

PROGRAM ANNOUNCEMENT



DEPARTMENT OF DEFENSE

High Energy Laser Multidisciplinary Research Initiative (HEL-MRI)

Fiscal Year 2012

W911NF-12-R-0003



**Issued by the Army Research Office (ARO)
on behalf of the**

**Deputy Undersecretary of Defense for Science and Technology and the High Energy
Lasers-Joint Technology Office (HEL-JTO)**

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Full Proposals Due: 1 February 2012

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OVERVIEW INFORMATION

- **Federal Agency Name** –
High Energy Lasers – Joint Technology Office, Albuquerque, NM
- **Issuing Acquisition Office** –
US Army Contracting Command, Aberdeen Proving Ground
Research Triangle Park Division, Durham, NC
- **Funding Opportunity Title** – Fiscal Year 2012 High Energy Laser
Multidisciplinary Research Initiative (HEL MRI)
- **Funding Opportunity Number** – W911NF-12-R-0003
- **CFDA Number** – 12.630 Basic, Applied, and Advanced Research in Science and
Engineering
- **Announcement Type** – This is the initial announcement (November 2011). This
publication constitutes a program announcement as authorized by DoDGARs
22.315(a). A formal Request for Proposals (RFP) or solicitation will not be
issued.
- **Response Date** –
Full Proposals: Wednesday, 1 February 2012, 4:00 PM Eastern Standard Time
- **Research Opportunity Synopsis** –

Under the authority vested in the Secretary of Defense by 10 USC 113 and Public Law No. 106-398 Sections 241-250, High Energy Laser Programs, as established by the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001, the Department of Defense (DoD) announces the Fiscal Year 2012 High Energy Laser Multidisciplinary Research Initiative (HEL MRI). This program is executed under the policy and guidance of the Office of the Deputy Undersecretary of Defense for Science and Technology (DUSD (S&T)) and administered by the US Army Research Office (ARO), Durham, NC and the High Energy Lasers-Joint Technology Office (HEL-JTO), Albuquerque, NM. The High Energy Lasers-Joint Technology Office is seeking unclassified, fundamental research proposals in the topics described in SECTION I, FUNDING OPPORTUNITY DESCRIPTION. Proposed basic research should have the potential to transition to applied research at the end of the performance period. Fundamental research includes both basic research and applied research (see definitions section of this announcement).

I. FUNDING OPPORTUNITY DESCRIPTION

There are eight major topic areas for the FY2012 HEL MRI. The specific research topic descriptions are provided below.

FEL-1: INVESTIGATE METHODS TO IMPROVE FREE ELECTRON LASER

Proposals are sought for research and investigations into new, unique, and advanced methods to substantially improve the operation of the very high power Megawatt class (MW) Free Electron Laser (FEL). Specifically, research is sought for the improvement of the electron beam stability at high average current levels, the mitigation of beam halo, and the investigation of Coherent Synchrotron Radiation and the mitigation of its effects in increasing the beam emittance.

GL-1: OPTICALLY AND ELECTRICALLY PUMPED GAS LASERS

Recent advancements have generated increased interest in gas lasers that are optically or electrically pumped (thereby avoiding the use of large quantities of potentially dangerous chemicals while maintaining the opportunity for power scaling via thermal management based on gas circulation). One example has been the development of narrow-linewidth diode lasers, which has enabled diode-pumped alkali lasers (DPALs). Other examples are the exciplex pumped alkali laser (XPAL), which circumvents the need for a narrow-line pump, and the electric oxygen ion laser (EOIL), which can be pumped by an electrical discharge.

Proposals are sought for the development of gas lasers based on novel pumping schemes (as exemplified above) that have high energy efficiency and would be ultimately scalable to high average power operation at wavelengths that propagate in the atmosphere. Offerors are encouraged to address basic issues such as pumping schemes, energy flow and quenching kinetics, thermal management, optical aberrations, and materials issues such as chemical reactivity and passivation.

SSL-1: NOVEL FIBER LASERS

Proposals are sought for systematic research directed toward greater knowledge and understanding of the fundamental aspects of fiber lasers scalable to high average power. This research should (1) demonstrate potential for a broad range of Directed Energy (DE) applications, (2) include comprehensive modeling and experimentation aimed at the significant advancement of fundamental knowledge in the field, and (3) be farsighted, high-payoff research that provides the bases for technological progress. This research may lead to (a) subsequent applied research and advanced technology developments, and/or (b) the discovery of new knowledge that may lead to more focused advances in fiber laser technologies.

Research and development in novel fiber lasers should show developments consistent with DE applications, such as high efficiency, high beam quality, and scalability to high

average power. All experimental efforts should also include comprehensive modeling. Models should be validated with experimental data that could be utilized in future research and in the development of a deeper understanding of the physical phenomena involved.

The research should explore novel clad fiber lasers with the potential to deliver excellent beam quality, with the goal to emit up to 20kW per fiber, and be suitable for beam combining. It is expected that one or more of the following areas be included in the research proposal:

- Research into fiber laser materials such as crystalline fibers, ceramic fibers, and alternative silica glass fibers
- Research into fiber laser designs, both passive and/or active, such as photonic bandgap fibers, photonic crystal fibers, large mode area (with mode selectivity), etc.
- Research into fiber laser components such as couplers, end caps, diffusers, isolators, etc.
- Research into laser beam combining concepts to achieve high energy with good beam quality such as spectral beam combining, coherent combining passively or actively, etc.

SSL-2: NOVEL LASER GAIN MATERIALS

Proposals are sought for systematic research directed toward greater knowledge and understanding of the fundamental, critical properties of high power solid state laser materials. This research should (1) include comprehensive modeling and experimentation aimed at the significant advancement of fundamental knowledge in the field and (2) be farsighted, high-payoff research that provides the bases for technological progress. This research may lead to subsequent applied research, advanced technology developments, and new or improved capabilities.

Research in novel laser gain materials should show developments consistent with Directed Energy (DE) applications, such as high efficiency, high thermal conductivity, excellent beam quality, and scalability to high average power. Models should be validated with experimental data that could be utilized in future research and in the development of a deeper understanding of the physical phenomena involved. The research should explore diode pumped, bulk solid state lasers operating within good atmospheric transmission windows anywhere from 1 to 2.1 microns in wavelength. Research should contribute to a more developed understanding of (1) the thermal-optical-mechanical material properties when applied to high average power lasers and (2) the spectral properties and laser dynamics of the materials in a pump configuration. Research should lead to engineered gain media with designs that include Amplified

Spontaneous Emission (ASE) suppression, cladding, thermal management, mode control, gradient doping, composite structures, the minimizing of the effects of interfaces, etc.

SSL-3: NON-LINEAR OPTICS (NLO) EFFECTS MODELING AND MATERIAL DEVELOPMENT

Proposals are sought for systematic research directed toward greater knowledge and understanding of the fundamental aspects of non-linear effects scalable to high energy. This research should (1) have the potential for a broad range of Directed Energy (DE) applications, (2) include comprehensive modeling and experimentation aimed at the significant advancement of fundamental knowledge in the field, and (3) be farsighted, high-payoff research that provides the bases for technological progress. This research may lead to (a) subsequent applied research and advanced technology developments, and/or (b) the discovery of new knowledge that may lead to more focused advances in Directed Energy (DE).

Research and development in non-linear effects should show developments consistent with DE applications, such as high efficiency, high beam quality, and scalability to high average power. All experimental efforts should also include comprehensive modeling. Models should be validated with experimental data that could be utilized in future research and in the development of a deeper understanding of the physical phenomena involved. The research should explore techniques yielding excellent beam quality (BQ) along with high continuous wave (CW) average laser power. The focus is on fiber and bulk solid state lasers with designs to very high power output. Areas of consideration are: non-linear optics (NLO) beam combining, Raman applications (conversion & suppression), Stimulated Brillouin Scattering (SBS) for suppression and/or exploitation (such as for beam clean-up), and other non-linear techniques that could be exploited to enhance high average power performance.

BC-1: ROBUST OPTICS IN ADVERSE ENVIRONMENTS

This effort seeks research and development of damage resistant optical components in contaminant prone field conditions, to include (1) moisture, salt spray, and sand/dust environments, (2) harsh lasing environments like UV (ultraviolet) loading (such as in Free Electron Laser), and (3) chemical surface contamination. Thin film optical coatings are being produced with ultra low absorption and scatter characteristics permitting operation at very high power densities. Usually, these high energy laser (HEL) optical coatings are used in very controlled environments, clean rooms, inert gas pressurized enclosures, etc. As HEL systems are developed for field use, the actual operating environment for these optical coatings will no longer be pristine, facilitating a need for the understanding of how external contaminants, cleaning procedures, thermal extremes, and other environmental factors affect the optical coating survivability under high energy laser irradiation.

It is necessary to investigate the influence of these environmental factors, cleaning techniques, and surface contaminants on optical coatings, substrates, the optical coating

interfaces, and their vulnerability to laser damage. Wavelengths of interest span the interval of 1-5 μm . This project could include collaboration in laser damage testing at a Government laboratory. Ideas in theory, fabrication, and measurements are sought to gain an understanding of the influence of harsh environments and contaminants on laser damage threshold reduction, loss of optical performance, contamination initiated laser damage thresholds, cleaning procedures, and vulnerability to prolonged laser exposure.

BC-2: PROPAGATION THROUGH THE LOW ATMOSPHERE

Effective wavefront sensors and adaptive optics techniques have been developed for compensating the degrading effects of turbulence on laser beam propagation through the atmosphere. These techniques are generally effective only for short optical paths or for weak to moderate atmosphere turbulence conditions having homogeneous statistical properties (i.e. Kolmogorov model statistics, Rytov variance $\ll 1$). For low-altitude near-horizontal paths, the turbulence can become strong (Rytov ~ 1) and non-homogeneous (non-Kolmogorov), resulting in severe laser beam phase aberrations, anisoplanatism effects, and scintillation. These conditions severely reduce the effectiveness of techniques currently used for adaptive optical system compensation.

Research is sought to better understand laser beam propagation over near-horizontal paths of up to 20 kilometers (with varying terrain) and to develop approaches for adaptive optics compensation of atmospheric turbulence effects resulting from these conditions. Richer statistical models and spatial/temporal means of characterizing these propagation problems are of interest. Improved wavefront sensing and adaptive optics techniques are sought to mitigate the much more degrading atmospheric propagation effects encountered for low-altitude near-horizontal paths. Research should include (1) improvement of models and techniques for wavefront sensing of highly scintillated turbulent structures (such as the correct interpretation of branch points), (2) development of advanced techniques for wavefront reconstruction under strong turbulence conditions, and (3) development of adaptive optics or other approaches for compensation of strong turbulence effects on laser beam propagation in the atmosphere. This effort should be a combination of analytical modeling and field observation.

BC-3: AIRBORNE AERO-OPTIC ABERRATION MEASUREMENT AND PREDICTION

Proposals are sought for research directed toward greater knowledge and understanding of the aerodynamic flow over turreted laser beam directors as relevant to the large dynamic optical aberrations induced by the aerodynamic flow (at wavelengths from the visible to 2 μm). Understanding, mitigating, and predicting the aerodynamic flow features that cause these aberrations are the focal points of this topic. An additional issue is the turret buffeting caused by the aerodynamic flow (leading to mechanical jitter of internal optics). The Joint Technology Office (JTO) has sponsored HEL-MRI work in this area for a traditional ball-on-cylinder turret up to Mach 0.71. Research in this same area is now sought at Mach of at least 0.8 and for non-traditional but more aerodynamic turret configurations. Issues to be addressed by this topic include: turret aerodynamic

design and passive/active mitigation approaches, validation of wind tunnel testing, flight testing of scaled turrets, and fluid/structural dynamic modeling (Computational Fluid Dynamics (CFD) and Finite Element Method (FEM)) to predict these effects.

II. AWARD INFORMATION

Through this announcement, the DoD intends to award approximately \$6-7M for FY 2012, subject to the availability of funds. Approximately twelve to fifteen (12-15) awards are anticipated. It is projected that awards will be made in the form of grants or cooperative agreements. The estimated value of each award is approximately \$500K per year for three (3) years with an additional two (2) year option period. Exceptionally meritorious proposals may be considered for up to \$1M per year. Funding for years four (4) and five (5) is contingent upon completion of a satisfactory third year oral review. The third year review will be conducted by a multi-government agency panel composed of members from the US Army Research Office (ARO), the US Air Force Office of Scientific Research (AFOSR), the Office of Naval Research (ONR), the High Energy Lasers-Joint Technology Office (HEL-JTO), the Defense Advanced Research Projects Agency (DARPA), and other agencies. The panel will assess the third year review results to determine the satisfactory level of each research proposal. Exceptional proposals will be considered for higher funding levels. Evaluations and awards will be subject to the Department of Defense Grant and Agreement Regulations (DoDGARs) and any other applicable laws and regulations.

III. ELIGIBILITY INFORMATION

1. Eligible Applicants: The primary focus of the FY2012 HEL MRI is to enhance the capabilities of US institutions of higher education to perform fundamental science and engineering research related to lasers, optics, laser interaction physics, and relevant advanced concepts. This research is authorized by Public Law No. 106-398 Sections 241-250. Awards will be made to degree-granting US institutions of higher education. Federally Funded Research and Development Centers (FFRDCs) and Government laboratories are not eligible for awards under this announcement, although they may participate as subawardees. Entities other than US institutions of higher education, to include non-profit organizations, not-for-profit organizations, private industry concerns, and foreign universities/research institutions are not eligible for awards under this announcement, although they may participate as subawardees. Domestic institutions of higher education/universities are to be the primary awardees and must perform at least 60% of the proposed research effort (universities participating as first tier subawardees count within the 60% requirement threshold). Industrial and non-profit/not-for-profit partners may not contribute more than 40% of the total effort or receive more than 40% of awarded funds. Only proposals submitted directly by domestic institutions of higher education/universities (to include US Military Academies) will be considered for award. United States Military Academies are eligible as prime awardees or subawardees under this announcement. If a proposal selected for award is to a US Military Academy, or if

the proposal includes one or more subawards to a Federally Funded Research and Development Center, Government laboratory, or US Military Academy, award funds allocated for FFRDCs, Government laboratories, and/or US Military Academies will be provided via a Military Interdepartmental Purchase Request (MIPR). No award funds will be channeled directly from a prime awardee to a Federally Funded Research and Development Center, Government laboratory, or US Military Academy subawardee.

2. Cost Sharing or Matching: Cost sharing or matching is not a requirement for eligibility under this announcement.

3. Principal Investigator: The named Principal Investigator must be employed on a full-time basis by the institution and hold a regular position. If these two conditions are not in effect at the time of proposal submission, an accompanying letter from the institution shall be submitted with the proposal to indicate that the named Principal Investigator will be considered for a full-time regular position in the event that the proposal is selected for award. Failure to submit this letter with the proposal will deem the offeror to be non-responsive and the proposal will not be considered for award. The named Principal Investigator must be a US citizen, national, or permanent resident.

IV. APPLICATION AND SUBMISSION INFORMATION

1. Application and Submission Process:

Submission of White Paper:

This announcement does not require or involve white paper submissions. White papers will not be accepted for feedback or evaluation under this announcement.

Submission of Full Proposal:

Full proposals must be **submitted electronically via Grants.gov**, <http://www.grants.gov>.

After a full proposal is submitted through Grants.gov, the Authorized Organization Representative (AOR) will receive a series of three e-mails. It is extremely important to save each of these e-mails. You will know that your proposal has reached the Army Research Office upon receipt of the third e-mail. You will need the submission receipt number provided in the first e-mail to track a submission. The three e-mails are:

Number 1 – The applicant will receive a confirmation page upon completing the submission to Grants.gov.

Number 2 – The applicant will receive an e-mail indicating that the proposal has been validated by Grants.gov within two days of submission. (This means that all of the required fields have been completed.)

Number 3 – The third notice is an e-mail from Grants.gov acknowledging that the designated agency has downloaded the proposal. This e-mail is normally sent within ten days of the proposal being validated in Grants.gov.

2. Content and Format of Full Proposal:

Full proposal format shall be as follows:

- Paper size when printed: 8.5 X 11 inches
- Margins: 1 inch; Spacing: Single; Font: Times New Roman 10 Point
- A full proposal will be composed of the following (see pages 9-12) of this announcement):
 - (a) SF 424 (R&R) Form
 - (b) Research & Related Other Project Information Form
 - (c) Project Summary/Abstract
 - (d) Project Narrative
 - (e) Bibliography & References Cited
 - (f) Facilities & Other Resources
 - (g) Equipment
 - (h) Budget/Cost Proposal
- Number of Pages: Full proposals may not exceed 25 single-sided pages. Tables, charts, figures, and other illustrations count toward the 25-page limit. The 25-page limit excludes the SF 424 (R&R) Form, Research and Related Other Project Information Form, cover page/letter, table of contents, project summary/abstract, bibliography and references cited, curriculum vitae, letters of support, national policy compliance certifications, budget(s)/cost proposal(s), and supporting budget/cost proposal narrative(s)/documentation (i.e. equipment quotes, rate agreements, etc.).

INSTRUCTIONS FOR GRANTS.GOV SUBMISSION

These instructions are provided to assist with the submission of proposals through <http://www.grants.gov>.

Registration Requirements for Grants.gov:

There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with Central Contractor Registration, register with the credential provider, and register with Grants.gov). To begin this process, go to the Grants.gov registration webpage, http://www.grants.gov/applicants/get_registered.jsp.

You may download the Grants.gov Organization Registration User Guide and Organization Registration Checklist from this webpage. The webpage also features an Organization Registration Overview Tutorial. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants who are not registered with CCR and Grants.gov should allow at **least 21 days** to complete these requirements. It is suggested that the process be started as soon as possible. Questions relating to the registration process, system requirements, or the submission process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

Grants.gov Full Proposal Submission Content and Format of Applications:

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 search for the funding opportunity number that appears on the first page of this announcement.

Content and Form of Application:

You must complete the mandatory forms 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 announcement.

a. Form: SF 424 (R&R) – Mandatory Form

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. To activate the instructions, turn on the "Help Mode" (icon with the pointer and question mark at the top of the form).

b. Form: Research & Related Other Project Information – Mandatory Form

Complete fields 1 through 6 and attach files for fields 7 through 12. To attach files in fields 7 through 12, click "Add Attachment." The files must comply with the instructions cited below for each field.

c. Project Summary/Abstract (Field 7 on the Form)

The project summary should be a single page (not to exceed 500 words) that identifies the research problem, technical approaches, anticipated outcome of the research, and impact on DoD capabilities. It should identify the Principal Investigator and other key research personnel as well as all institutions and/or industry concerns involved in the project. In the header of the abstract, include the proposal title and the topic number/title as specified in SECTION I of this announcement. 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 Times New Roman 10 point.

d. Project Narrative (Field 8 on the Form)

The full content of your narrative must include the following information:

Table of Contents: List project narrative sections and corresponding page numbers.

Technical Proposal/Statement of Work:

Project Narrative (Statement of Objectives) – Cite the research goals and objectives in a one-page Statement of Objectives. Active verbs should be used in this statement (for example, “conduct” research into a topic, “investigate” a problem, “determine” to test a hypothesis).

Project Narrative (Research Effort) – Describe in detail the research to be performed. State the objectives and approach and their relationship and comparable objectives in progress elsewhere. Discuss the relationship of the proposed research to the state-of-the-art knowledge in the field and to related efforts in programs elsewhere. Identify potential scientific breakthroughs that could result from the research. Include appropriate literature citations/references. Discuss the nature of expected results and how data will be analyzed and interpreted. Provide a summary of the schedule of events and milestones. The adequacy of this information will influence the overall evaluation. Letters of support from field experts in academia, industry, or government may be helpful in determining technical merit. Proposals for continuation of existing support must include a description of progress if the proposed objectives are related.

Project Narrative (Impact) – Describe the expected impact of the research on the high energy laser technology field and the DoD. Address the transformative potential of the research on existing technologies, systems, methods, approaches, etc. The transition potential of the research from basic research to applied research by the end of the performance period should be discussed in this section.

Project Narrative (Principal Investigator/Key Personnel) – Include curriculum vitae of all key personnel. For efforts involving multiple Principal Investigators, identify the primary Principal Investigator who will provide a single or initial point of communication between the sponsoring agency(ies) and the awardee organization(s). If not otherwise designated, the first Principal Investigator (PI) listed will serve as the primary PI. This individual can be changed upon notification of the agency. The sponsoring agency(ies) does not infer any additional scientific stature to this role among collaborating investigators. List the estimates of time that the Principal Investigator and other senior personnel will devote to the research. Include information pertaining to other commitments of time (such as sabbatical or extended leave). List current and pending DoD awards to the Principal Investigator and key personnel as follows:

- List of previous, current, and pending DoD awards to applicant organization and investigator(s)
- List of current and pending non-DoD support for each investigator collaborating on this proposal

- List of other agencies, organizations, or funding sources to which this proposal has been submitted (if applicable)

Project Narrative (Management/Facilities) – Describe the overall approach to the management of this effort, to include the following: required facilities; relationships with any subawardees and/or other organizations; availability of personnel; planning, scheduling, and control procedures. Describe facilities available for performing the proposed research and any additional facilities or equipment the organization proposes to acquire at its own expense. List government-owned facilities or equipment already possessed that will be used. Briefly indicate whether the proposed research will result in environmental impact outside the laboratory/research facilities and how the offeror institution will ensure compliance with environmental statutes and regulations.

e. Bibliography & References Cited (Field 9 on the Form)

f. Facilities & Other Resources (Field 10 on the Form)

g. Equipment (Field 11 on the Form)

h. Other Attachment – Budget/Cost Proposal (Field 12 on the Form)

Attach the budget/cost proposal(s) and supporting narratives at field 12. You must provide a detailed breakdown of all costs. For proposals exceeding one year, provide separate budgets for each year and a summary budget for all years. Include a quarterly spending plan/profile that will match the anticipated needs of the research. The Research and Related Budget Form may be used but is not required. The budget/cost proposal(s) must include the following information:

- Direct Labor/Fringe: For all employee/labor categories, indicate the amount of time being charged to the proposed (hours per month per employee and/or labor category) and show resulting costs based on current or projected salary and fringe benefits. Estimate stipends, fees, and health insurance for students, if applicable.
- Materials/Supplies: Estimate costs of materials and supplies. List types of materials needed and costs. Provide a basis for the estimate.
- Equipment: Describe any equipment to be acquired and the basis of cost estimates. Costs should be based on recent quotations from manufacturers or distributors. Provide copies of vendor quotes. Describe the purpose of the proposed equipment.
- Travel: Identify any travel requirements associated with the proposed research and define its relationship and significance to the project. List proposed destinations and purpose for each trip, as well as the number of travelers per trip. Provide a basis for the estimate.

e. Other Direct Costs: Describe any other additional direct costs such as publications, communication, student tuition, facilities and equipment rental/user fees, consultant fees, etc. Provide a basis for the estimate.

f. Subaward Costs: Provide a description of the work to be performed by each subrecipient, if applicable, and provide a detailed budget for each. Each subrecipient must provide a basis for each cost element proposed.

g. Indirect Costs (Overhead, General and Administrative, Facilities Capital Cost of Money (FCCM), and Other): Provide the most recent rates, rate agreements, dates of negotiations, the period to which the rates apply, and a statement identifying whether the proposed rates are provisional or fixed. If the rates have been negotiated by a Government agency, state when and by which agency. Include a copy of the current rate agreement(s) with the budget.

h. Total Direct and Indirect Costs: Provide the total costs per year and a cost summary for the entire proposal period.

i. Fee or Profit: Fee or profit is not allowable for the prime recipient or any subrecipient of a grant or cooperative agreement.

3. Significant Dates and Times/Schedule of Events:

Event	Deadline Date	Deadline Time
Questions Regarding Full Proposals	20 January 2012 *	12:00 PM Eastern Standard Time
Full Proposals Due	1 February 2012	4:00 PM Eastern Standard Time
Notification of Selection for Award	15 March 2012 **	
Start Date of Awards	1 June 2012 **	

* Questions received after this date and time will not be answered, and the due date for submission of the proposals will not be extended.

** This is an estimated date.

4. Late Proposals: Any full proposal submitted and validated through Grants.gov whereby the date/time for submission is after the deadline for proposal submission as specified in SECTION IV of this announcement (Significant Dates and Times/Schedule of Events) will be considered late and will not be evaluated unless the Grants.gov website was not operational on the due date/time and was unable to receive the proposal submission. If this occurs, the time specified for the receipt of proposals through Grants.gov will be extended to the same time of the day specified in this announcement on the first workday on which the Grants.gov website is operational. Be advised that Grants.gov applicants have been experiencing system delays and validation issues which may impact proposal submission time. After a proposal is uploaded to Grants.gov, the offeror receives an e-mail message indicating the proposal has been submitted and that the validation process will take up to two days. As it is possible for Grants.gov to reject the proposal during this process, it is **STRONGLY recommended that proposals be uploaded at least 48 hours prior to the deadline specified in this announcement. Additionally, offerors are also advised to plan ahead to prevent late proposals resulting from internal electronic data/computer resources delays that may originate from their submission sites.**

V. EVALUATION INFORMATION

1. Full Proposal Evaluation Process:

All proposals received prior to the submission deadline will be subject to a technical peer review using merit-based competitive procedures as described in DoDGARs 22.315. Proposals may be evaluated by program managers from the US Army Research Office (ARO), the US Air Force Office of Scientific Research (AFOSR), the Office of Naval Research (ONR), the High Energy Lasers-Joint Technology Office (HEL-JTO), the Defense Advanced Research Projects Agency (DARPA), the European Office of Aerospace Research & Development (EOARD), the Asian Office of Aerospace Research and Development (AOARD), the US Air Force Research Laboratory (AFRL) Technology Directorates, and other agencies.

Employees of commercial firms under contract to the Government may be used to administratively process proposals. These support contracts include nondisclosure agreements prohibiting contractor employees from disclosing any information submitted by other contractors.

All proposals are treated as privileged information prior to award and the contents are disclosed only for the purpose of evaluation in accordance with applicable laws and DoD regulations. Offerors are expected to appropriately mark proprietary information. Technical and cost proposals (or any other material) submitted in response to this announcement will not be returned. Funding for direct reimbursement of proposal development costs will not be provided.

Proposals may be submitted for one or more topics or for a specific portion of one topic. Offerors may submit separate proposals on different topics or different proposals on the same topic. The US Government does not guarantee an award in each topic area. Furthermore, be advised that as funds are limited, otherwise meritorious proposals may not be funded. Therefore, it is important that proposals show strength in as many of the evaluation areas as practicable for maximum competitiveness.

IMPORTANT: As specified in SECTION IV (Content and Format of Full Proposal), full proposals must not exceed the 25-page limit. **Proposal pages beyond the 25-page limit will not be evaluated or read.**

2. Full Proposal Evaluation Criteria:

Proposals submitted in response to this announcement will be evaluated using the following criteria:

Primary evaluation criteria (of equal importance to each other) are:

- a. The overall scientific and/or technical merits of the proposed research
- b. Potential relationship of the proposed research to DoD missions

Secondary evaluation criteria (of less importance than primary criteria but of equal importance to each other) are:

- c. The offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposed objectives
- d. The qualifications, capabilities, and experience of the proposed principal investigator, team leader, and/or other key personnel who are critical to achievement of the proposed objectives
- e. The offeror's and associated personnel's records of past performance
- f. The likelihood or potential of the research transitioning from basic research to applied research at the end of the performance period
- g. The offeror's plan for establishing collaborations with scientific organizations that transition research findings to applications. Domestic industrial organizations, DoD laboratories, and DoD organizations that perform research and development are encouraged to be involved in this process. These collaborations may include but are not

limited to funding via subcontract awards, exchange of technical ideas, and/or exchange of scientific related personnel to further advance the technology transition.

- h. The reasonableness and realism of proposed costs

VI. AWARD ADMINISTRATION INFORMATION

1. Award Notices:

Written notification of award selection or non-selection will be provided via e-mail correspondence to all principal investigators who submitted a full proposal (provided the proposal was received prior to the submission deadline). Award selections will not be announced by press release or posted online. The notification of award selection must not be regarded as an authorization to begin performance or commit/expend funds. The Government is not obligated to provide any funding until a Government Grants Officer signs the respective award document.

2. Administrative and National Policy Requirements:

Administrative:

Meeting Requirements: Meeting requirements will vary by project.

Travel Requirements: All Principal Investigators will be required to travel to project review meetings twice annually (three (3) days each meeting) during the course of the project and should budget for this travel accordingly. Project review meetings may be held onsite at the HEL-JTO facility, Albuquerque, NM, or other CONUS location(s).

Government Property/Government Furnished Equipment and Facilities:

Government equipment, research facilities, and operational military units may be available and may be considered as potential Government-furnished equipment/facilities. The use of these facilities and resources may be negotiated as the program unfolds. Offerors should explain as part of their proposals if any of these resources could be useful to the success of a proposed project.

Department of Defense High Performance Computing Program: The DoD

High Performance Computing Program (HPCMP) furnishes the DoD S&T and DT&E communities with user access to very powerful high performance computing systems. Awardees of DoD contracts and assistance instruments may be eligible to use HPCMP assets in support of their funded activities if Program Officer approval is obtained and security/screening requirements are favorably completed. Additional information and an application may be found at <http://www.hpcmo.hpc.mil>.

National Policies:

Lobbying: Federal regulations (Appendix A to 32 CFR Part 28) require certification regarding lobbying at the time of proposal submission-

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 USC Sec. 1352, as implemented by the DoD at 32 CFR Part 28. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Human Subjects: All research involving human subjects must be conducted in accordance with 32 CFR 219, 10 USC 980, and DoDD 3216.2, as well as other applicable federal and state regulations. Contractors must be cognizant of and abide by the additional restrictions and limitations imposed on the DoD regarding research involving human subjects, specifically as regarding vulnerable populations (32 CFR 219 modifications to subparts B-D of 45 CFR 46), recruitment of military research subjects (32 CFR 219), and surrogate consent (10 USC 980). The regulations mandate that all DoD activities, components, and agencies protect the rights and welfare of human subjects of study in DoD supported research, development, test/evaluation, and related activities hereafter referred to as "research." The requirement to comply with the regulations applies to new starts and to continuing research.

Animal Subjects: DoD Directive 3216.1 dated 17 April 1995 provides policy and requirements for the use of animals in DoD funded research. The DoD definition of animal is any live nonhuman vertebrate. All proposals that involve the use of animals

must address DoD compliance with Directive 3216.1. Provisions include rules on animal acquisition, transport, care, handling, and use in 9 CFR Parts 1-4, Department of Agriculture rules implementing the Laboratory Animal Welfare Act of 1966 (7 USC 2131-2156), and guidelines in the National Academy of Sciences (NAS) “Guide for the Care and Use of Laboratory Animals” (1996), including the Public Health Service Policy and Government Principles Regarding the Care and Use of Animals in Appendix D to the Guide.

Environmental Compliance: Federal agencies making contract, grant, or cooperative agreement awards and recipients of such awards must comply with various environmental requirements. The National Environmental Policy Act of 1969 (NEPA), 42 USC Sections 4321-4370 (a), requires that agencies consider the environmental impact of “major Federal actions” prior to any final agency decision. With respect to those awards which constitute “major Federal actions,” as defined in 40 CFR 1508.18, federal agencies may be required to comply with NEPA and prepare an environmental impact statement (EIS) even if the agency does no more than provide grant funds to the recipient. Each proposal shall address environmental impact (fields 4(a) through 4(d)) of the Research and Related Other Project Information Form. This information will be used by the sponsoring agency to make a determination if the proposed research effort qualifies for categorical exclusion.

Central Contractor Registration: Central Contractor Registration (CCR) means the Federal repository into which an entity must provide information required for the conduct of business with the Government. Information about registration procedures may be found at the CCR website, <http://www.ccr.gov>. By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any award resulting from this announcement.

Subaward Reporting: The Federal Funding Accountability and Transparency Act of 2006 (Public Law 109-282) as amended by Section 6202 of Public Law 110-252 requires that all agencies establish requirements for Recipients reporting information on subawards and executive total compensation.

3. Reporting Requirements: Quarterly technical and financial reports, as well as a final technical report, will be required under this program. All reporting requirements and instructions for report preparation will be included in the award document signed by the Government Grants Officer.

VII. AGENCY CONTACTS

Technical Point of Contact
Army Research Office, Durham, NC
Dr. Michael D. Gerhold, Program Manager
michael.d.gerhold.civ@mail.mil

Business Point of Contact
Army Research Office, Durham, NC
Maria D. Nelson, Contracting Officer
maria.d.nelson.civ@mail.mil

All questions in response to this announcement must be addressed in writing via e-mail to the contacts specified above. You must cite 'W911NF-12-R-0003' in the subject line of the e-mail.

Answers to questions submitted in response to this announcement will be made available in the form of attachments to this announcement and will be posted to Grants.gov, <http://www.grants.gov>.

No questions will be addressed after the dates cited in SECTION IV (Significant Dates and Times/Schedule of Events).

VIII. OTHER INFORMATION

1. Acronyms List:

AFOSR – Air Force Office of Scientific Research
AFRL – Air Force Research Laboratory
AOARD – Asian Office of Aerospace Research and Development
AOR – Authorized Organization Representative
ARO – Army Research Office
ASE – Amplified Spontaneous Emission
BQ – Beam Quality
CCR – Central Contractor Registration
CFD – Computational Fluid Dynamics
CFDA – Catalogue of Federal Domestic Assistance
CFR – Code of Federal Regulations
CONUS – Continental United States
CW – Continuous Wave
D&B – Dun and Bradstreet, Inc.
DARPA – Defense Advanced Research Projects Agency
DE – Directed Energy
DHHS – Department of Health and Human Services
DoD – Department of Defense

DoD DT&E – Department of Defense Development Test and Evaluation
DoD S&T – Department of Defense Science and Technology
DoDD – Department of Defense Directive
DoDGARs – Department of Defense Grant and Agreement Regulations
DPAL – Diode-Pumped Alkali Lasers
DUNS – Data Universal Numbering System
DUSD S&T – Deputy Undersecretary of Defense for Science and Technology
EBiz POC – E-Business Point of Contact
EOARD – European Office of Aerospace Research and Development
EOIL – Electric Oxygen Ion Laser
FCCM – Facilities Capital Cost of Money
FEL – Free Electron Laser
FEM – Finite Element Method
FFRDC – Federally Funded Research and Development Center
FSC – Federal Service Code
FY– Fiscal Year
HEL – High Energy Laser
HEL-JTO – High Energy Lasers-Joint Technology Office
HEL-MRI – High Energy Laser-Multidisciplinary Research Initiative
HPCMP – DoD High Performance Computing Program
MIPR – Military Interdepartmental Purchase Request
MW– Megawatt Class
NAS – National Academy of Sciences
NEPA – National Environmental Policy Act
NLO – Non-Linear Optics
ONR – Office of Naval Research
PDF – Portable Document Format
PI – Principal Investigator
RFP – Request for Proposals
SBS – Stimulated Brillouin Scattering
SF – Standard Form
UIC – Unit Identification Code
USC – United States Code
UV – Ultraviolet
XPAL – Exciplex Pumped Alkali Laser

2. Definitions List:

Applied Research: Efforts to determine and exploit the potential of science and engineering knowledge and understanding in technology such as new materials, devices, methods, and processes. The term does not include efforts whose principal aim is the design, development, or testing of specific products, systems or processes to be considered for sale or acquisition.

Basic Research: Efforts directed toward increasing knowledge and understanding in science and engineering rather than the practical application of that knowledge and understanding.

Cooperative Agreement: A legal instrument which, consistent with 31 USC 6304, is used to enter into a relationship:

(a) Of which the principal purpose is to transfer a thing of value to the Recipient to carry out a public purpose of support or stimulation authorized by a law of the United States, rather than to acquire property or services for the Department of Defense's direct benefit or use.

(b) In which substantial involvement is expected between the Department of Defense and the Recipient when carrying out the activity contemplated by the cooperative agreement.

Fundamental Research: Includes research performed under grants, cooperative agreements, and contracts that are (a) funded by budget Category 6.1 ("Research"), whether performed by universities or industry or (b) funded by budget Category 6.2 ("Exploratory Development") and performed on campus at a university. The research shall not be considered fundamental in those rare and exceptional circumstances where the Category 6.2 funded effort presents a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense, and where agreement on restrictions have been recorded in the grant, cooperative agreement, or contract.

Grant: A legal instrument which, consistent with 31 USC 6304, is used to enter into a relationship:

(a) Of which the principal purpose is to transfer a thing of value to the Recipient to carry out a public purpose of support or stimulation authorized by a law of the United States, rather than to acquire property or services for the Department of Defense's direct benefit or use.

(b) In which substantial involvement is not expected between the Department of Defense and the Recipient when carrying out the activity contemplated by the grant.