16043/2820	Construction and Testing of a Mesocosm Seawater Wave Tank for Conducting Environmental Oil and Gas Research & Development under Simulated Arctic Conditions	\$0	\$164,630	\$164,630
PN16044/2821	Stream Adaptive Foraging for Evidence: Human-Computer co-assisted signature discovery and evidence generation for streaming data with deep learning	\$0	\$310,349	\$310,349
PN16045/2822	Automated biofilm Imaging with white light Interferometry	\$0	\$129,988	\$129,988
PN16046/2823	Quantifying Hazardous Turbulence Conditions and Dose-Response for Fish Passage through Hydropower Turbines	\$0	\$232,121	\$232,121
PN16047/2824	In-situ Fastening of Metals to Plastics	\$0	\$64,904	\$64,904
PN16048/2825	Yarrowia lipolytica platform for biobased chemical production	\$0	\$149,901	\$149,901
PN16049/2826	Climate Informed Decision Support System for Identifying Sustainable Hydropower Development Opportunities	\$0	\$147,808	\$147,808
PN16050/2827	Commercially viable slow-release solid nitride fertilizer	\$0	\$119,950	\$119,950
PN16051/2828	Geopolitical Discourse Characterization through Deep Learning in Diverse Data Modalities	\$0	\$168,994	\$168,994
PN16052/2829	Optimization of Plutonium Uranium Redox Extraction for Centrifugal Contactors	\$0	\$51,286	\$51,286
PN16053/2830	Development of aluminum alloys with improved strength at elevated temperatures	\$0	\$148,325	\$148,325
PN16054/2831	Establishing new standards for automated digital biofouling (Biofouling - the gradual accumulation of waterborne organisms (as bacteria and protozoa) on the surfaces of engineering structures in water that contributes to corrosion of the structures and to a decrease in the efficiency of moving parts) analysis	\$0	\$49,970	\$49,970
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	\$119,796	\$119,796
PN16056/2833	Design and Development of Coded Aperture for Video Compressive Sensing Acquisition System for Environment Transmission Electron Microscope	\$0	\$72,719	\$72,719
PN16057/2834	Integration of an Atmospheric Flow Tube Ionization source with a novel Ion mobility analyzer.	\$0	\$114,359	\$114,359
PN16058/2835	Particle-Filter Surface Interactions and Dynamics in the Presence of Cross-Flow	\$0	\$71,910	\$71,910
PN16059/2836	Demonstration of Advanced Bi-additive Vanadium Sulfate Electrolyte	\$0	\$47,711	\$47,711
PN16060/2837	In-Line, On-Demand Increase of Fuel Octane and Cetane Numbers	\$0	\$99,626	\$99,626
PN16061/2838	32-Silicon Geochronology Gap Analysis	\$0	\$96,522	\$96,522
PN16062/2839	Fundamental Insights into Gamma-Radiation Effects at Complex Oxide-Water Interfaces from First Principles Simulations	\$0	\$180,989	\$180,989
PN16063/2840	Control Framework for Large Scale Complex Systems	\$0	\$29,289	\$29,289
PN16064/2841	Sparcity-based data-driven learning method for complex systems	\$0	\$124,073	\$124,073
PN16065/2842	Network analysis of soil organic matter molecular chemistry to enable more robust modeling of C cycle along ecosystem gradients	\$0	\$65,307	\$65,307
PN16066/2843	The role of hurricanes in the carbon and oxygen dynamics of the coastal zone and its global significance	\$0	\$136,497	\$136,497
PN16067/2844	Understanding the Stability of Organic Matter-Clay Systems in Presence of Aqueous Iron (II)	\$0	\$49,438	\$49,438
PN16068/2845	Signature Development for Identifying Human Trafficking in the Online Landscape	\$0	\$100,007	\$100,007
PN16069/2846	Characterizing halogenated organic compounds in the terrestrial-aquatic continuum	\$0	\$54,112	\$54,112
PN16070/2847	Spatially-resolved, consortial approaches towards a mechanistic understanding of soil nitrogen fate	\$0	\$121,206	\$121,206
PN16071/2848	Unveiling the Dynamics Microbial Biofilm and Plant Root Interface under Extreme Conditions	\$0	\$147,223	\$147,223
PN16072/2849	Analysis of UrbanSim and SoundCast for Parallelization	\$0	\$34,939	\$34,939
PN16073/2850	Advancing ecosystem understanding of carbon turnover and storage through molecular characterization	\$0	\$86,749	\$86,749
PN16074/2851	Geochemical Sensors of Fracturing in the Subsurface	\$0	\$128,767	\$128,767
PN16075/2852	At the fringe of a shifting Carbon paradigm with Climate change: Unlocking the organo-mineral controls on the bioavailability of Carbon at the terrestrial-aquatic interface	\$0	\$109,707	\$109,707
PN16076/2853	Ecosystem Transitions and Associated Greenhouse Gas Fluxes Following Salt-Water Intrusion from Relative Sea Level Rise	\$0	\$99,727	\$99,727
PN16077/2854	Scaling Multisubject Cortical Parcellation	\$0	\$29,918	\$29,918
PN16078/2855	Multiscale Modeling Using Particle-based Methods	\$0	\$43,834	\$43,834
PN16079/2856	Search for Lepton Number Violation	\$0	\$228,410	\$228,410
PN16080/2857	Atomic Tritium for Project 8, the next generation experiment to measure the mass of the neutrino.	\$0	\$84,310	\$84,310
PN16081/2858	Accelerator Neutrino Physics in Liquid Argon Time Projection Chambers	\$0	\$112,879	\$112,879
PN16082/2859	Development of Surface-Modifying Tracers for Improved Geophysical Imaging of Fracture Networks	\$0	\$134,697	\$134,697
PN16083/2860	Advanced Detection Techniques for a Linear Collider Detector	\$0	\$121,974	\$121,974

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PN16084/2861	Durable and Stretchable Materials for Protective Equipment and Coatings	\$0	\$111,201	\$111,201
PN16085/2862	Advanced sensor system to preserve U.S. food security: determining early onset of Bovine Respiratory Disease	\$0	\$282,637	\$282,637
PN16086/2863	Low-Mass Dark Matter Backgrounds Research & Development	\$0	\$82,582	\$82,582
PN16087/2864	Axion Dark Matter Experiment	\$0	\$145,411	\$145,411
PN16088/2865	Smart Node - A Highly Adaptable Passive Acoustic Receiver System	\$0	\$98,183	\$98,183
PN16089/2866	Software for Analysis of Metabolite Data from Ion Mobility/Mass Spectrometry Systems	\$0	\$99,460	\$99,460
PN16090/2867	Interfacial Diffusion and Crust Formation at the Liquid-Liquid Interface of Solvent Extraction Processes	\$0	\$178,789	\$178,789
PN16091/2868	Chemical Consequence Assessment Methodology and Code Assessment	\$0	\$49,727	\$49,727
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	\$101,039	\$101,039
PN16093/2870	Spectrally Resolved Nanoscale Imaging of Single Molecules, Plasmons, and their Interaction	\$0	\$156,377	\$156,377
PN16094/2871	Signatures for Early Disease Detection: Application of a Non-Invasive Multi-Modal Sensor System for Bovine and Swine	\$0	\$98,451	\$98,451
PN16095/2872	Development of Optimal Visualization Techniques for Climate Model Performance Evaluation	\$0	\$41,929	\$41,929
PN16096/2873	Modeling Continuous Human Information Processing	\$0	\$79,702	\$79,702
PN16097/2874	Cryogenic Low Energy Astrophysics with Noble Liquids Detection of Dark Matter and Low Energy Neutrinos	\$0	\$310,720	\$310,720
PN16098/2875	GoBrachy - Developing a Metabolite-Trait Association Network Model for Carbon Allocation in Brachypodium	\$0	\$183,240	\$183,240
PN16099/2876	CyberFit Eddi - Living Lab Infrastructure - Eddi is a platform for safely removing personally identifiable information from cyber data while preserving the structure of the data; making cyber security research possible and minimizing the risk of inappropriate or inadvertent behavior.	\$0	\$230,240	\$230,240
PN16100/2877	Structural Framework for a Holistic Transportation System Model	\$0	\$99,849	\$99,849
PN16101/2878	Ultra-stable, ultra-low platinum group metal loading membrane electrode assembly	\$0	\$91,375	\$91,375
PN16102/2879	Low-scaling electronic structure methods for accurate modeling chemical transformations in complex environments	\$0	\$55,447	\$55,447
PN16103/2880	Virtual Plant-Atmosphere-Soil System version 2.0: Mechanistic process components of a virtual plant simulator	\$0	\$99,410	\$99,410
PN16104/2881	Preparation for Tidal Turbine Deployment at the Marine Sciences Laboratory	\$0	\$65,198	\$65,198
PN16105/2882	Fundamental Investigations of Photoelectrochemical Water Splitting of Model Oxide Electrode Surfaces	\$0	\$62,532	\$62,532
PN16106/2883	Determining mechanisms of microbial metal mobilization in coastal wetland environments	\$0	\$43,905	\$43,905
PN16107/2884	PhenoAccess: Physiological Phenotyping of Brachypodium Accessions	\$0	\$104,473	\$104,473
PN16108/2885	Gut-on-a-chip for Multi-Omics Studies of the Gut Microbiome	\$0	\$25,044	\$25,044
PN16109/2886	Integrated In situ chemical and topographic optical imaging of live microbiomes in transition	\$0	\$32,972	\$32,972
PN16110/2887	Spatially Resolved Quantitative Gene Expression Analyses Applied to Transitioning Mouse Gut and Soil Microbiomes	\$0	\$24,865	\$24,865
PN16111/2888	Preliminary Study on Knowledge Automation for Complex Systems - Uncertainties Impact in Decision Making	\$0	\$154,255	\$154,255
PN16112/2889	Virtual Plant-Atmosphere-Soil System version 1.0: Quantifying signatures of phenomic expression of a Brachypodium ecosystem as a function of genomic and environmental variables	\$0	\$32,007	\$32,007
PN16113/2890	Understanding Polar Climate Sensitivity	\$0	\$17,900	\$17,900
Total # of Projects for PNNL: 218		Total Equipment Cost for PNNL: \$0	Total Other Cost for PNNL: \$39,739,013	Total Project Cost for PNNL: \$39,739,013

PRINCE - Princeton Plasma Physics Lab

PPPL-031	Two-Dimensional Linear Mode Conversion Calculations for Solar and Heliospheric Radio Emissions	\$0	\$4,557	\$4,557
PPPL-038	Imaging x-ray spectroscopy for x-ray synchrotron radiation and high energy density experiments	\$0	\$83,823	\$83,823
PPPL-039	Development of the Advanced Annular Couette Centrifuge	\$0	\$20,396	\$20,396
PPPL-041	Development of a Plasma Data Management Program	\$0	\$79,756	\$79,756
PPPL-042	Assessment of methodology used in estimating power plant economics	\$0	\$1,459	\$1,459
PPPL-043	Development of Innovative Optics for Extreme Ultra Violet Lithography	\$0	\$57,386	\$57,386
PPPL-044	Development of a Suite of Atomistic Codes for Fusion, Advanced Materials and Warm Dense Matter Applications	\$0	\$131,340	\$131,340
PPPL-045	Predicting and Mitigating Runaway Electrons in Tokamaks	\$0	\$141,207	\$141,207
PPPL-046	Simulations of Plasma Turbulence With Lithium or Other Walls	\$0	\$205,314	\$205,314
PPPL-048	Plasma Facing Components	\$0	\$168,286	\$168,286
PPPL-049	Design of a flowing liquid metal wall test stand - Development of a toroidal test stand to demonstrate flowing liquid metal walls and divertor concepts for fusion devices	\$0	\$150,694	\$150,694
PPPL-050	High Temperature Superconductors for Increased Efficiency Spherical Tokamaks	\$0	\$188,667	\$188,667
PPPL-051	Low Temperature Plasma for Synthesis and Functionalization of Graphene	\$0	\$145,639	\$145,639
PPPL-052	Development of an Electron Beam Diagnostic for monitoring magnetic field	\$0	\$28,529	\$28,529
PPPL-054	Large Scale Multi-Physics Simulation of a Blanket Module	\$0	\$104,377	\$104,377
PPPL-055	Investigation of a Plasma Mass Filter	\$0	\$147,611	\$147,611
PPPL-056	Machine-Learning Jet Disruption Studies - Large-data statistical approach for predicting disruptions in tokamaks using a Joint European Torus disruption-relevant database	\$0	\$240,418	\$240,418
PPPL-057	Scoping Study for a World-Leading U.S. Stellarator Program and Facility	\$0	\$154,478	\$154,478

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Project ID	Project Name	Equipment	Other	FY Total
PPPL-058	Construction of Superconducting Magnets at Princeton Plasma Physics Laboratory	\$0	\$170,903	\$170,903
PPPL-059	Advanced Centrifuge Development for Industrial Applications	\$0	\$152,257	\$152,257
PPPL-060	Establishing the Feasibility of the Lithium Vapor Box Divertor	\$0	\$90,936	\$90,936
PPPL-061	Development of Plasma-Surface Interaction Science for Direct Power Extraction Applications	\$0	\$52,666	\$52,666
PPPL-062	Study and Control of Fast Flowing Liquid Metal Divertor	\$0	\$176,649	\$176,649
PPPL-063	Full Wave Calculations in the Scrape-off Layer of Tokamak	\$0	\$96,277	\$96,277
PPPL-064	Stellarator Core Designs for a Net-Energy Break-even Fusion Plant	\$0	\$209,973	\$209,973
PPPL-065	Development of New Initiatives for Space Instrumentation and Space Plasma Physics Research at PPPL	\$0	\$92,337	\$92,337
Total # of Projects for PRINCE: 26		Total Equipment Cost for PRINCE: \$0	Total Other Cost for PRINCE: \$3,095,935	Total Project Cost for PRINCE: \$3,095,935

PTX - Pantex Plant					
16-3601	Less Than Lethal Technologies	\$0	\$16,786	\$16,786	
16-3605	Alternative Processing and Post-Processing Capabilities for HE	\$0	\$71,091	\$71,091	
16-3606	Develop Continuous-Flow Reactor Capabilities	\$0	\$42,498	\$42,498	
16-3612	Investigations into High Explosive Machining Parameters	\$0	\$186,271	\$186,271	
16-3615	Additive Manufacturing for Energetic Materials	\$0	\$484,742	\$484,742	
16-3616	Formulation Controller Recipe Development	\$0	\$38,704	\$38,704	
16-3617	Resonant Acoustic Mixing for Small-scale Synthesis and Formulation Processes	\$0	\$211,836	\$211,836	
16-3618	Special Nuclear Material Cart for Transport Across Ramps And Buildings	\$0	\$229,981	\$229,981	
16-3619	Autonomous Mobile Bay Equipment Retriever	\$0	\$101,405	\$101,405	
16-3625	Microreactor Technology Development	\$0	\$474,546	\$474,546	
16-3629	Modelling Explosive Impact Sensitivity	\$0	\$228,094	\$228,094	
16-3638	Thermal Modeling of High Explosives Machining and Data Interpretation	\$0	\$153,801	\$153,801	
16-3641	Establishment of Dust Ignition Testing Capability	\$0	\$89,274	\$89,274	
16-3644	Conductive Polymers Using Additive Manufacturing	\$0	\$100,006	\$100,006	
16-3647	Insensitive, High Temperature, High Performance Explosive	\$0	\$24,883	\$24,883	
16-4210	PXY-12 Joint Non-Destructive Laser Gas Sampling	\$0	\$955	\$955	
16-4213	Texas Tech University, Supervisory Control and Data Acquisition- Pantex Plant Electrical System Study	\$0	\$11,224	\$11,224	
PX13013	Synthesis and Formulation of high explosives from inert precursor materials	\$0	\$304,091	\$304,091	
PX13016	Precision S-Axis mill/vertical turret lathe machining	\$0	\$1,543,997	\$1,543,997	
PX14012	Rheometry as a Gel-Time Tool	\$0	\$8,550	\$8,550	
PX14014	Microcalorimetry – Decomposition	\$0	\$72,168	\$72,168	
PX14015	Determination of VinylideneFluoride In hopes of drawing correlations with mechanical strength or molecular weight	\$0	\$21,510	\$21,510	
PX14028	Organizational Health System Dynamics Model	\$0	\$62,595	\$62,595	
PX15001	High Speed Video of Laser Drilling and Welding	\$0	\$253,780	\$253,780	
PX15005	Robotic Quasi Pulsed Laser System	\$0	\$150,827	\$150,827	
PX15010	Contact & Non-Contact Guaging System	\$0	\$441,351	\$441,351	
PX15011	Scheduling for Human Risk to Catastrophic Error	\$0	\$95,522	\$95,522	
PX15016	Cyber Lock System Evaluation	\$0	\$458,907	\$458,907	
PX15019	Cleaning Solvent for Roll Mill	\$0	\$18,593	\$18,593	
PX15020	Hot-Surface Ignition Temperature of High Explosive Dust Layers	\$0	\$61,892	\$61,892	
PX15025	Enhanced Diagnostic Techniques for Explosive Testing Applications	\$0	\$447,617	\$447,617	
PX15031	Drop Hammer Diagnostics	\$0	\$104,167	\$104,167	
PX15032	Relationships Between Explosive Properties and Raman Spectra	\$0	\$166,604	\$166,604	
PX15033	Laser Ignition of Explosives	\$0	\$116,939	\$116,939	
PX15034	Viability Flexible fiber Optic Bundles and related optics to transmit thermal imaging data From Inside or near a machine Bed to a High-speed Infrared Camera	\$0	\$240,487	\$240,487	
PX15039	Field Flow Fractionation	\$0	\$70,185	\$70,185	
RR15001	HE Machining Holding Fixture	\$0	\$69,976	\$69,976	
RR16331	Burning Ground Monitoring	\$0	\$107,714	\$107,714	
Total # of Projects for PTX: 38		Total Equipment Cost for PTX: \$0	Total Other Cost for PTX: \$7,283,569	Total Project Cost for PTX: \$7,283,569	

SLAC - SLAC National Accelerator Laboratory					
15-005	Understanding Controlling Elevated-Temperature Charge Transfer	\$0	\$3,393	\$3,393	
15-007	Compact High Power Terahertz Source	\$0	\$704	\$704	
15-019	Prototype for a MicroJoule Class Femtosecond Extreme Ultra Violet Source	\$0	\$4,271	\$4,271	
16-001	Ultrafast Surface Chemical Transformation at the X-ray Laser Linac Coherent Light Source	\$0	\$162,555	\$162,555	
16-002	Large Underground Xenon/Large Underground Xenon-Zeplin Dark Matter Search	\$0	\$676,402	\$676,402	
16-003	Molecular Basis of Ecosystems: A Strategic SLAC Biosciences Program	\$0	\$308,158	\$308,158	
16-004	Real Time Control of Subsurface Fractures and Fluid Flow	\$0	\$260,189	\$260,189	
16-005	Cpix Detector Evaluation- This project proposes to build a prototype with two gates and two counters for time-resolved experiments at x-ray facilities. The chip will be tested and bump-bonded to a pixelated sensor. The module will be integrated in a prototype system and tested with x-rays. This validation with x-rays will serve as proof-of-concept for fast dynamic time domain studies needed to address some of DOE's grand challenges.	\$0	\$19,504	\$19,504	
16-006	Electrochemical Heat Harvesting & Cooling	\$0	\$538,945	\$538,945	
16-007	Chemistry in Motion: Probing Enzymatic Reaction Mechanisms in Crystallo (Crystallo - chemical retardation mechanisms)	\$0	\$201,074	\$201,074	
16-008	Modeling Acceleration in Laser-Driven Shocks	\$0	\$207,746	\$207,746	

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Project ID	Project Name	Equipment	Other	FY Total
16-009	Center for Laboratory Astrophysics where the rapidly expanding experimental capabilities with the MEC instrument to develop the expansion of the high-power ultra short-pulse optical lasers	\$0	\$486,403	\$486,403
16-010	Structural Characterization of Electrolyte and Polymer Gated Electronics to Better Control Device Properties	\$0	\$87,673	\$87,673
16-012	A Radio For Hidden Photon Dark Matter	\$0	\$89,652	\$89,652
16-013	Monolithic Area Detector for Soft X-rays and Charged Particles	\$0	\$184,411	\$184,411
16-014	Ultrafast 11eV Source for Time-Resolved Photoemission	\$0	\$170,345	\$170,345
16-015	The Kavli Institute for Particle Astrophysics and Cosmology Cosmic Inflation Initiative	\$0	\$481,957	\$481,957
16-016	Scattering for Material Science Research	\$0	\$117,689	\$117,689
16-017	Scattering Studies and Crystal Growth of Quantum Materials	\$0	\$79,098	\$79,098
16-018	Megawatt terahertz Optical Parametric Amplifier	\$0	\$128,586	\$128,586
16-019	New Initiative for Pioneering Research in Biology, Chemistry, and Material Science with State-of-the-Art Soft X-ray Spectroscopy	\$0	\$495,118	\$495,118
16-020	Development of Spatial and Time Resolving Pixel Detector	\$0	\$230,329	\$230,329
16-021	Development of Nano Ultrafast Electron Diffraction at SLAC	\$0	\$162,686	\$162,686
16-022	Integrated Electrochemical-Biological System for the Production of Fuels and Chemicals from Carbon Dioxide	\$0	\$145,049	\$145,049
16-023	Carbon Dioxide to Methanol Conversion	\$0	\$151,961	\$151,961
16-024	Accelerating Nanocrystal Synthetic Development	\$0	\$146,684	\$146,684
16-025	Hybrid Organic/Inorganic Perovskite Films Solar Absorbers: What is the role of defect?	\$0	\$140,090	\$140,090
16-026	Battery Electrode/Electrolyte Studies - This project is to conduct in-situ x-ray studies of model single crystalline and thin film electrode structures as well as solid-state electrolytes. The results will provide a better fundamental understanding of the electrode reactions and phase transformations of metal-oxide cathodes in non-aqueous electrolytes with the potential to inform applied research on energy storage materials.	\$0	\$199,590	\$199,590
16-027	Beyond the Current Limitations of Water Splitting Catalysts	\$0	\$168,492	\$168,492
16-028	Quantum Optics and Biological Probes with Silicon Vacancies in Chemical Vapor Deposition Grown Diamond	\$0	\$177,334	\$177,334
16-029	PolyUbiquitin Structural Biology	\$0	\$154,147	\$154,147
16-030	Ultrafast Electron Diffraction Experiments	\$0	\$393,865	\$393,865
16-031	Cross-Platform Multiple Length Scale Imaging System for Energy Storage Materials	\$0	\$142,141	\$142,141
16-032	Multi-dimensional Interconnects	\$0	\$55,468	\$55,468
Total # of Projects for SLAC : 34		Total Equipment Cost for SLAC : \$0	Total Other Cost for SLAC : \$6,971,709	Total Project Cost for SLAC : \$6,971,709

SNL - Sandia National Lab				
173019	Understanding and Engineering Lignolysis for Renewable Chemical Production	\$0	\$660,639	\$660,639
173021	In Vivo High Throughput Transcriptomics to Elucidate the Spatial and Temporal Dynamics of Host-Pathogen Interactions	\$0	\$424,985	\$424,985
173024	Simulation Capability and Computational Assessment of Memristors as Beyond-CMOS Logic and Memory Devices	\$0	\$608,361	\$608,361
173025	Coupling Computational Models: From Art to Science	\$0	\$715,247	\$715,247
173026	Towards Rigorous Multiphysics Shock-Hydro Capabilities for Predictive Computational Analysis	\$0	\$884,096	\$884,096
173028	Analyst-to-Analyst Variability in Simulation-Based Prediction	\$0	\$74,882	\$74,882
173029	User-Accessible Unified Manycore Performance-Portable Programming Model	\$0	\$613,877	\$613,877
173035	Using Linkographies of Cyber Attack Patterns to Inform Honeytoken Placement	\$0	\$293,965	\$293,965
173037	Using Machine Learning in Adversarial Environments through game-theoretic methods and engaging experimental subjects with red teaming experience to try to circumvent an intrusion detection system and learn a predictive model of such circumvention activities.	\$0	\$491,699	\$491,699
173039	Novel, Semi-Destructive Failure Analysis Technique for Stacked Die - Stacked Three-dimensional integration becoming for commercial applications, including field programmable gate arrays and complimentary metal-oxide-semiconductor devices.	\$0	\$251,369	\$251,369
173056	Co-Design of Sensors and Analysis Methods for Optical Remote Sensing of Spectral-Temporal Signals	\$0	\$907,726	\$907,726
173059	Deployable, Ground-Based, Discrete Zoom Telescope	\$0	\$362,272	\$362,272
173060	Broadband Digital Active-Electronically-Steered-Array Radar Prototype for Multi-Mission Applications	\$0	\$734,951	\$734,951
173064	Imaging Light Detection and Ranging and Raman Imaging Light Detection and Ranging through Fog and Dust for Maritime Surveillance	\$0	\$427,263	\$427,263
173066	Adaptive Waveform and Signal Processing Techniques that Mitigate Adversarial Anti-Access/Area Denial Technology	\$0	\$490,204	\$490,204
173067	Dynamic Analytical Capability to Better Understand and Anticipate Extremist Shifts Within Populations under Authoritarian Regimes	\$0	\$312,367	\$312,367
173069	Imaging Mass Spectrometry for Biometric and Forensic Detection	\$0	\$311,439	\$311,439
173070	Quantifying the Uncertainty of Risk Assessment for High Consequence Flight Tests	\$0	\$397,800	\$397,800
173071	Assessing the Security Impact of Moving Target Defense Approaches	\$0	\$249,311	\$249,311
173076	The Effect of Proppant Placement on Closure of Fractured Shale Gas Wells	\$0	\$278,129	\$278,129
173078	The Role of Real-Time Decision Making in Grid Resilience	\$0	\$685,919	\$685,919
173079	Next Generation Global Atmosphere Model	\$0	\$647,658	\$647,658
173090	An Advanced Decision Framework for Power Grid Resiliency	\$0	\$868,884	\$868,884
173092	Fractal-Like Materials Design with Optimized Radiative Properties for High-Efficiency Solar Energy Conversion	\$0	\$591,228	\$591,228

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173094	Measurements and Modeling of Black Carbon Aerosols in the Arctic for Climate-Change Mitigation	\$0	\$727,786	\$727,786
173095	High Fidelity Coupling Methods for Blast Response on Thin Shell Structures	\$0	\$615,954	\$615,954
173096	Modeling Primary Atomization of Liquid Fuels Using a Multiphase Direct Numerical Simulation, Large Eddy Simulation Approach	\$0	\$599,490	\$599,490
173097	Experiments and Computational Theory for Electrical Breakdown in Critical Components	\$0	\$540,574	\$540,574
173098	Mechanics of Battery Degradation through Stress Driven Rearrangement of Percolated Conductive Networks during Discharge and Cycling	\$0	\$818,001	\$818,001
173100	Monitoring, Understanding, and Predicting the Growth of Methane Emissions in the Arctic	\$0	\$601,190	\$601,190
173101	Imaging the Subsurface with Upgoing Muons	\$0	\$331,940	\$331,940
173102	Fundamental Study of Disposition and Release of Methane in a Shale Gas Reservoir	\$0	\$680,654	\$680,654
173103	Sandia Enabled Communications and Authentication Network using Quantum Key Distribution	\$0	\$5,460,980	\$5,460,980
173104	New Capabilities for Hostile Environments	\$0	\$5,892,363	\$5,892,363
173106	Decontamination of Radiological Contaminated Materials using Magnetotactic Bacteria	\$0	\$199,050	\$199,050
173110	Development of a Novel Nanoparticle Delivery Vehicle for Pre-Treatment with Nerve Agent Countermeasures	\$0	\$507,431	\$507,431
173111	Real-Time, Autonomous Field Surveillance for Vector-Borne Pathogens	\$0	\$518,255	\$518,255
173112	Online Mapping and Forecasting of Epidemics using Open-Source Indicators	\$0	\$344,433	\$344,433
173113	Single-Volume Neutron Scatter Camera for High-Efficiency Neutron Imaging and Source Characterization	\$0	\$667,028	\$667,028
173114	A Complex Systems Approach to More Resilient Multi-Layered Security Systems	\$0	\$500,917	\$500,917
173115	Denial of Use of Bulk Chemical Agents and their Precursors	\$0	\$79,626	\$79,626
173116	Multi-Resolution Characterization and Prediction of Environmentally-Assisted Intergranular Fracture	\$0	\$739,839	\$739,839
173117	Phonon Scattering at Mobile Ferroelastic Domain Walls: Toward Voltage Tunable Thermal Conductivity	\$0	\$496,252	\$496,252
173118	In Situ Study of Surface-Mediated Explosive Degradation using Surface Enhanced IR-Vis Sum Frequency Generation	\$0	\$421,318	\$421,318
173119	Scanning Ultrafast Electron Microscopy for Charge Carrier Lifetime Imaging with High Spatial Resolution	\$0	\$456,670	\$456,670
173121	High Fidelity Modeling of Ionic Conduction in Solids	\$0	\$470,052	\$470,052
173122	Understanding and Overcoming Materials Challenges for AlN: A Scientific Foundation for Next-Generation Power Electronics	\$0	\$374,231	\$374,231
173124	Harnessing Multiscale Periodicity of Two-Dimensional-Crystals for Flexible Adaptable Broadband Optics	\$0	\$528,457	\$528,457
173126	Reduced Dimensionality Lithium Niobate Microsystems	\$0	\$592,635	\$592,635
173127	The Anatomy of the Minority Carrier - Atomic Cluster Interaction in Semiconductors	\$0	\$517,122	\$517,122
173128	Seebeck Enhancement via Quantum Confinement in Metal Oxide Semiconductor Field-effect Transistors: Towards Monolithic On-Chip Cooling	\$0	\$708,203	\$708,203
173129	Beyond Moore's Law Through Three-Dimensional-Integrated Circuit Fabrication	\$0	\$613,802	\$613,802
173130	A New Approach to Entangling Neutral Atoms	\$0	\$640,686	\$640,686
173131	Fundamental Scaling of Microplasmas and Tunable Ultra Violet Light Generation	\$0	\$574,378	\$574,378
173140	Synthetic Deoxyribonucleic Acid for Highly Secure Information Storage and Transmission	\$0	\$126,449	\$126,449
173142	Probing Small-Molecule Degradation to Counter Enzyme Promiscuity	\$0	\$205,698	\$205,698
173153	Cognitive Data Science for Neutron Generator Predictive Pattern Analysis	\$0	\$569,799	\$569,799
173154	Radiation Hardness of Micro-electromechanical Systems Capacitive and Electromagnetic Accelerometers	\$0	\$479,066	\$479,066
173156	Recycling Scandium and Erbium from Nuclear Weapon Manufacturing Operations	\$0	\$569,976	\$569,976
173180	Compressed Sensing to Support Reduced Flight Testing	\$0	\$359,812	\$359,812
173182	Non-Linear Transmission Line Based Technology	\$0	\$698,947	\$698,947
173183	Organic Semiconducting Materials for Thin-Film Optoelectronic Devices	\$0	\$665,060	\$665,060
173184	Electro-Syntheses of Intermetallic Couples as Thin-Film Heat Sources for Advanced Thin-Film Thermal Batteries	\$0	\$594,284	\$594,284
173186	Engineered Composite Materials Science and Technology for Next Generation Glass-to-Metal Seals	\$0	\$637,402	\$637,402
173187	Reconfigurable Matching Networks for High-Efficiency GaN Power Amplifiers	\$0	\$349,549	\$349,549
173189	Wavelength Conversion Arrays for Optical and X-Ray Diagnostics at Z	\$0	\$514,078	\$514,078
173190	Investigating Laser Preheat and Applied Magnetic Fields Relevant to the MagLIF Fusion Scheme	\$0	\$691,022	\$691,022
173191	Creating the Foundation of Next-Generation Pulsed-Power-Accelerator Technology	\$0	\$1,210,154	\$1,210,154
173192	An Ion-Neutron Electron-Gamma Simulation System for Radiation Testing of Optical Components for Weapons Systems	\$0	\$547,708	\$547,708
173194	A Mesh-Free Method to Predictively Simulate Solid-to-Liquid Phase Transitions in Abnormal Thermal Environments	\$0	\$489,549	\$489,549
173331	Advanced Uncertainty Quantification Methods for Circuit Simulation	\$0	\$403,678	\$403,678
173339	Chemical Vapor into Liquid Encapsulation of Microorganisms for Hazardous Agent Detection	\$0	\$77,368	\$77,368
173490	Plasmonic-Based Optical Modulators and Switches	\$0	\$50,119	\$50,119
173491	Simulation of Optical Phenomena in the Upper Atmosphere	\$0	\$74,929	\$74,929
173495	Electrostatic Coating with Naked Copper Nanoparticles to Develop Low-cost Nanoinks for Interconnect Applications, Focusing on Nanocopper Inks.	\$0	\$32,378	\$32,378

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173496	Piezoelectric Nano-Optomechanical Systems to Allow new Functionality and Interactions in Chipscale, Electro-Optomechanical Systems	\$0	\$98,930	\$98,930
173664	Predictive Engineering Tools for Novel Fuels to Explore Methods for Increasing Efficiency and Reducing the Climate Effects of Energy Utilization	\$0	\$47,042	\$47,042
173669	Advanced Imaging Algorithms for Radiation Imaging Systems to Bring the Analysis from Qualitative Images to Quantitative Attributes of Objects Containing Special Nuclear Material.	\$0	\$46,996	\$46,996
173670	Engineering Bioelectronic Signal Transduction using the Bacterial Type III Secretion Apparatus	\$0	\$31,505	\$31,505
173867	A Framework for Wind Turbine Design under Uncertainty	\$0	\$42,440	\$42,440
173868	Modeling of Nonlocal Electron Conduction for Inertial Confinement Fusion	\$0	\$42,440	\$42,440
173878	Reducing the Adverse Effects of Boundary-Layer Transition on High-Speed Flight Vehicles	\$0	\$226,087	\$226,087
173882	Reducing Computation and Communication in Scientific Computing: Connecting Theory to Practice	\$0	\$239,257	\$239,257
173883	Scaling up Semiconductor Quantum Computers through Multiscale Analysis	\$0	\$260,326	\$260,326
176117	Novel Materials and Devices for Solid-State Neutron Detection	\$0	\$95,859	\$95,859
176311	Rocket Engine Test System for Development of Novel Propulsion Technologies	\$0	\$43,710	\$43,710
176312	Understanding Photo-Induced Oxidation Mechanisms of Volatile Organic Compounds	\$0	\$55,337	\$55,337
177962	Room Temperature Solid-State Deposition of Ceramics	\$0	\$129,912	\$129,912
177964	Novel Cathode Materials for Large-Scale Electrical Energy Storage	\$0	\$181,440	\$181,440
177965	Game Theory for Proactive Dynamic Defense and Attack Mitigation in Cyber-Physical Systems	\$0	\$79,984	\$79,984
177967	Cavity Electron Density Measurements within Pulsed Radiation Environments	\$0	\$128,615	\$128,615
178470	Modeling Information Multiplexing in the Hippocampus on How Neurons in the Hippocampus Integrate, Process, and Transmit Different Information Streams	\$0	\$128,773	\$128,773
178667	Predicting the Multiscale, Mechanical Response of Additively Manufactured Materials across a Wide Spectrum of Loading Conditions	\$0	\$294,822	\$294,822
179224	Building the Scientific Basis for Cyber Resilience of Critical Infrastructure	\$0	\$124,911	\$124,911
180812	Bio-Emulative Metal Organic Framework-Based Lignin Degradation Catalysts	\$0	\$521,680	\$521,680
180814	Predictive Pathogen Biology: Genome-Based Prediction of Pathogenic Potential and Countermeasures Targets	\$0	\$724,163	\$724,163
180817	Coupling Chemical Energy with Protein Conformational Changes to Translocate Small Molecules Across Membranes	\$0	\$46,930	\$46,930
180818	In Situ Compressed Sampling and Reconstruction of Exascale Unstructured Mesh Datasets	\$0	\$363,807	\$363,807
180819	Pacific Institute for the Mathematical Sciences: Memristor-Based Processing-in-Memory-and-Storage	\$0	\$539,855	\$539,855
180820	Advanced Data Structures for Improved Cyber Resilience and Awareness in Untrusted Environments	\$0	\$621,090	\$621,090
180821	Topological Design Optimization of Convolutes in Next Generation Pulsed Power Devices	\$0	\$286,215	\$286,215
180822	Data-Driven Optimization for the Design and Control of Large-Scale Systems	\$0	\$229,174	\$229,174
180823	Identification of Markers of High Reynolds Averaged Navier-Stokes Uncertainty for Model Improvement in Engineering Flows	\$0	\$252,383	\$252,383
180824	Staghorn: An Automated Large-Scale Distributed System Analysis Platform to create a new analysis platform for large-scale distributed systems enabling automated attack path discovery through restoration of system-wide states coupled with network message modifications	\$0	\$306,471	\$306,471
180825	Intelligent Control for Autonomous Penetration through drilling heterogeneous materials to access and defeat hardened and deeply buried targets	\$0	\$470,769	\$470,769
180826	Hypersonic Autopilot Adaptive Control for Aerodynamic Uncertainty Mitigation to develop an Adaptive Control to supplement existing nonlinear control strategies for a representative hypersonic vehicle and design a center-of-mass adaptation to provide a mechanical, real-time method for manipulating stability in the presence of large, 1-Adaptive Control Identified uncertainty	\$0	\$421,248	\$421,248
180827	Additive Manufacturing of Integrated Functional Materials - This is a classified project	\$0	\$218,565	\$218,565
180829	Mitigating Information Disclosure Vulnerabilities - This is a classified project	\$0	\$222,054	\$222,054
180830	Confidence In Cyber Modeling and Simulation to Create a Methodology for Establishing Credibility of Emulation-Based Models of Distributed Systems	\$0	\$364,091	\$364,091
180831	Flux: Toward a General Model of Moving Target Defense Efficacy for the development of a general model to identify current known problems with Moving Target Defense solutions at a variety of levels, ranging from application-level controls to host controls to network controls	\$0	\$200,160	\$200,160
180832	High Fidelity Advanced Reduced Instruction Set Computing Machine Virtualization for Large Scale Mobile Emulatics	\$0	\$325,881	\$325,881
180833	Dynamic Multi-Sensor Multi-Mission Optimal Planning Tool	\$0	\$562,459	\$562,459

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180834	DiSeG: Data Inferencing on Semantic Graphs	\$0	\$334,261	\$334,261
180835	Microsensor Arrays for Energy Efficiency, Emission Monitoring and Explosives Detection	\$0	\$250,084	\$250,084
180836	Exploring Two-Dimensional Materials for Remote Sensing Applications	\$0	\$260,774	\$260,774
180838	Internal Structure Mapping with X-Ray Phase Contrast Imaging	\$0	\$440,035	\$440,035
180839	Dim Target Tracking using an Adaptively Tuned Velocity Matched Filter on High Performance Computing using A Priori Information for Real-Time Tracking	\$0	\$465,620	\$465,620
180840	Exploitation of Optical Polarimetry for Remote Sensing	\$0	\$372,109	\$372,109
180841	Pinned Photodiode Pixel Development Enabling High Performance Visible Focal Plane Array	\$0	\$403,796	\$403,796
180842	Biologically-Enabled Remote Sensing for Real-Time Detection and Threat Response	\$0	\$419,711	\$419,711
180844	Pulsed Ultraviolet Light-Assisted Chemical Etching for Failure Analysis of Advanced Complimentary Metal-oxide Semiconductor Circuitry	\$0	\$197,597	\$197,597
180845	Hyperspectral Hypertemporal Database Reference Search Project	\$0	\$377,348	\$377,348
180846	Improving Radiation Spectra Identification for Radioactive Materials with Uncertain Configurations	\$0	\$249,822	\$249,822
180848	Electromagnetic Propagation and Prediction	\$0	\$285,580	\$285,580
180850	Using Graphene to Enable Trusted Microelectronics	\$0	\$244,223	\$244,223
180852	An Ultra-low Size, Weight, and Power Multi-Mission Bi-Static Sensor	\$0	\$280,360	\$280,360
180853	Advanced Detection and Focusing of "Peak Through" Synthetic Aperture Radar Imagery in Foliage	\$0	\$250,080	\$250,080
180854	Alumina Materials Chemistry - This is a classified project	\$0	\$276,176	\$276,176
180855	Meta-Meta-Optimization for Integrated Requirements Development tuning user-defined parameters by behavioral parameters solved by an overlaid optimization method	\$0	\$205,361	\$205,361
180856	Engineering Efficient Human-System Interaction in Defense Systems-of-Systems	\$0	\$349,719	\$349,719
180857	Trusted Materials using Orthogonal Testing for undetected, detrimental material changes through a new testing paradigm to verify that materials are precisely those which are required for their intended purpose	\$0	\$306,348	\$306,348
180859	Macro Supply Chain Decision Analytics to View of the Supply Chain Representation, and Identify and Assess Macro-level Indicators that could help Policy and Decision Makers	\$0	\$334,075	\$334,075
180861	Reconfigurable Structure Coupler for Antenna Mode Excitation	\$0	\$157,839	\$157,839
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	\$374,531	\$374,531
180865	Nanocomposite Barrier Films for Enhanced Thin Film Photovoltaic Stability	\$0	\$330,514	\$330,514
180867	Aggregating Distributed Energy Resources as Secure Virtual Power Plants	\$0	\$545,784	\$545,784
180869	Multiscale Multiphysics for Subsurface Science and Engineering of Shale	\$0	\$189,127	\$189,127
180870	Holographic Spectrum Splitting Demonstration System for Dual Photovoltaic and Biofuel Operation	\$0	\$28,038	\$28,038
180872	Multi-objective Optimization of Solar-Driven, Hollow-Fiber Membrane Distillation Systems	\$0	\$30,073	\$30,073
180874	Understanding Hot Spot Initiation using Electronic Ultrafast Sum Frequency Spectroscopy	\$0	\$595,309	\$595,309
180875	Magnetic Sensing to Determine Material Flows within Opaque Vessels	\$0	\$395,741	\$395,741
180876	Experiments to Elucidate Fundamental Breakup Mechanisms of Molten Components in Shock Driven Flows	\$0	\$715,725	\$715,725
180877	Developing Strong, Concurrent, Multiphysics, Multiscale Coupling to Understand the Impact of Microstructural Mechanisms on the Structural Scale	\$0	\$584,890	\$584,890
180878	Multiscale Now! A Novel Hierarchical Approach for Multiscale Structural Reliability Predictions of Ultra-High Consequence Systems	\$0	\$359,966	\$359,966
180879	A Partial Differential Equation Constrained Optimization Approach for Crack Identification Based on Phase-Field Regularization	\$0	\$239,084	\$239,084
180880	Exploring the Influence of Microstructural Properties of Heterogeneous Explosives on Performance	\$0	\$229,348	\$229,348
180881	Process Modeling for Additive Manufacturing	\$0	\$250,699	\$250,699
180882	Self-Tuning Seismic Sensor Data Processing	\$0	\$359,509	\$359,509
180883	Novel Method to Characterize and Model the Multiaxial Constitutive and Damage Response of Energetic Materials	\$0	\$92,027	\$92,027
180884	Revolutionary Size, Water, and Power Capability from Ultra-Wide-Bandgap Power Electronics	\$0	\$5,626,390	\$5,626,390
180885	Hardware Acceleration of Adaptive Neural Algorithms for Dynamic and Intelligent Threat Detection	\$0	\$5,285,760	\$5,285,760
180889	Towards Representativeness in Emulytics Assessing our Infrastructure Information System Security Posture and Potential System Impacts that Could Result from Cyber Threats.	\$0	\$357,444	\$357,444
180891	Emulation for Cyber-Enabled Physical Attack Scenarios	\$0	\$438,141	\$438,141
180893	Magnetic Smart Tags for Arms Control and Treaty Verification	\$0	\$432,757	\$432,757
180896	Understanding Chemical Threat Agent Interaction with Concrete: Critical Step Toward Counter Intelligence Restoration	\$0	\$250,456	\$250,456
180897	Dual-Particle Imaging System with Neutron Spectroscopy for Safeguard Applications	\$0	\$46,143	\$46,143
180898	Molecule at Metal Organic Framework: A Study of a New Class of Optoelectronic Materials	\$0	\$890,968	\$890,968
180899	Compliant Nanoepitaxy: The Next Materials Revolution Focusing on Nanostructure Shape, Composition, Strain, and Defect Content	\$0	\$615,685	\$615,685
180900	Engineered Reliability via Intrinsic Thermomechanical Stability of Nanocrystalline Alloys	\$0	\$617,815	\$617,815

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180901	Additive Manufacturing: Predicting the Performance and Reliability of Laser Engineered Materials	\$0	\$631,758	\$631,758
180902	Improved Mechanical Performance and Reliability of Radical-Cured Thermosets	\$0	\$279,042	\$279,042
180906	Magnetic Josephson Junction Memory and Three-Dimensional Integration for Scalable, High Performance, Low Power Computing	\$0	\$518,415	\$518,415
180907	Electrochemical Detection of Single Molecules in Nanogap Electrode Fluidic Devices	\$0	\$540,701	\$540,701
180919	Atom Traps on a Microfabricated Optical Waveguide Platform for Quantum-Limited Spin-Squeezed Magnetometry and Quantum Information Applications	\$0	\$657,323	\$657,323
180920	Beyond Graphene: Boron Nitride-Based Semiconductor Alloys for Next-Generation Optoelectronics	\$0	\$587,402	\$587,402
180921	Distributed Session Types for Trusted Systems and Communications	\$0	\$21,676	\$21,676
180922	Controlling Nanoparticle Assembly to Engineer New Materials	\$0	\$204,981	\$204,981
180923	Emergent Phenomena in Oxide Nanostructures	\$0	\$235,341	\$235,341
180924	Sandia's Rotary Vapor Compression Cycle Technology: A Pathway to Ultrahigh Efficiency Building Air Conditioning, Heating, and Refrigeration	\$0	\$249,545	\$249,545
180926	Direct Mechanical Ignition of Reactive Materials for Improved Safety and Performance	\$0	\$590,289	\$590,289
180928	Defect Characterization for Material Assurance in Metal Additive Manufacturing	\$0	\$659,071	\$659,071
180929	Additive Manufacturing of Porous Materials	\$0	\$566,055	\$566,055
180930	Microenergetic Logic for Safety Applications	\$0	\$745,534	\$745,534
180931	Trust of Third Party Digital Design Tools using Formal Methods	\$0	\$444,208	\$444,208
180932	Compact Models for Defect Diffusivity in Semiconductor Alloys	\$0	\$497,024	\$497,024
180933	Extending the Accessible Range of Strain Rates on Z using Continuously Graded-Density Flyers Fabricated using Sputter Deposition	\$0	\$242,476	\$242,476
180935	Measuring Plasma Formation, Field Strength, and Current Loss in Pulsed Power Diodes	\$0	\$434,078	\$434,078
181060	Predictive Modeling of Aging and Degradation of Materials in Extreme Environments	\$0	\$59,996	\$59,996
181061	(Active) Learning on Groups of Data with Information-Theoretic Estimators	\$0	\$42,440	\$42,440
181063	Optimization of Isentropic Compression Loads on Current-Adder Pulsed Power Accelerator Architectures	\$0	\$261,201	\$261,201
181198	Application of Enhanced Photocurrent Models and Single Event Effects	\$0	\$200,897	\$200,897
181202	Optimizing Microgrid Energy Delivery Under High Uncertainty	\$0	\$53,821	\$53,821
181204	Additive Manufacturing of Metallic Components by Laser Powder Forming	\$0	\$61,916	\$61,916
181205	Lithium OxySilicate Compounds as Stable Analogs to Improve the Safety and Reliability of Lithium Battery Systems: Moving Solid Electrolytes into High Rate Applications	\$0	\$102,033	\$102,033
183780	Graph Learning in Knowledge Bases - The goal of this research is to leverage (and advance where necessary) recent advances in state-of-the-art probabilistic knowledge base design and couple them with statistical inference and learning algorithms	\$0	\$57,179	\$57,179
186113	Visible Quantum Nano photonics - This project will develop a quantum nanophotonics laser architecture in the visible that enables practical control over electrons and photons in more than one dimension	\$0	\$201,733	\$201,733
186363	Enabling Explosives and Contraband Detection with Neutron Resonant Attenuation	\$0	\$195,154	\$195,154
186364	Discovery of Anti-Viral Inhibitors Against the Chikungunya Virus nsP2 Protease Domain	\$0	\$275,240	\$275,240
186366	Sampling-Based Algorithms for Estimating Structure in Big Data	\$0	\$199,304	\$199,304
186367	Advanced Computational Methods for Thermal Radiative Heat Transfer	\$0	\$266,734	\$266,734
186839	Validating Hydrogen Concentration Fields at Crack Tips	\$0	\$204,560	\$204,560
188288	Vertically-Injected Ultraviolet Laser Diodes	\$0	\$249,566	\$249,566
188289	Exploring Growth Conditions to Identify, Quantify, and Reduce the Risk of False Negatives	\$0	\$18,556	\$18,556
189267	Material Testing for Shear-Dominated Ductile Failure	\$0	\$119,992	\$119,992
189614	Smart Sensor Technologies	\$0	\$4,259,769	\$4,259,769
190245	NanoCRISPR: A Revolutionary Therapeutic Platform for Rapidly Countering Emerging and Genetically-Enhanced Biological Threats	\$0	\$4,280,166	\$4,280,166
190958	Analyzing and Understanding of Transporters to Control Lignin Transformation into Fuel	\$0	\$561,477	\$561,477
190959	Unmasking Hidden Compounds within Hyperspectral Images	\$0	\$179,824	\$179,824
190960	Modular Abiotic/Biotic Systems for Understanding and Directing Biological Function	\$0	\$617,835	\$617,835
190961	Exploiting the Microbial Achilles Heel for New Broad Spectrum Anti-Microbials	\$0	\$474,808	\$474,808
190962	Engineering 'Green' Algae: Reducing Metabolic Waste for High Biomass Productivity	\$0	\$540,271	\$540,271
190963	Quantum Optimization and Approximation Algorithms	\$0	\$342,229	\$342,229
190964	Heimdallr: Automated Binary Analysis via Symbolic Execution	\$0	\$370,552	\$370,552
190965	Adverse Event Prediction Using Graph-Augmented Temporal Analysis	\$0	\$570,827	\$570,827
190966	Counter Adversarial Graph Analytics	\$0	\$689,408	\$689,408
190967	Modeling Human Comprehension of Data Visualizations	\$0	\$515,448	\$515,448
190968	Subsystem Reduced-Order Modeling and Network Uncertainty Quantification for Rapid, Agile, Extreme-Scale Simulation	\$0	\$591,000	\$591,000
190970	Optimal Control and Design of Qubits	\$0	\$119,701	\$119,701
190971	Green Monopropellant System Design and Characterization for Threat Signature Analyses	\$0	\$496,093	\$496,093
190974	Optical Technology - this is a classified project	\$0	\$287,440	\$287,440
190975	Novel Applications of the Multi-Beam Scanning Electron Microscope	\$0	\$201,330	\$201,330
190976	Patterns of Life Algorithm Development via Semantic Graphs	\$0	\$274,241	\$274,241
190978	Realistic Internet of Things Signal Control	\$0	\$149,982	\$149,982
190979	High Fidelity Simulations of Large-Scale Wireless Networks	\$0	\$313,709	\$313,709
190980	Inferential and Feature Selection Methods for Video Imaging	\$0	\$241,067	\$241,067
190988	Hybrid Classifiers Using Statistics and Machine Learning	\$0	\$566,166	\$566,166
190989	Creating Data for Validating Machine Learning Methods	\$0	\$363,553	\$363,553
190990	Social-Media Account Resolution and Verification	\$0	\$256,166	\$256,166
190991	Multimodal Data Integration Under Uncertainty	\$0	\$350,917	\$350,917

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190992	Radio Frequency Enabled Cyber: Incorporating RF Channel Effects in Modeling of Wireless Networked Information Systems	\$0	\$231,075	\$231,075
190993	Implementing Neural Adaptive Filtering in Detection Systems	\$0	\$242,971	\$242,971
190994	Shot Noise Limited Imaging with Lock-In Based Focal Plane Arrays	\$0	\$305,687	\$305,687
190995	Alternate Focal Plane Array Architectures	\$0	\$190,419	\$190,419
190996	Microsystems Enabled Passive Radio Frequency Signal Processing	\$0	\$205,450	\$205,450
190997	Assessment of Non-Traditional Phenomenologies for Proliferation Detection	\$0	\$219,990	\$219,990
190998	Microscale Transient Detection	\$0	\$282,883	\$282,883
190999	Multitarget-Multisensor Tracking	\$0	\$265,606	\$265,606
191000	Advanced Materials and Devices for Communications	\$0	\$255,611	\$255,611
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	\$497,818	\$497,818
191002	Tunable Inkjet Materials	\$0	\$141,613	\$141,613
191004	Exploiting Social Media Sensor Networks through Novel Data Fusion Techniques	\$0	\$200,153	\$200,153
191005	Development and Demonstration of Alternative Precision Navigation Capabilities in Global Positioning System-Denied Environments	\$0	\$364,075	\$364,075
191006	Understanding Photon / Free Carrier Interaction in LVP Signals on Ultra-Thin Silicon Ics - this is a classified project	\$0	\$255,815	\$255,815
191009	Accurate Characterization Of Real Networks from Inaccurate Measurements	\$0	\$356,495	\$356,495
191011	Field Programmable Gate Array Trust and Vulnerability Assessment Guided by Network Criticality Metrics	\$0	\$350,750	\$350,750
191013	Novel Techniques for Silicon Doping Profiling	\$0	\$179,232	\$179,232
191014	Stress-Induced Emission - this is a classified project	\$0	\$175,147	\$175,147
191017	A Fundamental Study on the Physicochemical Process of Soot Particle Inception	\$0	\$921,139	\$921,139
191018	Waste Water for Power Generation via Energy Efficient Selective Silica Separations	\$0	\$395,251	\$395,251
191051	Water Treatment System for Resilient Energy Production	\$0	\$449,657	\$449,657
191053	Investigating the Chemistry, Physics, Wear and Aging in Rolling Electrical Contact	\$0	\$620,405	\$620,405
191054	Nuclear Power Plant Cyber Security Discrete Dynamic Event Tree Analysis	\$0	\$394,094	\$394,094
191055	High-Resolution Modeling and Measurements in the Arctic	\$0	\$199,130	\$199,130
191056	Fundamentals of Pellet-Clad Debonding	\$0	\$549,322	\$549,322
191057	Co-optimization to Integrate Power System Reliability Decisions with Resiliency Decisions	\$0	\$144,969	\$144,969
191058	Meta Material Receivers for High Efficiency Concentrated Solar Energy Conversion	\$0	\$177,638	\$177,638
191059	Foundations for Protecting Renewable-Rich Distribution Systems	\$0	\$42,440	\$42,440
191060	Understanding Soot Development and Thermal Stratification in Combustion Engines through Hyperspectral Non-linear Optical Diagnostics	\$0	\$607,613	\$607,613
191065	Coarse-Grained Reactive Molecular Dynamics Simulations of Heterogeneities in Shocked Energetic Materials	\$0	\$330,193	\$330,193
191068	High-Throughput Material Characterization (more parameters per test with Uncertainty Quantification) via 6-Degrees of Freedom Loading and Material Parameter Feedback Control using 304L Stainless Steel as an Exemplar Material	\$0	\$538,526	\$538,526
191069	Big-Data Multi-Energy Iterative Volumetric Reconstruction Methods for As-Built Validation & Verification Applications	\$0	\$417,202	\$417,202
191072	High-Density Signal Interface Electromagnetic Radiation Prediction for Electromagnetic Compatibility Evaluation	\$0	\$65,596	\$65,596
191074	Reduced Order Models of Structures Incorporating Complex Materials	\$0	\$196,584	\$196,584
191076	Turbulent Flow Uncertainty Quantification using Machine Learning Techniques	\$0	\$393,161	\$393,161
191078	Stress-Induced Block Copolymer Lithography	\$0	\$100,036	\$100,036
191080	Phononic Manipulation of the Superconducting State	\$0	\$101,392	\$101,392
191085	Detection of Soluble Ligand-Tuned Molecular Tags for Subterranean Fluid Flow Monitoring Using Resonance Raman Spectroscopy	\$0	\$409,682	\$409,682
191087	High Fidelity Hybrid Method for In Situ Borehole Stress Determination	\$0	\$397,457	\$397,457
191092	Development of a Downhole Technique for Measuring Enthalpy in Geothermal Reservoirs	\$0	\$199,235	\$199,235
191129	Digital Rock Physics for Multi-Scale Experiments and Modeling of Fractured Porous Media	\$0	\$367,213	\$367,213
191133	Chemical-Mechanical Modeling of Subcritical-to-Critical Fracture in Geomaterials	\$0	\$477,418	\$477,418
191137	Real Time Degassing of Rock during Deformation	\$0	\$259,126	\$259,126
191144	Changing the Engineering Design and Qualification Paradigm in Component Design and Manufacturing (Born Qualified)	\$0	\$4,597,353	\$4,597,353
191147	Fundamental Trust Analysis - Building on existing research in game theory, supply chain analytics, and risk assessment to develop a novel graph-based game-theoretic approach for analyzing trust. Development of verification-based analysis techniques to identify effective ways to apply diversity. This research, if successful, will advance the ability to conduct quantitative analysis of trust, and will lay the groundwork for future development of objective techniques for the analysis and synthesis of trust.	\$0	\$747,562	\$747,562
191150	Arming and Firing System Charge State Determination using Unintended Radiated Electromagnetic Emissions	\$0	\$471,696	\$471,696
191151	Improving Render Safe Capabilities for National Security from Chemical and Biological Dissemination Devices	\$0	\$396,446	\$396,446
191152	Airborne Defense Against the Small Unmanned Aircraft Systems Threat	\$0	\$614,981	\$614,981
191154	System Theoretic Framework for Mitigating Risk Complexity in the Nuclear Fuel Cycle	\$0	\$301,581	\$301,581
191160	Improved Analytics for Dynamic Three-Dimensional Security Systems	\$0	\$254,469	\$254,469
191161	Eyes on the Ground: Visual Verification for On-Site Inspection	\$0	\$476,183	\$476,183
191162	Automated Generation of Tailored Malware Execution Environments	\$0	\$364,546	\$364,546
191165	Instrumentation Infrastructure for Cyber Emulations	\$0	\$307,778	\$307,778

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Project ID	Project Name	Equipment	Other	FY Total
191166	Using Data Science to Improve Theorems of Human Performance in National Security Domains	\$0	\$311,042	\$311,042
191175	Rapid Automated Pathogen Identification by Enhanced Ribotyping	\$0	\$670,172	\$670,172
191176	Modeling Metal/Metal Compound Combustion for Energetic Material Enhancement	\$0	\$197,135	\$197,135
191183	Applying Biological Immune-System Concepts to Improve Electronic Biosurveillance System Performance	\$0	\$350,797	\$350,797
191184	Polarimetry for Extended Persistence and Range In Fog for Infrastructure Protection	\$0	\$470,681	\$470,681
191185	Compressive Optical Physical Unclonable Function for Secure Communication	\$0	\$500,305	\$500,305
191186	Understanding Transport and Aging Mechanisms to Optimize Sandia's Ion-Conducting Electrolytes for Energy Applications	\$0	\$518,038	\$518,038
191187	Electrochemical Model of Humidity-Driven Corrosion	\$0	\$235,879	\$235,879
191188	Interfacial Effects on the Microstructure and Morphology of Energetic Materials	\$0	\$160,587	\$160,587
191190	Fundamental Science of Doping and Defects in Gallium Oxide for Next Generation Power Semiconductors	\$0	\$92,737	\$92,737
191191	High Power Solid-State Li-ion Batteries Through Interface Engineering	\$0	\$616,771	\$616,771
191194	Cooperative Self-Assembly for Structure and Morphology Control of Energetic Materials	\$0	\$519,931	\$519,931
191196	Quantum Nanofabrication: Mechanisms and Fundamental Limits	\$0	\$646,019	\$646,019
191197	Ferroelectric Tunnel Junctions: A Physics-Based Solution to Reliable Resistive Memory	\$0	\$412,926	\$412,926
191198	Scandium Aluminum Nitride for Advanced Piezoelectric Sensors, Actuators, and Filters	\$0	\$433,454	\$433,454
191199	Highly Efficient Solar-Blind Single Photon Detectors	\$0	\$483,786	\$483,786
191203	A New Paradigm in Chemical/Biological Threat Detection: Evaluating Threats Based on Biological Function Rather than Chemical Form	\$0	\$406,510	\$406,510
191204	Optimization of Sputtered Aluminum Nitride for the Seeding of Metalorganic Chemical Vapor Deposition Gallium Nitride Films	\$0	\$110,299	\$110,299
191209	Band Structure Engineering for Inherent Rad Hard Devices	\$0	\$115,477	\$115,477
191210	Developing a Solid State Technology for Electron Spin Qubits on Liquid Helium	\$0	\$507,794	\$507,794
191211	A Platform for Quantum Information and Large-Scale Entanglement with Rydberg Atoms in Programmable Optical Potentials	\$0	\$259,648	\$259,648
191215	Creating and Understanding Lifelike Matter: Far-from-Equilibrium States that Arise from Injecting Energy into Dipolar Fluids	\$0	\$175,852	\$175,852
191221	Topological Photonics: The Quest for Ultimate Photon Control	\$0	\$241,770	\$241,770
191223	A New All-Dielectric Nanolaser	\$0	\$250,330	\$250,330
191225	Mediated Flow Batteries	\$0	\$147,128	\$147,128
191227	Bridging the Gap: Evaluating Compatibility and Reliability of Interfaces between Additively Manufactured and Conventional Gas Transfer Systems Components	\$0	\$144,413	\$144,413
191229	Advanced Neutron Generator	\$0	\$676,425	\$676,425
191232	Multi-Material Additive Manufacturing for Trusted Ceramic Packages with Embedded Capacitors	\$0	\$542,606	\$542,606
191234	Creating Robust and Secure Free-Space Optical Systems for Information and Power Transmission in Confined Environments	\$0	\$513,647	\$513,647
191235	Time-Resolved X-Ray Diffraction Measurements on Laser-Compressed Polycrystalline Samples Using a Multi-Pulse, Short-Pulse Laser Generated X-Ray Source	\$0	\$548,377	\$548,377
191237	Current Loss in 0.1 - 100 Terawatt Vacuum Transmission Lines: Next-Generation Experiments and Physics-Based Simulations	\$0	\$763,486	\$763,486
191238	Development of a 200-kilovolts, Low-Inductance, Low-Jitter, Low-Prefire-Rate Spark-Gap Switch	\$0	\$253,964	\$253,964
191239	Adjoint-Based Methods for Optimization and Uncertainty Quantification in Particle Transport	\$0	\$442,853	\$442,853
191240	Correlating the Structural and Electrical Performance of Microelectronics during a Radiation Event	\$0	\$707,181	\$707,181
191313	Realizing the Power of Near-Term Quantum Technologies	\$0	\$355,393	\$355,393
191316	A Nanocomposite Inductor for Pulsed Power Fusion	\$0	\$104,238	\$104,238
192700	Probing Charge Layers in Conducting Oxides for Next-Generation Plasmonics	\$0	\$82,970	\$82,970
192701	Optimization of Silicon Vacancy Defect Yield in Diamond Substrates	\$0	\$143,886	\$143,886
192703	Quantitative Temperature Measurement of Electrically-Driven Bridge for Model Validation	\$0	\$100,308	\$100,308
192762	Novel Microelectromechanical Systems-Enabled Nanofracking of Subsurface Minerals	\$0	\$708,871	\$708,871
192786	A Compact, Spectrally-Tunable Source of Entangled Photon-Pairs for Quantum Sensing	\$0	\$422,171	\$422,171
192787	Risk Evaluation for Identification and Intervention in Dual Use Research of Concern for International Biological Research & Development Activity	\$0	\$253,891	\$253,891
192788	Deciphering Global Dynamics of Microbial Multidrug Resistance Regulation using Microfluidic Cross-Linking Kinetic Analysis and Ultra High-throughput Sequencing	\$0	\$323,358	\$323,358
192794	Artificial Graphene in Undoped Semiconductor Heterostructures	\$0	\$99,786	\$99,786
192869	Modeling Electric Double Layer Effects on Charge Transfer at Flow Battery Electrode/Electrolyte Interfaces	\$0	\$85,220	\$85,220
192870	Synthetic Aperture Radar Targeting for Prompt Global Strike Missions	\$0	\$174,866	\$174,866
193072	Fracture Toughness of Microstructural Gradients	\$0	\$85,821	\$85,821
193073	Measuring Idea Generation and Test	\$0	\$99,837	\$99,837
193231	Developing Fugitive Emissions Sensor Networks: New Optimization Algorithms for Monitoring, Measurement and Verification	\$0	\$245,295	\$245,295
193373	Dynamic Mode Decomposition of Solids	\$0	\$103,068	\$103,068
193375	Shock Capability Development for Flight Simulation Inertial Testing	\$0	\$87,232	\$87,232
193376	Plasma Tailoring Technology	\$0	\$123,102	\$123,102
193377	Exploring the Response of Jointed Structures to Blast Waves using a Shock Tube	\$0	\$100,308	\$100,308
193378	Fluxional Monomers for Enhanced Thermoset Materials	\$0	\$218,023	\$218,023
193407	Additively Manufactured Shock Absorbing Engineered Materials	\$0	\$48,894	\$48,894
193418	Geomechanics of Induced Seismicity in Carbon Dioxide Reservoirs	\$0	\$105,697	\$105,697

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Project ID	Project Name	Equipment	Other	FY Total
193419	Development of Detection and Mitigation Algorithms for False Data Injection Cyberattacks against Nuclear Facilities	\$0	\$78,878	\$78,878
193420	Hybrid Simulation-Optimization Methods for System of System Models	\$0	\$104,867	\$104,867
193422	Understanding the Physics of Silicon-Germanium Heterojunction Bipolar Transistors for Cutting-edge Electronics at Deep Cryogenic Temperatures	\$0	\$98,643	\$98,643
193424	Motion and Trajectory Algorithms for Visual Information Foraging in Intelligence Analysis Workflows	\$0	\$148,680	\$148,680
193766	Dynamic Simulation and Optimization of Resilient Hybrid Microgrid Systems	\$0	\$56,900	\$56,900
194773	A Case Study on Neural Inspired Dynamic Memory Management Strategies for High Performance Computing	\$0	\$157,439	\$157,439
194774	Understanding the Hierarchy of Dense Subgraphs in Stationary and Temporally Varying Setting	\$0	\$134,627	\$134,627
195213	Next-Generation Electronic Structure Codes for National Security Application	\$0	\$79,208	\$79,208
195215	High Brightness, Room Temperature III-Nitride Based Single Photon Source	\$0	\$97,884	\$97,884
195216	Improving Catalysis with Bifunctional Conductors	\$0	\$136,468	\$136,468
195217	Ionic Borate-Based Covalent Organic Frameworks: Lightweight, Porous Materials for Lithium-Stable Solid-State Electrolytes	\$0	\$64,179	\$64,179
195218	Low-Power Sensor Authentication using Public Physical Unclonable Functions	\$0	\$52,725	\$52,725
195304	Understanding Velocity of Detonation in Graded Density Energetic Materials	\$0	\$102,232	\$102,232
195305	The Green Machine: Light Starved Communication beyond the Classical Limit	\$0	\$104,297	\$104,297
195306	Auto-Magnetizing Liners for Magnetized Liner Inertial Fusion: Helically-Wound Composite Liners	\$0	\$120,106	\$120,106
195307	Statistically Rigorous Uncertainty Quantification for Physical Parameter Model Calibration with Functional Output	\$0	\$49,792	\$49,792
195557	Artificial Diffusion: Rapid Disease Detection by Driven Magnetic Polybeads	\$0	\$100,707	\$100,707
195702	Fundamental Properties of Confined Enzymes	\$0	\$50,338	\$50,338
195868	Electromagnetic (Optical/Radio Frequency) Signatures Associated with Atmospheric Discharges and Plasma Generation in Explosive Events	\$0	\$122,543	\$122,543
195880	Systems	\$0	\$101,435	\$101,435
195881	Sequential Design of Experiments for Accelerated Life Testing	\$0	\$42,608	\$42,608
195883	Microstructural Modeling of Brittle Materials for Enhanced Performance and Reliability	\$0	\$100,461	\$100,461
195968	Efficient-Track-Before-Detect with Minimal Prior Knowledge	\$0	\$237,978	\$237,978
196223	High Performance Computing Metrics to Enable Application-Platform Communication	\$0	\$55,379	\$55,379
196225	Piezoelectric-Magnetostrictive Transceiver Concept	\$0	\$200,541	\$200,541
196390	Event Correlation using Spatio-Temporal Point Processes	\$0	\$170,435	\$170,435
196470	Optical Bus Architecture for Vertical-Cavity Surface-Emitting Lasers Transceivers	\$0	\$201,682	\$201,682
196604	Contactless Communications and Power Transfer Bridge	\$0	\$200,151	\$200,151
198367	Normalized Compression Distance as a Metric for Analytic Software Utility	\$0	\$59,710	\$59,710
198368	Tritium-Based Accelerated Aging	\$0	\$55,544	\$55,544
198369	'Tattle-tale', Ion-Implanted Nanoparticle, Strengthened Steels	\$0	\$79,336	\$79,336
198370	Porous Liquid Electrolytes for Metal-Air Batteries	\$0	\$65,106	\$65,106
198371	System Level Design of Jointed Interfaces via Advanced Manufacturing Techniques	\$0	\$72,697	\$72,697
198372	Geospatial Nonproliferation Signature Modeling	\$0	\$336,558	\$336,558
198383	Hyper-Insulating Fullerene Inks For Thermal Barrier Coatings	\$0	\$47,787	\$47,787
198384	Dynamical Systems for Resilient Computing	\$0	\$44,232	\$44,232
198564	Biosecurity through Public Health System Design	\$0	\$104,865	\$104,865
198982	Integration of Climate and Wave Models to Evaluate Arctic Erosion Caused by Melting Sea Ice	\$0	\$49,309	\$49,309
Total # of Projects for SNL: 366		Total Equipment Cost for SNL: \$0	Total Other Cost for SNL: \$155,051,502	Total Project Cost for SNL: \$155,051,502

SRNL - Savannah River National Lab

LDRD-2013-00016	Long-term, In-situ Monitoring for Subsurface Contaminant Stability	\$0	\$14,338	\$14,338
LDRD-2014-00011	Electro-Dynamic Particle Sorter	\$0	(\$7,819)	(\$7,819)
LDRD-2014-00014	Novel Ceramic Membranes for the Efficient Utilization of Natural Gas	\$0	\$27,020	\$27,020
LDRD-2014-00029	Direct Lithium Electrolysis in a Metallic Lithium Fusion Blanket	\$0	\$115,372	\$116,493
LDRD-2014-00073	Far Field Modeling Methods for Characterizing Surface Detonations	\$0	\$24,821	\$24,864
LDRD-2014-00079	Next Generation Betavoltaic Cells – Increasing Power Density	\$0	\$64,194	\$76,215
LDRD-2014-00097	Reinventing the Nuclear Waste Chemical Processing Flowsheet using Advanced Continuous Chemical Reactors and Separations	\$0	(\$22,363)	(\$22,363)
LDRD-2014-00099	Smart Manufacturing: replacing analytical sample control with model predictive control	\$0	\$80,473	\$80,473
LDRD-2014-00100	Low Temperature Waste Form Process Intensification	\$0	\$115,637	\$148,769
LDRD-2014-00127	Electrodialysis for Intensification of Aqueous Polishing and Other Separations	\$0	\$84,768	\$84,768
LDRD-2015-00001	Reactive amendment saltstone: a novel approach for improved sorption/retention of radionuclides such as iodine and technetium	\$0	\$14,584	\$14,584
LDRD-2015-00002	Development of Liquid Phase Water Detritiation Technology	\$0	\$135,672	\$142,675
LDRD-2015-00005	Alternate Tritium Production Methods Using a Liquid Lithium Target	\$0	\$7,112	\$7,112
LDRD-2015-00010	Characterization of High Explosives Detonations Via Laser-Induced Plasmas	\$0	\$148,844	\$219,479
LDRD-2015-00014	Functionalized Magnetic Mesoporous Silica Nanoparticles for U and Tc Removal: Defining Engineering Parameters for Applications	\$0	\$182,633	\$182,633
LDRD-2015-00015	Laser-Induced Ionization Efficiency Enhancement of a Filament for Thermal Ionization Mass Spectrometer	\$0	\$11,272	\$11,272
LDRD-2015-00019	Molecular Breeding Algae for Improved Traits for the Conversion of Waste to Fuels and Commodities	\$0	\$8,883	\$9,148
LDRD-2015-00021	Field Detector Development for Undeclared/declared Nuclear Testing for Treaty Verification Monitoring	\$0	\$6,490	\$6,490
LDRD-2015-00030	Argon Collection and Purification for Proliferation Detection	\$0	\$6,468	\$6,468

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Project ID	Project Name	Equipment	Other	FY Total
LDRD-2015-00036	Identification of Mercury Sources in Aquatic Media of Savannah River Site Waters by Isotopic Analysis	\$0	\$4,804	\$4,804
LDRD-2015-00037	Nanostructured Neutron Conversion Material for Gas-Filled Proportional Detectors	\$0	\$47,312	\$47,776
LDRD-2015-00040	Magnetically induced heat generation for controlled hydrogen isotope release from nano-hydrides	\$0	\$252,384	\$293,647
LDRD-2015-00052	Nano-carbon Dyes for Use in Plastic Scintillators	\$0	(\$18,775)	(\$18,749)
LDRD-2015-00055	MAX Phase Materials and Coatings for High Temperature Reactors	\$0	\$11,999	\$16,337
LDRD-2015-00057	Multi-Component Separation and Purification of Natural Gas	\$0	\$372,391	\$380,198
LDRD-2015-00058	Graphene-Based Gas Separation Membranes	\$0	\$278,007	\$287,575
LDRD-2015-00059	Resilient Electrical Grid Synchrophasor	\$0	\$238,954	\$452,792
LDRD-2015-00062	High Energy Density Supercapacitors from Scalable Edge Rich Graphene	\$0	\$3,238	\$3,238
LDRD-2015-00068	Using Atmosphere-Forest Flux measurements to Examine the Potential for Reduced Downwind Dose	\$0	\$3,492	\$3,492
LDRD-2015-00069	Model-Driven Data Analysis of the 2013 H-Canyon Dissolution Experiment	\$0	\$7,333	\$7,333
LDRD-2015-00071	BioAccumulation using Surrogate Samplers for an Alternative Monitoring Tool for Environmental Contaminants at the Savannah River Site	\$0	\$11,009	\$11,203
LDRD-2015-00072	Pu Anion Exchange Process Intensification through the use of Microchannel Arrays or Highly Porous Monolithic Foam Columns	\$0	\$8,001	\$8,001
LDRD-2015-00075	New Frontiers in Nuclear Particulate Microanalysis and Signature Development	\$0	\$276	\$276
LDRD-2015-00076	Validation Study of the Savannah River National Lab Vacuum Aerosol Contamination Extractor	\$0	\$9,758	\$9,762
LDRD-2015-00077	In-situ Raman - The objective of this work will be to demonstrate that Raman spectroscopy and chemometrics can be used to monitor reactants and products of the adduct-based synthesis of alane	\$0	\$9,227	\$12,879
LDRD-2015-00078	Electrorefining of Stainless Steel and Zirconium Alloy Cladding to Allow the Processing of Nuclear Materials with No Clear Disposition Pathway	\$0	\$5,206	\$18,327
LDRD-2015-00079	Sensor Design for Monitoring and Control of Waste Biomass to Methane for Energy Production	\$0	\$1,448	\$1,477
LDRD-2015-00080	Development of Expandable Heat Exchanger for Enhanced Refueling of Compressed Natural Gas Tanks	\$0	\$11,352	\$11,352
LDRD-2016-00015	Advanced Ultrafast Spectroscopy for Chemical Detection of Nuclear Fuel Cycle Materials	\$0	\$3,580	\$411,067
LDRD-2016-00023	Hyperspectral Analysis - classified project	\$0	\$72,978	\$85,912
LDRD-2016-00025	Non-Platinum Group Metal Fuel Cell Catalysts	\$0	\$221,532	\$254,050
LDRD-2016-00026	Pu Anion Exchange Process Intensification	\$0	\$140,416	\$140,416
LDRD-2016-00029	Hydrogen Isotope Separation by Nanosized Palladium-Isoelectronic Rhodium-Silver Alloys	\$0	\$132,544	\$136,526
LDRD-2016-00031	Tetrafluoride	\$0	\$214,496	\$232,727
LDRD-2016-00034	On-line Underground Cable Diagnostic System Using Time Domain Reflectrometry and Cable Signal Subtraction	\$0	\$54,375	\$145,210
LDRD-2016-00035	Metal Hydride Thermal Energy Storage Material Development for Dish-Stirling Systems	\$0	\$261,978	\$262,334
LDRD-2016-00037	Problematic Contaminants (Technetium-99, mercury) for Tank Waste Treatment and Disposal	\$0	\$183,453	\$183,453
LDRD-2016-00038	Selective Adsorption/Purification of Natural Gas Using Tunable Adsorbents	\$0	\$311,982	\$311,982
LDRD-2016-00048	Use of Diffusive Gradients in Thin Films as an alternative monitoring tool for Inorganic environmental contaminants	\$0	\$193,201	\$213,211
LDRD-2016-00049	Understanding the Effect of Impurities on the Plutonium Ionization Efficiency with Thermal Ionization Mass Spectrometry	\$0	\$172,174	\$196,765
LDRD-2016-00052	Microencapsulation of plutonium oxide in a low-water cement-based waste form	\$0	\$195,870	\$225,347
LDRD-2016-00053	Explore Innovative Chemistry of Natural Gas Conversion to Dimethyl Ether	\$0	\$288,907	\$395,043
LDRD-2016-00054	Lithium Isotope Electrochemical Separation in the Molten State	\$0	\$71,178	\$71,178
LDRD-2016-00062	Synthesis of Zeolite Materials for Noble Gas Separation	\$0	\$229,344	\$315,074
LDRD-2016-00066	Mercury Removal & Stabilization in the Subsurface using Vapor Phase Sulfur	\$0	\$59,342	\$59,342
LDRD-2016-00070	A Next Generation Digital Counting System For Low-Level Tritium Studies	\$0	\$85,991	\$243,356
LDRD-2016-00071	Advanced Atmospheric Modeling Techniques for Non-Proliferation Applications	\$0	\$269,739	\$269,739
LDRD-2016-00074	Development of advanced processing technologies for plutonium oxide production	\$0	\$100,503	\$153,081
LDRD-2016-00081	Effects of power line noise on Supervisory Control and Data Acquisition system stability	\$0	\$126,252	\$297,671
LDRD-2016-00107	Solid State Nuclear Magnetic Resonance evaluation of Carbon Dots and fluidic lithium borohydride on buckminsterfullerene	\$0	\$39,975	\$39,975
Total # of Projects for SRNL: 60		Total Equipment Cost for SRNL: \$0	Total Other Cost for SRNL: \$7,337,798	Total Project Cost for SRNL: \$7,337,798

SRP - Savannah River Plant

SR14008	Degradation Resistant Carbon Nanotube Reinforced Elastomer for Tritium Service	\$0	\$319,151	\$319,151
SR14020	Evaluation of the Four-Inch Short Hydride Bed	\$0	\$155,406	\$155,406
SR14023	Glovebox Moisture De-Tritiation by Isotope Exchange	\$0	\$334,106	\$334,106
SR14024	Graphene Permeation Barrier for the Reduction of Water and Oxygen Flux through Glovebox Gloves	\$0	\$412,704	\$412,704
SR15010	Reliable and Maintainable Replacement Oxygen Analyzer	\$0	\$56,850	\$56,850
SR15011	Aluminum and Other Coatings as Passivation Layers	\$0	\$142,433	\$142,433
SR15012	Evaluation of Alternate SAES® Hydrogen Getters	\$0	\$214,692	\$214,692
SR15029	Evaluation of Potential Inline Analytical Capabilities	\$0	\$183,952	\$183,952
SR16009	Durable Water Splitting Using Thermochemical Cycles of Nanostructured Metal Oxides	\$0	\$150,979	\$150,979
SR16010	Electroplating Nanodiamond Coating for Stainless Steel Passivation	\$0	\$142,341	\$142,341
SR16017	Lanthanum Nickel Aluminum Bed Life Extension	\$0	\$199,029	\$199,029
SR16022	Passivation of Stainless Steel Components by Electropolishing and Vacuum Heat Treatment	\$0	\$275,947	\$275,947
SR16026	Two Dimensional Materials for the Passivation of Stainless Steel Surfaces	\$0	\$129,319	\$129,319

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Project ID	Project Name	Equipment	Other	FY Total
SR16031	Development of Future Thermal Cycling Absorption Process Replacement Capabilities	\$0	\$570,567	\$570,567
SR16032	Enhanced Pinch Weld Electrode	\$0	\$77,282	\$77,282
Total # of Projects for SRP: 15	Total Equipment Cost for SRP: \$0	Total Other Cost for SRP: \$3,364,758	Total Project Cost for SRP: \$3,364,758	

TJNAF - Thomas Jefferson National Accelerator Facility				
2015-LDRD-01b	Experimental Studies of Optics Schemes at the Continuous Electron Beam Accelerator Facility for Suppression of Coherent Synchrotron Radiation	\$0	\$36	\$36
2015-LDRD-03	Wireless, Hand-Held Data Acquisition System for Imaging Detector	\$0	\$727	\$727
2016-LDRD-1	Enhancing Simulation Capability for Electron Cooling in Medium Energy Electron-Ion Collider Project	\$0	\$125,054	\$125,054
2016-LDRD-2a	Generation and Characterization of Magnetized Bunched Electron Beam from Direct Current Photogun for Medium Energy Electron-Ion Collider Cooler	\$0	\$327,738	\$327,738
2016-LDRD-4a	Nuclear Gluons with Charm at Electron-Ion Collider	\$0	\$159,535	\$159,535
Total # of Projects for TJNAF: 5	Total Equipment Cost for TJNAF: \$0	Total Other Cost for TJNAF: \$613,090	Total Project Cost for TJNAF: \$613,090	

Y-12 - Y-12 Plant				
PD130033	Improved Depleted Uranium Welding	\$0	\$7,943	\$7,943
PD141010	Direct Electrolytic Reduction and Electrorefining of Uranium	\$0	\$2,945,897	\$2,945,897
PD141040	Small Scale Lithium Compound Drying	\$0	\$53,432	\$53,432
PD141080	Special Material Processing Demonstration	\$0	\$364,809	\$364,809
PD142020	Complex surface uranium characterization techniques to support studies related to uranium production and hydrogen embrittlement reduction	\$0	\$191,268	\$191,268
PD142030	Corrosion studies of Lithium Hydride	\$0	\$225,669	\$225,669
PD142040	Advanced Modeling of Y-12's Electrolysis Operations	\$0	\$130,930	\$130,930
PD142050	Helium Leak Detector Upgrade	\$0	\$201,570	\$201,570
PD143010	Atomization to Produce Uranium Alloy Powders	\$0	\$1,468,797	\$1,468,797
PD143040	Pressure Generators	\$0	\$151,260	\$151,260
PD143050	FY14 Enhanced Alloy Processing in Microwave castings	\$0	\$146,471	\$146,471
PD144050	Microwave Casting Temperature Measurement	\$0	\$163,181	\$163,181
PD147010	Automatic Modulated Tool Path Part Programming	\$0	\$184,136	\$184,136
PD147040	Interim Machining Capabilities	\$0	\$654,620	\$654,620
PD15A250	Large Scale Additive Manufacturing Machine & Tooling Evaluation	\$0	\$84,571	\$84,571
PD15A540	Additive Machine Tool Install & Research & Development Testing	\$0	\$387,575	\$387,575
PD15A880	Additive Manufacturing Working Group	\$0	\$262,861	\$262,861
PD15E610	Mercury Stabilization for Off-Site Disposal	\$0	\$127,429	\$127,429
PD15E770	Non-Destructive Assay Concrete Corrosion Detection and Transmission Technology	\$0	\$84,278	\$84,278
PD15F170	Enhanced Programmability for Alpha 1 Machining	\$0	\$246,526	\$246,526
PD15M340	Gas Content in Microwave Melted Castings	\$0	\$95,854	\$95,854
PD15M650	Residual strains and texture in uranium foil and alloy casting	\$0	\$309,891	\$309,891
PD15M770	Microwave Consolidation of Chips Without Briquetting	\$0	\$18,809	\$18,809
PD15N360	Development of New Uranium Quantitative Holdup Equipment & Analysis Software	\$0	\$138,965	\$138,965
PD15N610	All Optical Determination of Isotopic Enrichment of Actinides	\$0	\$129,160	\$129,160
PD15N640	Expansion of Alisense Gamma Hotspot Locator Capabilities for Y-12 needs	\$0	\$42,425	\$42,425
PD15N790	Compact Liquid Stream Monitors for Enriched Uranium	\$0	\$181,464	\$181,464
PD15N820	Airborne Dust Explosions	\$0	\$379,257	\$379,257
PD15Q190	Coded Source Apertures for Low-Dosage Computed Tomography	\$0	\$250,197	\$250,197
PD15Q210	Understanding Mass Spectrometers for Accurate Measurements	\$0	\$99,435	\$99,435
PD15Q630	High Precision Isotope Ratios by Femtosecond Laser Induced Breakdown Spectroscop	\$0	\$341,257	\$341,257
PD15S060	Advanced Thermal Decomposition/Distillation	\$0	\$410,297	\$410,297
PD15S140	Lithium Purification Chemistry	\$0	\$358,502	\$358,502
PD15S370	Modern Lithium Crusher	\$0	\$134,191	\$134,191
PD15S500	Special Material Process Recovery	\$0	\$81,589	\$81,589
PD15U590	Filter Separate Improvement - Identify and test potential replacements for the single source depth filter currently used in Filter Separate Operations	\$0	\$2,513	\$2,513
PD15U740	Uranium Processing In Room Temperature Ionic Liquids	\$0	\$64,068	\$64,068
PD15W570	Strategic Area Movement Detection System	\$0	\$183,729	\$183,729
PD15W830	Tactical Wireless Evolution	\$0	\$33,051	\$33,051
PD15W900	Artificial Neural Network Representation of Critical Excursions	\$0	\$86,413	\$86,413
PD16A260	Tailoring Material Properties using Additive Manufacturing Process Controls	\$0	\$71,868	\$71,868
PD16A730	Small Scale Metal Powder	\$0	\$29,275	\$29,275
PD16A750	In Process Powder Characterization Capabilities for Additive Manufacturing	\$0	\$156,554	\$156,554
PD16E970	Novel Screening Method for Dust Explosions	\$0	\$95,417	\$95,417
PD16F450	Tooling Alignment of certain systems for machining cut that will not damage any items needed for further analysis in Phase III of the D&I by FY17 for Core Surveillance	\$0	\$6,992	\$6,992
PD16M110	Establish Capability for Making Depleted Uranium Wire	\$0	\$814,617	\$814,617
PD16M480	Thermal Spray Crucible Coatings for Microwave	\$0	\$169,144	\$169,144
PD16M490	Focused Exchange - Crimp and Laser Welds Across the Nuclear Weapons Enterprise	\$0	\$67,318	\$67,318
PD16M530	Grain size Control for Microwave cast parts	\$0	\$57,932	\$57,932
PD16M870	Dielectric Properties at Elevated Temperatures	\$0	\$91,715	\$91,715
PD16M970	Continuation of Robust Insulation for Microwave Castings	\$0	\$347,710	\$347,710
PD16N080	Manufacturing Innovation Network	\$0	\$299,780	\$299,780
PD16N230	Chalcopyrite based Neutron Radiography	\$0	\$360,116	\$360,116
PD16N690	Feed Materials For High Flux Isotope Reactor	\$0	\$170,167	\$170,167
PD16Q210	Y-12/Pantex Joint Non-Destructive Laser Gas Sampling	\$0	\$15,047	\$15,047
PD16Q240	Boltless Conflat Flange Containers	\$0	\$27,934	\$27,934
PD16Q250	Bulk-sample Direct Contact Inductively Coupled Plasma Mass Spectrometry	\$0	\$104,069	\$104,069

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Project ID	Project Name	Equipment	Other	FY Total
PD16Q260	Complex Matrix Beryllium Sample Preparation Development and Analytical Benchmarking	\$0	\$34,507	\$34,507
PD16Q290	Dual Resolution three-dimensional Surveillance Microscope	\$0	\$275,493	\$275,493
PD16Q440	Hand-held laser induced breakdown spectroscopy instrument Evaluation	\$0	\$205,055	\$205,055
PD16Q500	Phased Array Ultrasonic Testing- Wheel Probe and Software Prove In	\$0	\$307,210	\$307,210
PD16Q690	Use of Time Domain Nuclear Magnetic Resonance for the determination of % moisture in solid materials	\$0	\$121,736	\$121,736
PD16Q740	Modified Gate Valve	\$0	\$58,610	\$58,610
PD16Q890	Computed Tomography Testing and development (Small)	\$0	\$588,036	\$588,036
PD16Q930	Direct Particle Size Analysis of Dry Materials	\$0	\$100,480	\$100,480
PD16RR00	FY16 Plant Directed Research & Development Rapid Response	\$0	\$171,138	\$171,138
PD16S5000	Automated field calibration moisture standard	\$0	\$288,282	\$288,282
PD16S500	Purification by Zone Refining	\$0	\$343,244	\$343,244
PD16S640	Near-Net-Shape Lithium Hydride	\$0	\$35,473	\$35,473
PD16S710	Homogenization Study	\$0	\$6,593	\$6,593
PD16S720	Lithium Hydride/Lithium Deuteride Alternate Pressing Media	\$0	\$5,619	\$5,619
PD16S750	Dry Powder Processing Humidity Control	\$0	\$88,226	\$88,226
PD16S830	Lithium Processing In Ionic Solutions	\$0	\$186,350	\$186,350
PD16S950	Plug Detection for Lithium Process and Purification Prototype Facility	\$0	\$170,449	\$170,449
PD16U040	Uranium dioxide Passivation scale-up	\$0	\$206,278	\$206,278
PD16U090	Oxide Conversion Facility Low Level Switches	\$0	\$112,376	\$112,376
PD16U120	Chip Recycle - Direct Melt Parameters	\$0	\$296,128	\$296,128
PD16U280	Depleted Uranium Cutting	\$0	\$509,776	\$509,776
PD16U360	Production Prototype Bulk Metal Burner for Low Enriched Uranium and High Enriched Uranium	\$0	\$69,996	\$69,996
PD16U570	Special Oxide Centrifuge Data Needs for Nuclear Critically Safety	\$0	\$263,905	\$263,905
PD16U600	Calciner Demonstration	\$0	\$1,392,800	\$1,392,800
PD16U610	Organic Treatment Improvement	\$0	\$36,828	\$36,828
PD16U670	Enhanced Material Properties of Consolidated Uranium Alloy Spherical Powder	\$0	\$16,263	\$16,263
PD16W550	Perimeter Thermal Analytics and Sensing System	\$0	\$8,327	\$8,327
PD16W670	Acoustical Fiber Sensing	\$0	\$3,070	\$3,070
PD16W990	Container tracking and condition monitoring	\$0	\$23,714	\$23,714
PDX16019	Autonomous Mobile Bay Equipment Retriever	\$0	\$313,761	\$313,761
PDX16053	Pantex 5-Axis Mill and Coordinate Measurement Machine	\$0	\$70,994	\$70,994

Total # of Projects for Y-12: 88 Total Equipment Cost for Y-12: \$0 Total Other Cost for Y-12: \$20,620,662 Total Project Cost for Y-12: \$20,620,662

The negative project costs reflected in 'Other' column are rare but the negative amounts are due to refunds, credits, or reversed accruals