

**University of Rochester
Laboratory for Laser Energetics**

**Academic and Industrial Basic Science Experiments
at the Omega Laser Facility
Fiscal Year 2020–2021**

Date Issued: September 13, 2019

Applications Due: October 4, 2019

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PART I – PROGRAM DESCRIPTION

A. Overview

The University of Rochester’s (UR) Laboratory for Laser Energetics (LLE) 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).

The Omega Laser Facility is maintained and operated by UR/LLE for DOE/NNSA. As a part of its mission, UR/LLE provides shot opportunities on the Omega Laser Facility for University and Industrial Scientists to conduct basic science experiments. UR/LLE researchers are available for scientific collaboration and for assistance with user experiments. Principal Investigators are encouraged to collaborate with UR/LLE staff members.

This is a special facility-time call. Subject to funding, there is approximately 5% of the OMEGA and OMEGA EP operating time that may be available for basic science experiments led by University and Industrial Scientists in the U.S. during fiscal year (FY) 2020 and FY21.

This call is administered by the UR/LLE National Laser Users’ Facility (NLUF) Manager. An independent proposal review committee will review all proposals submitted to this call on their scientific and technical merit and make recommendations to the LLE Director.

B. Purpose and Objectives

The objective of the Program is to provide access to the Omega Laser Facility for university and industry-led basic science experiments. Specifically, this program is intended to provide access to the Omega Laser Facility to a broad community of academic and industrial research interests for:

- a) conducting basic laser–matter interaction, inertial confinement fusion (ICF) and high-energy-density (HED) physics research, and
- b) providing research experience necessary to maintain a cadre of trained scientists to meet the nation’s future needs in these areas of science and technology

Recipient’s project objectives should align with the aforementioned program objectives. Upon selection, recipients are to submit annual progress reports to LLE.

1. Technical Scope and Topical Research Areas

The technical scope of the Program is to encourage U.S. scientists and industrial specialists (by making available unique research tools and resources) to conduct state-of-the-art “basic research” in the following topical areas:

- a) high-energy-density hydrodynamics;
- b) magnetized high-energy-density plasmas;
- c) nonlinear optics of plasmas;
- d) radiation-dominated dynamics and material properties;
- e) relativistic HED plasmas and intense beam physics;

- f) warm dense matter;
- g) high-Z, multiply ionized HED atomic physics;
- h) plasma and nuclear physics;
- i) diagnostic and experimental platform development

“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 an immediate application of that knowledge.

All proposed work to be conducted through this program announcement is to be UNCLASSIFIED. No proposals for CLASSIFIED work will be accepted.

C. Solicitation Schedule

| <u>Event</u> | <u>Target Date</u> |
|----------------------------------|---------------------------------|
| Program announcement issued | September 13, 2019 |
| Applications due (via pdf files) | October 4, 2019 |
| Selection of projects for award | November 1, 2019 |
| Experiments conducted | February 2020 to September 2021 |

Proposals must be received in full no later than 17:00 ET on 4 October 2019 at the UR/LLE at the following address:

omegabasicscience@lle.rochester.edu

PART II – SHOT ALLOTMENT (AWARD) INFORMATION

A. Type of Award

Only Omega Facility time (including OMEGA EP) is available through this competition. There is no funding or other material support provided via this program.

B. Expected Number of Awards

A total notional allotment of approximately 11.5 and 9.5 shot days at the Omega Laser Facility (OMEGA and OMEGA EP) may be available for this special program in FY20 and FY21, respectively. For planning purposes, one OMEGA shot day typically produces 11 target shots while one OMEGA EP shot day is expected to produce approximately 7 target shots. For shot time allocation purposes, a joint OMEGA and OMEGA EP target shot day is equivalent to one OMEGA shot day and 0.5 OMEGA EP shot day.

LLE anticipates making 4–6 awards under this call depending on the size of the awards.

C. Anticipated Award Size

The minimum shot allotment is anticipated to be half a day for OMEGA, and one day for OMEGA EP, respectively. Proposals that require less than the required minimum time on a laser will not be accepted. While there is no maximum shot allocation beyond those stated in Section B above, the normal shot allotment for each award on a single research topic is 1–2 days per year.

D. Period of Performance

The program is for OMEGA and OMEGA EP shots from Q2FY20 to Q4FY21.

E. Limitations on the Applications by Same Organization or Institution

There is no limit on the number of proposals the same institution/organization or Principal Investigator (PI) can submit to this call. Multiple proposals may also be submitted to each topic research areas as specified in Part I Section B of this call.

F. Required Acknowledgement for the Successful Applications

Proposal teams must acknowledge the UR/LLE in presentations and publications using the template: “This work was conducted at the Omega Laser Facility and funded under the auspices of the U.S. Department of Energy by the University of Rochester’s Laboratory for Laser Energetics under Contract No. DE-NA0003856.”

PART III – ELIGIBILITY INFORMATION

A. Eligible Applicants

Only proposals led by scientists from universities and business in U.S. will be considered for this call.

Principal investigators who have already been awarded the beam time at the Omega Laser Facility in FY20 and FY21 through the NNSA-funded NLUF program are not eligible to apply.

The proposals should not duplicate efforts currently being conducted or proposed to be conducted through the NNSA-funded UR/LLE Laboratory Basic Science (LBS) program or the Office of Fusion Energy Sciences-funded LaserNetUS program.

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

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

2. FACILITY REQUIREMENTS/PROPOSAL SUMMARY

The second and third pages of the proposal shall be the filled-out Proposal Summary Form (Form B) of Appendix B and the filled-out Facility Experimental Configuration Summary (Form C) of Appendix C. The primary facility (OMEGA or OMEGA EP or both) where the work will be performed must be indicated. If the project requires extraordinary support (such as non-standard laser or diagnostics configurations or targets), such requirements and the source of such support must be identified.

3. PROJECT NARRATIVE

The project narrative MUST NOT exceed **25** pages, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5-in. by 11-in. paper with 1-in. margins (top, bottom, left, and right). EVALUATORS WILL REVIEW ONLY THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCE. The font must not be smaller than 11 point. Do not include any Internet addresses (URLs) that provide information necessary to review the application because the information contained in these sites will not be reviewed.

The project narrative must include:

Project Objectives. This section should provide a clear, concise statement of the specific objectives/aims of the proposed project. This section should also provide a detailed explanation of the proposed methods or approach of the project. This explanation should be complete and understandable to experts in the field. Additionally, project objectives should state how they align with Program Objectives as described in Part I, Section B.

Relevance and Outcomes/Impacts. This section should explain the relevance of the effort to the objectives in the program announcement and the expected outcomes and/or impacts.

Scientific and Technical Merit. This section should address how the project will advance the current state of science and technology in alignment with the Program Objectives in Part I, Section B. Address the scientific and technical risks associated with the proposed approach. The section should address each of the merit review criterion and sub-criterion listed in Part V, Section A. Provide sufficient information so that reviewers will be able to evaluate the application in accordance with these merit review criteria.

Project Timetable. Outline as a function of time, year by year, all the important activities or phases of the project, including any activities planned beyond the project period. Successful applicants must use this project timetable to report progress.

Equipment. Provide 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.

Laser Configuration. Provide information on the OMEGA and/or OMEGA EP Laser, diagnostics and targets for the proposed project, including number of shots, number of beamlines, total energy on target as well as a beam-to-beam energy variance, pulse shape, beam smoothing, plasma and laser diagnostics, and other requirements that are important to the conduct of the proposed experiment.

Users are encouraged to consult the Omega Laser Facility Users' Guide in the link below for facility information:

<http://www.lle.rochester.edu/about/nluf.php>

Targets: Describe proposed target types, number, suppliers and method of obtaining targets.

Roles of Collaborators/Participants. Provide information on collaboration with scientists at UR/LLE or other institutions that are required to conduct the proposed work, including official institutional confirmation of the acceptance of such collaborations in Appendix 5. For multi-organizational or multi-investigator projects, describe the roles and the work to be performed by each participant/investigator, business agreements between the applicant and participants, and how the various efforts will be integrated and managed. This section must not exceed **one** page.

4. APPENDICES TO PROJECT NARRATIVE INFORMATION

All applicants should complete the following appendices and attach them to the final Project Narrative document. All of the requested information for the following appendices will not count in the Project Narrative page limitation of no more than 25 pages.

Appendix 1. Biographies:

Provide a biographical sketch for the principal investigator and each senior/key person proposed. A senior/key person is any individual who contributes in a substantive, measurable way to the scientific/technical development or execution of the project. The biographical information for each person should include education and training, research and professional experience, relevant publications, and synergistic activities. The biographical information for each person must not exceed two pages when printed on 8.5-in. by 11-in. paper with 1-in. margins (top, bottom, left, and right) with the font not smaller than 11 point.

Appendix 2. Bibliography and References Cited:

Provide a bibliography for any reference cited in the Project Narrative Section. This section must include only bibliographic citations.

Appendix 3. Facilities and Other Resources:

This information is used to assess the capability of the organizational resources available to perform the effort proposed. Identify the facilities to be used (laboratory, office, laser, etc.) at each performance site listed and, if appropriate, indicate their capacities pertinent resources that are directly applicable to the proposed work, relative proximity, and extent of availability to the project. Describe other resources available to the project such as machine and electronic shops and the extent to which they would be available to the project.

Appendix 4. Targets and Funding Sources:

Targets: Users are responsible for their own targets for the proposed experiments under this program. LLE target team can assist in the final target assembly. Major target components and target metrology must be provided by users.

Target availability will be considered as part of the selection process. Applicants are encouraged to discuss their target needs with suppliers and LLE in advance.

Funding sources. As it is understood today, users are 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.

Appendix 5. Collaboration Letters:

Include official institutional confirmation of the acceptance of collaborations (if applicable).

Appendix 6. Three-Page Summary of the Proposed Experiments in FY20:

Applicants must provide a summary of their proposed experiments in FY20 indicating the title, PI's name, purpose, and goals of the experiments; and laser, target and diagnostics configurations and the preferred schedule placement including an indication of whether any of the proposed shots could be carried out in Q2FY20. This is for the facility planning purpose. A template of the three-page summary is included as Appendix D at the end of this document.

D. SUBMISSION DATES AND TIMES

Applications must be received by **October 4, 2019**, not later than 17:00 Eastern Time.

You are encouraged to transmit your application well before the deadline.

APPLICATIONS RECEIVED AFTER THE DEADLINE MAY NOT BE REVIEWED OR CONSIDERED FOR AWARD.

E. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit

APPLICATIONS MUST BE SUBMITTED VIA E-MAIL

Submit electronic applications in **pdf form** to:

omegabasicscience@lle.rochester.edu

PART V – APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria

Prior to a comprehensive merit evaluation, UR/LLE will perform an initial 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; (4) the proposed project is responsive to the objectives of the OMEGA/OMEGA EP shot opportunity announcement, and (5) the proposed experiments are consistent with the capabilities of the facility.

2. Merit Review Criteria

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following criteria, listed in descending order of importance (with a relative weighting in the approximate ratio of 4:3:2:1):

- 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/or key personnel; and
- 4) 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.

Note that external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues.

B. REVIEW AND SELECTION PROCESS

1. Merit Review

Applications that pass the initial review will be subjected to a merit review in accordance with the guidance provided above.

2. Selection

The UR/LLE Director will make the final decision concerning the award of OMEGA/OMEGA EP shot opportunities for this Program based on the peer review committee recommendations and the facility feasibility assessments.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

Successful principal investigators will be notified on or about November 1, 2019 for experiments to be conducted in FY20 and FY21 starting on February 2020.

Part VI – AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. Notice of Selection

UR/LLE will notify applicants selected for award.

B. OMEGA OPERATIONS REQUIREMENTS

1. LFORM

Users of the UR/LLE facilities are expected to comply with the UR/LLE laboratory policies and procedures as identified in the OMEGA Laboratory Facility Organization and Regulation Manual: <http://www.lle.rochester.edu/media/resources/documents/3000.pdf>

PART VII – OMEGA FACILITY CONTACTS

A. CONTACTS

Questions relating to the Omega Laser Facility and this call for proposal should be addressed to:

Dr. Mingsheng Wei
Manager, National Laser Users' Facility
Laboratory for Laser Energetics
University of Rochester
250 East River Road
Rochester, NY 14623

Phone: (585)-275-3866
Fax: (585)-275-5960
Email: mingsheng@lle.rochester.edu

APPENDICES

- A Proposal Cover Page (template)**
- B Summary Sheet (template)**
- C Facility Experimental Configuration Summary (template)**
- D Three-Page Summary for the Proposed Experiments in FY20 (template)**

Appendix A – Proposal Cover Page

**Academic and Industrial Basic Science Experiments
at the Omega Laser Facility – FY 2020 and 2021**

| | |
|---|--|
| Proposal Title: | |
| Project Topic Area: | |
| Principal Investigator: (Name, Institution, Address, Telephone and Email) | |
| Collaborators (List the names, institution, email address of all collaborators including students who would participate in the proposed experiment and describe their roles) | |
| Submission Date: | |

Appendix B – Proposal Summary Sheet

**Academic and Industrial Basic Science Experiment
at the Omega Laser Facility – FY2020–2021**

| | |
|---|--|
| Principal Investigator: (Name and Institution) | |
| Title of Proposed Project: | |
| Proposed Project Objectives: | |
| Approach: | |
| Facility Requirements: (OMEGA/OMEGA EP, diagnostics, etc.) | |
| Number of Shot Days | |
| Target Types: | |
| Diagnostic Development Required: | |
| Equipment Required: | |
| User Provided Equipment: | |

APPENDIX C: FACILITY EXPERIMENTAL CONFIGURATION SUMMARY

**Academic and Industrial Basic Science Experiment
at the Omega Laser Facility – FY2020–2021**

Proposed Experiment Title: _____
Principal Investigator: _____ **Institution:** _____

Facility Required: OMEGA 60 Beam OMEGA EP Joint (OMEGA/OMEGA EP)

Target Requirements:

If hohlraum or half-hohlraum specify:

Axis: _____

Scale size: _____

Material and thickness: _____

If spherical specify:

Diameter/thickness: _____

Materials: _____

Fill gas: _____

If other target, please describe: _____

Target Fabrication:

Total number: _____

Standard target: Yes No

Targets supplied by: _____

Hazardous materials: _____

Laser Configuration:

OMEGA Drive:

Pulse shape: _____ (If new, the design must be received by LLE two months in advance of planned shots):

Beams: _____

Energy (per beam, power setting, or kJ on target): _____

DPP's: _____

OMEGA driver: _____

OMEGA Backlighter:

Pulse shape: _____ Energy: _____ Drivers: _____

Beams: _____

DPP's: _____

Target positioner: _____

OMEGA EP:

| Beam | Circle | Requested Configuration | Pulse Width | Energy (J) |
|------|--------|----------------------------|-------------|------------|
| 1 | UV | IR Short-Pulse Sidelighter | _____ | _____ |
| 2 | UV | IR Short-Pulse Backlighter | _____ | _____ |
| 3 | UV | _____ | _____ | _____ |
| 4 | UV | _____ | _____ | _____ |

Primary Diagnostic Configuration:

TIM based: _____

Fixed: _____

New (please describe): _____

APPENDIX D – THREE-PAGE SUMMARY FOR EXPERIMENTS IN FY20

Q2-Q4 FY20

OMEGA/OMEGA EP

Proposed campaign/experiment name:

| |
|--|
| <ul style="list-style-type: none">• <u>Purpose/goal:</u><ul style="list-style-type: none">• To measure• <u>Specific deliverable(s) of this campaign (in FY20):</u><ul style="list-style-type: none">• To measure• <u>What would we do with results:</u><ul style="list-style-type: none">• Compare with• <u>PI/Designer:</u><ul style="list-style-type: none">•• <u>Technical issues (e.g., target design/fab, diagnostics, reconfiguration, etc.):</u> |
|--|

Page 1

Q2-Q4 FY20

OMEGA/OMEGA EP

Proposed campaign/experiment name:

VISRAD model configuration or schematic for the proposed experiments

Page 2

Proposed campaign/experiment name:

Experimental configuration

No of shots or days required:

Schedule request (by quarter, Q2-Q4 FY20):

(Some beam time is available in Q2 FY20 on OMEGA EP. If your proposal is selected for a beam-time awarded and the PI could be ready by then, please specify it.)

Facility (OMEGA or EP or Joint):

You must unambiguously provide the following information for each configuration on each shot day covered by this 3-page summary:

Beam configuration:

*OMEGA 60: Number of beams , Number and Type of DPPs, 2w/3w/4w probe beam (if required), and experiment axis
OMEGA EP: Required mode for each beam (SP, SP CoProp, UV, or T-OPA)*

Primary diagnostics:

List all required diagnostics (fixed or TIM-based)

Targets:

*DT or DD, Special Fills, Planar Cryo
For EP, all components not expected to survive the shot, driven or otherwise, must be identified including scale, to determine if the OAP dds will be required*