

# The 4<sup>th</sup> Omega Laser Facility Users Group Workshop (April 25 - 27, 2012)

## Introduction

A capacity gathering of 115 researchers from over 25 universities and laboratories and 9 countries met at the Laboratory for Laser Energetics (LLE) for the 4th OMEGA Laser Facility Users Group (OLUG) workshop. The purpose of the 2.5-day workshop was to facilitate communications and exchanges among individual Omega users, and between users and the LLE management; to present on-going 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 NIF or LULI); to provide an opportunity for students, post-doctoral fellows and young researchers to present their research in an informal setting; and to provide LLE management feedback from the users about ways to improve the Facility and future experimental campaigns. The interactions were wide-ranging and lively, as illustrated in the accompanying photographs.

The OMEGA Users consist of 304 members from 34 universities and 25 Centers and National Laboratories; their names and affiliations can be found at <http://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 physics, and it is certainly one of the most active.

The first two mornings of the workshop comprised 7 science and facility presentations (the Workshop agenda is at the end of this document). The facility talks proved especially useful for those not familiar with the art and complexities of performing experiments at OMEGA. But as the facility is constantly changing and improving, even experienced users significantly benefited from these updates. The overview science talks, given by leading world science authorities, described the breadth and excitement of high-energy-density science undertaken at the Omega Laser Facility.

About 50 students and post-doctoral fellows participated in the workshop, and 42 were supported by travel grants from NNSA. The content of their presentations encompassed target fabrication to simulating aspects of supernovae; the presentations generated spirited discussions, probing questions, and friendly suggestions. In all there were 75 contributed posters, including 11 that focused on the Omega Facility. The invited and facility presentations, as well as OLUG's Findings and Recommendations, can be found at:

[http://www.lle.rochester.edu/about/omega\\_laser\\_users\\_group.php](http://www.lle.rochester.edu/about/omega_laser_users_group.php)

An important function of the workshop was to develop a set of **Findings and Recommendations** to help set future priorities for the OMEGA Facility.



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*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 304 members which come from 34 universities and 25 laboratories, making it by far the largest users group in the world in High-Energy-Density Physics. The next annual OMEGA Users Workshop occurs on 24 -26 April 2013.*

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*49 students and post-doctoral fellows attended and nearly all made poster presentations. Forty two received travel assistance from an NNSA grant. Travel assistance has already been arranged for the next annual workshop on 24 -26 April 2013. The workshop places tremendous emphasis on the participation and involvement of young researchers.*

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They were grouped into 4 areas: 60-beam OMEGA, OMEGA EP, General Facility-improvements, and Accessibility of OMEGA operational information. These categories comprise a report given to Omega Facility management, highlights to follow. Twenty such presentations were made by researchers deeply involved in HED science. LLE management uses these recommendations as a guide for making decisions about Omega Laser Facility operations, priorities, and future changes. In addition, the status of these **OLUG Findings and Recommendations** will be updated and reviewed at a satellite evening meeting during the fall APS-DPP conference (in Rhode Island, 30 October 2012). They will also form the grist for the forthcoming workshop.

One highlight of the workshop, as in past workshops, was the panel of students and post-docs that discussed their experiences at the Omega Laser Facility and their thoughts and recommendations on facility improvements. Engaging discussions were sparked by this forum, which resulted in the student/postdoctoral recommendations for the Facility.

Another important event at the end of the workshop was a panel of experts who gave an overview of the HED opportunities at the National Labs, at universities, and at LLE itself. These discussions are very useful for young researchers who may not know all the capabilities and HED research occurring at these different institutions.

Finally, one of the important decisions made at the workshop was the selection of 24-26 April 2013 as the date of the next Users workshop. Plans are already well underway for this event.

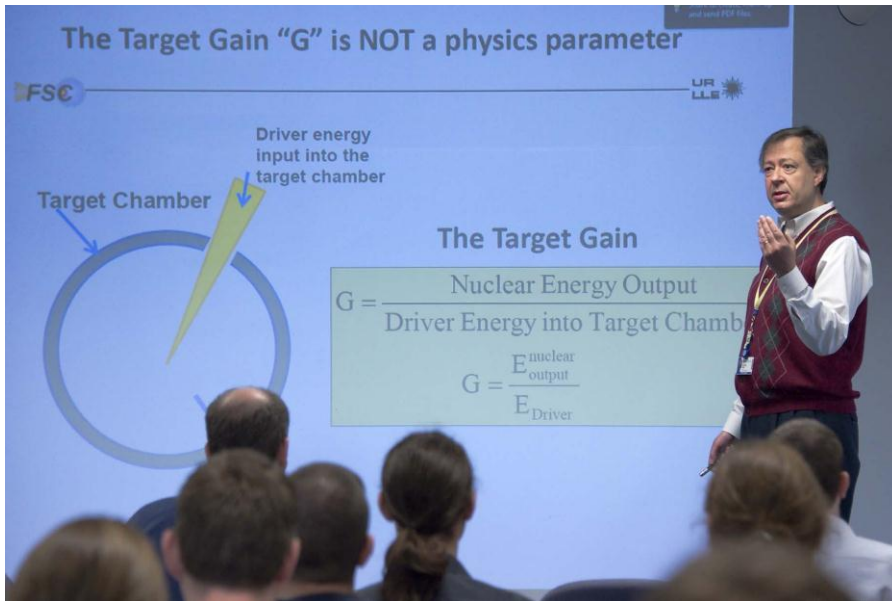
The photographs on the following pages provide a representative sampling of the workshop's talks, interactions, and ambience.



Registration for OLUG 2012 was a busy time. MIT's 7 PhD students worked the registration desk, demonstrating that they are capable of doing more than just physics!



University of Rochester Provost Ralph Kuncel (above) , as did LLE Director Dr. Robert McCrory, welcomed and thanked the OLUG Users for their active involvement in helping to guide and formulate the priorities and activities of Omega.



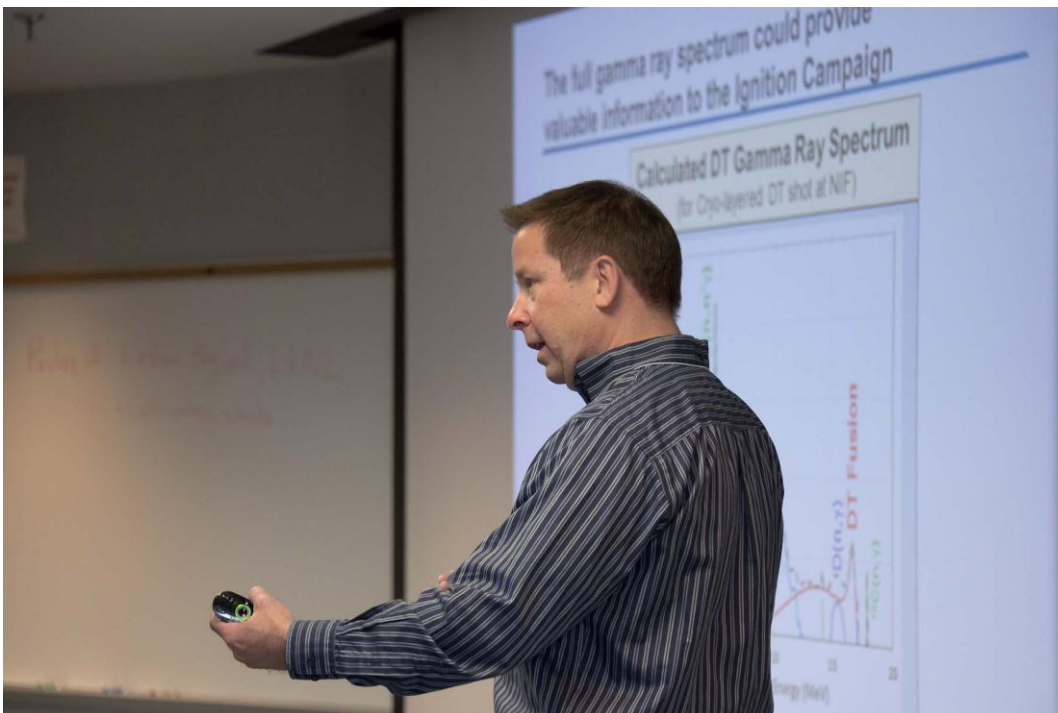
Invited presentations of OLUG 2012 were made by world-class physicists, such as LLE's Riccardo Betti, who talked about frontier research in ICF and, more generally, in HED Physics.



GA's Joe Kilkeny, head of NIF diagnostics, talked about the critical role that OMEGA and the OLUG Users play in developing and fielding essential NIF diagnostics and platforms. Joe gave many examples of such.



LLNL's Nino Landen gave two talks: one highlighting the NIC scientific progress and challenges; and one regarding the HED opportunities available at the Jupiter facility, in which a wider but smaller scale spectrum of research was described.



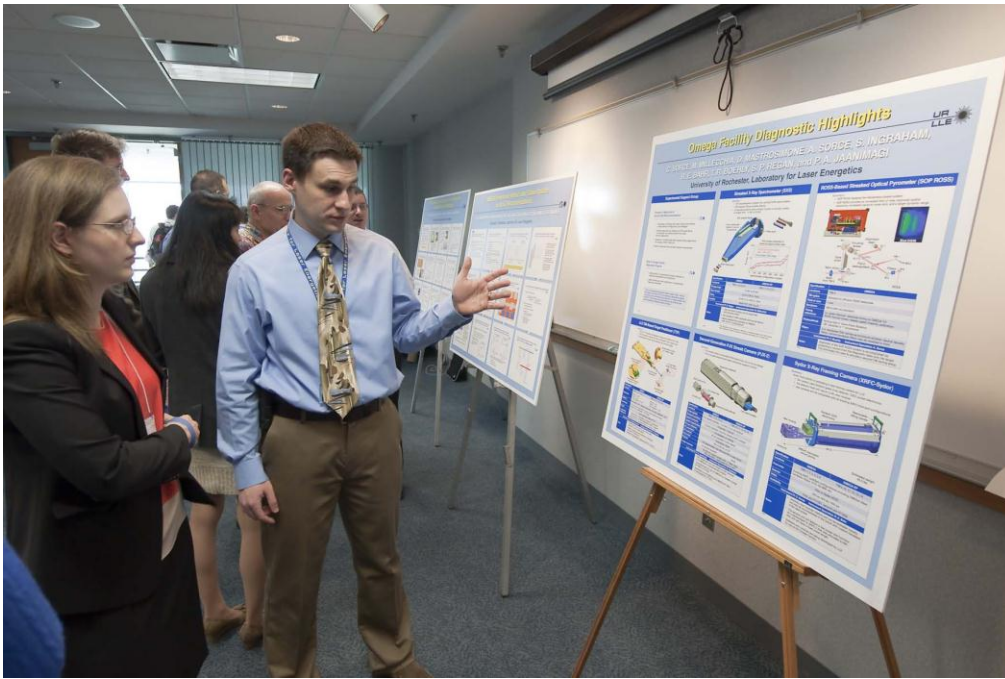
Hans Herrmann also gave two talks: one on gamma-ray spectroscopy at OMEGA and the NIF; the second, the broader HED activities at LANL. Hans is one of the leaders of the nascent field of plasma nuclear science.



In the Workshop's numerous *question and discussion* sessions, animated and *spirited* discussions were the norm. Here LLNL postdoc Nathan Kugland humorously (but seriously) raises a technical issue of widespread concern that impacts many OLUG users (i.e. imaging detectors for multi-MeV protons).



In three different poster sessions, 75 posters were presented; the majority by students and postdocs.



The 11 “Facility” posters, many addressing *Findings and Recommendations* of OLUG, were widely lauded by the Users. “Incredibly useful” was the universal sentiment for this session. These posters are available on-line.

Another critical *Finding and Recommendation* of OLUG was the appointment of a key technical contact with whom the Users could interact to help implement their complex experiments. Chuck Sorce, shown here talking with Carolyn Kuranz of the University of Michigan, was subsequently appointed head of the Experimental Support Group with a staff to address this issue. OLUG thanks LLE for such responsiveness.



The student-postdoc panel and town meeting, one of OLUG’s most important sessions, highlights many of the challenges faced by young researchers at OMEGA and elsewhere. Their *Findings and Recommendations* often bring to light infrastructure and operational issues, many of which have been addressed by LLE.



Rutherford-Appleton Lab's Peter Norreys chaired a session on *Findings and Recommendations*. Here he shares a light moment during Tammy Ma's presentation on the Student-Postdoc *Findings and Recommendations*. Tammy, a LLNL postdoc, chairs that group.



Princeton Physics Laboratory's Ken Hill presented, in a *Findings and Recommendations* session, a unique concept and proposal for an OMEGA high-resolution x-ray imaging spectrometer. OLUG recommends that we actively pursue further exploration and development of this promising concept of Ken's.





One of OLUG's 2011 *Findings and Recommendations* focused on the development of a robust magnetized HEDLP platform. LLE's Gennady Fiksel (right) talked about these recent implementations, which OLUG found truly impressive! Thank you, LLE and Gennady!



In a session chaired by University of Nevada's Roberto Mancini, DoE technical manager Lois Buitano praised the OLUG/LLE working relationship: "This is an excellent model" for all NNSA facilities.



The banquet at the Meliora on the University of Rochester campus offered workshop attendees a wonderful time for socializing and good cuisine.

# Agenda for the OMEGA Users Workshop: 25-27 April 2012

## Wednesday: 25 April 2012

7:00-8:00 Continental Breakfast  
8:00-8:10 Richard Petrasso Introductory Remarks and Workshop objectives  
8:10-8:20 Robert McCrory Welcome from the Laboratory Director and Vice President  
8:20-8:30 Ralph Kuncl Welcome from University of Rochester Provost

Session chair: Roberto Mancini

8:30-9:20 Riccardo Betti **Critical steps to Ignition**  
9:20-10:10 Nino Landen **Scientific advances and challenges at the National Ignition Facility**  
10:10-10:30 Coffee Break

Session Chair: Chikang Li

10:30-11:15 Sean Regan **Xray Thomson Scattering: Incisive probe for warm, dense matter**  
11:15-12:00 Joe Kilkenny **Moving diagnostic platforms from OMEGA to NIF (and back)**  
12:00-12:30 Workshop pictures  
12:30-1:30 Lunch, and OMEGA/OMEGA-EP tours

Session chair: Hui Chen

1:30-3:30 **Poster Session 1** (HED Science)

Session chair: Tammy Ma

3:30-5:45 **Poster Session 2** (HED Science)

## Thursday: 26 April 2012

7:00-8:00 Continental Breakfast  
8:00-8:05 Announcements

Session chair: Mark Koepke

8:05-8:45 Hans Herrmann **ICF Gamma Spectroscopy: New window to plasma nuclear science**  
8:45-9:30 Sam Morse **OMEGA Facility Update: Progress on User Recommendations**  
9:30-10:00 Abbas Nikroo **Target Basics for NLUF and Laboratory Basic Science**

Session chair: Jim Cobble

10:00-12:30 **Poster Session 3** (Facility and HED Science)

12:30-1:30 Lunch, and OMEGA/OMEGA-EP tours  
1:30-3:00 **Student-postdoc panel/Town meeting**  
3:00-3:15 Coffee Break

Session chair: Peter Norreys

3:15-6:30 **Presentation/Discussion of User Findings and Recommendations: Existing and New**

1. Tammy Ma, Chair, LLNL, *Findings and Recommendations of the Student/Postdoc Panel.*
2. Louise Willingale, Chair, Univ. of Michigan, *Bringing EP performance up to full specification, and 4-  $\square\square$  probe utilization.*
3. Mingsheng Wei, Chair, GA, *Long-pulse operations of OMEGA-EP*
4. Carolyn Kuranz, Chair, Univ. of Michigan, *Independent operations of the 3 legs of OMEGA 60*
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 at 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 nucleosynthesis 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 nucleosynthesis reactions in OMEGA implosions*
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 Fiskel, Chair, LLE, *Developing magnetic inertial fusion platforms for basic science and implosion physics*
13. Hye-sook Park, Chair, LLNL, *Cu-K(alpha) crystal imaging on OMEGA-EP for HED physics*

7:00-10:30 Banquet at Meliora

### **Friday: 27 April 2012**

7:15-8:00 Continental Breakfast

8:00- 8:05 Announcements

Session chair: Roberto Mancini

8:05-8:15 Lois Buitano, National Nuclear Security Administration

8:15-8:25 Ann Satsangi, Office of Fusion Energy Sciences

8:25-8:35 David Crandall, Advisor to Under Secretary for Science and Inertial Fusion and National Security

8:35-10:45 **Discussion of Findings and Recommendations with the LLE management**

10:45-12:00 Coffee Break

Session chair: Johan Frenje

10:55-1:00 **Overview of HED Science at LLNL, LANL, SNL, and LLE**

10:55-11:00 Carolyn Kuranz, Jupiter Users Group

11:00-11:30 Nino Landen, LLNL

11:30-12:00 Hans Herrmann, LANL

12:00-12:30 Ray Leeper, SNL

12:30-1:00 Craig Sangster, LLE

1:00-2:30 Lunch, **OMEGA/OMEGA-EP tours, and Omega Users Executive Session.**

## **Questions addressed in the General Workshop Sessions:**

*What new avenues of research should we be pursuing on the OMEGA / OMEGA-EP 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 NIF, and/or between OMEGA and Trident or Jupiter?*

## **NEXT OMEGA USER MEETINGS and WORKSHOP:**

2012 October 30 meeting, Tue., 5:00- 6:30 PM, APS/DDP R.I, Update

2013 April 24-26, Next OMEGA Users Workshop, LLE

## **ACKNOWLEDGMENTS:**

*This OMEGA Users workshop is made possible in part by the generous support of the National Nuclear Security Administration for travel expenses of students and postdocs; by the Office of Fusion Energy Sciences for support of general workshop costs; by the Fusion Science Center; by the MIT/Plasma Science and Fusion Center; and by the Laboratory for Laser Energetics for the use and availability of critical resources and support. In addition, OLUG especially thanks LLE Director Dr. Robert McCrory and the LLE management and technical staff for their responsiveness to OLUG's Findings and Recommendations and for providing a superb and dynamic HED facility for conducting state-of-the-art experiments. For capturing through his lens the workshop's ambiance, OLUG thanks Eugene Kowaluk. R. D. Petrasso is the editor of this Proceeding.*