

Guidelines for Application of
ILE Collaborative Research for FY2020

November 1, 2019

Institute of Laser Engineering,
Osaka University

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1. Outline of Call for Application

Institute for Laser Engineering (ILE), Osaka University was approved as a Joint Usage/Research Center for laser energy science in 2010, and the second term (6 years) started in 2016.

We have facilities that can be used for researches that are related to laser science in a wide range of interdisciplinary academic fields, including high energy density science using GEKKO XII, which is the only large-scale laser device in Japan, and LFEX laser with petawatt output. We look forward to proposals for a variety of challenging research topics, which include but not limited to the use of such facilities, but also the promotion of collaboration among researchers and scientists from all over the world. We also expect emerging challenges that can be developed in the future.

As a Joint Usage/Research Center that is open to the world, our institute has accepted collaborative research from overseas researchers. For this reason, overseas researchers also participate as technical committee members in the project screening from FY2018. For the time being, the provisional measures will be limited, but we will continue to establish a system that is suitable as an international base after a trial period. We ask for your understanding and cooperation in advance.

For research applications, please specify the relevant research area and select a research method among the following: use of large laser facility (GEKKO XII and LFEX), use of medium-sized devices, individual collaborative research, and workshop proposals.

Each research area will hold a study group to promote information exchange and collaborative relationships between collaborators and to facilitate joint use and joint research. Please apply after carefully consulting with each field's contact scientist (see Section 2. **Research Fields**) and host researchers (liaison scientists).

When applying for a research application, please make sure to discuss the details of the research (experimental method, implementation period, purpose, and application subject) with the host researcher at ILE.

Support for research funds

Due to the significant reduction in base operating costs, support for research expenses for large facility usage issues (Research Method A) has been abolished since fiscal year 2016. However, we will continue to support the travel expenses for Research Methods B1, B2, C and the joint symposium for optical and quantum beam science as before.

2. Research Fields

The Collaborative Research Steering Committee of the Center is concerned with the expansion of related communities and international competitiveness through the promotion of collaborative research in cooperation with domestic and overseas research groups. Nine research areas have been established since FY2019 for the development of high-energy density scientific research using high-power lasers and we believe it is essential to maintain.

When applying for collaborative research, please specify the relevant research field. However, if it is determined during the selection process that a proposal is more appropriate to a different research field, the proposal may be selected for that research field.

Representatives of each research field are selected by the Collaborative Research Technical Committee established under the Collaborative Research Steering Committee. We ask that you consult with the contact scientist before applying for each field.

* Please apply for Research Method B2 for collaborative research projects of “High-power laser advanced basic technology” that were accepted as A3 category.

* If you are a for-profit organization such as a company, please apply for a paid usage allowance. (Please contact us for details of the paid usage allowance.)

* For collaborative research related to fusion research, please apply to the “Interactive Collaborative Research” at the National Institute for Fusion Science (NIFS). For details, please refer to the NIFS website (<http://www.nifs.ac.jp/en/index.html>).

2.1 List of Research Fields

1. High Energy Density Science

- Laser Astrophysics
- High Pressure / Laser Earth & Planetary Science
- High Magnetic Field Science
- Quantum Beam Science
- Plasma Science

2. Laser Science and Optics

- Terahertz Science
- Power Laser Science
- Laser & Optical Material

3. Initiative

- Physical Informatics

4. General Subjects

2.2 Details of Research Fields

1. High Energy Density Science

Laser Astrophysics (Representative: Masahiro Hoshino (Professor), Contact scientist: Youichi Sakawa (Associate Professor))

Utilizing high-temperature, high-energy-density, and ultra-high flow-velocity plasmas observed only in the Universe, we aim to understand plasma physics and astrophysics using large-energy/high-power lasers in the laboratories. Many astrophysical phenomena such as collisionless shock generation, magnetic reconnection, plasma-jet collimation and instabilities are related to explosion and instantaneous energy-release. We simulate these phenomena in the laboratory using pulse lasers. Relativistic laser astrophysics, such as electron-positron plasma generation and particle acceleration using high-intensity lasers, is also an important topic of interest.

We also study theory and simulation on these topics shown above.

- (a) Laser Plasma Astrophysics: Experiment
- (b) Laser Plasma Astrophysics: Theory/Simulation

High Pressure / Laser Earth & Planetary Science (Representative: Toshimori Sekine (Professor), Contact scientist: Keisuke Shigemori (Professor))

High-energy lasers can generate extreme pressure and temperature conditions beyond the limit of traditional high-pressure apparatus such as large volume press, diamond anvil cell, and light-gas gun. It can be applied to study physical properties of the Earth and planetary materials, as well as various impact phenomena of planetary surfaces. We investigate the EOS of shocked materials, high-pressure phase transitions, physical properties of solids and liquids, deformation and breaking mechanism, acceleration and impact process, degassing and vaporization of shocked materials, synthesis and chemical reaction of prebiotic materials, gravitational instability simulating core formation, and so on, using newly developed in-situ measurements and recovery methods to clarify the formation process, internal structure and evolution of the Earth and other planets including Super-Earths.

- (a) In-situ Measurements of Shock-compressed Materials
- (b) High-speed Impact and Recovery of the Sample

High Magnetic Field Science (Representative: Joao Santos (Dr.), Contact scientist: Shinsuke Fujioka (Professor))

The combination of laser-produced strong magnetic field and high-energy-density plasma can open a novel field of plasma physics. The objectives of this subject are to develop an experimental platform utilizing 100 kT and to build domestic and international networks. We welcome your proposals to develop novel generation schemes of strong magnetic field, to control generation and transport of laser-accelerated beams, to understand high-energy-density-plasma physics under the strong magnetic field, and to apply the strong magnetic field to ICF and MCF plasmas. We also welcome interdisciplinary proposals, for example, plasma propulsion with strong magnetic field and x-ray spectroscopy under strong magnetic field for x-ray astronomy applications.

Quantum Beam Science (Representative: Mitsuru Uesaka (Professor), Contact scientist: Akifumi Yogo (Associate Professor))

Laser-produced plasma generates high energy particles, including ions, electrons, neutrons, and intense radiative emission ranging from extreme ultra violet (EUV) to gamma-ray. This research project aims to investigate Laser Quantum Beams mentioned above, especially on its generation mechanism, energy scaling, demonstration of applications, and improvement of performances (e.g., generation efficiency, monochromaticity, highest energy, stabilization, control of emittance, etc.). This research project will be collaboratively carried out by a few groups using facilities at ILE and possibly at other institutions. Major subjects will be

- (a) Laser-driven Particle Acceleration and Neutron Generation and Applications
- (b) Laser-driven x- or gamma-rays and Applications
- (c) Laser-driven Nuclear Physics and Application

Plasma Science (Representative: Ryosuke Kodama (Professor), Contact scientists: Hiroyuki Shiraga (Professor) and Yasuhiko Sentoku (Professor))

A research proposal on plasma science related to high energy density science excluded in the above subjects is welcome for both theoretical and experimental research.

2. Laser Science and Optics

Terahertz Science (Contact scientist: Makoto Nakajima (Associate Professor))

The development of terahertz (THz) devices such as terahertz emitter, detector, and other THz components will be performed. Various applications of THz waves using femtosecond pulsed laser such as THz time domain spectroscopy and THz imaging will also be investigated. THz properties of semiconductors, superconductors, magnetic materials, biological materials, and nonlinear optical crystals, etc. can be evaluated and utilized for THz devices. Superconducting photonics and strongly correlated electron photonics will be explored using these devices, together with the application of metamaterials which are new artificial materials to THz technology.

- (a) THz Technology
- (b) Superconducting Photonics and Strongly Correlated Electron Photonics
- (c) Metamaterials

Power Laser Science (Contact scientist: Junji Kawanaka (Professor))

Novel techniques and technology for the next high power laser operation with a high pulse energy and repetition rate are required for the advancement of science, medicine, and industry. In addition, the introduction of information and communication technology (ICT) such as AI and IoT into the next power laser increases and extends application fields due to its autonomously controlled operation for multiple purposes.

- (a) Basic technical elements and technology for the next high power laser
- (b) Phase, wavefront and spectral control
- (c) Introduction of ICT into the next power laser and its operation

Laser & Optical Material (Contact scientists: Nobuhiko Sarukura (Professor) and Masashi Yoshimura (Professor))

Next-generation light sources open infinite possibilities in optical technology for basic and applied research from environmental monitoring to high-power laser development. For example, ultrashort optical pulsed lasers in the ultraviolet (UV) to deep ultraviolet (DUV) region can be used for material processing and gas sensing applications. We are then investigating various laser and optical materials, both experimentally and theoretically, such as oxide and fluoride glasses, crystals, and nanostructures. We aim to (1) develop and characterize novel optical materials, (2) understand their properties and applications, (3) reduce detrimental crystal defects, (4) develop damage-resistant lenses, windows, and scintillators, and (5) realize high-power DUV lasers and processing machines. Together with researchers inside and outside of Japan, the general topics of our research include:

- (a) Deep ultraviolet lasers
- (b) Laser and optical materials research
- (c) Terahertz studies and applications

3. Initiative

Physical Informatics (Contact scientist: Hideo Nagatomo (Associate Professor))

Data that grows with the advancement of simulation and experimental measurement methods will be applied to information science to deepen understanding of physical phenomena, which can lead to new discoveries. Alternatively, we will conduct research such as improving the controllability of laser plasma. (If you want to link with this cross-cutting field even if you are applying in another field, please enter "Please link in the physical informatics field" in the remarks column when applying.)

4. General Subjects

The theme is based on a free conception of the researcher to use the device and the calculation code, etc. The application is examined/evaluated every single fiscal year.

Other Collaborative Research

Laser Fusion Science (Contact scientist: Hiroyuki Shiraga (Professor))

The joint usage/research related to the laser fusion is conducted as an Interactive Collaborative Research of the National Institute for Fusion Science (NIFS), so please apply for "Interactive Collaborative Research" of NIFS. For details, please refer to the NIFS website (<http://www.nifs.ac.jp/en/index.html>).

Paid Usage Collaborative Research (Contact scientist: Keisuke Shigemori (Professor))

The large laser facility of ILE can be used for a fee. Whether the research content does not conflict with defense technology or security export control will be judged by the Industry-Academia-Government Collaboration Issues

Committee. Please contact the contact scientist for details.

Simultaneous use of high power nanosecond laser HERMES and X-ray free electron laser SACLA

For information about research applications that use the high-power nanosecond laser HERMES (ILE) and the X-ray free electron laser SACLA (RIKEN Harima Branch), please visit the SACLA website (<https://sacla.xfel.jp/?lang=en>).

3. Research Methods

When applying for collaborative research, please specify the relevant research method from the list below.

Note that the application format differs depending on the research method. Please download the application file from the following link: <http://www.ile.osaka-u.ac.jp/eng/collaboration/application/index.html#download>.

When an application proposal is accepted, the joint research expenses and machine time will be allocated according to the screening results.

3.1 List of Research Methods

- A Collaborative Research using the Large Laser Facility -GEKKO XII and LFEX
- B1 Collaborative Research using Medium Size Lasers and Computer Code
- B2 Individual Collaborative Research
- C Workshop related to High Energy Density Physics

3.2 Details of Research Methods

A. Collaborative Research using the Large Laser Facility -GEKKO XII and LFEX

Research Method A is collaborative research with host researchers to promote advanced research using large laser devices (GEKKO XII and LFEX). One application is approved for each applicant.

When applying for an assignment, you can choose to apply as a general research or as an exploratory research. An exploratory research is a challenging research based on a creative idea. Exploratory research applications are selected without emphasizing research achievements, but only those that are determined to be particularly promising for future development will be selected. If you wish to apply, please select the application for exploratory research when you submit the application through the Collaborative Research Application System.

About the use of LFEX laser

Since FY2017, the GEKKO XII and the LFEX laser have been utilized for joint use and joint research. If you plan to conduct experiments with the LFEX laser, please consult with the host researcher (liaison scientist) and apply for large-scale facility usage (Research Method A) after fully understanding the special features of the facility.

About the experiment schedule

Please confirm the experiment schedule of large laser facility from the following URL.
<http://www.ile.osaka-u.ac.jp/eng/collaboration/application/schedule/index.html>

B1. Collaborative Research using medium size Lasers and computer code

Collaborative research is also designed to promote advanced research with host researchers using medium-size devices. When submitting multiple applications for Research Method B1 or B2, please indicate both the differences from the other applications in your application form. Please also fill in the necessary expenses when

you submit the application through the Collaborative Research Application System (limit of 100,000 yen).

Terahertz Spectroscopy System (Contact scientist: Makoto Nakajima (Associate Professor))

Application of Terahertz waves (0.05–4THz) such as spectroscopy, sensing, imaging, and devices can be performed in the collaborative research.

We can offer the spectroscopy from terahertz region, infrared region (FT-IR), to visible region hence having the range of 350nm – 6mm (0.2meV – 3.5eV).

Target: Semiconductors, insulators, magnetic materials, biological materials, metamaterials, etc.

- THz time domain spectroscopy (THz-TDS) can be performed.
- THz imaging, Polarization measurement, Temperature dependence (4K-750K), Femtosecond or Picosecond Time resolved spectroscopy with THz and optical pulses,
- High intensity THz excitation measurements such as nonlinear optic phenomena.

Please contact us (M. Nakajima) about the measurement of THz wave.

If you apply for collaborative research using this system, please contact the person in-charge in advance:

Makoto Nakajima (Associate Professor) E-mail: nakajima-m@ile.osaka-u.ac.jp

Acceptance Research Group: Ultrabroadband Photonics (UP)

Optical property evaluation of laser systems (Contact scientist: Nobuhiko Sarukura (Professor))

Supported collaborative research themes:

- Search for solid-state laser
- Search for nonlinear optical materials
- Search for scintillator materials
- Development of new optical elements
- Search for new terahertz functional materials
- Development of measurement and technology in the new wavelength range

Available equipment for the research themes stated above

- Vacuum ultraviolet-infrared streak camera
- Titanium sapphire regenerative amplifier
- Q-switched YAG laser
- THz spectroscopy system
- Fluorine laser

etc.

If you apply for collaborative research using this system, please contact the person in-charge in advance:

Nobuhiko Sarukura (Professor) E-mail: sarukura-n@ile.osaka-u.ac.jp

Acceptance Research Group: Laser Advanced Material (LAM)

Terahertz (THz) wave measurement system (Contact scientist: Masayoshi Tonouchi (Professor))

THz time-domain spectroscopy (THz-TDS) and laser THz emission spectroscopy on various materials (semiconductors, dielectric materials, oxides, organic materials, etc.) are possible in temperatures down to about 10 K

In addition to these measurements, laser terahertz emission microscopy (LTEM), time-resolved pump-probe THz imaging & spectroscopy, and broadband (~7 THz) THz-TDS measurement, etc. can also be performed. Please contact us for details.

If you apply for collaborative research using this system, please contact the person in-charge in advance:

Masayoshi Tonouchi (Professor) E-mail: tonouchi@ile.osaka-u.ac.jp

Acceptance Research Group: TeraHertz Photonics (THP)

High-Performance Computer System (Contact scientist: Hideo Nagatomo (Associate Professor))

Supercomputers

In laser plasma researches, simulation study using supercomputers is becoming important. For example, simulations can be executed relatively easier even for problems that are experimentally challenging, so we will perform a simulation study first. Sometimes it may lead to new discoveries in the process. It is also important to predict the target design and experiment results based on the simulation before performing the experiment. Simulation study also plays an important role in the early stages of experimental research, such as improving the quality of experiment measurement.

NEC SX-ACE Specification

Main Memory: 2 TB

Node: 32 Nodes 4 Cores/Node

Performance: 8.1 TFLOPS

Computational Simulation Code

In order to investigate the high energy density physics generated by high power lasers, computational simulation codes have been developed. As a collaborative research base, some of the simulation codes can be used for joint collaborative research by comparing various experiments and simulation. There are radiation hydrodynamic codes and Particle-in-Cell codes for relativistic laser plasma interaction. In order to select the appropriate simulation code for each problem, specialists are available for consultation.

If you apply for collaborative research using this system, please contact the person in charge in advance:

Hideo Nagatomo (Associate Professor) E-mail: naga@ile.osaka-u.ac.jp

Acceptance Research Group: Physics Informatics (PIF)

B2. Individual Collaborative Research

Collaborative research promotes advanced research with the host researcher using equipment other than those mentioned above. It is desirable to develop into Research Methods A and B1. When submitting multiple applications for Research Method B1 or B2, please indicate both the differences from the other applications in your application form. Please also fill in the necessary expenses when you submit the application through the Collaborative Research Application System (limit of 100,000 yen).

C. Workshop related to High Energy Density Physics

To hold a study group to link research development in the field of laser energy science, please indicate the necessary expenses when you submit the application through the Collaborative Research Application System (limit of 100,000 yen).

4. Schedule of Application

| | | |
|-------------------|---|---|
| November 1, 2019 | Start of accepting applications | Applicants enter application information and uploads the application form through the Collaborative Research Application System (https://collabo.ile.osaka-u.ac.jp/) |
| December 1, 2019 | Application deadline | |
| December 8, 2019 | Liaison Scientists application deadline | Liaison scientists enter application information through the in-house Collaborative Research Application System (http://collabo-local.ile.osaka-u.ac.jp/) |
| Early March, 2020 | Notification of screening results | Screening results are posted in the Collaborative Research Application System (reviewable and downloadable by the principal investigator and the applicant) |

We will not be able to replace or accept the application form after the deadline.

5. Application Procedure

Please submit your application through the Collaborative Research Application System (<https://collabo.ile.osaka-u.ac.jp/>) on or before the due date. Please note that we do not accept applications by email. For the input items in the Collaborative Research Application System, please refer to Section 7. Application through ILE Collaborative Research Application System.

Application format

The application form (MS Word file) is different for each research method. Please use the format that matches your research method. In order to prevent garbled characters and image distortion when sending, please convert to PDF (maximum 20 MB) before submitting.

Please download the application form from the following web page:

<http://www.ile.osaka-u.ac.jp/eng/collaboration/application/index.html#download>

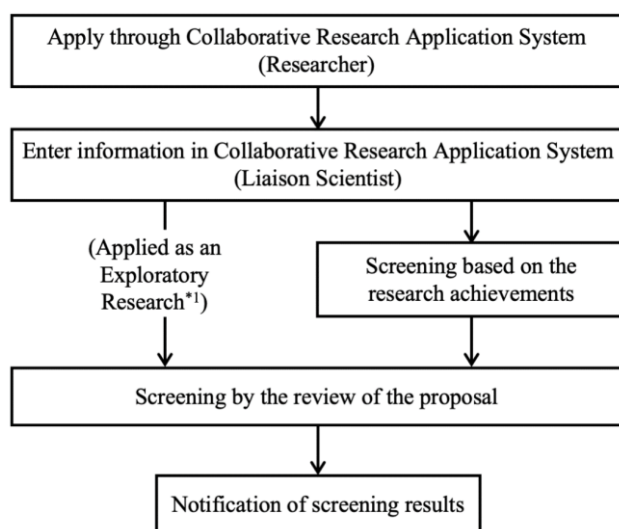
6. About Selection Process

Each submitted proposal will be evaluated and ranked by multiple judges. Starting 2018, we will conduct the review with overseas reviewers for English applications. The Collaborative Research Technical Committee will deliberate the proposal based on the evaluation report from the judges. The screening will also consider matching and positioning of the submitted research field. For Research Method A, the number of selected projects is limited to ensure sufficient machine time per research project.

The Collaborative Research Committee will decide whether to accept or reject the proposal after the review by the Collaborative Research Technical Committee.

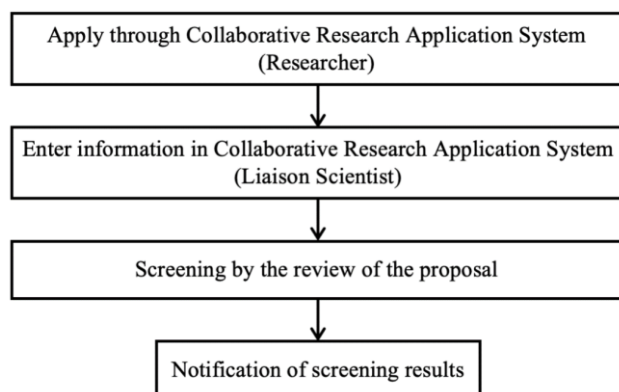
Flow of application and screening

Research Method A



*1 Regarding the Exploratory Research, please see about Research Method A in Section 3. Research Methods.

Research Methods B1, B2, C



7. Application through ILE Collaborative Research Application System

Applications for collaborative research should be made through the Collaborative Research Application System (<https://collabo.ile.osaka-u.ac.jp/>). Please apply on or before the due date. Anyone can make an application, but please note that information of the principal investigator and the liaison scientist (host researcher at ILE) are required. For necessary information, see the following section **Enter application information**.

Login to the Collaborative Research Application System

Access the page <https://collabo.ile.osaka-u.ac.jp/>, enter your email address in the box labeled 'Email address', and click SIGN IN. A one-time password will be sent to the email address you entered. Log in with the password and the email address you entered.

Move to the web page for proposal application

Click "Proposal Application" on the top page to move to the proposal application page.

Enter application information

The proposal application page has the following items. Items marked with (*) are required items. Enter them, upload the application form at the end and the click submit button to complete the submission.

- Research Title
English*, Japanese
- Principal Investigator
E-mail address*, ILE-ID, Name*, Name in Japanese, Institution*, Position*, Post address*, TEL*
- Liaison Scientist
Select from the list*
- Research Field
Select from the list*
- Research Method
Select from the list*

(If you select Research Method A, please enter the following 8 items.)

- Is your proposal document written in English? If so, the review will be done by international reviewers.
Yes / No*
- Do you apply this proposal as an exploratory research?
Yes / No*
- Do you use the LFEX laser in this research?
Yes / No*
- For continued research applications, please select which year this proposal will correspond to.
2nd year / 3rd year or more than 3rd year / Not a continued research*

- Regarding the scientific papers written in your proposal document, please input the number of papers which present results obtained using the large laser facility at ILE (GEKKO-XII and/or LFEX).
Enter the number*

- Please input the number of Fundings/Research Grants written in your proposal document.
Enter the number*

- Regarding the scientific papers written in your proposal document, please input the number of papers which are categorized as the following (1)-(4). Please refer to Journal Citation Reports (<https://jcr.clarivate.com/JCRLandingPageAction.action>) for impact factors (IF).

(1) IF less than 1, or not listed in Journal Citation Reports.

(2) IF 1 or more and less than 5.

(3) IF 5 or more and less than 15.

(4) IF 15 or more.

Enter each number*

- Critical scheduling issues for your experiment

You can write critical scheduling issues here.

(If you select Research Method B1, B2 or C, please enter the following item.)

- Necessary funds (JPY)

Enter the amount in Japanese yen*

(If you select Research Method B1, please enter the following item.)

- Facility

Select one of the facilities (medium size lasers and computer code) from the list*

8. Confirmation Items for Collaborative Research Application

The principal investigator must make sure that the approval of the head of the research collaborator is obtained when applying. The confirmation method at that time may be written document, email, or verbal. In addition, there is no need to submit a written document to ILE.

Based on the above, each principal investigator and research collaborator should obtain the approval of their respective directors to become a collaborator at ILE when the application is adopted.

9. Radiation Worker Registration

The vicinity of GEKKO XII target room I and pellet building 3F and 4F are designated as radiation control areas, and those who work in the control area need to be registered as radiation workers. Please register in advance at your institution.

Registration of radiation workers requires medical examinations and education and training as stipulated by law. Although it is possible to register newly at ILE, it may take some time to complete the procedure. Please keep in mind that even in this case, it is necessary to have a medical examination in advance at your institution or general hospital. In addition, those who have already registered at their institution are required to take the training (30 minutes) related to the Radiation Hazard Prevention Regulations of ILE every year.

Please check with the liaison scientist to see if you need to register as a radiation worker.

10. About Presentation of Research Results

For the selected projects, it is required to submit a report on the results at the end of the fiscal year, and also to report on the results at “OPTO Symposium on Photon and Beam Science”. Details will be announced after adoption.

When you present the collaborative research results externally, please specify that the research is an ILE Collaborative Research, referring to the following.

Policies for Logo Usage and Acknowledgments

Usage of ILE Logo

When using the ILE logo in presentations or reports, please use the logo according to the guidelines. The use of the ILE logo conforms to the rules concerning the use of name and logos of Osaka University (http://www.osaka-u.ac.jp/jp/about/kitei/reiki_honbun/u035RG00000937.html).

Please download the logos from <http://www.ile.osaka-u.ac.jp/eng/collaboration/logo/index.html>

Acknowledgments

When presenting the collaborative research results, please do not forget to acknowledge that the results are obtained through ILE Collaborative Research.

Examples of Acknowledgments for technical support using large laser equipment:

- 1-1) The authors would like to acknowledge the dedicated technical support by the staff at ILE for the laser operation, target fabrication, and plasma diagnostics.
- 1-2) We are deeply grateful to the ILE technical crew for their exceptional support during these experiments.

Acknowledgments to collaborators, shot managers, and staffs who are not on the author list:

- 2-1) We also acknowledge xxx of xxx University and xxx of the xxxx Agency, as well as their colleagues, for valuable discussions of xxx.
- 2-2) We thank xxx for his/her valuable efforts to manage our laser shots.
- 2-3) We thank xxx for providing us with their xxx data and xxx for useful discussions.

Acknowledgments on ILE Collaborative Research Expenses:

- 3-1) This work was performed under the joint research project of the Institute of Laser Engineering, Osaka University (under contract subject “xxx”).
- 3-2) This research was partially supported by the Japanese Ministry of Education, Science, Sports, and Culture (MEXT), Special Education and Research Expenses for ‘xxxx’ and Grant-in-Aid for Young Scientists (A) for ‘xxxx (Grant No. xxxxx)’, and by the joint research project of the Institute of Laser Engineering, Osaka University (under contract subject “xxx”).

11. Use of Personal Information

Except when required by law, we will not use or provide personal information for any purpose other than the purpose of use without obtaining the prior consent of the person. For details, please see the Osaka University Privacy Policy (<https://www.osaka-u.ac.jp/en/guide/information/kojinjoho>).

12. Contact Information

ILE Collaborative Research Promotion Office

e-mail: kyodokenkyu@ile.osaka-u.ac.jp

- For research activities and accepted researchers at ILE, please refer to “Research” and “ILE Groups” on the ILE website (<http://www.ile.osaka-u.ac.jp/eng/>). The Osaka University Researcher Directory (<http://www.dma.jim.osaka-u.ac.jp/search?m=home&l=en>) can be used to view the data of all faculty members at ILE.
- Please refer to “Collaborative Research” on the ILE website (<http://www.ile.osaka-u.ac.jp/eng/collaboration/application/index.html>) for procedures after the selection.