

**University of Rochester
Laboratory for Laser Energetics**

**Laboratory Basic Science (LBS) Call for Proposal
for Experiments at the Omega Laser Facility
Fiscal Year 2025**

Date Issued: December 18, 2023

Applications Due: **February 9, 2024 (by 11:59:59 PM EST)**

Point of Contact: Dr. Mingsheng Wei
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Note: Electronic application in a single **PDF file** must be submitted via the [LBS proposal submission webpage](#) on the LLE website on or before **February 9, 2024**.

PART I: LABORATORY BASIC SCIENCE PROGRAM DESCRIPTION

A. Summary

The University of Rochester's Laboratory for Laser Energetics (LLE) is issuing a call for proposals for experiments in the Laboratory Basic Science (LBS) Program at the Omega Laser Facility in Fiscal Year (FY) 2025. LLE expects to allocate about 10% of the Omega Laser Facility time for LBS experiments in FY25. As is always the case, management of the LBS Program is contingent upon funding and authorization. If the FY25 enacted budgets contain a significant cut to LLE's Inertial Confinement Fusion (ICF) Program, the time allotted to the LBS program under this call may be reduced. In FY25, we are expecting a budget increase to support the sustainment activities at the Omega Laser Facility, as are the other ICF facilities. This is a needed move to ensure continued availability of our lasers by preventing unexpected downtime. We will anticipate an increase in scheduled downtime. The facility operational planning team will optimize the schedule, but the total LBS shot time may be impacted.

B. Background

LLE was established in 1970 as a center for the investigation of the interaction of intense radiation with matter. It is the home of the Omega Laser Facility, which includes OMEGA—a 30-kJ UV, 60-beam laser system (at a wavelength of 0.35 μm), and OMEGA EP—a four-beam, high-energy, UV long-pulse laser system, two of which can be compressed for high-intensity, short-pulse operation (at a wavelength of 1.053 μm). Up to two of the OMEGA EP short-pulse beams or one of the OMEGA EP long-pulse UV beams (wavelength tunable) can be coupled with the 60-beam OMEGA laser for joint operation in the OMEGA target chamber.

The Omega Laser Facility is maintained and operated by LLE for the National Nuclear Security Administration (NNSA) within the US Department of Energy (DOE). LLE's Cooperative Agreement with the DOE/NNSA specifies that approximately 10% of the OMEGA and OMEGA EP beam time each year be available for the merit-based LBS Program with projects selected through an annual call for proposal and review process.

The LBS program provides access to the Omega Laser Facility for basic science research in high-energy-density (HED) physics led by researchers from participating laboratories in the NNSA ICF Program and the DOE Office of Science laboratories. Proposals will be judged on their scientific merit, technical feasibility, and broader impact.

For information about the Omega Laser Facility and further information about the LBS Program, including a User's Guide, please visit: <https://www.lle.rochester.edu/>. Questions relating to the Omega Laser Facility, the current experimental capabilities, and this call for proposal should be addressed to National Laser Users' Facility (NLUF) Manager, **Dr. Mingsheng Wei**.

C. Research Areas

The unique research tools and resources of LLE's Omega Laser Facility are available to laboratory scientists (as defined in Section B) to conduct state-of-the-art basic science research in the following topical areas (but not limited to):

- (1) HED hydrodynamics
- (2) radiation-dominated dynamics and material properties
- (3) magnetized HED plasmas

- (4) nonlinear optics of plasmas and laser–plasma interactions
- (5) relativistic HED plasmas and intense beam physics
- (6) warm dense matter
- (7) high-Z, multiply ionized HED atomic physics
- (8) plasma and nuclear physics
- (9) diagnostic and experimental platform development
- (10) other (please specify)

Basic research is defined as research directed toward increasing knowledge in a particular field of science. The primary aim of basic research is a fuller knowledge or understanding of the subject matter under study, rather than any immediate application of that knowledge to NNSA’s mission. Science relevant to inertial fusion energy will be considered but will be judged solely on the basis of its quality as basic science. In particular, the results of the experiment must be of significant interest in other fields, consistent with guidelines for publication in a highly ranked journal.

All proposed work to be conducted through this program announcement is to be UNCLASSIFIED. No proposals for CLASSIFIED work will be accepted. All applicants are responsible for ensuring compliance with all applicable US Export Control laws and regulations and all other applicable security requirements relating to any work performed under a resulting beam-time award.

D. Solicitation Schedule

<u>Event</u>	<u>Target Date</u>
Program Announcement Issued	December 18, 2023
Applications due	February 9, 2024
Decision on applications	April 2024
Experiments to be conducted	October 2024 to September 2025

PART II: FACILITY-TIME ALLOTMENT (AWARD) INFORMATION

A. Type of Award

Only Omega Facility time (including OMEGA EP) in units of “shot day(s)” will be awarded.

Users’ institutions are generally responsible for travel and target expenses as well as any significant consumables required by the experiment.

B. Expected Number of Awards

The exact number of awards will depend on the number of meritorious applications and the availability of the shot time allotted for the LBS Program.

For shot time allocation purposes, a joint OMEGA and OMEGA EP target shot day is equivalent to one and a half days (one OMEGA shot day and 0.5 OMEGA EP shot day).

C. Anticipated Award Size

The minimum facility-time allotment is anticipated to be half a day for OMEGA and one day for OMEGA EP, respectively. The maximum allotment for each award will be limited to two days per year.

Facility time is awarded, not a specific number of shots. The number of shots that can be accomplished per day is a function of experimental complexity. For planning purposes, one OMEGA shot day typically produces 11 to 14 shots while one OMEGA EP shot day typically yields 6 to 14 shots depending on the configuration.

D. Period of Performance

The program is for OMEGA and OMEGA EP experiments in FY25 from October 2024 through September 2025.

LLE will make every effort to schedule experiments as outlined in this Call and, once scheduled, to execute the runs on time. Note: the Omega Laser Facility can fully support remote PI shot operation. In this mode, users are not on-site but instead lead their experiments online while facility and experimental support staff set up and deliver the shots.

E. Limitations on the Applications by the Same Organization or Institution

There is no limit on the number of distinct proposals the same institution/organization or PI can submit to this call. Multiple submissions from the same team for similar experiments will not be considered.

F. Required Acknowledgement and Disclaimer for Successful Applications

If awarded, recipients must include an acknowledgement of LBS user program and federal support as well as a disclaimer in the publication based on or developed under the LBS project. Publications must also go through LLE’s Review and Release procedure to be documented prior to submission and should be submitted through LLE’s Publications ticketing system (for LLE PIs and coauthors) at <https://urlle.lle.rochester.edu/index.php/resources/publications-and-design-support/> or forwarded to the NLUF Program Manager for projects without an LLE coauthor.

Acknowledgement (template) for LBS user program support:

“The experiment was conducted at the Omega Laser Facility with the beam time through the Laboratory Basic Science user program. This material is based upon work supported by the Department of Energy [National Nuclear Security Administration] University of Rochester “National Inertial Confinement Fusion Program” under Award Number(s) DE-NA0004144.”

Disclaimer:

“This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.”

PART III: ELIGIBILITY INFORMATION

A. Eligible Applicants

Only proposals submitted from the NNSA ICF laboratories (Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Sandia National Laboratories, Naval Research Laboratory, and LLE), and the DOE Office of Science laboratories (Ames Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Princeton Plasma Physics Laboratory, SLAC National Accelerator Laboratory, and Thomas Jefferson National Accelerator Facility) will be considered for this program. Researchers from non-US institutions can be collaborators on LBS projects.

LBS proposals should not duplicate efforts being conducted or proposed to be conducted through the NNSA-supported NLUF program or the Office of Fusion Energy Sciences-funded LaserNetUS program, nor proposals submitted through the NNSA HED program Omega Facility allocations.

Consistent with the UR/LLE and NNSA policies, additional information will be required for all non-US Persons who will be involved in the proposed project if the application is selected for an LBS beam-time award. A “US Person” is defined as an individual who is a US citizen or an alien lawfully admitted for permanent residence.

PART IV: APPLICATION AND SUBMISSION INFORMATION

A. Application Package

All application forms and instructions are included in this solicitation.

B. Content and Form of Application

1. Cover (1 page)

The cover page of the proposal shall include all the information requested in Appendix A.

2. PROJECT NARRATIVE (not more than 6 pages)

The project narrative MUST NOT exceed **six** pages, including text, figures and tables, printed using standard 8.5-in. by 11-in. paper with 1-in. margins (top, bottom, left, and right). The font must not be smaller than 11 point. Do not include any Internet addresses (URL's) that provide information necessary to review the application because the information contained in these sites will not be reviewed. The project narrative must include:

- (a) **Abstract:** Provide a single paragraph summarizing the proposed experiment, quantities to be measured, samples to be studied, expected scientific results, and impact.
- (b) **Scientific Motivation:** Describe the background, the objectives of the experiment, the scientific questions to be addressed, the proposed experimental method including the specific measurements to be made, the expected outcome and impact, and the relevance to the objectives in the program announcement. Also discuss why the proposed experiment is uniquely suited to OMEGA and/or OMEGA EP. The experimental design should be described, including simulations, predictions, and previous experimental results (if any) that show the goals of the proposed experiment can be achieved. The proposal should focus on the specific experiment.
- (c) **Proposed Experiments and Expected Results:** Please describe the proposed experimental configurations, geometry, requirements of the laser, diagnostics and targets, number of the shot days and the expected number of shots, preliminary shot plan, and the data to be collected. A schematic layout of the experiment should be included. This section should contain sufficient information so that reviewers will be able to evaluate the application in accordance with the merit review criteria listed in Part V, Section A.
 - (1) **Laser and Experimental Configuration:** Provide information on the required OMEGA and/or OMEGA EP laser, including number of beamlines, total energy on target, beam-to-beam energy variance, pulse shape, beam-smoothing requirements, beam timing and synchronization requirements, beam pointing, laser diagnostics, the primary target physics diagnostics and specific measurements with the needed primary diagnostics, number of shot days, and expected number of shots. Also indicate whether the experiment will use an existing platform and existing diagnostics or will require new capabilities and/or new diagnostics.
 - (2) **Equipment:** Information on the experimental equipment requirements of the projects, including both standard equipment items, which may be provided by UR/LLE, and any special equipment to be purchased or provided by the applicant.

- (3) **Targets:** Describe proposed target types, number, suppliers, and method of obtaining targets. PIs and their institution are responsible for targets. Applicants are urged to discuss target needs for the proposed experiment with their target suppliers before submitting proposals and confirm the discussion.
- (d) **Project Timetable and Shot Plan:** (a) Outline all the important activities or phases of the project including supporting activities and (b) provide a shot plan including decision points and contingency plan if results significantly differ from prediction.
- (e) **Merit Review Criteria Discussion:** The section should briefly address each of the merit review criterion listed in Part V, Section A.

3. Appendices to Project Narrative Information

All applicants must complete the following appendices and attach them to the final Project Narrative document.

(a) Appendix 1: Bibliography and References Cited

Provide a bibliography for any reference cited in the Project Narrative.

(b) Appendix 2: Funding Sources

Users are generally responsible for their own travel and target expenses, as well as any extraordinary consumables required by the experiment. List available funding sources to support the execution of the proposed experiment.

(c) Appendix 3: Summary of Previous LBS Project (not more than one page)

If this proposal is the continuation of a previously awarded experiment through LBS, please include a brief summary of the experiments conducted, the status of the analysis, and results disseminated (list major invited talks, papers published or in press, awards or special recognition, graduate students and postdoctoral researchers being trained, and/or advanced degrees obtained).

(d) Appendix 4: Three-Page Overview of the Proposed LBS Experiment

The Overview shall include all the information requested in Appendix B.

C. Submission Requirements

Submit electronic applications in a single **PDF file** via the [LBS proposal submission webpage](#) on the LLE website. Applications must be received by **February 9, 2024**, not later than 11:59:59 PM Eastern Time.

PART V: APPLICATION REVIEW INFORMATION

A. Criteria

1. Initial Review Criteria

Prior to a comprehensive merit evaluation, UR/LLE will perform an initial compliance review to determine that (1) the applicant is eligible for an award; (2) the information required by the announcement has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of this announcement.

2. Merit Review Criteria

Applications will be reviewed in accordance with the following criteria:

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following criteria:

- (1) The overall scientific/technical merit of the project and its relevance and prospective contribution to its field of research;
- (2) The scientific/technical soundness and quality of the proposed method/approach, and the feasibility/likelihood of accomplishment of the stated objectives;
- (3) The competence, experience, and past performance of the proposer, principal investigator, and key team members;
- (4) The broader impact of the project on education and workforce development (e.g., training opportunities to students or early-career researchers), and expanding scientific ecosystem (e.g., new research topic areas, engaging with new users particularly from underrepresented groups or institutions, the proposed experiment being part of larger project or program such as LDRD, etc.); and
- (5) The demands of the project in terms of resource requirements (equipment, beam time, target support, etc.) and/or other requirements (facility hardware modifications, component development, etc.) vis-à-vis competing demands.

B. Review and Selection Process

1. Review

Applications that pass the initial compliance review will be subjected to both merit review by an independent LBS Proposal Review Panel in accordance with the guidance provided above and the technical feasibility review including resource demands by LLE.

2. Selection

The LLE Director will make the final decision concerning the award of OMEGA/OMEGA EP shot opportunities for this Program based on the peer review panel recommendations and the facility feasibility and executability assessments. Diversity, Equity, Inclusion and Accessibility principles, diversity of institution, and diversity of science will be considered in the selection process.

PART VI: AWARD ADMINISTRATION INFORMATION

A. Award Notices

1. Notice of Selection

LLE will notify applicants selected for award in April 2024.

B. OMEGA Operations Requirements

1. OMEGA Laser Facility Organization and Regulation Manual (LFORM)

All users of the Omega Laser Facility are expected to comply with the UR/LLE Laboratory policies and procedures as identified in the OMEGA Laser Facility Organization and Regulation Manual (LFORM) Instruction 3000 which can be found at:

<https://www.lle.rochester.edu/index.php/omega-laser-facility-2/omega-laser-facility-documentation/>

APPENDICES

- A. Proposal Cover Page (template)**
- B. Six-Page Overview of the Proposed Experiment (template)**

**Appendix A: Proposal Cover Page
Laboratory Basic Science Experiments
at the Omega Laser Facility in FY2025**

(a) **Proposal Title** (a descriptive title of your proposed experiment that will be made public if awarded)

(b) **Research Topic Area** (see Part I, C):

(c) **Lead Principal Investigator (PI)** [The lead PI is the primary point of contact for the proposed experiment, typically overseeing the project team, leading the designs and/or experiments and analysis effort. A Co-PI is required for all submissions when a student or postdoctoral researcher is the Lead PI. In this case, the Co-PI is typically the supervisor and is expected to provide oversight, funding, and other resources to execute the experiment.]

(1) **Name**

(2) **Job Title**

(3) **Department**

(4) **Institution**

(5) **Mailing address**

(6) **Telephone**

Tentative Research Team: (List all team members that you expect to be involved in the proposed research including Lead PI, Co-PI, students, postdocs, research staff; and describe their roles.)

Name	Affiliation	Email	Job Title	Tentative Role [Lead PI, Co-PI, experimental, theory/simulation, other (specify)]	Citizenship

Appendix B: Three-Page Overview of the Proposed LBS Experiment in FY2025

(Note: PowerPoint template file is available on the LBS submission page.)