**U.S. Department of Homeland Security**
**Notice of Funding Opportunity**
**Domestic Nuclear Detection Office: Academic Research Initiative**

**NOTE:** If you are going to apply for this funding opportunity and have not obtained a Data Universal Numbering System (DUNS) number and/or are not currently registered in the System for Award Management (SAM), please take immediate action to obtain a DUNS Number, if applicable, and then to register immediately in SAM . It may take 4 weeks or more after you submit your SAM registration before your registration is active in SAM, then an additional 24 hours for Grants.gov to recognize your information. Information on obtaining a DUNS number and registering in SAM is available from Grants.gov at: http://www.grants.gov/documents/19/18243/SAM_New_Grantee_Registration.pdf/8bf1c182-8d35-47e0-99e2-a263fa3d9005

## A. Notice of Funding Opportunity (NOFO) Description

**Issued By**

U.S. Department of Homeland Security (DHS) Domestic Nuclear Detection Office (DNDO) – Transformational and Applied Research Directorate

**Catalog of Federal Domestic Assistance (CFDA) Number**

97.077 --- Homeland Security Testing, Evaluation, and Demonstration of Technologies

**CFDA Title**

Evaluation, and Demonstration of Technologies Related to Nuclear Threat Detection

**Notice of Funding Opportunity Title**

Domestic Nuclear Detection Office: Academic Research Initiative (ARI)

**NOFO Number**

*DHS-15-DNDO-077-001*

**Authorizing Authority for Program**

*Homeland Security Act of 2002, Section 1908 P.L. 107-296 Title V Section 501(a)*

**Appropriation Authority for Program**

P. L. 114-4, Department of Homeland Security Appropriations Act, 2015, Title IV; Domestic Nuclear Detection Office; Research Development, and Operations

**Program Type**

Select the applicable program type: ☒ New ☐ Continuation ☐ One-time

## Program Overview, Objectives, and Priorities

### Overview

The ARI program addresses the security, prevention and protection per the PPD-8 by seeking novel cross-cutting research that will enhance national security's capability to detect and interdict nuclear or radiological material outside of regulatory control, and otherwise help prevent nuclear terrorism or radiological attacks.

### Objectives

The ARI Program has two primary objectives: 1) Engage the academic community to advance fundamental knowledge for nuclear and radiological threat detection, nuclear forensics and related sciences with emphasis on fundamental research to solve long-term, high-risk challenges and 2) Develop human capital for the nuclear science and engineering profession. Further, the program works to sustain a long-term commitment to basic research in this field and coordinates research efforts across the federal government.

### Priorities

Each grant application will be evaluated based on the criteria provided in Evaluation Criteria under the Application Review Information section. The research topics in this announcement will address each of the following challenges list below. The solicitation research topics are listed in Appendix A.

***Cost effective equipment with sufficient performance to ensure wide spread deployment***

Currently deployed radiation sensors have limited ability to detect, locate, and identify R/N threats. They may also present operational limitations by their high cost, inadequate reliability, and complex logistical needs. These limitations can be addressed by developing new detection materials that provide good performance, are low cost, and are available in large volumes.

High performance materials (e.g., high energy resolution materials with energy resolution better than 1% at 662 keV) are typically high cost materials. Examples are CZT (Cadmium Zinc Telluride) semiconductors which, because of growth issues and consequent low yield, are typically high cost (e.g., $\$3000/cm^3$). Another example is High Purity Germanium (HPGe) which, because it needs to operate at very low temperatures, drives up the cost due to cooling requirements and associated increases in operational burden. Moderate energy resolution materials (e.g., 3% @ 662 keV) can still provide good detection and isotope identification but also remain relatively high cost; examples are Lanthanum Bromide ($LaBr_3$) which is typically $\$400/cm^3$.

The ARI program research can have a significant impact on DNDO's mission by providing low cost detector materials ($40/cm3) with sufficient moderate energy resolution (3%: not very good, but not poor either) so that more detectors can be

fielded, thus providing wider-spread deployment. This may be achieved by either reducing the cost of 3% materials, or improving the energy resolution of typically lower cost 7-8% energy resolution materials, or by finding completely new materials.

***Detection of special nuclear material (SNM), i.e. uranium or plutonium, especially when shielded***

SNM produces a relatively weak passive signature that can be easily shielded. Active interrogation, which includes techniques such as x-ray imaging and nuclear resonance fluorescence, uses active probes to penetrate shielding to produce unique signatures indicating the presence of SNM. Other techniques of interest use cosmic rays and gravity to interrogate large cargo volumes and detect the presence of very dense objects, such as lead shielding and SNM. However, these active techniques have limited utility due to logistical and cost considerations.

Currently, SNM detection technologies typically require large, heavy, and expensive scanning systems to detect the presence of shielded SNM. A research goal is to detect shielded SNM in a timely manner while using operationally viable form factors and radiation exposure rates. Research efforts are looking at both near term improvements to enhance performance of existing imaging systems used at ports of entry, as well as the longer range improvements needed to support mobile applications.

***Enhanced wide area search capabilities in a variety of scenarios, to include urban and highly cluttered environments***

Improvements are needed in two broad areas: better discrimination between threats and non-threats, and extending the detection range. A key research objective is to improve threat detection by employing concepts that will result in systems with greater sensitivity and much greater specificity.

Novel system approaches are required to provide substantive improvements in the detection, localization, and identification of threats at extended ranges. Mobile detection systems which can cover large areas with the ability to precisely locate and then track potential threats are needed. Likewise, choke point systems are needed to monitor highway traffic at full speeds. Possible solutions include large next-generation imaging detectors or extensive networked arrays of intelligent detectors. Both approaches explore how conventional radiation detection can be improved through data fusion and through the use of non-radiological signatures (e.g., video, light detection and ranging (LIDAR), hyper spectral imaging).

***Monitoring along challenging GNDA pathways***

Vast land, sea and air borders provide many pathways into the country. These pathways include general aviation, small maritime craft, land crossings in between ports of entry, and rail crossings. New solutions are needed for these

challenging pathways that integrate technology, general domain awareness, and novel operational approaches.

***Forensics determination of the origin and history of interdicted nuclear materials***

To address this challenge, innovative and transformational solutions are desired in the following areas:

- Material measurement techniques or methodologies
- Predictive models of steps in the nuclear fuel cycle
- Advanced analytics for comparing or combining information from multiple techniques

In order to better connect the origin and history of interdicted nuclear materials, more precise, accurate, and faster measurement techniques are desired. An enhanced understanding of how the different stages of cycle affect these qualities is required to better determine when, where, and how the interdicted nuclear material was fabricated. Research is also needed to analyze and compare the potential for determining the age, origin, and formation history from multiple methodologies to include physical, chemical, radiological, micro-structural, and morphological features of materials applicable to nuclear forensics.

## B. Federal Award Information

### Award Amounts, Important Dates, and Extensions

**Available Funding for the NOFO:** $3.0 M

**Projected number of Awards**: 8-10

**Period of Performance:** Up to 60 months

DHS anticipates the period of performance of awards to range from 24-60 months, encompassing two to five program years. DHS anticipates each program year will be 12 months.

**Extension Requests:**

Is an extension to the period of performance permitted? ☒ Yes ☐ No

No-cost extensions may only be submitted during the last budget period of the awarded grant. They may be durations up to 12 months.

DHS will base extension approvals on the availability of funds, acceptable performance, and the reason(s) for the requested extension. DHS will not provide extensions solely to enable universities to expend unspent funds.

**Projected Period of Performance Start Date(s):** *09/01/2015*

**Projected Period of Performance End Date(s):** *08/31/2016*

**Funding Instrument**

Awards under this Announcement will be Grants for financial assistance in the form of money.

## C. Eligibility Information

**Eligible Applicants**

The following entities are eligible to apply for this NOFO are listed below*:*

Private institutions of higher education
Public & State controlled institutions of higher education

**Eligibility Criteria**

**Organization Limit.** The following listed below are organizations that are eligible and encouraged to submit a proposal:

- Universities and Colleges. Universities and two- and four-year colleges (including community colleges) accredited by a U.S. Department of Education recognized accrediting agency, and having a campus located in the U.S;
- Organizations are referred to as academic institutions for the purposes of this Solicitation.

All non-academic institutions regardless of profit or non-profit status are ineligible to participate.

**Principal Investigator (PI) Limit.** None Specified

**Limit on Number of Proposals per Organization.** None Specified

**Limit on Number of Proposals per PI.** One (1). Further, an individual researcher may not be named as a participant on more than one proposal submitted to this Solicitation. This limitation includes participation as a PI, co-PI, senior researcher, consultant, or any other role for which financial remuneration is requested.

**Other Eligibility Criteria – Applications DHS Considers Non-Responsive**

DHS will not consider applications that do not adhere to one or more of the following requirements:

1. **Deadlines.** DHS will not accept late applications. Without exception, applications must be received by Grants.gov on or before the deadline in this announcement or they will not be considered.
2. **Application relevance.** Applications that do not address the purpose of this announcement will not be considered.
3. **Compliance and completeness.** Applications must substantially comply with the application submission instructions and requirements in this announcement or they will not be considered.

### Cost Share or Match

Cost Share or Match is prohibited in this NOFO.

## D. Application and Submission Information

### Submission Date and Other Key Dates and Times

**Date Posted to Grants.gov:** *05/12/2015*

**Application Submission Deadline:** *06/12/2015 at 11:59:59 PM [Eastern Time]*

**Anticipated Funding Selection Date:** *08/06/2015*

**Anticipated Award Date:** *09/01/2015*

**Other Key Dates**

| Event | Suggested Deadline For Completion |
|---|---|
| Obtaining DUNS Number | Four weeks before actual submission deadline 6/12/2015 |
| Obtaining a valid EIN | Four weeks before actual submission deadline 6/12/2015 |
| Updating SAM registration | Four weeks before actual submission deadline 6/12/2015 |
| Starting application in Grants.gov | One week before actual submission deadline 6/12/2015 |

### 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 "Applicants" then "Apply for Grants," read the registration requirements and register if necessary (**Allow up to 7-10 business days after you submit before your registration is active in SAM, then an additional 24 hours for Grants.gov to recognize your information)**. In order to obtain the application package select "Download a Grant Application Package." Enter the CFDA and/or the funding opportunity number located on the cover of this NOFO, select "Download Package," and then follow the prompts to download the application package.

For a hardcopy of the full NOFO, please write or fax a request to:

*Arvette Leake-Davis*
*Office of Procurement Operations (MGMT I OPO)*
*245 Murray Lane SW, Mail Stop 0115*
*Washington, D.C. 20528-0115*
*Office: (202) 447-5537*
*Email: arvette.leake-davis@hq.dhs.gov*

Applications are **only** accepted through the Grants.gov portal.

**Content and Form of Application Submission**
**HOW TO APPLY**
**Note:** There are two groups of forms associated with this application: mandatory and optional. Please read the instructions carefully to determine which forms you must submit.

**MANDATORY FORMS**

- **SF424 (R&R) Application for Federal Assistance (SF424-V2.0)**

Please complete this form in its entirety. If you fill this form out first, other required forms will populate with basic data such as name, address, etc. Signature and date will auto-fill when you submit the application package through Grants.gov.

a. Block 1, Type of Submission – Please check "Application."
b. Block 8, Type of Application – Please check "New."
c. Block 12, Proposed Project – Enter Dates of Entire Project Period
d. Block 15a, Estimated Project Funding – This amount should correspond to your R&R Budget form's total and budget justification total for the requested budget period.
e. Block 16, E.O. 12372 review question – Please check "No."
f. Block 17 - By submitting this application, your organization is providing certifications and assurances regarding:
    i. Drug-Free Workplace Requirements
    ii. Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions
    iii. Assurance that your organization is not delinquent on any Federal debt.

- **Research & Related (R&R) Budget**

An R&R Budget is required for ALL applications. Please ensure that the total requested corresponds to Block 15.a on the SF 424 R&R form.

Include up to two to five annual budgets, one for each year of the duration of the award; a cumulative budget will be automatically generated by Grants.gov. A detailed budget justification (up to three pages) should document proposed expenses. Multi-institutional proposals should use the award-sub award proposal mechanisms or the collaborative mechanism.

Mention if any government-furnished equipment (GFE, e.g. specific radioactive sources to calibrate or test detector systems) is required. Attach an expanded equipment list (see item C on R&R Budget Form) if necessary.

An annual grantees review will enable the investigators of grants awarded through this solicitation to review progress, exchange information, and promote collaborations. The PI, all co-PIs, and at least one of the students supported from each funded grant will be required to participate. Representatives of DNDO, DHS Science and Technology, other Federal agencies, and various National Laboratories and industry are also expected to be present at this annual review to provide an expanded opportunity for collaboration and information sharing. Funds must be included in each year of the proposal budget for attendance at this annual workshop. For budgetary purposes, the workshop may be assumed to be in the U.S. and be of three days duration. This workshop will be a primary mechanism for the DNDO program managers to assess progress and thus to adjust the future funding profiles for individual projects.

- **Budget Justification**

A Budget Justification is required for ALL applications. Please ensure that items listed in the budget justification correspond to the funds requested on the R&R Budget form. Attach the Budget Justification to the R&R Budget form. If you need to attach more than one file to fully capture your budget justification, you may use the optional "Attachments" form.

Please use the following guidance when assembling your budget justification:

-- Use the following cost categories to group items of cost in your budget justification.

PERSONNEL
FRINGE BENEFITS
TRAVEL
EQUIPMENT (see item C on R&R Budget Form)
SUPPLIES (see item F.1 on R&R Budget Form)
CONTRACTUAL (see item F.5 on R&R Budget Form)
OTHER DIRECT COSTS (see items under item F on R&R Budget Form)
INDIRECT COSTS

-- If you wish to display your budget justification by task, please ensure that you supply a total for each of the cost categories listed above (and related fields on the R&R Budget Form) for the proposed budget period in your application.

- **Research & Related Project/Performance Site Location(s)**

Please provide information for every site (including subcontractors and outside vendors, with sub-awards or subcontracts of $25,000 or more) in your project.

- **SF 424B Assurances for Non-Construction Programs**

Submit this form. It will be electronically signed upon submission to Grants.gov as part of your application.

- **Certification Regarding Lobbying (GG_Lobbying Form-V1.1)**

Submit this form. If paragraph two of the certification applies, then complete and submit the SF-LLL Disclosure of Lobbying, which is provided as an optional form in the application package.

- **Research & Related Senior/Key Person Profile**

– Please supply biographical information on key personnel. The files can be attached at item 12 on the "Other Project Information Form", or use the optional "Attachments" form.

- **Research & Related Other Project Information**

Tips: Write for a general audience. Please define any technical terminology that is discipline-specific. Be concise and direct in descriptions. The file submission for this section shall consist the cover page, project summary and quad chart followed by the items 3-7 below.

## Proposal Preparation Instructions:

1. **Cover Sheet:**
   The cover sheet will be provided in the template below in the Appendix B. Note: for a proposal ID, please follow the following naming convention:

   ARINOFO14-XXXX-YYYY-TA-0#-0##
   XXXX = four letter (maximum 4 letter) character shortcut for organization name
   YYYY = four letter (maximum 4 letter) character shortcut for department/division name
   # = Topic Area number
   ## = number of proposal submission.

   ***Example:*** Organization A, Dept B's submission for its first proposal to topic 01 would have the ID listed: ORGA-DEPB-TA-01-001

   For a fillable .pdf copy of the cover sheet, please send a request to dndo.ari@hq.dhs.gov.

2. **Project Summary:**
   The Project Summary is limited to a one page narrative and a quad chart that summarizes the effort.

The Project Summary must address the intellectual merit and broader impacts of the proposal and must include a brief but explicit statement on how the proposed research relates to enabling the global nuclear detection architecture and/or addressing the topic areas and research objectives outlined in Priorities section and Appendix A. Omission of this statement will result in the proposal being returned without review.

The quad chart provides a single page summary of the effort and should include a picture, graphic or artist's conception of the effort in the top left, a summary of intellectual merit in the bottom left, a summary of broader impact on the top right, and a summary of schedule and proposed budget in the bottom right. See quad chart template in the **Appendix C**.

For a quad chart template, please send a request to dndo.ari@hq.dhs.gov.

3. **Project Description:**
Describe the vision and goals of the proposed research, approaches and methodologies to attain the goals, and the expected outcomes. The project description must present a clear and compelling explanation of the cutting-edge nature of the proposed research and its potential impact. High-risk proposals with the potential for high impact are encouraged. The Project Description and Proposed Research sections are limited to a total of fifteen (15) pages. The following the sections on Modes of Dissemination and Education, Management Plan, and References Cited are limited to a total of three (3) pages.

4. **Proposed Research:** Narrative consisting of the following items:
    - An explanation of the scientific context, intellectual merit, relevance to the solicitation research topics in Appendix A, its potential long-term impact and timeliness of the proposed project;
    - A detailed description of the proposed research, it goals, objectives and milestones, and any substantive risks and risk mitigation strategies;
    - A discussion of the broader impacts of the proposed work;
    - If appropriate, a justification for why an effort involving at least two investigators is necessary to carry out the proposed project;
    - If appropriate, a discussion of the multidisciplinary approach taken and its proposed benefits;
    - A description of the contribution to be made by each senior investigator; and
    - A timeline for the planned work.

5. **Modes of Dissemination and Education:**
    - Narrative describing:
    - The mode of training undergraduate students, graduate students, and postdoctoral researchers, including co-mentorship or other collaborative training; and
    - Plans for dissemination and education/outreach,/publications including any pilot activities.

6. **Management Plan:** If appropriate, narrative describing:
    - How the group effort will be coordinated, including any use of cyberinfrastructure;
    - How decisions will be made regarding the conduct of the project; and
    - How collaboration will be evaluated.

7. **References Cited:**
    - References should include full titles of articles and book chapters cited. This section should include bibliographic citations only and must not be used to provide parenthetical information outside of the project description. Indicate with an asterisk (*) references co-authored by two or more proposal investigators.

8. **Formatting:** The format applies to items 2-7 above:

    a. Margins – Margins for length and width should be at least one (1) inch.
    b. Page formatting – Use standard, single-column format.
    c. Figures, Tables, Diagrams – Use captions and appropriate references with at least size 10 font for caption descriptions.
    d. Spacing – Use least single spacing (for size 12 font and higher) and use single and a half (for size 11)
    e. Font and size (except for item c above) - Use Calibri or Times New Roman font at size 11 or larger.

## OPTIONAL FORMS

1. **SF-LLL Disclosure of Lobbying Activities**

Do NOT submit this form UNLESS paragraph 2 of the "Certification Regarding Lobbying" form applies to your organization. Some items on this form auto-populate once you complete the SF-424.

2. **Attachments Form**

Use this form to attach other documents if you need another place to electronically attach portions of your application.

3. **Current and Pending Support:**

A full description of the total level of current and pending support from all sources for the key personnel. Any overlap between federally funded projects and the proposed research must be clarified.

**Application and Submission Information**
Application forms and instructions for this funding opportunity are available through Grants.gov (http://www.grants.gov/).

Submit through the Grants.gov portal. Applicants may download the Grants.gov user manual at:
http://www.grants.gov/documents/19/18243/GrantsGovApplicantUserGuide.pdf/0ed6bbba-3b87-4600-8449-4bb1603b4e70

**Dun and Bradstreet Universal Numbering System (DUNS) Number, System for Award Management (SAM), and Authorized Organizational Representative (AOR)**

DHS is participating in the Grants.gov Initiative that provides the Grant Community a single site to find and apply for grant funding opportunities; therefore, applicants with electronic access are to submit their applications electronically through http://www.grants.gov/web/grants/applicants/apply-for-grants.html. Before you can apply for a DHS grant at grants.gov, you must have a DUNS number and must be registered in the System for Awards Management (SAM).

The DUNS number must be included in the data entry field labeled "Organizational DUNS" on the SF-424 form. Instructions for obtaining a DUNS number can be found at the following website:
http://www.grants.gov//web/grants/applicants/organization-registration/step-1-obtain-duns-number.html

**System for Award Management.** In addition to having a DUNS number, applicants applying electronically through Grants.gov must register with the federal System for Award Management (SAM). Step-by-step instructions for registering with SAM can be found here:
http://www.grants.gov/web/grants/applicants/organization-registration/step-2-register-with-sam.html. All applicants must register with SAM in order to apply online. Failure to register with the SAM will result in your application being rejected by Grants.gov during the submissions process.
**Please give yourself plenty of time before your grant application submission deadline to obtain a DUNS number and then to register in SAM. It may take 4 weeks or more after you submit your SAM registration before your registration is active in SAM, then an additional 24 hours for Grants.gov to recognize your information.**

**Authorized Organizational Representative.** The next step in the registration process is creating a username and password with Grants.gov to become an Authorized Organizational Representative (AOR). AORs will need to know the DUNS number of the organization for which they will be submitting applications to complete this process. To read more detailed instructions for creating a profile on Grants.gov visit:
http://www.grants.gov/web/grants/applicants/organization-registration/step-3-username-password.html.

**AOR Authorization.** After creating a profile on Grants.gov, the E-Biz Point of Contact (E-Biz POC) a representative from your organization who is the

contact listed for SAM will receive an email to grant the AOR permission to submit applications on behalf of their organization. The E-Biz POC will then log in to Grants.gov and approves an applicant as the AOR, thereby giving him or her permission to submit applications. To learn more about AOR Authorization visit: http://www.grants.gov/web/grants/applicants/organization-registration/step-4-aor-authorization.html. To track an AOR status visit: http://www.grants.gov/web/grants/applicants/organization-registration/step-5-track-aor-status.html.

**Applicants are, therefore, encouraged to register early. The registration process can take four weeks or more to be completed. Therefore, registration should be done in sufficient time to ensure it does not impact your ability to meet required submission deadlines. After you have been approved as an AOR you will be able to submit your application online.**

**Electronic Signature.** Applications submitted through Grants.gov constitute a submission as electronically signed applications. The registration and account creation with Grants.gov with E-Biz POC approval, establishes an Authorized Organization Representative (AOR). When you submit the application through Grants.gov, the name of your AOR on file will be inserted into the signature line of the application. Applicants must register the individual who is able to make legally binding commitments for the applicant organization as the Authorized Organization Representative (AOR); this step is often missed and it is crucial for valid submissions.

If you experience difficulties accessing information or have any questions please call the grants.gov customer support hotline at (800) 518-4726 or email grants.gov at support@grants.gov.

The Federal awarding agency may not make a Federal award to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time the Federal awarding agency is ready to make a Federal award, the Federal awarding agency may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

**Intergovernmental Review**

An intergovernmental review may be required. Applicants must contact their State's Single Point of Contact (SPOC) to comply with the State's process under Executive Order 12372 (see *http://www.fws.gov/policy/library/rgeo12372.pdf*). Name and addresses of the SPOCs are maintained at the Office of Management and Budget's home page at *http://www.whitehouse.gov/omb/grants_spoc* to ensure currency.

**Funding Restrictions**

8-10 small to medium awards in FY 2015. The requested budget for small to medium awards should adhere to the following:

- Single Investigator Awards will average approximately $150,000 per year
- Multi-disciplinary Awards will average approximately $350,000 per year

for a duration up to five years. For the purposes of this announcement multi-disciplinary means two or more investigators from substantially different disciplines, departments or organizations within a single university or from multiple universities.

**Management and Administration**

M&A are not operational costs but are necessary costs incurred in direct support of the grant or cooperative agreement or as a consequence of it, such as travel, meeting-related expenses, and salaries of full/part-time staff in direct support of the program. As such these can be itemized in financial reports.

**Indirect (Facilities & Administrative (F&A)) Costs**

Indirect Cost (IDC) is allowable by the recipient and sub-recipients. IDC is based on a federally approved and negotiated rate. Please provide a copy of the negotiated rate approved by the applicant's cognizant agency at the time of application. Indirect costs on sub-awards are limited to the first $25,000 of direct costs

**Other Submission Requirements**

All files submitted in the application shall be in .pdf format. Limit filenames to 50 characters. Do not password-protect files.

## E. Application Review Information

**Evaluation Criteria**

The following criteria are in descending order of importance.

**Criteria I: Intellectual Merit and Technical Approach**

The following elements will be considered upon technical evaluation:

- The intellectual merit of the proposed research activity will serve to advance knowledge and understanding within the related technical field and/or across multiple related disciplines.
- The proposed team (or individual) has the complete experience (include prior, if available) and expertise qualified to conduct the proposed research.
- The proposed technical plan addressing at least the following: cost/schedule, and technical strategies and resources are clear and complete.
- The proposed approach includes a multi-disciplinary and/or multi-institutional approach.

**Criteria II: Broader Impact**

The following elements will be considered upon technical evaluation:

- The research activity will advance discovery and understanding while promoting teaching, training, and learning to support fostering the next generation scientists and engineers.
- The degree of undergraduate and/or graduate student participation in the proposed research.
- The proposed activity will broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.).
- The research activity will enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships.
- The dissemination of the results will broadly enhance scientific and technological understanding that may be beneficial to the academic community and society.

**Criteria III: Transformational Impact**

The following additional elements will be considered upon technical evaluation, as applicable:

- The responsive of the application toward the topic area requirements/objectives.
- The success of the proposed research will improve the Global Nuclear Detection Architecture (GNDA) or Technical Nuclear Forensics (TNF) and their technical challenges through high-risk, innovative research.
- The proposed research activity exhibits creative, original (non-duplicative), innovative, and/or potentially transformative concepts. Whether this effort is being duplicated or is redundant under funding from either DNDO or another Government activity, and the risk and/or reward, if successful, does not warrant multiple efforts in the same area.

**Application Review and Selection Process**

**Application Receipt.** All completed applications ("proposals") submitted through grants.gov in response to this NOFO will be subjected to a technical evaluation by a panel review. This NOFO contains five (5) topic areas. Proposals that are determined non-compliant to the topic area(s) will not be considered for technical evaluation.

**Application Handling.** Completed applications will be handled following DHS safeguarding procedures. All application materials will be treated as confidential.

**Panel Review and Reviewers.** Each application will be reviewed by at least three (3) panelists. Each panelists are subject-matter experts (SMEs) assigned to the appropriate topics (areas) based on their technical expertise. The panelists and review will be established and conducted by the Program office.

**Selection Process**

**Evaluation.** Reviewers will conduct their individual evaluation for each assigned application. Following the individual evaluation, a consensus review will be held

to formulate a recommendation for each application. The rating of recommendations for each application will follow:

**Recommended (R) –** Proposals have met and/or exceed the topic requirements/objectives and will conduct successful research. Proposals under this rating are recommended for funding.

**Selectable (S) –** Proposals will likely satisfy the topic requirements/objectives and has a likelihood of successful research. Proposals under this rating are recommended for funding, if available.

**Not Recommended (NR) –** Proposals that are non-responsive to the topic area requirements/objectives and/or do not satisfy the evaluation criteria and will unlikely conduct a successful research. Proposals under this rating are not recommended for funding.

A summary of the recommendation and accompanying narrative will be completed by each reviewer. The Program Office will make the selection based on the consensus evaluation. Please note that decisions to fund all the recommended for funding proposals are subjected to available funding.

## F. Federal Award Administration Information

### Notice of Selection for Award

Notification of the award is made to the submitting organization via email by a Grants Officer in the Grants and Financial Assistance Division.

### Notice of Not Selection for Award

Applications that were not selected for award will be notified by a Grants Officer in the Grants and Financial Assistance Division in a timely manner. The Applicant will receive feedback comments from the consensus reviews. The feedback comments will not include the identities of the panelists and reviewers.

### Administrative and National Policy Requirements

All successful applicants for all DHS grant and cooperative agreements are required to comply with DHS Standard Administrative Terms and Conditions, which are available online at:
*http://www.dhs.gov/sites/default/files/publications/Proposed%20FY%2014%20Standard%20TC%202013-12-04.pdf*

Before accepting the award the authorized official should carefully read the award package for instructions on administering the grant award and the terms and conditions associated with responsibilities under Federal Awards. Recipients must accept all conditions in this NOFO as well as any Special Terms and Conditions in the Notice of Award to receive an award under this program.

**Reporting**

**A. Quarterly Federal Financial Reports (Cash Transaction).** The Recipient shall submit the FFR (SF 425) Federal Cash Transaction Report to the Department of Health and Human Services, Payment Management System, Smartlink. Quarterly Cash Transaction reports shall be submitted no later than 1/30, 4/30, 7/30 and 10/30.

**B. Annual Federal Financial Report.** The Recipient shall submit an annual Federal Financial Report (SF 425) to the DHS Grants Officer no later than 90 days after the Budget Period end date. The report must be submitted via email to DHS-GrantReports@dhs.gov and dndoari.del@hq.dhs.gov. Be sure to include the grant program name and number in the subject line.

C. **Final Federal Financial Report** – the Recipient shall submit the final Federal Financial Report (SF425) to the DHS Grants Officer no later than 90 days after the end of the Project Period end date. The report must be submitted via email to DHS-GrantReports@dhs.gov and dndoari.del@hq.dhs.gov. Be sure to include the grant program name and number in the subject line.

**Federal Financial Reporting Requirements**

The Federal Financial Reporting Form (FFR) is available here: http://www.whitehouse.gov/sites/default/files/omb/grants/approved_forms/SF-425.pdf, SF-425 *OMB #00348-0061*

**Program Performance Reporting Requirements**

**A. Quarterly Performance Report**: A quarter report that shall be submitted to the program office at dndoari.del@hq.dhs.gov at the end of every 4 months beginning at the period of performance start date.

**B. Interim Performance Report:** An interim performance report is due 90 days prior to the expiration date of the Budget Period or as specified above. The report must be submitted via email to DHS-GrantReports@dhs.gov and dndoari.del@hq.dhs.gov. The subject line of the email should include the phrase, "ARI Interim Performance Report", your University name and your ARI grant number. Please adhere to the Research Performance Progress Report (RPPR) format provided at: http://www.nsf.gov/bfa/dias/policy/rppr/format_ombostp.pdf

C. **Annual Project Summary and Accomplishments:** In addition to the required performance report, an updated project quad chart and summary of fiscal year accomplishments must be submitted to the Program Office, as requested by DNDO for every year of the project's duration. Specific due dates and templates will be distributed by the program office at least one month prior to the requested submission date.

*D.* **Final (End of Program) Performance Report:** The final performance report is due within 90 days after the expiration date of the Project Period. The report must be submitted via email to DHS-GrantReports@hq.dhs.gov and dndoari.del@hq.dhs.gov. The subject line of the email should include the phrase, "ARI Final Performance Report", your University name and your ARI grant number.

**Close Out**

Within 90 days after the end of the period of performance, or after an amendment has been issued to close out a grant, whichever comes first, recipients must submit a final FFR and final progress report detailing all accomplishments and a qualitative summary of the impact of those accomplishments throughout the period of performance.

If applicable, an inventory of all construction projects that used funds from this program has to be reported using the Real Property Status Report (Standard Form SF 429) available at *http://www.whitehouse.gov/sites/default/files/omb/grants/approved_forms/sf-429.pdf*.

After these reports have been reviewed and approved by the Program Office, a close-out notice will be completed to close out the grant. The notice will indicate the period of performance as closed, list any remaining funds that will be deobligated, and address the requirement of maintaining the grant records for three years from the date of the final FFR.

The recipient is responsible for returning any funds that have been drawn down but remain as unliquidated on recipient financial records.

## G. DHS Awarding Agency Contact Information

### Contact and Resource Information

### The Program Officer.

Shall be the DHS official responsible for monitoring the completion of work and technical performance of the projects or activities described in the Program Narrative Statement.

**Richard Vojtech**
**DHS Domestic Nuclear Detection Office, Mail Stop 0550**
**245 Murray Lane SW**
**Washington, DC 20528-0550**
**Office: (202) 254-7109, Email: Richard.Vojtech@hq.dhs.gov**
**Program inbox – dndo.ari@hq.dhs.gov**

### The Grants Officer.

Shall be the DHS official that has the full authority to negotiate, administer and execute all terms and conditions of this Award in concurrence with the Program Officer.

**Arvette Leake-Davis**
**Office of Procurement Operations (MGMT I OPO)**
**245 Murray Lane SW, Mail Stop 0115**
**Washington, D.C. 20528-0115**
**Office: (202) 447-5903, Email: arvette.leake-davis@hq.dhs.gov**

## H. Additional Information

### Automatic Carry-forward/Carry-over

Budget periods are funded annually. Any unobligated funds remaining at the end of a budget period will automatically transfer to the next budget period, a process commonly known as carry-forward or carry-over, subsequent budget period amounts may be reduced in proportion to the carry-forward/carryover amounts. DHS may request estimated Federal Financial Reports (FFRS) be submitted prior to the budget period end date to determine potential unobligated amounts. **Large unobligated amounts may result in restriction of automatic carryover authority.**

### Extensions

Extensions to projects awarded under this NOFO are allowed. Please follow the instructions below to apply for an extension. The Applicant must complete an Extension Request form.

- Send a request for the form to the Program Office, the Grants Officer and the program inbox - dndo.ari@hq.dhs.gov. Upon completion of the Extension Request form, send your completed forms to the Program Office, Grants Officer and the program inbox.
- Requests shall be submitted no later than one month prior to the end of period of performance.

# APPENDICIES

## A. RESEARCH TOPIC AREAS

### RTA-01 Advanced Analytics supporting the GNDA

DNDO is charged with coordinating the development and implementing the domestic portion of the Global Nuclear Detection Architecture (GNDA), the framework for detecting (through technical and non-technical means), analyzing, and reporting on nuclear and other radioactive materials that are out of regulatory control. This topic seeks novel analytical approaches to evaluate the strengths, weaknesses, opportunities, and threats affecting the GNDA. Activities under this topic area include advanced techniques in operational modeling of GNDA nodes or pathways, economic research and cost/benefit analyses to support or inform policy decisions or research priorities, and analytical approaches to understanding adversary behaviors in response to GNDA implementation and messaging strategies. Such activities would include, but not be limited to those that:

- Improve the understanding of how factors external to the GNDA impact overall GNDA effectiveness, e.g. public perception and awareness;
- Examine the economic impact of nuclear (or radiological) terrorist act and determine how these impacts influence GNDA cost/benefit analyses;
- Apply innovative strategies and models needed to optimize the distribution of fixed and mobile detection assets (either manned or unmanned) during a wide area search considering both cost and performance.

### RTA-02 Studies on Wearable Nuclear Detection and Interdiction

DNDO has recently initialized the Wearable Intelligent Nuclear Detection (WIND) Advanced Technology Demonstration (ATD). The goal of this ATD is to develop and characterize advanced wearable (i.e., backpack) detection technology with optimized gamma / neutron detection response, spatial tracking and localization, device networking and reach back, and smart device integration. In order to augment WIND technology development and characterization and to enhance academic access to unique data sets, DNDO is seeking universities to pursue game-changing feasibility studies and technology assessments by pursuing a number of potential related thrust areas including but not limited to:

- Localization of both users and radioactive sources:
  - Low-cost and reliable tracking of operator position in both GPS-denied and GPS-enabled settings that may be enabled through video analytics, inertial measuring units (INU), fusion of cellular/Wi-Fi/Bluetooth technology, or by other novel means;
  - Utility of imaging and directional wearable detection systems during dynamic search operations;
  - Advanced techniques for tracking and then converging on moving sources in cluttered environments.

- Implementation of algorithm and visualization techniques such as augmented reality for projection of spectral surface emissions from spatial mapping approaches;
- Quantifying the uncertainties which arise from the extrapolations and interpolations used in spatial mapping of radiation fields.
- Studies of advanced scintillating materials for reducing non-threat alarms commonplace during man-portable search activities
- Development of realistic virtual 3D models of detectors in their intended operational environments to support visualization and exploration of proposed concepts of operations.

This work may be coordinated with on-going government characterizations in order to provide increased mission impact of the university based research. The awardee may work with government-furnished data and material to support a number of game-changing and high-risk feasibility studies as well as be given opportunities to support the government-sponsored characterization of those technologies. Government sponsored characterization means data collection, data reduction, data reporting and data analysis during government run technology demonstration. This may include travel for participating students to characterization sites.

### RTA-03 Model Validation for Nuclear Forensic Applications

There is a need to enhance and expand the knowledge of actinide chemistry and how it may form features during its formation of relevance for the nuclear fuel cycle. The topic area seeks to develop predictive models of chemical, morphological, microstructural, and physical properties to support nuclear forensics signatures and features. In order to assess the veracity of these predictive features, measured data is required to provide validation. Research that coordinates with expertise and resources within the national laboratory nuclear forensics community is recommended.

### RTA-04 Approaches to Detect Shielded Special Nuclear Materials (SNM)

The proposed research should investigate the approaches needed to determine if SNM is present in an object (e.g., truck, container, vessel, rail car), even when the SNM is heavily shielded or masked. Research can focus on, but is not limited to:

- Development of compact high repetition rate tunable multi-energy laser driven mono-energetic gamma source capable of up to 10 MeV operation for radiography or active interrogation;
- Innovative accelerator concept to improve size, weight, or performance over currently deployed systems;
- Detectors that perform better than conventional radiographic imaging detectors (e.g. $CdWO_4$, CsI) for active interrogation;
- Improved algorithms to differentiate between high-Z materials and to detect shielded SNM in the cargo by data fusion or reconstruction;
- New physics or signatures enabling the detection of shielded SNM including no-dose approaches.

Proposals should include a detailed explanation and justification of the research investigation. Successful approaches will dramatically enhance the ability to detect, adjudicate and interdict

nuclear threats when implemented in primary and secondary scanning roles. Collaborations and/or partnerships with industry or national laboratory are encouraged.

## B. DNDO ARI COVER SHEET TEMPLATE

| DNDO Academic Research Initiative Cover Sheet | | |
|---|---|---|
| **Proposal ID:** | **NOFO ID:** | **Research Topic Area:** |
| **Proposed Amount:** | **Proposed Duration (months):** | **Anticipated Start Date:** |
| **Project Title:** | | |
| **Primary Organization Information** | | |
| **Organization Name and Address:** | **Organization Postal Name and Address:** | |
| **DUNS + 4:** | **TIN/EIN:** | |
| **Principal Investigator (PI)/Project Leader Information** | | |
| **PI Full Name and Address:** | | |
| **PI Phone:** | **PI Fax:** | **PI E-mail:** |
| **Co-PI, Organization:** | **Co-PI, Organization:** | |
| **Co-PI Organization:** | **Co-PI, Organization:** | |
| **Collaborative Effort?:**<br><br>**If yes, list collaborator organization and PI name:** | **Additional Organization Name and PI for Collaboration:** | |
| **Abstract (500 words)** | | |

| DNDO Academic Research Initiative Cover Sheet (continued) | |
|---|---|
| **Project Information** | |
| **Primary Address of Project Effort:** | |
| **Does the project support another topic area?** **If so, which topic area:** | |
| **Has this proposal been submitted to other US Government Agencies or their components?** ***(If yes, list the name(s) of the agency or component and topic number)***<br><br>**Agency:** **Topic Number:** | |
| **Project Metrics** | |
| **Number of Graduate Students Support/Involved:** | **Number of Undergraduate Student Supported/Involved:** |
| **Number of Post-docs Supported/Involved:** | **Number of High School Students Supported/Involved:** |
| **Number of Relevant Publications:** | **Number of Relevant Patents:** |
| **Total Number of Research Personnel Supported/Involved:** | |
| **Will any foreign nationals be supported by this project?** | |

## C. QUAD CHART TEMPLATE

Title: Project Title

Org-PI: Prime Organization – Principal Investigator

**Photograph or Artist's Conception**

A simple but sufficiently detailed graphic to convey the main idea of the research effort and/or developmental prototype.

**Broader Impact**

- Describe how the research activity will foster the next generation scientists and engineers.
- Describe how the results of the research will broadly enhance the scientific community and society.

**Transformational Impact**

- Describe how the objectives will improve the Global Nuclear Detection Architecture or Technical Nuclear Forensics and their technical challenges.
- Describe the innovation of the approach and how it relates to the current

**Technical Merit and Approach**

- Methodology of technical approach
  - Risk and mitigation strategies
- Significant technical accomplishments / milestones over the past year (if applicable)
- Current status of the proposed approach
- Planned technical accomplishments / milestones for the next year
- Planned technical accomplishments / milestones for the following year (if applicable)

**Schedule and Funding**

- Milestones, primary deliverables, task durations, and funding for the current year
- Duration and funding for previous years and future years as applicable

**Team**

- Prime organization, principal investigator, and Co-principal investigator
- Subcontractors and main team members