
The Third Omega Laser Facility Users' Group Workshop

Introduction

A capacity gathering of 115 researchers from 25 universities and laboratories and 9 countries met at the Laboratory for Laser Energetics (LLE) for the third Omega Laser Facility Users' Group (OLUG) workshop. The purpose of the three-day workshop was to facilitate communication and exchanges among individual Omega Laser Facility users and between users and the LLE management; to present ongoing and proposed research; to encourage research opportunities and collaborations that could be undertaken at the Omega Laser Facility and in a complementary fashion at other facilities (such as the NIF or LULI); to provide an opportunity for students, postdoctoral fellows, and young researchers to present their

research in an informal setting; and to provide LLE management with feedback from the users about ways to improve the Facility and future experimental campaigns. The interactions were wide-ranging and lively, as can be seen in photographs shown in this article.

The Omega Laser Facility Users consist of 266 members from 32 universities and 23 centers and national laboratories; their names and affiliations can be found at www.lle.rochester.edu/media/about/documents/OLUGMEMBERS.pdf. OLUG is by far the largest users' group in the world in the field of high-energy-density (HED) physics, and it is certainly one of the most active.



U1400JR

Figure 128.149

A capacity gathering of 115 researchers from 25 universities and laboratories around the world participated in this year's workshop. The users' group itself has 266 members from 32 universities and 23 laboratories, making it by far the largest such high-energy-density-physics group in the world. The Omega Facility is now a member of the National Users' Facility Organization, which in turn promotes science education and outreach throughout the nation. The next annual Omega Laser Facility Users' Workshop will occur on 25–27 April 2012.

The first two mornings of the workshop comprised 13 science and Facility presentations. The Facility talks proved especially useful for those unfamiliar with the art and complexities of performing experiments on OMEGA. But since the Facility is constantly changing and improving, even experienced users significantly benefited from these updates. The overview science talks, given by leading world authorities, described the breadth and excitement of HED science undertaken at the Omega Laser Facility. The next section of this article contains a summary of the range of presentations and activities.

About 50 students and postdoctoral fellows, 44 of whom were supported by travel grants from NNSA, attended the workshop and presented 37 of the 57 contributed poster and oral presentations. The content of their presentations ranged from target fabrication to simulating aspects of supernovae; the presentations generated spirited discussions, probing questions, and friendly suggestions. In addition, 20 contributed presentations were made by professional scientists and academics.

An important function of the workshop was to develop a set of **Findings and Recommendations** (p. 253) to help set future priorities for the Omega Laser Facility.

These findings were grouped into four areas: 60-beam OMEGA, OMEGA EP, general Facility improvements, and the accessibility of OMEGA operational information. These categories comprise a report given to Omega Facility management (highlights to follow). LLE management is currently using these recommendations as a guide for making decisions about Omega Laser Facility operations, priorities, and future changes.

One highlight of the workshop was the panel of students and postdoctoral fellows who discussed their experiences at the Omega Laser Facility and presented their thoughts and recommendations on Facility improvements. Wide-ranging and engaging discussions were sparked by this forum, which resulted in the student/postdoctoral report.

Another important event was a job fair designed to bring students together with potential future employers and to discuss career opportunities that exist at national laboratories, in private industry, and at universities.

Finally, one of the important decisions made at the workshop was the scheduling of the next one. It will be held at LLE on 25–27 April 2012. Meetings of the Users' Group and interested



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Figure 128.150

About 50 students and postdoctoral fellows, 44 of whom received travel assistance from an NNSA grant, attended and made 37 presentations. Travel assistance has already been arranged for the next annual workshop. The workshop places tremendous emphasis on the participation of young researchers.

members of the HED community are formulating plans for this fourth workshop. In addition, an annual meeting, in which the status of the **Findings and Recommendations** (p. 253) will be updated, will occur during the fall APS/DPP Conference.

The Presentations

A diverse set of 70 talks and posters were presented over a three-day period. In morning sessions, invited talks on the Facility and science were given. The invited science talks focused on several important topics, including HED plasmas in general, laboratory astrophysics, ignition in inertial confinement fusion (ICF), the physics of shock and fast ignition, and future experiments on OMEGA and the NIF.

The Omega Facility talks presented important details and developments on the status and performance of OMEGA/OMEGA EP from pulse shaping and duration to beam smoothing; the qualification process for interfacing new experiments;

the present, and soon-to-be operating, set of diagnostics; and the critical role of targets, from design, to procurement, to full characterization, to fielding, and finally shooting.

In addition to the 13 invited presentations, 57 contributed posters and talks covered a wide spectrum of work on OMEGA from target fabrication to fast-ignition experiments to basic and novel nuclear physics experiments. Work was also presented on opportunities for taking physics platforms developed on OMEGA to other facilities that are both larger (the NIF) and smaller (Jupiter, Trident, and LULI, as examples). The invited and contributed presentations formed much of the basis for the discussions that resulted in the **Findings and Recommendations** (p. 253) for the Omega Facilities; topics and chairpersons for each are presented herein.

The photographs provide a representative sampling of the workshop's talks, interactions, and ambience.



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Figure 128.151

In the plenary sessions, 13 authorities spoke about the science and opportunities of HED physics and described the evolving capabilities of the Omega Laser Facility needed to reach new science frontiers. Here LLE Director Dr. Robert L. McCrory, a strong supporter of OLUG since its inception, welcomes the users and talks about the evolving capabilities of the Facility that keep it at the cutting edge of research.

The 13 Findings and Recommendations of the OMEGA 2011 Users' Workshop (reports and presentations can be found on-line at www.lle.rochester.edu/about/OLUG11_workshop/index.php):

1. Tammy Ma, Chair, LLNL. *Findings and Recommendations of the Student/Postdoc Panel.*
2. Louise Willingale, Chair, University of Michigan. *Bringing OMEGA EP Performance up to Full Specification, and 4 ω Probe Utilization.*



U1404JR

Figure 128.152
University of Rochester astrophysicist Adam Frank gave a stellar talk on instabilities and clumping processes in jets and in astrophysical and laboratory settings.



U1405JR

Figure 128.153
University of New Hampshire (UNH) theorist Will Fox talked about theoretical aspects of 3-D reconnection in laboratory and astrophysical settings. UNH is one of 32 universities who are members of the OMEGA Users' group. University researchers, 107 in number, comprise the largest component of OLUG's 266 members.

3. Mingsheng Wei, Chair, GA. *Long-Pulse Operations of OMEGA EP.*
4. Carolyn Kuranz, Chair, University of Michigan. *Independent Operations of the Three Legs of OMEGA 60.*



U1406JR

Figure 128.154
Nuclear physicist Dennis McNabb of LLNL described new and exciting opportunities in plasma nuclear science that are emerging on OMEGA and the NIF. Several contributed workshop talks, as well as Facility recommendations, focused on this nascent frontier field, whose origins directly derive from recent OMEGA Users' experiments. Subsequent to the workshop, a joint MIT, LLNL, and LLE press conference (www.web.mit.edu/press/2011/omega-laser.html) announced the results of the first basic nuclear physics experiments obtained in ICF. Many more such experiments are either already underway or are being actively planned on OMEGA.



U1407JR

Figure 128.155
Joe Kilkenny of General Atomics talked about the importance and pervasiveness of moving diagnostics and experimental platforms from OMEGA to the NIF. Many critical diagnostics at the NIF, such as the magnetic recoil (neutron) spectrometer, were first developed and used on OMEGA before being duplicated and deployed on the NIF.

5. Dustin Froula, Chair, LLE. *Work to Develop a Simulation Capability for the OMEGA External Users.*
6. Peter Norreys, Chair, Rutherford Appleton Laboratory. *Dual Foci for the Omega 60 Facility.*
7. Dennis McNabb (LLNL) and Johan Frenje (MIT), Chairs. *Developing Implosion Capabilities on OMEGA with*

Arbitrary Fuel Mixtures of Tritium for Advancing Plasma Nuclear Science.

8. Alex Zylstra, Chair, MIT. *An Ultra-Low-Charged-Particle Spectrometer for Studying Nucleo-Synthesis Reactions in OMEGA Implosions.*
9. Nareg Sinenian (MIT) and Jim Cobble (LANL), Chairs. *Utilization of Thomson Parabola on OMEGA for Characterizing Implosion Ion-Loss Channels and for Studying Nucleo-Synthesis Reactions in OMEGA Implosions.*



U1408JR

Figure 128.156

Sam Morse, the Omega Facility Director, talked about changes in the Facility and LLE's implementation of OLUG'S Findings and Recommendations. Sam leads the Facility's cognizant, approachable engineers and managers who are constantly working to facilitate and improve users' experiments. A very strong and cordial relationship exists between the users and the LLE management team, and extensive discussions occur throughout the year between OLUG and the management regarding OLUG's Findings and Recommendations.



U1410JR

Figure 128.158

Two poster sessions presented an opportunity for informal discussions about OMEGA experiments and their connections to important work at other HED facilities, especially the NIF.



U1409JR

Figure 128.157

Don Cook, NNSA's Deputy Administrator for Defense Programs, talked to the OMEGA Users about NNSA's perspective on HED science on OMEGA and on the value they place on the users' work and research.



U1412JR

Figure 128.159

The workshop provided many opportunities for informal interactions and discussions and for sowing the seeds of new experimental and theoretical efforts.



U1411JR

Figure 128.160

Thirty-seven posters and contributed talks were given by students and post-doctoral fellows.



U1413JR

Figure 128.161

The student–postdoc panel, chaired by LLNL’s Tammy Ma, led an engaging discussion about issues that young researchers face in performing experiments on OMEGA. This panel formulated their own Findings and Recommendations that became part of the workshop proceedings.



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Figure 128.162

Thirteen different Findings and Recommendations for the Facility were extensively discussed by User leads and Chairs (shown here from top to bottom are Maria Gatu-Johnson from MIT; Hye-Sook Park from LLNL; and Carolyn Kuranz from University of Michigan). Women physicists have an extremely strong presence at every level of OLUG, from the Executive Committee to the chairs of the major OLUG committees on Findings and Recommendations.

10. Hans Herrmann, Chair, LANL. *Gamma-Ray Spectrometry for Plasma Nuclear Science and Implosion Physics.*

11. Maria Gatu-Johnson, Chair, MIT. *A Low-Energy Neutron Spectrometer for Plasma Nuclear Science and Implosion Physics.*

12. Gennady Fiksel, Chair, LLE. *Developing Magnetic Inertial Fusion Platforms for Basic Science and Implosion Physics.*

13. Hye-Sook Park, Chair, LLNL. *Cu-K α Crystal Imaging on OMEGA EP for HED Physics.*



U1416JR

Figure 128.163

Tours of OMEGA and OMEGA EP were a critical component of the workshop and greatly appreciated by users new and old. Here LLE engineer Steve Stagnitto is shown in the OMEGA viewing gallery talking with workshop attendees about the intricacies and challenges of organizing a successful experimental program.



U1418JR

Figure 128.165

The workshop banquet was enjoyed by all and offered a wonderful opportunity for good cheer and good food. The making of lifelong colleagues and friends is one of the lasting results of the Users' workshop. Good friends make for good science!



U1417JR

Figure 128.164

Physicist Ray Leeper discussed career opportunities in research at Sandia National Laboratory, Lawrence Livermore National Laboratory and Los Alamos National Laboratory also presented overviews of laboratory research opportunities. These talks presented a unique opportunity for young researchers to learn about research not only on OMEGA, but at the other major facilities, at Universities, and in the private sector.

Questions Addressed in the General Workshop Sessions:

What new avenues of research should we be pursuing on the Omega/Omega EP Laser Facilities?

What Facility improvements, large or small, can improve current research and help us pursue science at the cutting edge?

How can the administrative organization and the infrastructure at LLE better support ongoing and groundbreaking research?

What additional platforms/experiments/diagnostics might advantageously be built and coordinated, e.g., between OMEGA and the NIF, and/or between OMEGA and Trident or Jupiter?

The OMEGA Laser Users' Meeting was held at the APS/DPP conference in Utah on 15 November 2011. The next OMEGA Laser Users' Workshop will be held at LLE on 25–27 April 2012.

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