

Request for Information
Air Force Research Laboratory (AFRL) Directed Energy Directorate

Laser Vulnerability Research (LVR)
RFI-RVKDL-2017-0001

THIS IS A REQUEST FOR INFORMATION (RFI) ONLY as defined in FAR 15.201(e). This RFI is issued solely for information and planning purposes to further the Government's understanding of market capabilities. This RFI is not a request for proposals; therefore responses to this notice are not considered offers and cannot be accepted by the Government to form a binding contract. This RFI does not commit the Government to contract for any supply or service whatsoever. This announcement shall **NOT** be construed as a commitment by the Government to issue a solicitation or ultimately award a contract, nor does it restrict the Government to a particular acquisition approach. Responses to this RFI will **NOT** be returned and no further feedback will be provided. Not responding to this RFI does not preclude participation in any future solicitation, if any is issued. If a solicitation is released, it will be synopsized on the Federal Business Opportunities (FedBizOpps) website. Submitted information shall be **UNCLASSIFIED**.

NO reimbursement will be made by the Government for any costs associated with providing information in response to this RFI or any follow up information requests.

The Air Force Research Laboratory (AFRL), Directed Energy Directorate (RD), Laser Vulnerability Research Program (LVR) is seeking information on industry capability performing research on the effects of high power continuous-wave (up to megawatt class) and possible comparisons to high energy pulsed lasers interacting with individual materials, multi-material subsystems, and/or fully functional targets. Accomplishing these research goals requires conducting both laser interaction testing and high-fidelity physics modeling and simulation to support the development of target vulnerability assessments.

A LVR program objective is to utilize the results of laser interaction testing with well controlled experimental procedures to determine susceptibility of various materials, components, and sub-systems to laser irradiation. Respondents shall provide a high-level description of their capabilities for addressing key areas for laser interaction testing including:

- Pre-Experimental Analysis
- Microstructural Analysis for Material Identification
- Material Characterization Testing, for example;
 - a) Specific heat
 - b) Thermal expansion
 - c) Optical characteristics – scattering and absorption
- Failure Modes Analysis
- Experimental Planning
- Unique Target Fabrication
- Experimental Environment
- Experiment Execution

- Post-experiment Data Reduction including Quantification of Experimental Uncertainty
- Post-experiment Failure Analysis
- Counter-measure Techniques
- Counter-Countermeasures Techniques
- Laboratory Hardware Selection, Calibration and Troubleshooting
- Special Diagnostics
- Contingency Planning and Range Safety

Another LVR program objective is to develop advanced computational methods for predicting the physical phenomenology resulting from high energy laser interactions. The goal is to develop a predictive capability which can support both high-fidelity modeling & simulation for vulnerability assessments as well as laser test development and execution. Prediction of the laser interaction must take into account a spatially and temporally resolved beam irradiance profile, absorption into the target, localized thermo-structural response, coupled physical phenomena, and resulting damage modes. Respondents shall provide a high-level description of their capabilities for addressing key areas for laser interaction modeling including:

- Develop and Demonstrate State-of-the-Art Physics-based Models for Predicting Laser Effects
- Model Verification and Validation
- Experimental Coordination and Data Analysis
- Develop Simplified Physics-based Solvers for Engineering Models
- Parametric Analysis, Optimization, and Uncertainty Quantification
- Software, Database, and Hardware Maintenance

Finally, the LVR program will combine results from testing, target optical signature measurements, target exploitation intelligence, system-level fault tree and failure mode analysis, shotline dependency, and computational predictive results into a comprehensive probabilistic vulnerability assessment. The LVR program will utilize these assessments in support of AFRL/RD laser weapon system concept development and requirements definition. Respondents shall provide a high-level description of their capabilities for addressing key areas for target assessments including:

- Target and Threat Characterization
- Develop and Demonstrate State-of-the-Art Engagement and Engineering Models for Predicting Laser Effects
- Model Verification and Validation
- Integration of Experimental Data and High-End Modeling Results into Assessment Process
- Target Vulnerability Assessment
- Software, Database, and Hardware Maintenance

The Air Force Research Laboratory is seeking industry's abilities and potential solutions capable of meeting ALL the requirements listed below:

1. Conducting experimental efforts using a variety of high power laser systems to evaluate laser/material interactions, component failure, and target vulnerability against systems of interest to the Air Force and other Governmental agencies.
2. Supporting program experiments to include test plan development, test article acquisition, surrogate test article fabrication or procurement, test set-up and execution, data reduction and analysis, and documentation of both testing and analysis of the results from test activities.
3. Developing and Managing testing capabilities to include beam train design documentation, test layout design and documentation, test hardware fabrication, test diagnostic instrumentation, material property measurements, raw data collection and documentation, test reports in the form of monthly technical status reports as required for test operations, and incidental programming or software developed during the test analysis and experimentation.
4. Maintaining and Documenting laboratory functionality to support the technical requirements and research and development needs of the program.
5. Developing physics-based models to predict the target response accurately during laser irradiation quantifying susceptibility and improving the understanding of target vulnerabilities.
6. Performing parametric studies for analyzing the laser performance trade space and uncertainty quantification for tracking solution uncertainties.
7. Identifying governing physical processes necessary to represent the target response and simplify physics-based models to an engineering level for integration in engagement and mission-level models.
8. Completing assessments for combining target vulnerability data from testing, target optical signature, target exploitation intelligence, fault tree and failure mode analysis, functional assessments, and system-level modeling and simulation.
9. Completing assessments including proper interpretation of post-test data, calibration into physical quantities, uncertainty, confidence intervals, and regimes of applicability.
10. Integrating vulnerability data and effects models with engagement and mission level models to ensure proper representation of target susceptibility to laser systems in mission studies.

Interested parties capable of performing this work are invited to submit a capability statement on company letterhead no later than **30 JAN 2017 at 12:00 noon Mountain Standard Time (MST)**. Provide sufficient written information to indicate capacity and any other specific and pertinent information. Any responses received not also addressing items a-d below may be considered as incapable of meeting the Government's requirements.

Company Profile

- (a) Company Name and Mailing Address
- (b) CAGE Code and DUNS Number
- (c) Point(s) of Contact to include telephone number and e-mail address
- (d) Business Size Status (i.e. 8(a), HUBZone, woman-owned, Service Disabled Veteran-Owned, Small Business, Large Business, Historically Black College/University). Also, indicate if entity is a minority-serving institution of higher education that meets the definition of "Covered Institution" (as defined in 10 USC 2362 Covered Educational

Institution) which is (1) an institution of higher education eligible for assistance under title III or V of the Higher Education Act of 1965 (20 U.S.C. 1501 et seq); or (2) an accredited postsecondary minority institution). The applicable NAICS code is 541712 with an associated small business size standard of 500.

Responses must be unclassified and any proprietary information provided must be portion marked accordingly. The Government shall not be liable for or suffer any consequential damages for any proprietary information not properly identified.

There are three objectives for this program therefore, the possibility of three awards exists to meet this requirement. Respondents may submit a capability statement to any or all of the three objective areas.

RFI responses are limited to twenty (20) pages, singled-sided, single-spaced, Times New Roman 12-point font with one inch margins. A cover page, index and response to use of non-Government advisors are not included in the page count.

Submittals should consist of an original and an electronic version (CD-ROM) in a format readable and usable by Microsoft (MS) Word 2007® or in PDF format viewable with the standard Adobe Acrobat Reader®.

Submissions shall be delivered by **MAIL ONLY** and received **NLT 30 JAN 2017 at 1200 Noon MST**, to the Contracting Office at the following address:

Det 8 AFRL/RVKDL
Attn: Sara Chesser
Contracting Specialist
3550 Aberdeen Ave. SE, Bldg 499
Kirtland AFB NM 87116-5776
sara.chesser.2@us.af.mil

NOTE: Submissions sent via facsimile, hand delivered or electronically will NOT be accepted.

The operations, research, and test data produced under a resultant contract may contain Military Critical Technology List (MCTL) information whose export is restricted by the Export Control Act (Title 22, USC, Section 2751, et seq.) or the Export Administration Act of 1979, as amended (Title 50, USC, App. 40-1, et seq.). Therefore, **ONLY** offerors who are certified by the Defense Logistics Information Service (DLIS) may submit statements of capability. Contact US/Canada Joint Certification Office, DLIS, Federal Center, 74 Washington Ave, North, Battle Creek, Michigan, 49037-3084, (800) 352-3572, <http://www.dlis.dla.mil/jcp/>, for further information on certification and the approval process.