

**FINANCIAL ASSISTANCE  
FUNDING OPPORTUNITY ANNOUNCEMENT**



**U. S. Department of Energy  
Office of Science  
Advanced Scientific Computing Research (ASCR)**

**Exploratory Research for Extreme-Scale Science**

**Funding Opportunity Number: DE-FOA-0001250**

**Announcement Type: **Amendment****

**CFDA Number: 81.049**

**This Funding Opportunity has been amended to change the deadline dates as follows:**

**Jan 22 at 5 PM: 2-page pre-applications due**

**Feb 12 at 5 PM: Encourage/Discourage full proposals**

**Mar 26 at 11:59 PM: Full proposals due**

<b>Issue Date:</b>	<b>12/01/2014</b>
<b>Pre-Application Due Date:</b>	<b>01/22/2015 at 5 PM Eastern Time <b>A Pre-Application is required</b></b>
<b>Encourage/Discourage Date:</b>	<b>02/12/2015 at 5 PM Eastern Time</b>
<b>Application Due Date:</b>	<b>03/26/2015 at 11:59 PM Eastern Time</b>

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## **UPDATES AND REMINDERS**

### DATA MANAGEMENT PLAN

The Office of Science has published a new Statement on Digital Data Management, published at <http://science.energy.gov/funding-opportunities/digital-data-management/>, which governs applications submitted under this FOA, and is detailed in Part IV of this FOA.

### ACKNOWLEDGMENT OF FEDERAL SUPPORT

The Office of Science published guidance about how its support should be acknowledged at <http://science.energy.gov/funding-opportunities/acknowledgements/>.

### REPORTING

If an award results from an application submitted under this FOA, read the Reporting Checklist contained in the Assistance Agreement carefully as it may have changed. The current version of the checklist is available at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms>.

### REGULATIONS

Effective December 26, 2014, this FOA and any awards made under it will be governed by 2 CFR 200, the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, as modified by 2 CFR 910, the Department of Energy Financial Assistance Rules, and 10 CFR 605, the Office of Science Financial Assistance Program.

### RECOMMENDATION

The Office of Science encourages you to register in all systems as soon as possible. You are also encouraged to submit pre-applications and applications well before the deadline.

## **Section I – FUNDING OPPORTUNITY DESCRIPTION**

### **GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO:**

#### **Main Technical/Scientific Program Contact:**

Dr. Steven L. Lee, Office of Advanced Scientific Computing Research

Phone: 301-903-5710

Email: [Steven.Lee@science.doe.gov](mailto:Steven.Lee@science.doe.gov)

FAQ: <http://science.doe.gov/ascr/funding-opportunities/>

Questions regarding the specific technical requirements can be directed to the program managers listed for each area within this Announcement: Applied Mathematics, Computer Science, or Next Generation Networking.

### **STATUTORY AUTHORITY**

Public Law 95-91, US Department of Energy Organization Act

Public Law 109-58, Energy Policy Act of 2005

### **APPLICABLE REGULATIONS**

U.S. Department of Energy Financial Assistance Rules, codified at 10 CFR 600. For awards issued after December 26, 2014, the Financial Assistance regulations contained in 2 CFR 200 will be codified by Part IX of 2 CFR (DOE's new financial assistance regulations, which succeed 10 CFR 600). U.S. Department of Energy, Office of Science Financial Assistance Program Rule, codified at 10 CFR 605

### **SUMMARY**

The Advanced Scientific Computing Research (ASCR) program of the Office of Science (SC), U.S. Department of Energy (DOE), hereby invites applications with the potential to enable significant research and computational advances for extreme-scale science.

The mission of the DOE Office of Science is the delivery of scientific discoveries, capabilities and major scientific tools to transform the understanding of nature and to advance the energy, economic, and national security of the United States. Extreme-scale science research recognizes that fundamentally different techniques, software tools, and approaches will likely be needed to reap scientific benefits from disruptive, but potentially revolutionary, changes in technology. Major changes are occurring not only in scientific computing technologies (e.g., processors, memory and interconnect systems), but also in sensors and other hardware technologies at DOE experimental and observational scientific user facilities. The purpose of this Funding Opportunity Announcement (FOA) is to invite exploratory basic research applications with the potential to deliver significantly advanced or improved science capabilities in light of emerging and disruptive technology changes.

## SUPPLEMENTARY INFORMATION

The mission of the ASCR program is to advance applied mathematics and computer science; deliver, in partnership with disciplinary science, the most advanced computational scientific applications; advance computing and networking capabilities; and develop, in partnership with U.S. industry, future generations of computing hardware and tools for science. A major objective of the ASCR basic research portfolio is to enable DOE-mission science applications to take full advantage of next generation, high-performance computing systems. Desired outcomes include advances in scalable algorithms, programming models, operating systems, and enabling technologies that will make massively parallel, heterogeneous computer architectures more efficient and practical to use in carrying out scientific research activities. A complementary ASCR objective is to build up the computational research infrastructure for enabling data-intensive science advances. Taken together and in the spirit of harnessing emerging and leading-edge technologies for scientific discovery, these two objectives fall under the umbrella of extreme-scale science research.

This Exploratory Research for Extreme-Scale Science (EXPRESS) FOA aims to stimulate early investigations of potentially high-impact approaches for extreme-scale science research across ASCR basic research subprograms. The EXPRESS FOA focuses on topic areas related to exascale computing or data-intensive science. A recent ASCR Advisory Committee (ASCAC) report [A1] describes research goals for exascale computing and data-intensive science, and identifies investments that are most likely to positively impact both areas. As noted in [A1], “exascale systems” refers to systems with exascale computing capability and “extreme-scale systems” refers to all classes of systems built using exascale-era technologies - which includes chips with hundreds of cores and different scales of interconnects and memory systems.

In support of the ASCAC report's 10-year outlook, FOA develops an ASCR extreme-scale science research portfolio comprised of small-award projects funded over a short period of time (up to 2 years) – see the section on Award Information for complete details. The objective is to provide seed funding to explore potentially fruitful areas of high-impact research, with results that can inform ASCR as it executes an extreme-scale science research agenda. See [A2-A5], for additional reports on challenges and opportunities related to DOE science and technology advances.

The EXPRESS FOA is not intended to incrementally extend current research in the area of the proposed project. The exploratory nature of the proposed research should pursue substantially different scientific directions and markedly depart from conventional approaches. While the research direction may have its foundation in the investigator's prior work and expertise, it cannot be a scale-up of a current research effort. Rather, the proposed project must reflect fundamentally new strategies toward the potential solution of a challenging problem in extreme-scale science research. It is expected that the proposed project will derive and significantly benefit from the exploration of innovative ideas and/or from the development of unconventional approaches.

## **Applied Mathematics**

Technical Contact: Steven Lee, 301-903-5710, [Steven.Lee@science.doe.gov](mailto:Steven.Lee@science.doe.gov)

Website: <http://science.energy.gov/ascr/research/applied-mathematics/>

The Applied Mathematics subprogram supports basic research leading to fundamental mathematical advances and computational breakthroughs across DOE and Office of Science missions. The proposed work should clearly articulate how applied mathematics research may have a significant impact in enabling extreme-scale science. For references, see [A1-A5, B1-B3].

Research focused on any of the following will be considered out of scope: (1) tailoring or implementation of existing numerical methods for specific scientific problems; (2) HPC implementation or “framework” for scientific or engineering calculations that are based on specific programming models (for example, “OpenCL”, “CUDA”) or architectures (such as “GPGPU”, “MIC”, or variants); or (3) solutions for specific scientific or engineering problems that are not applicable to a broader class of problems.

## **Computer Science**

Technical Contact: Robinson Pino, 301-903-1236, [Robinson.Pino@science.doe.gov](mailto:Robinson.Pino@science.doe.gov)

Website: <http://science.energy.gov/ascr/research/computer-science/>

The Computer Science subprogram supports research to enable extreme-scale computing and the understanding of extreme-scale data from simulations, experiments and observations. For this subprogram, ASCR would benefit from high-impact and revolutionary research in the following topic areas:

- Programming models and environments, compilers, languages, runtime systems, and resource management given that significant innovation is needed to realize the potential of extreme-scale computing systems.
- Data and visualization research that enables the interactive exploration of petabytes to exabytes of scientific data, or the improved understanding of extreme-scale computing system behavior and resource management.
- Research approaches for enabling and ensuring the scientific computing integrity of extreme-scale leadership class applications.

For this subprogram, proposed innovative methods and approaches must address some aspect(s) of scalability, performance portability, productivity, resilience, scientific integrity, and/or power challenges inherent to future scientific supercomputing facilities. The proposed work should clearly articulate how computer science research may have a significant impact in enabling extreme-scale science. For references, see [A1-A5, C1-C12].

Topics that are out of scope include research not addressing the challenges described above and research primarily focusing on hardware architecture design, all aspects of quantum computing, networking, computer-supported collaboration, mathematics, mathematical formulations and algorithms, social computing, natural language processing / understanding / generation and/or analysis, generalized research in human-computer interaction, discipline-specific data analytics and informatics, research focused on the World Wide Web and/or Internet, and research that is only applicable to hand-held, portable, desktop, embedded or cloud computing.

## **Next Generation Networking for Science**

Technical Contact: Richard Carlson, 301-903-9486, [Richard.Carlson@science.doe.gov](mailto:Richard.Carlson@science.doe.gov)

Website: <http://science.energy.gov/ascr/research/next-generation-networking/>

The Next Generation Networking for Science subprogram supports software/middleware research and development activities to enable high-performance networks and complex scientific collaborations. High-performance networks of interest range from supercomputer interconnect fabrics to federated high-capacity optical network infrastructures. Complex scientific collaboration may consist of a single investigator remotely accessing a unique instrument or large distributed multidisciplinary science teams interacting with DOE facilities or each other. The proposed work should clearly articulate how next generation networking research may have a significant impact in enabling extreme-scale science, see [A1-A5, D1-D5].

High-impact approaches are requested that pursue innovative software/middleware research in the development of high-performance networking infrastructure and/or collaboration environments for DOE-mission science. The main research topic areas are:

- High-performance Software Defined Networks (SDN) - Research for SDN and Network Functions Virtualization (NFV) to enable end-to-end terabits networking in the interconnect fabrics, storage area networks, local area networks, and wide area networks (SANs, LANS, and WANs) to support distributed extreme-scale science and the movement of large data sets. For references, see [D1-D2].
- Extreme-scale scientific collaborations and workflows - Next generation networking research approaches for accelerating scientific discovery at DOE computing and science facilities, or improving the effectiveness of advanced scientific collaboration systems and workflows. For references, see [D3-D5].

## **References: Advanced Scientific Computing Research for Extreme-Scale Science**

[A1] Synergistic Challenges in Data-Intensive Science and Exascale Computing, DOE ASCR Advisory Committee (ASCAC) Data Subcommittee Report, March 2013.

<http://science.energy.gov/~media/40749FD92B58438594256267425C4AD1.ashx>

[A2] Scientific Grand Challenges: Cross-cutting Technologies for Computing at the Exascale – Workshop Report, February 2010. [http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Crosscutting\\_grand\\_challenges.pdf](http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Crosscutting_grand_challenges.pdf)

[A3] Scientific Grand Challenges: Architectures and Technology for Extreme Scale Computing – Workshop Report, December 2009.

[http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Arch\\_tech\\_grand\\_challenges\\_report.pdf](http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Arch_tech_grand_challenges_report.pdf)

[A4] The Opportunities and Challenges of Exascale Computing – ASCAC Summary Report, Fall 2010.

[http://science.energy.gov/~media/ascr/ascac/pdf/reports/Exascale\\_subcommittee\\_report.pdf](http://science.energy.gov/~media/ascr/ascac/pdf/reports/Exascale_subcommittee_report.pdf)

[A5] Extreme-Scale Research Principal Investigators Meetings, see

<http://exascaleresearch.labworks.org/oct2012/>

- **Applied Mathematics**

[B1] Applied Mathematics Research for Exascale Computing – Workshop Report, March 2014. <http://science.energy.gov/~media/ascr/pdf/research/am/docs/EMWGreport.pdf>

[B2] Extreme-Scale Solvers: Transition to Future Architectures – Workshop Report, March 2012. <http://science.energy.gov/~media/ascr/pdf/program-documents/docs/reportExtremeScaleSolvers2012.pdf>

[B3] A Multifaceted Mathematical Approach for Complex Systems – Workshop Report, September 2011. [http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Multifaceted Mathematical Approach for Complex Systems.pdf](http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Multifaceted_Mathematical_Approach_for_Complex_Systems.pdf)

- **Computer Science**

[C1] Abstract Machine Models and Proxy Architectures for Exascale Computing - Report, May 2014, [http://science.energy.gov/~media/ascr/pdf/research/cs/cal\\_amm\\_v1\\_1.pdf](http://science.energy.gov/~media/ascr/pdf/research/cs/cal_amm_v1_1.pdf)

[C2] Modeling and Simulation of Exascale Systems and Applications – Workshop Report, August 2012. [http://science.energy.gov/~media/ascr/pdf/program-documents/docs/ModSim\\_Report-2012\\_AH\\_5.pdf](http://science.energy.gov/~media/ascr/pdf/program-documents/docs/ModSim_Report-2012_AH_5.pdf)

[C3] Exascale Operating System and Runtime Software - Report, December 2012. <http://science.energy.gov/~media/ascr/pdf/research/cs/Exascale%20Workshop/ExaOSR-Report-Final.pdf>

[C4] Tools for Exascale Computing: Challenges and Strategies – Workshop Report, October 2011.

[http://science.energy.gov/~media/ascr/pdf/research/cs/Exascale%20Workshop/Exascale\\_Tools\\_Workshop\\_Report.pdf](http://science.energy.gov/~media/ascr/pdf/research/cs/Exascale%20Workshop/Exascale_Tools_Workshop_Report.pdf)

[C5] Exascale Programming Challenges – Workshop Report, July 2011.

<http://science.energy.gov/~media/ascr/pdf/program-documents/docs/ProgrammingChallengesWorkshopReport.pdf>

[C6] Exascale and Beyond: Configuring, Reasoning, Scaling – Workshop Report, August 2011. <http://science.energy.gov/~media/ascr/pdf/program-documents/docs/ArchitecturesIIWorkshopReport.pdf>

[C7] DOE Fault Management Workshop – Final Report, June 2012.

<http://science.energy.gov/~media/ascr/pdf/program-documents/docs/FaultManagement-wrkshpRpt-v4-final.pdf>

[C8] Data Crosscutting Requirements Review – Report, April 2013.

[http://science.energy.gov/~media/ascr/pdf/program-documents/docs/ASCR\\_DataCrosscutting2\\_8\\_28\\_13.pdf](http://science.energy.gov/~media/ascr/pdf/program-documents/docs/ASCR_DataCrosscutting2_8_28_13.pdf)

[C9] Data and Communications in Basic Energy Science: Creating a Pathway for Scientific Discovery – Workshop Report, October 2011.

[http://science.energy.gov/~media/ascr/pdf/research/scidac/ASCR\\_BES\\_Data\\_Report.pdf](http://science.energy.gov/~media/ascr/pdf/research/scidac/ASCR_BES_Data_Report.pdf)

[C10] Scientific Discovery at the Exascale: Data Management, Analysis and Visualization – Workshop Report, February 2011. <http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Exascale-ASCR-Analysis.pdf>

[C11] A Scientific Research & Development Approach to Cyber Security – Workshop Report, December 2008. [http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Cyber\\_security\\_science\\_dec\\_2008.pdf](http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Cyber_security_science_dec_2008.pdf)

[C12] DOE workshop on Software Productivity for eXtreme-scale Science (SWP4XS) - Workshop Report, January 2014,

<http://science.energy.gov/~media/ascr/pdf/research/cs/Exascale%20Workshop/SoftwareProductivityWorkshopReport2014.pdf>

- **Next Generation Networking for Science**

[D1] ASCR Intelligent Optical Network Infrastructure Workshop, August 2014.

<http://www.ornl.gov/ioninfrastructure2014/default.htm>

[D2] Networking and Information Technology Research and Development (NITRD) Large Scale Networking Workshop Report on Complex Engineered Networks – September 2012.

[http://scenic.princeton.edu/files/nitrd\\_workshop\\_report.pdf](http://scenic.princeton.edu/files/nitrd_workshop_report.pdf)

[D3] Scientific Collaborations for Extreme-Scale Science – Workshop Report, December 2011.

[http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Scientific\\_Collaborations\\_for\\_Extreme\\_Scale\\_Science\\_Report\\_Dec\\_2011\\_Final.pdf](http://science.energy.gov/~media/ascr/pdf/program-documents/docs/Scientific_Collaborations_for_Extreme_Scale_Science_Report_Dec_2011_Final.pdf)

[D4] Workshop report on Computational Modeling of Big Networks (COMBINE) - December 2012. <https://indico.fnal.gov/materialDisplay.py?materialId=0&confId=5397>

[D5] Accelerating Scientific Knowledge Discovery (ASKD) Working Group Report – August 2013. [http://www.ornl.gov/askd2013/ASKD\\_Report\\_V1\\_0.pdf](http://www.ornl.gov/askd2013/ASKD_Report_V1_0.pdf)

## **Collaboration**

Collaborative applications submitted from different institutions must clearly indicate they are part of a collaborative project/group. Every partner institution must submit an application through its own sponsored research office. Each collaborative group can have only one lead institution. Each application within the collaborative group, including the narrative and all required appendices and attachments, must be identical with the following exceptions:

- Each application must contain a correct SF 424 (R&R) cover page for the submitting institution only.
- Each application must contain a unique budget corresponding to the expenditures for that application's submitting institution only.
- Each application must contain a unique budget justification corresponding to the expenditures for that application's submitting institution only.

Collaborations that include a DOE National Laboratory should note that proposals from a DOE National Laboratory should be submitted in response to the companion laboratory announcement (LAB 15-1250) in PAMS.

## **Section II – AWARD INFORMATION**

### **A. TYPE OF AWARD INSTRUMENT**

DOE anticipates awarding grants under this FOA. DOE will consider funding multi-institution collaborations under this FOA.

### **B. ESTIMATED FUNDING**

It is anticipated that up to \$3,000,000 per year will be available under this FOA and DOE National Laboratory Announcement **LAB 15-1250**, contingent on satisfactory peer review and the availability of appropriated funds. Applicants should request project support for two years, with out-year support contingent on the availability of appropriated funds, progress of the research, and programmatic needs. Awards are expected to begin in Fiscal Year 2015, which ends on September 30, 2015.

DOE is under no obligation to pay for any costs associated with preparation or submission of applications. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this FOA.

### **C. MAXIMUM AND MINIMUM AWARD SIZE**

Under this FOA, it is anticipated that each funded project will have a total budget of \$100,000 per year for two years. Each institution that participates in a funded project receives a separate award. The award size to an institution is expected to be less than or equal to \$100,000 per year for two years. Applicants are strongly advised to propose total project research budgets as close as possible to \$100,000 per year for two years.

### **D. EXPECTED NUMBER OF AWARDS**

Under this FOA, it is anticipated that each funded project will have a total budget of \$100,000 per year for two years. Each institution that participates in a funded project receives a separate award. The total number of awards to institutions is expected to range between 5 and 25 (approximately).

### **E. ANTICIPATED AWARD SIZE**

Under this FOA, it is anticipated that each funded project will have a total budget of \$100,000 per year for two years. Each institution that participates in a funded project receives a separate award. The award size to an institution is expected to be less than or equal to \$100,000 per year for two years.

### **F. PERIOD OF PERFORMANCE**

Research Grant Awards are expected to be made for a period of two years. Out-year funding will depend upon suitable progress and the availability of appropriated funds.

**G. TYPE OF APPLICATION**

DOE will accept new applications under this FOA.

### **Section III – ELIGIBILITY INFORMATION**

#### **A. ELIGIBLE APPLICANTS**

All types of applicants are eligible to apply, except Federally Funded Research and Development Centers (FFRDC), and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

#### **B. COST SHARING**

Cost sharing is not required.

#### **C. ELIGIBLE INDIVIDUALS**

Individuals with the skills, knowledge, and resources necessary to carry out the proposed research as a Program Director/Principal Investigator are invited to work with their organizations to develop an application for assistance. Individuals from underrepresented groups as well as individuals with disabilities are always encouraged to apply for assistance.

## **Section IV – APPLICATION AND SUBMISSION INFORMATION**

### **A. ADDRESS TO REQUEST APPLICATION PACKAGE**

Application forms and instructions are available at grants.gov. To access these materials, go to <http://www.grants.gov>, select “Apply for Grants”, and then select “Download Application Package.” Enter the CFDA number (81.049) and/or the funding opportunity number (DE-FOA-0001250) shown on the cover of this FOA and then follow the prompts to download the application package.

Applications submitted through [www.FedConnect.net](http://www.FedConnect.net) will not be accepted.

### **B. LETTER OF INTENT AND PRE-APPLICATION**

#### **1. Letter of Intent**

N/A

#### **2. Pre-application**

PRE-APPLICATION DUE DATE

**January 22, 2015 at 5 PM Eastern Time**

ENCOURAGE/DISCOURAGE DATE

**February 12, 2015 at 5 PM Eastern Time**

Pre-applications will be reviewed and DOE will send a reply by e-mail to each applicant encouraging or discouraging the submission of a full application by **February 12, 2015**. Applicants who have not received a response regarding the status of their pre-applications by this date are responsible for contacting the program to confirm this status. **Only those applicants that receive notification from DOE encouraging a full application may do so.** No other full applications will be considered.

Those pre-applications that are encouraged will be used to help the Office of Science begin planning for the application peer review process. The intent of the Office of Science in discouraging submission of certain applications is to save time and effort of applicants in preparing an application that is not likely to be considered for award negotiations under this FOA.

Pre-applications will be evaluated with respect to the scope and research areas as outlined in the SUMMARY and SUPPLEMENTARY INFORMATION sections. The pre-application should contain (1) a one-page cover sheet, (2) a two-page technical narrative, and (3) conflict of interest information.

The one-page cover sheet identifies the name, institutional affiliation, e-mail address and telephone number of the Lead Principal Investigator and Senior/Key personnel expected to be involved in the project, and an estimated amount of funding requested for each year and for each funded institution. No biographical data need be included. The cover sheet must also specify the relevant subprogram for the proposed research: **Applied Mathematics, Computer Science, or Next Generation Networking**.

The technical narrative may not exceed two pages, with a minimum text font size of 11 point and margins no smaller than one inch on all sides. Figures and reference, if included, must fit within the two-page limit. The technical narrative must provide a clear and concise description of the objectives and technical approach of the proposed research. The technical narrative must address:

- a) **What is the nature of the problem or challenge?**
- b) **What is the new technical idea, approach, or insight?**
- c) **What is the impact for DOE extreme-scale science if successful?**

A project conflict of interest (COI) list for the Lead Principal Investigator and each project collaborator (supported or unsupported) is required. For each of the project participants, the COI list is comprised of the full name (alphabetically ordered by last name) and current organizational affiliation of their: collaborators or co-authors of the past 48 months; co-editors of the past 24 months; graduate advisor(s) and principal postdoctoral sponsor(s); and graduate students and postdoctoral associates. **These COI lists should be the final set of pages in the pdf for the pre-application.**

The Principal Investigator will be automatically notified when the pre-application is encouraged or discouraged. The DOE Office of Science Portfolio Analysis and Management System (PAMS) will send an email to the Principal Investigator from [PAMS.Autoreply@science.doe.gov](mailto:PAMS.Autoreply@science.doe.gov), and the status of the pre-application will be updated at the PAMS website <https://pamspublic.science.energy.gov/>. Notifications are sent as soon as the decisions to encourage or discourage are finalized.

It is important that the pre-application be a single file with extension .pdf, .docx, or .doc. The pre-application must be submitted electronically through the DOE Office of Science Portfolio Analysis and Management System (PAMS) website <https://pamspublic.science.energy.gov/>. The Principal Investigator and anyone submitting on behalf of the Principal Investigator must register for an account in PAMS before it will be possible to submit a pre-application. All PIs and those submitting pre-applications on behalf of PIs are encouraged to establish PAMS accounts as soon as possible to avoid submission delays.

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Registering to PAMS is a two-step process; once you create an individual account, you must associate yourself with (“register to”) your institution. Detailed steps are listed below.

### **Create PAMS Account:**

To register, click the “Create New PAMS Account” link on the website

<https://pamspublic.science.energy.gov/>.

- Click the “No, I have never had an account” link and then the “Create Account” button.
- You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
- On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
- Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.

PAMS will take you to the “Having Trouble Logging In?” page. (If you have been an Office of Science merit reviewer or if you have previously submitted an application, you may already be linked to an institution in PAMS. If this happens, you will be taken to the PAMS home page.

### **Register to Your Institution:**

- Click the link labeled “Option 2: I know my institution and I am here to register to the institution.” (Note: If you previously created a PAMS account but did not register to an institution at that time, you must click the Institutions tab and click the “Register to Institution” link.)
- PAMS will take you to the “Register to Institution” page.
- Type a word or phrase from your institution name in the field labeled, “Institution Name like,” choose the radio button next to the item that best describes your role in the system, and click the “Search” button. A “like” search in PAMS returns results that contain the word or phrase you enter; you do not need to enter the exact name of the institution, but you should enter a word or phrase contained within the institution name. (If your institution has a frequently used acronym, such as ANL for Argonne National Laboratory or UCLA for the Regents of the University of California, Los Angeles, you may find it easiest to search for the acronym under “Institution Name like.” Many institutions with acronyms are listed in PAMS with their acronyms in parentheses after their names.)
- Find your institution in the list that is returned by the search and click the “Actions” link in the Options column next to the institution name to obtain a dropdown list. Select “Add me to this institution” from the dropdown. PAMS will take you to the “Institutions – List” page.
- If you do not see your institution in the initial search results, you can search again by clicking the “Cancel” button, clicking the Option 2 link, and repeating the search.
- If, after searching, you think your institution is not currently in the database, click the “Cannot Find My Institution” button and enter the requested institution information into PAMS. Click the “Create Institution” button. PAMS will add the institution to the system, associate your profile with the new institution, and return you to the “Institutions – List” page when you are finished.

### **Submit Your Pre-Application:**

- Create your pre-application (called a preproposal in PAMS) outside the system and save it as a file with extension .docx, .doc, or .pdf. Make a note of the location of the file on your computer so you can browse for it later from within PAMS.
- Log into PAMS and click the Proposals tab. Click the “View / Respond to Funding Opportunity Announcements” link and find the current announcement in the list. Click the “Actions/Views” link in the Options column next to this announcement to obtain a dropdown menu. Select “Submit Preproposal” from the dropdown.
- On the Submit Preproposal page, select the institution from which you are submitting this preproposal from the Institution dropdown. If you are associated with only one institution in the system, there will only be one institution in the dropdown.
- Note that you must select one and only one Principal Investigator (PI) per preproposal; to do so, click the “Select PI” button on the far right side of the screen. Find the appropriate PI from the list of all registered users from your institution returned by PAMS. (Hint: You may have to sort, filter, or search through the list if it has multiple pages.) Click the “Actions” link in the Options column next to the appropriate PI to obtain a dropdown menu. From the dropdown, choose “Select PI.”
- If the PI for whom you are submitting does not appear on the list, it means he or she has not yet registered in PAMS. For your convenience, you may have PAMS send an email invitation to the PI to register in PAMS. To do so, click the “Invite PI” link at the top left of the “Select PI” screen. You can enter an optional personal message to the PI in the “Comments” box, and it will be included in the email sent by PAMS to the PI. You must wait until the PI registers before you can submit the preproposal. Save the preproposal for later work by clicking the “Save” button at the bottom of the screen. It will be stored in “My Preproposals” for later editing.
- Enter a title for your preproposal.
- Select the appropriate technical contact from the Program Manager dropdown.
- To upload the preproposal file into PAMS, click the “Attach File” button at the far right side of the screen. Click the “Browse” (or “Choose File” depending on your browser) button to search for your file. You may enter an optional description of the file you are attaching. Click the “Upload” button to upload the file.
- At the bottom of the screen, click the “Submit to DOE” button to save and submit the preproposal to DOE.
- Upon submission, the PI will receive an email from the PAMS system <[PAMS.Autoreply@science.doe.gov](mailto:PAMS.Autoreply@science.doe.gov)> acknowledging receipt of the preproposal.

You are encouraged to register for an account in PAMS at least a week in advance of the preproposal submission deadline so that there will be no delays with your submission.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9 AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this Funding Opportunity Announcement should reference **DE-FOA-0001250**.

Pre-applications submitted outside PAMS will not be considered. Pre-applications may not be submitted through grants.gov or www.FedConnect.net.

## C. CONTENT AND APPLICATION FORMS

### APPLICATION PREPARATION

You must download the application package, application forms and instructions, from Grants.gov at <http://www.grants.gov/>. (Additional instructions are provided in [Section IV, Part C](#) of this FOA.)

You are required to use the compatible version of Adobe Reader software to complete a [Grants.gov](#) Adobe application package. To ensure you have the [Grants.gov](#) compatible version of Adobe Reader, visit the download software page at [http://www.grants.gov/help/download\\_software.jsp](http://www.grants.gov/help/download_software.jsp).

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below.

Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this FOA. Attached PDF files must be plain files consisting of text, numbers, and images without editable fields, signatures, passwords, redactions, or other advanced features available in some PDF-compatible software. Do not attach PDF portfolios.

### LETTERS

Do not submit letters of support or endorsement as these are not used in making funding decisions and can interfere with the selection of peer reviewers.

#### 1. SF 424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 is available on the DOE Financial Assistance Forms Page at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Certifications and Assurances.

### PUBLIC POLICY REQUIREMENTS

The applicant assures DOE of its compliance with applicable public policy requirements, including the following:

Animal Welfare Act	7 USC 2131 et seq.,
Buy American Act	41 USC 10 et seq.
Cargo Preference Act	46 USC 55305, 46 CFR 381.7

Civil Rights Protections	10 CFR 1040
Debarment and Suspension	2 CFR 180, 2 CFR 901
Drug-Free Workplace Act	41 USC 701, 10 CFR 607
Environmental Protections	42 USC 7401, 33 USC 1251, 42 USC 4321
False Claims Act	31 USC 3729, 18 USC 287, 18 USC 1001, 10 CFR 1013
Federal Funding Accountability and Transparency Act	P.L. 109-282, 2 CFR 170
Fly America Act	49 USC 40118
Hatch Act	5 USC 1501 et seq.
Human Research Subjects Protections	10 CFR 745
Lobbying Disclosure Act	2 USC 1601 et seq.
Lobbying Prohibitions	31 USC 1352, 10 CFR 601
Metric System use	EO 12770
Non-delinquency on Federal Debt	28 USC 3201
Prohibition on benefitting Members of Congress	41 USC 6306
Seat Belt Use	EO 13043
Terrorist Financing	EO 13224, 66 FR 49079
Text Messaging While Driving	EO 13513, 74 FR 51225
Trafficking in Persons	22 USC 7104, 2 CFR 175

## 2. Research and Related Other Project Information

Complete questions 1 through 6 and attach files. The files must comply with the following instructions:

### PROJECT SUMMARY/ABSTRACT (FIELD 7 ON THE FORM)

The project summary/abstract is a summary of the proposed activity suitable for distribution to the public and sufficient to permit potential reviewers to identify conflicts of interest. It must be a self-contained document. Provide the name of the applicant, the project title, the project director/principal investigator(s) (PD/PI) and the PD/PI's institutional affiliation, any coinvestigators and their institutional affiliations, the objectives of the project, a description of the project, including methods to be employed, and the potential impact of the project (i.e., benefits, outcomes. A sample is provided below:

<p>A Really Great Idea</p> <p>A. Smith, Lead Institution (Principal Investigator)  A. Brown, Institution 2 (Co-Investigator)  A. Jones, Institution 3 (Co-Investigator)</p> <p>Text of abstract</p>
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The project summary must not exceed 1 page when printed using standard 8.5” by 11” paper with 1” margins (top, bottom, left and right) with font not smaller than 11 point. To attach a Project Summary/Abstract, click “Add Attachment.”

- Do not include any proprietary or sensitive business information.
- DOE may use the abstract may to prepare public reports about supported research.

#### DOE COVER PAGE

(PART OF PROJECT NARRATIVE ATTACHED TO FIELD 8 ON THE FORM)

The application narrative should begin with a cover page that will not count toward the project narrative page limitation. The cover page must include the following items:

- The project title
- Applicant/Institution:
- Street Address/City/State/Zip:
- Postal Address:
- Lead PI name, telephone number, email:
- Administrative Point of Contact name, telephone number, email:
- Funding Opportunity FOA Number: **DE-FOA-0001250**
- DOE/Office of Science Program Office: **Office of Advanced Scientific Computing Research**
- DOE/Office of Science Program Office Technical Contact: **Steven Lee (Applied Mathematics), Robinson Pino (Computer Science), or Richard Carlson (Networking)**
- PAMS Letter of Intent or Pre-Application tracking number (if applicable):
- Research area as identified in Section I of this FOA (Applied Mathematics, Computer Science, or Networking):

#### COVER PAGE SUPPLEMENT FOR COLLABORATIONS

(PART OF PROJECT NARRATIVE ATTACHED TO FIELD 8 ON THE FORM)

Collaborative applications submitted from different institutions must clearly indicate they are part of a collaborative project/group. Every partner institution must submit an application through its own sponsored research office. Each collaborative group can have only one lead institution. Each application within the collaborative group, including the narrative and all required appendices and attachments, must be identical with the following exceptions:

- Each application must contain a correct SF 424 (R&R) cover page for the submitting institution only.
- Each application must contain a unique budget corresponding to the expenditures for that application's submitting institution only.
- Each application must contain a unique budget justification corresponding to the expenditures for that application's submitting institution only.

Collaborations that include a DOE National Laboratory should note that applications from a DOE National Laboratory should be submitted in response to the companion laboratory announcement (LAB 15-1250) in PAMS.

Each application belonging to a collaborative group should have the same title in Block 11 of the SF 424 (R&R) form.

The Office of Science will use the multiple applications associated with a collaborative group to create one consolidated document for merit review that consists of the common, identical application materials combined with a set of detailed budgets from the partner institutions. It is very important that every application in the collaborative group be identical (including the title) with the exception of the budget and budget justification pages.

If the project is a collaboration, provide the following information on a separate page as a supplement to the cover page.

- List all collaborating institutions by name with each institution’s principal investigator on the same line.
- Indicate the lead PI who will be the point of contact and coordinator for the combined research activity.

Include a table modeled on the following chart providing summary budget information from all collaborating institutions. Provide the total costs of the budget request in each year for each institution and totals for all rows and columns.

<b>Collaborative Application Information</b>					
	<b>Names</b>	<b>Institution</b>	<b>Year 1 Budget</b>	<b>Year 2 Budget</b>	<b>Total Budget</b>
Lead PI					
Co-PI					
Co-PI					

Example Budget Table (\$ in thousands)

\* Note that collaborating applications must be submitted separately.

PROJECT NARRATIVE (FIELD 8 ON THE FORM)

The project narrative **must not exceed 10 pages** of technical information, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5” by 11” paper with 1 inch margins (top, bottom, left, and right). The font must not be smaller than 11 point. Merit reviewers will only consider the number of pages specified in the first sentence of this paragraph. This page limit does not apply to the Cover Page, Budget Page(s), Budget Justification, biographical material, publications and references, and appendices, each of which may have its own page limit.

Do not include any Internet addresses (URLs) that provide supplementary or additional information that constitutes a part of the application. Merit reviewers are not required to access Internet sites; however, Internet publications in a list of references will be treated identically to print publications. See Part VIII.D for instructions on how to mark proprietary application information. To attach a Project Narrative, click “Add Attachment.”

**Background/Introduction:** Explanation of the importance and relevance of the proposed work as well as a review of the relevant literature.

**Proposed Research and Methods:** Identify the hypotheses to be tested (if any) and details of the methods to be used including the integration of experiments with theoretical and computational research efforts.

**Timetable of Activities:** Timeline for all major activities including milestones and deliverables.

**Project Objectives:** This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

The Project Narrative comprises the research plan for the project. It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the method to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities. There should be no ambiguity about which personnel will perform particular parts of the project, and the time at which these activities will take place.

**For Collaborative Applications Only:** Each collaborating institution must submit an identical common narrative. Collaborative applications will necessarily be longer than single-institution applications. The common narrative may exceed the page limit described for the research narrative by 50%; i.e., if the page limit is 12 pages, a collaboration is subject to a limit of 18 pages. The common narrative must identify which tasks and activities will be performed by which of the collaborating institutions in every budget period of the proposed project. The budget and the budget justification—which are unique to each collaborating institution—may refer to parts of the common narrative to further identify each collaborating institution’s activities in the joint project. There should be no ambiguity about each institution’s role and participation in the collaborative group.

The Office of Science will use the multiple applications associated with a collaborative group to create one consolidated document for merit review that consists of the common, identical application materials combined with a set of detailed budgets from the partner institutions. It is very important that every application in the collaborative group be identical (including the title) with the exception of the budget and budget justification pages.

#### APPENDIX 1: BIOGRAPHICAL SKETCH

Provide a biographical sketch for the project director/principal investigator (PD/PI) and each senior/key person listed in Section A on the R&R Budget form.

- Provide the biographical sketch information as an appendix to your project narrative.

- Do not attach a separate file.
- The biographical sketch appendix will not count in the project narrative page limitation.
- The biographical information (curriculum vitae) for each person must not exceed two pages when printed on 8.5” by 11” paper with one-inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

**Education and Training:** Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

**Research and Professional Experience:** Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

**Publications:** Provide a list of up to ten publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

**Synergistic Activities:** List no more than five professional and scholarly activities related to the effort proposed.

**Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers:** Provide the following information in this section:

- **Collaborators and Co-editors:** List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of this application. For publications or collaborations with more than ten authors or participants, only list those individuals in the core group with whom the Principal Investigator interacted on a regular basis while the research was being done. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state “None.”
- **Graduate and Postdoctoral Advisors and Advisees:** List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s). Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates.

**Personally Identifiable Information:** Do not include sensitive personally identifiable information such as a Social Security Number, date of birth, or city of birth. Do not include information that a merit reviewer should not make use of.

#### APPENDIX 2: CURRENT AND PENDING SUPPORT

Provide a list of all current and pending support (both Federal and non-Federal) for the Project Director/Principal Investigator(s) (PD/PI) and senior/key persons, including subawardees, for ongoing projects and pending applications. For each organization providing support, show the

total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. Provide the Current and Pending Support as an appendix to your project narrative. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 3: BIBLIOGRAPHY & REFERENCES CITED

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. For research areas where there are routinely more than ten coauthors of archival publications, you may use an abbreviated style such as the Physical Review Letters (PRL) convention for citations (listing only the first author). For example, your paper may be listed as, “A Really Important New Result,” A. Aardvark et. al. (MONGO Collaboration), PRL 999. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. Provide the Bibliography and References Cited information as an appendix to your project narrative.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 4: FACILITIES & OTHER RESOURCES

This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. For proposed investigations requiring access to experimental user facilities maintained by institutions other than the applicant, please provide a document from the facility manager confirming that the researchers will have access to the facility. Please provide the Facility and Other Resource information as an appendix to your project narrative.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

#### APPENDIX 5: EQUIPMENT

List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. Provide the Equipment information as an appendix to your project narrative.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

## APPENDIX 6: DATA MANAGEMENT PLAN

Provide a Data Management Plan (DMP) that addresses the following requirements:

1. DMPs should describe whether and how data generated in the course of the proposed research will be shared and preserved. If the plan is not to share and/or preserve certain data, then the plan must explain the basis of the decision (for example, cost/benefit considerations, other parameters of feasibility, scientific appropriateness, or limitations discussed in #4). At a minimum, DMPs must describe how data sharing and preservation will enable validation of results, or how results could be validated if data are not shared or preserved.
2. DMPs should provide a plan for making all research data displayed in publications resulting from the proposed research open, machine-readable, and digitally accessible to the public at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible to the public in accordance with the principles stated in the Office of Science Statement on Digital Data Management (<http://science.energy.gov/funding-opportunities/digital-data-management/>). This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.
3. DMPs should consult and reference available information about data management resources to be used in the course of the proposed research. In particular, DMPs that explicitly or implicitly commit data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at Office of Science User Facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMP. Information about other Office of Science facilities can be found in the additional guidance from the sponsoring program.
4. DMPs must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all applicable laws, and regulations. There is no requirement to share proprietary data.

DMPs will be reviewed as part of the overall Office of Science research application merit review process. Applicants are encouraged to consult the Office of Science website for further information and suggestions for how to structure a DMP:

<http://science.energy.gov/funding-opportunities/digital-data-management/>

and ASCR-specific guidance:

<http://science.energy.gov/ascr/funding-opportunities/digital-data-management/>

- This appendix should not exceed three pages including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with one-inch margins (top, bottom, left, and right)
- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.

## APPENDIX 7: OTHER ATTACHMENT

If you need to elaborate on your responses to questions 1-6 on the “Other Project Information” document, please provide the Other Attachment information as an appendix to your project narrative. Information not easily accessible to a reviewer may be included in this appendix, but do not use this appendix to circumvent the page limitations of the application. Reviewers are not required to consider information in this appendix.

- Do not attach a separate file.
- This appendix will not count in the project narrative page limitation.
- **Do not attach any of the requested appendices described above as files for fields 9, 10, 11, and 12.**
- **Follow the above instructions to include the information as appendices to the project narrative file.**
- **These appendices will not count toward the project narrative’s page limitation.**
- **Do not attach any files to fields 9, 10, 11, or 12.**

### 3. Research And Related Budget

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this FOA (See PART IV, G).

#### Budget Fields

Section A Senior/Key Person	For each Senior/Key Person, enter the requested information. List personnel, base salary, the number of months that person will be allocated to the project, requested salary fringe benefits, and the total funds requested for each person. The requested salary must be the product of the base salary and the effort. Include a written narrative in the budget justification that justifies the need for requested personnel.
Section B Other Personnel	List personnel, the number of months that person will be allocated to the project, requested salary fringe benefits, and the total funds requested for each person. Include a written narrative in the budget justification that fully justifies the need for requested personnel.
Section C Equipment	For the purpose of this budget, equipment is designated as an item of property that has an acquisition cost of \$5,000 or more and an expected service life of more than one year. (Note that this designation applies for

	proposal budgeting only and differs from the DOE definition of capital equipment.) List <b>each</b> item of equipment separately and justify each in the budget justification section. Do not aggregate items of equipment. Allowable items ordinarily will be limited to research equipment and apparatus not already available for the conduct of the work. General-purpose office equipment is not eligible for support unless primarily or exclusively used in the actual conduct of scientific research.
Section D Travel	For purposes of this section only, travel to Canada or to Mexico is considered domestic travel. In the budget justification, list each trip's destination, dates, estimated costs including transportation and subsistence, number of staff traveling, the purpose of the travel, and how it relates to the project. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis). To qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Domestic travel is to be justified separately from foreign travel.
Section E Participant/Trainee Support Costs	If applicable, submit training support costs. Educational projects that intend to support trainees (precollege, college, graduate and post graduate) must list each trainee cost that includes stipend levels and amounts, cost of tuition for each trainee, cost of any travel (provide the same information as needed under the regular travel category), and costs for any related training expenses. Participant costs are those costs associated with conferences, workshops, symposia or institutes and breakout items should indicate the number of participants, cost for each participant, purpose of the conference, dates and places of meetings and any related administrative expenses. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).
Section F Other Direct Costs	<ul style="list-style-type: none"> <li>• <b>Materials and Supplies:</b> Enter total funds requested for materials and supplies in the appropriate fields. In the budget justification, indicate general categories such as glassware, and chemicals, including an amount for each category (items not identified under "Equipment"). Categories less than \$1,000 are not required to be itemized. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Publication Costs:</b> Enter the total publication funds requested. The proposal budget may request funds for the costs of documenting, preparing, publishing or otherwise making available to others the findings and products of the work conducted under the award. In the budget justification, include supporting information. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Consultant Services:</b> Enter total funds requested for all consultant services. In the budget justification, identify each consultant, the</li> </ul>

	<p>services he/she will perform, total number of days, travel costs, and total estimated costs. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</p> <ul style="list-style-type: none"> <li>• <b>ADP/Computer Services:</b> Enter total funds requested for ADP/Computer Services. The cost of computer services, including computer-based retrieval of scientific, technical and education information may be requested. In the budget justification, include the established computer service rates at the proposing organization if applicable. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Subawards/Consortium/Contractual Costs:</b> Enter total costs for all subawards/consortium organizations and other contractual costs proposed for the project. In the budget justification, justify the details.</li> <li>• <b>Equipment or Facility Rental/User Fees:</b> Enter total funds requested for Equipment or Facility Rental/User Fees. In the budget justification, identify each rental/user fee and justify. Indicate the basis for the cost estimate (quotes from vendors or suppliers, past experience of similar items, or some other basis).</li> <li>• <b>Alterations and Renovations:</b> Enter total funds requested for Alterations and Renovations. In the budget justification, itemize by category and justify the costs of alterations and renovations, including repairs, painting, removal or installation of partitions, shielding, or air conditioning. Where applicable, provide the square footage and costs.</li> <li>• <b>Other:</b> Add text to describe any other Direct Costs not requested above. Enter costs associated with “Other” item(s). Use the budget justification to further itemize and justify.</li> </ul>
Section G Direct Costs	This represents Total Direct Costs (Sections A through F)
Section H Other Indirect Costs	Enter the Indirect Cost information for each field. Only four general categories of indirect costs are allowed/requested on this form, so please consolidate if needed. Include the cognizant Federal agency and contact information if using a negotiated rate agreement.
Section I Total Direct and Indirect Costs	This is the total of Sections G and H

**BUDGET JUSTIFICATION (FIELD K ON THE FORM)**

Provide the required supporting information for the following costs (See R&R Budget instructions): equipment; domestic and foreign travel; participant/trainees; materials and supplies; publication; consultant services; ADP/computer services; sub-award/ consortium/ contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost

type. Provide any other information you wish to submit to justify your budget request. **Attach a single budget justification file for the entire project period in field K.** The file automatically carries over to each budget year.

**4. R&R Subaward Budget Attachment(s) Form**

**Budgets for Subawardees, other than DOE FFRDCs:** You must provide a separate R&R budget for each subawardee. Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET ATTACHMENT(S) FORM and e-mail it to each subawardee that is required to submit a separate budget. After the subawardee has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee’s name (plus.pdf) as the file name (e.g., ucla.pdf or energyres.pdf).

If the project involves more subawardees than there are places in the SUBAWARD BUDGET ATTACHMENT(S) FORM, the additional subaward budgets may be saved as PDF files and appended to the Budget Justification attached to Field K.

Ensure that any files received from subawardees are the PDF files extracted from the SUBAWARD BUDGET ATTACHMENT(S) FORM. Errors will be created if a subawardee sends a prime applicant a budget form that was not extracted from the application package.

**5. Project/Performance Site Location(s)**

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

**6. Summary of Required Forms/Files**

Your application must include the following items:

<b>Name of Document</b>	<b>Format</b>	<b>Attach to</b>
<b>SF 424 (R&amp;R)</b>	Form	N/A
<b>RESEARCH AND RELATED Other Project Information</b>	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative, including required appendices	PDF	Field 8
<b>RESEARCH &amp; RELATED BUDGET</b>	Form	N/A
Budget Justification	PDF	Field K

<b>PROJECT/PERFORMANCE SITE LOCATION(S)</b>	Form	N/A
<b>SF-LLL Disclosure of Lobbying Activities, if applicable</b>	Form	N/A

**D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS**

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable
- Environmental Information

**E. SUBMISSION DATES AND TIMES**

**1. Letter of Intent Due Date**

N/A

**2. Pre-application Due Date**

**January 22, 2015, at 5:00 PM Eastern Time**

**3. Application Due Date**

**March 26, 2015, at 11:59 PM Eastern Time**

**4. Late Submissions**

Applications received after the deadline will not be reviewed or considered for award.

**F. INTERGOVERNMENTAL REVIEW**

This program is not subject to Executive Order 12372 Intergovernmental Review of Federal Programs.

**G. FUNDING RESTRICTIONS**

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

**Cost Principles:** Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 10 CFR 600. The cost principles for commercial organizations are in FAR Part 31 and DEAR Parts 931 and 970.31.

For awards issued after December 26, 2014, the Financial Assistance regulations contained in 2 CFR 200 will be codified by Part IX of 2 CFR (DOE's new financial assistance regulations, which succeed 10 CFR 600)

**Pre-award Costs:** Recipients may charge to an award resulting from this FOA pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR 600 and 2 CFR 215. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

For awards issued after December 26, 2014, the Financial Assistance regulations contained in 2 CFR 200 will be codified by Part IX of 2 CFR (DOE's new financial assistance regulations, which succeed 10 CFR 600)

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

## **H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS**

### **1. Systems to Register In**

There are several one-time actions you must complete in order to submit an application in response to this FOA. Applicants not currently registered with SAM and grants.gov should allow **at least 44 days** to complete these requirements. You should start the process as soon as possible.

Applicants must obtain a DUNS number at <http://fedgov.dnb.com/webform>.

Applicants must register with the System for Award Management (SAM) at <http://www.sam.gov/>. If you had an active registration in the Central Contractor Registry (CCR), you should have an active registration in SAM. More information about SAM registration for applicants is found at [https://www.sam.gov/sam/transcript/Quick\\_Guide\\_for\\_Grants\\_Registrations\\_v1.7.pdf](https://www.sam.gov/sam/transcript/Quick_Guide_for_Grants_Registrations_v1.7.pdf).

Applicants must provide a Taxpayer Identification Number (TIN) to complete their registration in SAM.gov. An applicant's TIN is an Employer Identification Number (EIN) assigned by the Internal Revenue Service (IRS). In limited circumstances, a Social Security Number (SSN) assigned by the Social Security Administration (SSA) may be used as a TIN. If an SSN is used as a TIN, it will not be treated as privacy act data. You may obtain an EIN from the IRS at [http://www.irs.gov/Businesses/Small-Businesses-%26-Self-Employed/Apply-for-an-Employer-Identification-Number-\(EIN\)-Online](http://www.irs.gov/Businesses/Small-Businesses-%26-Self-Employed/Apply-for-an-Employer-Identification-Number-(EIN)-Online).

Applicants must register with FedConnect at [www.fedconnect.net](http://www.fedconnect.net). The full, binding version of assistance agreements will be posted to FedConnect.

Recipients must register with the Federal Funding Accountability and Transparency Act Subaward Reporting System at <https://www.fsrs.gov>. This registration must be completed before an award may be made: you are advised to register while preparing your application.

## 2. Registering in Grants.gov

Applicants must register with grants.gov.

For organizations, please follow the procedures detailed below, making use of the checklist provided below:

<http://www.grants.gov/web/grants/applicants/organization-registration.html>

<http://www.grants.gov/documents/19/18243/OrganizationRegChecklist.pdf>

For individuals, please follow the procedures detailed below:

<http://www.grants.gov/web/grants/applicants/individual-registration.html>

Organizations and individuals must have an E-Business (E-Biz) Point of Contact (POC). You may find the checklist at [http://www.grants.gov/documents/19/18243/E-Biz\\_POC\\_Checklist.pdf](http://www.grants.gov/documents/19/18243/E-Biz_POC_Checklist.pdf) useful.

Grants.gov maintains a User Guide at <http://www.grants.gov/documents/19/18243/GrantsGovApplicantUserGuide.pdf> and a list of Frequently Asked Questions at <http://www.grants.gov/web/grants/applicants/applicant-faqs.html>. Questions relating to the registration process, **system requirements, or how an application form works** must be directed to Grants.gov at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov).

### FIRST-TIME REGISTRATION PROCESS IN GRANTS.GOV

You must complete the one-time registration process (all steps) before you can submit your first application through [www.grants.gov](http://www.grants.gov). (See <http://www.grants.gov/web/grants/applicants/grant-application-process.html>). We recommend that you start this process at least six weeks before the application due date. It may take 44 days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at <http://www.grants.gov/web/grants/applicants/organization-registration.html> to guide you through the process. **IMPORTANT:** During the SAM registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner Identification Number" (MPIN). When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e., Grants.gov registration).

3. Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four e-mails are:

- Number 1 - Grants.gov Submission Receipt Number
- Number 2 - Grants.gov Submission Validation Receipt for Application Number
- Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number
- Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

**IMPORTANT NOTICE:** When you have completed the grants.gov registration process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e., grants.gov registration).

### **3. Where to Submit an Application**

Applications must be submitted through grants.gov to be considered for award.

Applicants must download the application package, application forms and instructions, from grants.gov at <http://www.grants.gov/> (Additional instructions are provided in Section IV A of this FOA.)

Submit electronic applications through the “Apply for Grants” function at [www.grants.gov](http://www.grants.gov). If you have problems completing the registration process or submitting your application, call grants.gov at 1-800-518-4726 or send an email to [support@grants.gov](mailto:support@grants.gov).

Please ensure that you have read the applicable instructions, guides, help notices, frequently asked questions, and other forms of technical support on grants.gov.

### **4. DOE Office of Science Portfolio Analysis and Management System (PAMS)**

After you submit your application through grants.gov, the application will automatically transfer into the Portfolio Analysis and Management System (PAMS) for processing by the DOE Office of Science. Many functions for grants and cooperative agreements can be done in PAMS, which is available at <https://pamspublic.science.energy.gov>.

You will want to “register to” your application: a process of linking yourself to the application after it has been submitted through grants.gov and processed by DOE.

You must register in PAMS to submit a pre-application or a letter of intent.

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Notifications sent from the PAMS system will come from the PAMS email address <[PAMS.Autoreply@science.doe.gov](mailto:PAMS.Autoreply@science.doe.gov)>. Please make sure your email server/software allows delivery of emails from the PAMS email address to yours.

Registering to PAMS is a two-step process; once you create an individual account, you must associate yourself with (“register to”) your institution. Detailed steps are listed below.

#### 1. CREATE PAMS ACCOUNT:

To register, click the “Create New PAMS Account” link on the website

<https://pamspublic.science.energy.gov/>.

- Click the “No, I have never had an account” link and then the “Create Account” button.
- You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
- On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
- Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
- PAMS will take you to the “Having Trouble Logging In?” page. (If you have been an Office of Science merit reviewer or if you have previously submitted an application, you may already be linked to an institution in PAMS. If this happens, you will be taken to the PAMS home page.)

#### 2. REGISTER TO YOUR INSTITUTION:

- Click the link labeled “Option 2: I know my institution and I am here to register to the institution.” (Note: If you previously created a PAMS account but did not register to an institution at that time, you must click the Institutions tab and click the “Register to Institution” link.)
- PAMS will take you to the “Register to Institution” page.
- Type a word or phrase from your institution name in the field labeled, “Institution Name like,” choose the radio button next to the item that best describes your role in the system, and click the “Search” button. A “like” search in PAMS returns results that contain the word or phrase you enter; you do not need to enter the exact name of the institution, but you should enter a word or phrase contained within the institution name. (If your institution has a frequently used acronym, such as ANL for Argonne National Laboratory or UCLA for the Regents of the University of California, Los Angeles, you may find it easiest to search for the acronym under “Institution Name like.” Many institutions with acronyms are listed in PAMS with their acronyms in parentheses after their names.)
- Find your institution in the list that is returned by the search and click the “Actions” link in the Options column next to the institution name to obtain a dropdown list. Select “Add me to this institution” from the dropdown. PAMS will take you to the “Institutions – List” page.
- If you do not see your institution in the initial search results, you can search again by clicking the “Cancel” button, clicking the Option 2 link, and repeating the search.
- If, after searching, you think your institution is not currently in the database, click the “Cannot Find My Institution” button and enter the requested institution information into

PAMS. Click the “Create Institution” button. PAMS will add the institution to the system, associate your profile with the new institution, and return you to the “Institutions – List” page when you are finished.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this Funding Opportunity Announcement should reference DE-FOA-0001250.

## 5. Viewing Submitted Applications

Each grants.gov application submitted to the DOE Office of Science (SC) automatically transfers into PAMS and is subsequently assigned to a program manager. At the time of program manager assignment, the three people listed on the SF 424 (R&R) cover page will receive an email with the subject line, “Receipt of Proposal 0000xxxxxx by the DOE Office of Science.” These three people are the Principal Investigator (Block 14), Authorized Representative (Block 19), and Point of Contact (Block 5). In PAMS notation, applications are known as proposals, the Principal Investigator is known as the PI, the Authorized Representative is known as the Sponsored Research Officer/Business Officer/Administrative Officer (SRO/BO/AO), and the Point of Contact is known as the POC.

There will be a period of time between the application’s receipt at grants.gov and its assignment to a DOE Office of Science program manager. Program managers are typically assigned two weeks after applications are due at grants.gov: please refrain from attempting to view the proposal in PAMS until you receive an email providing the assignment of a program manager.

Once the email is sent, the PI, SRO/BO/PO, and POC will each be able to view the submitted proposal in PAMS. Viewing the proposal is optional.

You may use the Internet Explorer, Firefox, Google Chrome, or Safari browsers to access PAMS.

Following are two sets of instructions for viewing the submitted proposal, one for individuals who already have PAMS accounts and one for those who do not.

If you already have a PAMS account, follow these instructions:

1. Log in to PAMS at <https://pamspublic.science.energy.gov/>.
2. Click the “Proposals” tab and click “Access Previously Submitted Grants.gov Proposal.”
3. Enter the following information:
  - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros (e.g., 00002xxxxx). Do not use the grants.gov proposal number. Use the PAMS number previously sent to you in the email with subject line, “Receipt of Proposal ...”.
  - Email (as entered in grants.gov application): Enter your email address as it appears on the SF 424(R&R) Cover Page.
  - Choose Role: Select the radio button in front of the role corresponding to the SF 424

- (R&R) cover page. If your name appears in block 19 of the SF 424 (R&R) cover page as the authorizing representative, select “SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer).” If your name appears in block 14 of the SF 424 R&R cover page as the PI, select “Principal Investigator (PI).” If your name appears in block 5 of the SF 424 R&R as the point of contact, select “Other (POC).”
4. Click the “Save and Continue” button. You will be taken to your “My Proposals” page. The grants.gov proposal will now appear in your list of proposals. Click the “Actions/Views” link in the options column next to this proposal to obtain a dropdown list. Select “Proposal” from the dropdown to see the proposal. Note that the steps above will work only for proposals submitted to the DOE Office of Science since May 2012.

If you do not already have a PAMS account, follow these instructions:

1. To register, click the “Create New PAMS Account” link on the website <https://pamspublic.science.energy.gov/>.
2. Click the “No, I have never had an account” link and then the “Create Account” button.
3. You will be prompted to enter your name and email address, create a username and password, and select a security question and answer. Once you have done this, click the “Save and Continue” button.
4. On the next page, enter the required information (at least one phone number and your mailing address) and any optional information you wish to provide (e.g., FAX number, website, mailstop code, additional email addresses or phone numbers, Division/Department). Click the “Create Account” button.
5. Read the user agreement and click the “Accept” button to indicate that you understand your responsibilities and agree to comply with the rules of behavior for PAMS.
6. You will be taken to the Register to Institution page. Select the link labeled, “Option 1: My institution has submitted a proposal in grants.gov. I am here to register as an SRO, PI, or POC (Sponsored Research Officer, Principal Investigator, or Point of Contact).”
7. Enter the following information:
  - Proposal ID: Enter the ten-digit PAMS proposal ID, including the leading zeros (e.g., 00002xxxxx). Do not use the grants.gov proposal number. Use the PAMS number previously sent to you in the email with subject line, “Receipt of Proposal ...”.
  - Email (as entered in grants.gov proposal): Enter your email address as it appears on the SF 424(R&R) Cover Page.
  - Choose Role: Select the radio button in front of the role corresponding to the SF 424 (R&R) cover page. If your name appears in block 19 of the SF 424 (R&R) cover page as the authorizing representative, select “SRO/BO/AO (Sponsored Research Officer/Business Officer/Administrative Officer).” If your name appears in block 14 of the SF 424 R&R cover page as the PI, select “Principal Investigator (PI).” If your name appears in block 5 of the SF 424 R&R as the point of contact, select “Other (POC).”
8. Click the “Save and Continue” button. You will be taken to your “My Proposals” page. The grants.gov proposal will now appear in your list of proposals. Click the “Actions/Views” link in the options column next to this proposal to obtain a dropdown list. Select “Proposal” from the dropdown to see the proposal.

If you were listed as the PI on a prior submission but you have not previously created an account, you may already be listed in PAMS. If this is the case, you will be taken to the PAMS home page after agreeing to the Rules of Behavior. If that happens, follow the instructions listed above under “If you already have a PAMS account...” to access your grants.gov proposal.

The steps above will work only for proposals submitted to the DOE Office of Science since May 2012.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9:00 AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, Email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this Funding Opportunity Announcement should reference **DE-FOA-0001250**.

## **Section V - APPLICATION REVIEW INFORMATION**

### **A. CRITERIA**

#### **1. Initial Review Criteria**

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b) to determine that (1) the applicant is eligible for the award; (2) the information required by the FOA has been submitted; (3) all mandatory requirements are satisfied; (4) the proposed project is responsive to the objectives of the funding opportunity announcement, and (5) the proposed project is not duplicative of programmatic work. Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.

#### **2. Merit Review Criteria**

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following criteria, listed in descending order of importance as found in 10 CFR 605.10 (d), the Office of Science Financial Assistance Program Rule.

- Scientific and/or Technical Merit of the Project;
- Appropriateness of the Proposed Method or Approach;
- Competency of Applicant's Personnel and Adequacy of Proposed Resources; and
- Reasonableness and Appropriateness of the Proposed Budget.

The evaluation process will include program policy factors such as the relevance of the proposed research to the terms of the FOA and the agency's programmatic needs. Note that external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

#### **SCIENTIFIC AND/OR TECHNICAL MERIT OF THE PROPOSED RESEARCH**

- What is the scientific innovation of the proposed research?
- To what extent is the proposed research likely to achieve valuable results?
- To what extent might the results of the proposed research impact the direction, progress, and thinking in areas relevant to extreme-scale science research?
- How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?
- Is the Data Management Plan suitable for the proposed research and to what extent does it support the validation of research results?

#### APPROPRIATENESS OF THE PROPOSED METHOD OR APPROACH

- To what extent are the research approaches logical and feasible?
- To what extent does the proposed research employ innovative concepts or methods?
- To what extent are the conceptual framework, methods, and analysis well justified, adequately developed, and likely to lead to scientifically valid conclusions?
- To what extent does the proposed research recognize significant potential problems and consider alternative strategies?

#### COMPETENCY OF APPLICANT’S PERSONNEL AND ADEQUACY OF PROPOSED RESOURCES

- To what extent does the project team have the requisite background and level of expertise to accomplish the proposed research?
- To what extent are the technical responsibilities of senior or key personnel clearly and adequately described?
- How well organized is the timeline for major research goals and objectives?
- To what extent does the proposed research take advantage of unique facilities and capabilities?

#### REASONABLENESS AND APPROPRIATENESS OF THE PROPOSED BUDGET

- To what extent are the personnel staffing levels adequate for carrying out the proposed research?
- To what extent is the budget reasonable and appropriate for the scope of research?

### **B. REVIEW AND SELECTION PROCESS**

#### **1. Merit Review**

Applications that pass the initial review will be subjected to a formal merit review and will be evaluated based on the criteria codified at 10 CFR 605.10(d) in accordance with the guidance provided in the “Office of Science Merit Review System for Financial Assistance,” which is available at: <http://science.energy.gov/grants/policy-and-guidance/merit-review-system/>.

#### **2. Selection**

The Selection Officials will consider the following items, listed in no order of significance:

- Scientific and technical merit of the proposed activity as determined by merit review
- Availability of funds
- Relevance of the proposed activity to Office of Science priorities
- Ensuring an appropriate balance of activities within Office of Science programs
- Previous performance

### **3. Discussions and Award**

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to the following: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR 600 and 10 CFR 605; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

For awards issued after December 26, 2014, the Financial Assistance regulations contained in 2 CFR 200 will be codified by Part IX of 2 CFR (DOE's new financial assistance regulations, which succeed 10 CFR 600)

#### **C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES**

It is anticipated that the award selection will be completed by June 30, 2015. It is expected that awards will be made in Fiscal Year 2015.

DOE is interested in seeing projects supported under this FOA begin work by September 1, 2015.

## **Section VI - AWARD ADMINISTRATION INFORMATION**

### **A. AWARD NOTICES**

#### **1. Notice of Selection**

**Selected Applicants Notification:** DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Part IV.G with respect to the allowability of pre-award costs.)

**Non-selected Notification:** Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

#### **2. Notice of Award**

An Assistance Agreement issued by the contracting officer is the authorizing award document. It normally includes, either as an attachment or by reference, the following items: (1) Special Terms and Conditions; (2) Applicable program regulations, if any; (3) Application as approved by DOE; (4) DOE assistance regulations at 10 CFR 600; (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget Summary; and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

For awards issued after December 26, 2014, the Financial Assistance regulations contained in 2 CFR 200 will be codified by Part IX of 2 CFR (DOE's new financial assistance regulations, which succeed 10 CFR 600)

### **B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS**

#### **1. Administrative Requirements**

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR 600 and 10 CFR 605.

For awards issued after December 26, 2014, the Financial Assistance regulations contained in 2 CFR 200 will be codified by Part IX of 2 CFR (DOE's new financial assistance regulations, which succeed 10 CFR 600).

#### **REGISTRATION REQUIREMENTS**

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR 25 (See: <http://www.ecfr.gov>). Prime awardees must keep their data at the System for Award Management (SAM) current at <http://www.sam.gov>. SAM is the government-wide system that replaced the Central Contractor Registry (CCR). If you had an active registration in the CCR, you have an active registration in SAM. Subawardees at all tiers must obtain DUNS numbers and provide the DUNS to the prime awardee before the subaward can be issued.

## SUBAWARD AND EXECUTIVE REPORTING

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR 170. (See: <http://www.ecfr.gov> ). Prime awardees must register with the new FSRS database and report the required data on their first tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile in the System for Award Management (SAM).

## PROHIBITION ON LOBBYING ACTIVITY

By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 USC 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

### **2. Terms and Conditions**

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Terms.

The standard DOE financial assistance intellectual property provisions applicable to various types of recipients are located at:

<http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards>

### **3. National Policy Assurances**

The National Policy Assurances To Be Incorporated As Award Terms are located at <http://www.nsf.gov/bfa/dias/policy/rtc/appc.pdf> and at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Terms.

### **4. Statement of Substantial Involvement**

If the award is a cooperative agreement, the DOE contract specialist and DOE project officer will negotiate a Statement of Substantial Involvement prior to award.

### **5. Additional Conditions**

#### CONFERENCE SPENDING (MARCH 2014)

The recipient shall not expend funds for the purpose of defraying the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office funded by FY2013 or future year appropriations for which the cost to the United States Government was more than \$20,000, or circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the

date, location, and number of employees attending such conference that is not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded.

#### CORPORATE FELONY CONVICTION AND FEDERAL TAX LIABILITY REPRESENTATIONS (MARCH 2014)

In submitting an application in response to this FOA the Applicant represents that:

- It is **not** a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months,
- It is **not** a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definitions apply:

- A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

#### LOBBYING RESTRICTIONS (MARCH 2012)

By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 USC 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

### **C. REPORTING**

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. The checklist is available at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> under Award Forms.

## Section VII - QUESTIONS/AGENCY CONTACTS

### A. QUESTIONS

Questions relating to the grants.gov registration process, system requirements, how an application form works, or the submittal process must be directed to grants.gov at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov). DOE cannot answer these questions.

Please only contact the grants.gov help desk for questions related to grants.gov.

For help with PAMS, click the “External User Guide” link on the PAMS website, <https://pamspublic.science.energy.gov/>. You may also contact the PAMS Help Desk, which can be reached Monday through Friday, 9AM – 5:30 PM Eastern Time. Telephone: (855) 818-1846 (toll free) or (301) 903-9610, Email: [sc.pams-helpdesk@science.doe.gov](mailto:sc.pams-helpdesk@science.doe.gov). All submission and inquiries about this Funding Opportunity Announcement should reference **DE-FOA-0001250**. Please contact the PAMS help desk for technological issues with the PAMS system.

Questions regarding the specific program areas and technical requirements may be directed to the technical contacts listed for each program within the FOA or below.

Please contact the program staff with all questions not directly related to the grants.gov or PAMS systems.

### B. AGENCY CONTACTS

Grants.gov Customer Support	800-518-4726 (toll-free) <a href="mailto:support@grants.gov">support@grants.gov</a>
PAMS Customer Support	855-818-1846 (toll-free) 301-903-9610 <a href="mailto:sc.pams-helpdesk@science.doe.gov">sc.pams-helpdesk@science.doe.gov</a>
Program Manager Scientific Contact	Dr. Steven L. Lee Office of Advanced Scientific Computing Research Phone: 301-903-5710 Email: <a href="mailto:Steven.Lee@science.doe.gov">Steven.Lee@science.doe.gov</a>

## **Section VIII - OTHER INFORMATION**

### **A. MODIFICATIONS**

Notices of any modifications to this FOA will be posted on grants.gov and the FedConnect portal. You can receive an email when a modification or an FOA message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other FOAs. More information is available at <http://www.fedconnect.net>.

### **B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE**

DOE reserves the right, without qualification, to reject any or all applications received in response to this FOA and to select any application, in whole or in part, as a basis for negotiation and/or award.

### **C. COMMITMENT OF PUBLIC FUNDS**

The contracting officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the contracting officer, either explicit or implied, is invalid.

### **D. PROPRIETARY APPLICATION INFORMATION**

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

“The data contained in pages \_\_\_\_\_ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government’s right to use or disclose data obtained without restriction from any source, including the applicant.”

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

“The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation.”

## **E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL**

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

## **F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM**

**Patent Rights:** The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 USC 5908 provides that title to such inventions vests in the United States, except where 35 USC 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See “Notice of Right to Request Patent Waiver” in paragraph G below.)

**Rights in Technical Data:** Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE’s own needs or to insure the commercialization of technology developed under a DOE agreement.

## **G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER**

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this FOA, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784. For more information, see <http://energy.gov/gc/services/technology-transfer-and-procurement/office-assistant-general-counsel-technology-transf-1>

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

## **H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES**

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

## **I. AVAILABILITY OF FUNDS**

Funds are not presently available for this award. The Government's obligation under this award is contingent upon the availability of appropriated funds from which payment for award purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the contracting officer for this award and until the awardee receives notice of such availability, to be confirmed in writing by the contracting officer.