
The Ninth Omega Laser Facility Users Group Workshop

Introduction

The Ninth Omega Laser Facility Users Group (OLUG) Workshop was held at the Laboratory for Laser Energetics (LLE) on 26–28 April 2017. It was attended by 110 researchers, including scientists, postdoctoral fellows (postdocs), and students (Fig. 152.20). The attendees represented institutions from five countries, including the U.S., UK, France, Spain, and Hungary. As has been the case for previous workshops, postdocs and students received travel support to attend the workshop from the Department of Energy's (DOE's) National Nuclear Security Administration (NNSA).

The Workshop Program

The OLUG program included the following four invited talks: “Exploring the Structure of Extra Solar Planets Using the OMEGA Laser,” by Tom Duffy (Princeton University) (Fig. 152.21); “Systematic Fuel Cavity Asymmetries in



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Figure 152.21

Tom Duffy (Princeton University) gave a talk on exploring the structure of extrasolar planets using the OMEGA Laser System.



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Figure 152.20

A group photo of the Ninth Omega Laser Facility Users Group Workshop attendees.

Directly Driven ICF Implosions,” by Rahul Shah [Los Alamos National Laboratory (LANL)] (Fig. 152.22); “Fast-Electron Transport in Warm and Hot Dense Plasmas,” by Farhat Beg [University of California, San Diego (UCSD)] (Fig. 152.23); and “Using Multi-Hohlraum Arrays for Studying the Pillars of Creation,” by David Martinez [Lawrence Livermore National Laboratory (LLNL)] (Fig. 152.24). DOE’s NNSA perspective was presented by ICF Program Director Njema Frazier. Other highlights included an evening tutorial, “X-Ray Imaging at OMEGA,” offered by Chuck Sorce (LLE); a facility talk, “Omega Facility Update and Progress on OLUG Recommendations,” by Sam Morse (LLE); research talks by representatives from LLE and the national laboratories [Mike

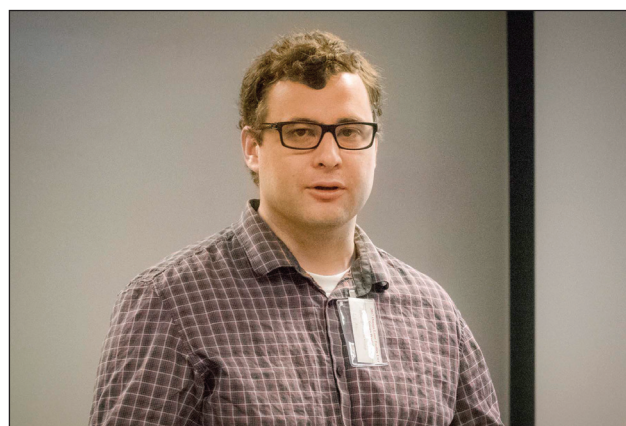
Campbell, LLE; Peter Celliers, LLNL; Kirk Flippo, LANL; and Kyle Peterson, Sandia National Laboratories (SNL)]; a lunch round-table discussion on career opportunities in high-energy-density science, the student and postdoc panel; and a discussion of OLUG’s Findings and Recommendations with LLE management. In addition, LLE staff organized tours of the OMEGA and OMEGA EP lasers (Fig. 152.25). The lunch round-table discussion on career opportunities followed up on the talks from laboratory representatives on Thursday morning and gave the students and postdocs an opportunity to engage in a relaxed and productive discussion with laboratory researchers (Fig. 152.26). The round-table discussion was a new activity of the workshop introduced this year. It was very well received by



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Figure 152.22

Rahul Shah (LANL) gave a talk on systematic fuel cavity asymmetries in directly driven ICF implosions.



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Figure 152.24

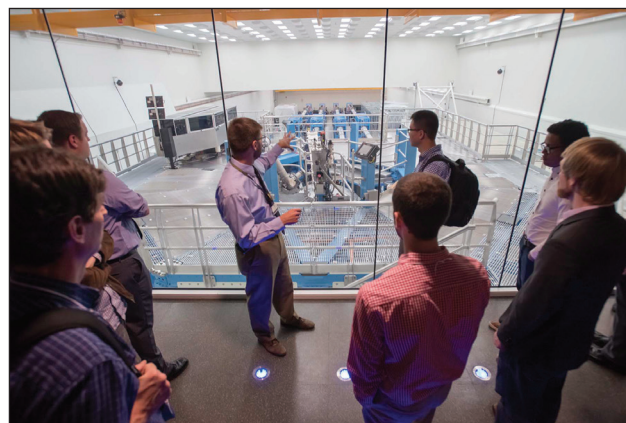
David Martinez (LLNL) gave a talk on using multi-hohlraum arrays for studying the pillars of creation.



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Figure 152.23

Farhat Beg (UCSD) gave a talk on fast-electron transport in warm and hot dense plasmas.



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Figure 152.25

LLE staff organized tours of OMEGA and OMEGA EP. In this photo David Canning explains the OMEGA EP Laser System to a group of students and postdocs.



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Figure 152.26

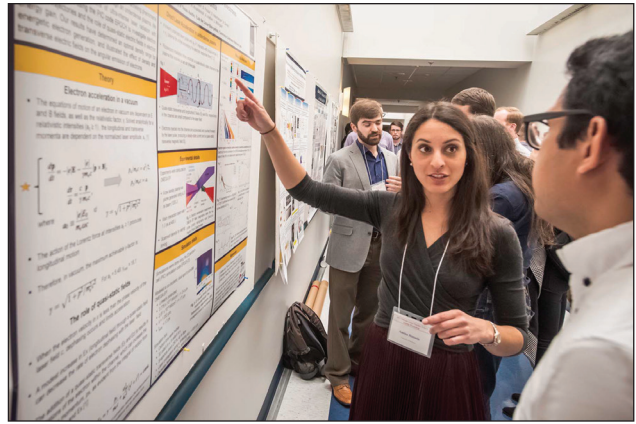
A lunch round-table discussion on career opportunities in high-energy density followed up on talks by national laboratory representatives.

students and postdocs, and it will be continued and expanded in future workshops to include scientists working in universities and industry.

Student, postdoc, scientist, and facility posters comprised a total of 62 poster presentations that were organized in three poster sessions. Of the total number, 46 posters were presented by graduate students and postdocs. In addition, six posters were presented by undergraduate students, and two posters were presented by high school students who had participated in LLE's 2016 Summer High School Research Program (Figs. 152.27–152.29).

Student and Postdoc Poster Awards

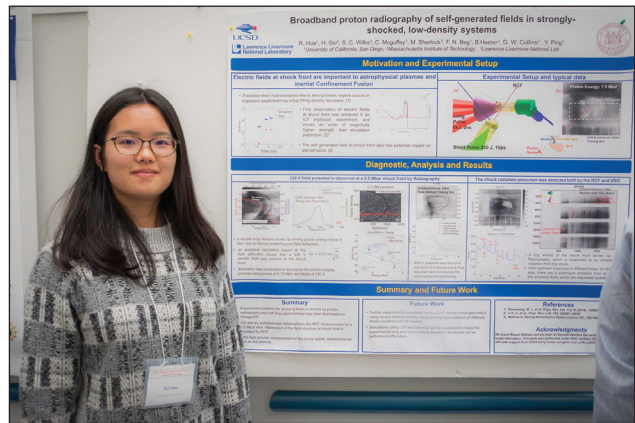
In an effort to promote and reward excellence in young researchers, the posters presented at the OLUG Workshop by students and postdocs were reviewed and ranked by a committee of scientists. As a result, honorable mentions and prizes were



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Figure 152.27

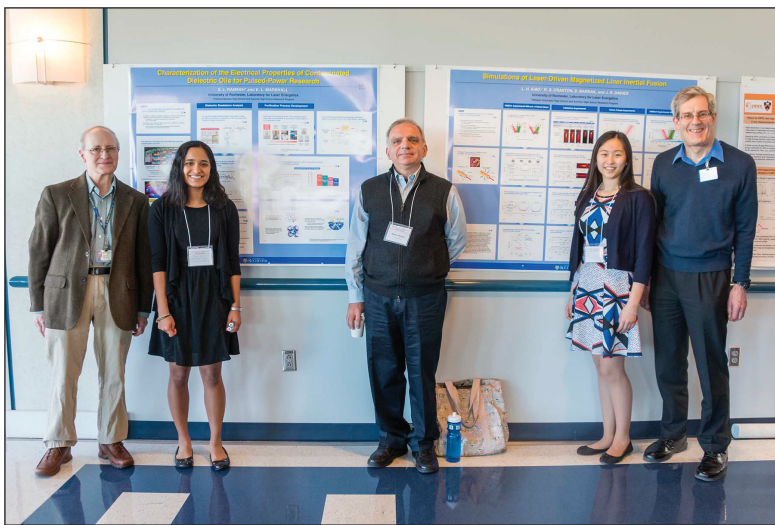
Amina Hussein (University of Michigan) discusses her poster on particle-in-cell simulations of laser-accelerated electrons in underdense plasmas.



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Figure 152.28

Rui Hua (UCSD) presented a poster on broadband proton radiography of self-generated fields in strongly shocked, low-density systems.



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Figure 152.29

Sapna Ramesh from Pittsford Mendon High School and her mentor Kenneth Marshall (left) and Leah Xiao from Webster Schroeder High School and her mentor Stephen Craxton (right) presented posters based on their summer internships at LLE. In the center is OLUG chair Roberto Mancini.

awarded to those posters at the top of the ranking. The following are the awards granted during this OLUG Workshop (Fig. 152.30).



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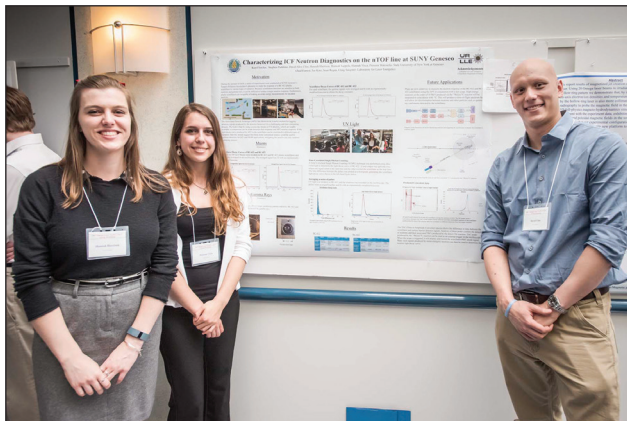
Figure 152.30

Student and postdoc poster awardees. From left to right: Craig Sangster, Derek Nasir, Hans Rinderknecht, Hong Sio, Archie Bott, Luke Ceurvorst, Paul Campbell, Samuel Totorica, and Maria Gatu Johnson. Craig Sangster and Maria Gatu Johnson led the poster awardees selection process.

Undergraduate Students

First place (\$250): Katelyn Cook and Micah Coates, Houghton College, “Measurement of the ${}^6\text{He}$ Decay Produced by the ${}^9\text{Be}(n,\alpha){}^6\text{He}$ Reaction”

Honorable Mention (\$75): Hannah Harrison, Hannah Visca, David Chin, and Praveen Wakwella, State University of New York (SUNY), Geneseo, “Characterizing Neutron Diagnostics on the nTOF Line at SUNY Geneseo” (Fig. 152.31)



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Figure 152.31

Undergraduate students Hannah Harrison, Hannah Visca, and David Chin (left to right) presented a poster on characterizing ICF neutron diagnostics on the neutron time-of-flight line at the SUNY, Geneseo.

Graduate Students

First place (\$250): Hong Sio, Massachusetts Institute of Technology (MIT), “Probing Kinetic and Multi-Ion Fluid Effects in ICF Implosions Using DT and D^3He Reaction Time-Histories on OMEGA”

Second place (\$175): Archie Bott, University of Oxford, “Proton Imaging of Stochastic Magnetic Fields”

Third place (\$100): Paul Campbell, University of Michigan, “X-Ray and Electron Measurements of Relativistic Magnetic Reconnection in Layered Targets and Preformed Plasmas”

Honorable mentions (\$75): Derek Nasir, Ohio State University, “Enhanced Laser Plasma Interaction Using Micro-Structured Targets”

Luke Ceurvorst, University of Oxford, “Implications for Channel Formation in ICF from Observations of mm-Scale Plasmas at Omega EP”

Samuel Totorica, Stanford University, “Plasmoid Formation and Particle Acceleration in Laser-Driven Magnetic Reconnection”

Postdoctoral Fellows

First place (\$250): Hans Rinderknecht, LLNL, “Measurements of Shock-Front Structure in Multi-Species Plasmas”

Honorable mention (\$75): Edward Marley, LLNL, “Development of a Buried Layer Platform at the OMEGA Laser to Study Non-Equilibrium Coronal Plasmas”

Nominations and Election

In the winter of 2017, a nominating committee was established to request nominations for the election of three new executive committee (EC) members according to the guidelines of OLUG’s bylaws. The nominating committee was comprised of Mark Koepke [West Virginia University (WVU), Chair] (Fig. 152.32), Ray Leeper (LANL), and Chris McGuffey (UCSD). The nominations for the three new members of OLUG’s EC were to include one representative from a U.S. university/small business, one representative from a national laboratory/major business, and one representative from non-U.S. researchers. Once again, we had an excellent group of nominees who agreed to put their name on the ballot and were willing to serve on the EC if elected. The election resulted in the selection of Maria Gatu Johnson from MIT, Channing Huntington from LLNL, and Alexis Casner from the University of Bordeaux, France, as new members of the EC. Taking



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Figure 152.32

Mark Koepke (WVU) explained the annual nominations and election process carried out in the winter of 2017 that led to the election of three new members of OLUG's Executive Committee.

into account the newly elected members as well as those who continue from the previous year, the EC of OLUG for the year April 2017–April 2018 will comprise the following members:

- U.S. university/small business: Roberto Mancini [University of Nevada, Reno (UNR), Chair], Mark Koepke (WVU, Vice Chair), Maria Gatu Johnson (MIT), and Johan Frenje (MIT)
- National laboratory/major business: Peter Celliers (LLNL), Channing Huntington (LLNL), and Mingsheng Wei [General Atomics (GA)]
- Junior researcher: Alex Zylstra (LANL)
- Non-U.S. researcher: Alexis Casner (University of Bordeaux, France)
- LLE, ex-officio: Jim Knauer

The three new EC members replaced Paul Drake (University of Michigan), Kirk Flippo (LANL), and Peter Norreys (Rutherford Laboratory, UK) who stepped down from the EC after completing their terms. The OLUG EC is very grateful to Paul Drake, Kirk Flippo, and Peter Norreys for their service in the EC and their contributions to the success of OLUG (Fig. 152.33).

Summary of Findings and Recommendations

An important outcome of OLUG's annual workshop is the list of Findings and Recommendations that OLUG submits for consideration to LLE's management every year. The 2017 Findings and Recommendations are summarized below, including those put forward by the student and postdoc panel (Fig. 152.34).

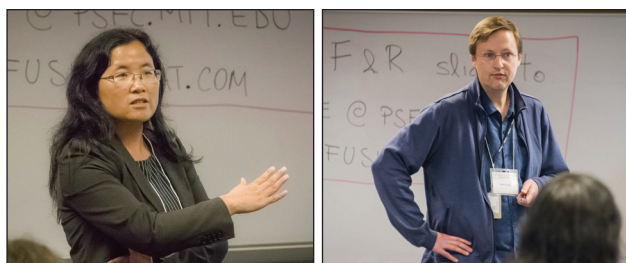
1. An increase in the NLUF shot allocation to advance fundamental high-energy-density science and student/postdoc training.
2. An opposing beam configuration for OMEGA EP.
3. Development of the capability for an absolute measurement of Raman backscattered light.
4. A distributed phase plate (DPP)–smoothed, nanosecond-duration beam with small focal spot on OMEGA EP.
5. Additional heated tritium-fill cells for filling glass capsules.
6. A facility-owned ten-inch manipulator (TIM)–mounted, DMX-type instrument to spectrally characterize x-ray drives on OMEGA EP.



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Figure 152.33

OLUG Executive Committee members and ICF Program Director Njema Frazier from NNSA. From left to right, front row: Maria Gatu Johnson (MIT), Mingsheng Wei (GA), Roberto Mancini (UNR, Chair), Njema Frazier (NNSA), Johan Frenje (MIT), and Peter Celliers (LLNL). From left to right, back row: Alex Zylstra (LANL), Kirk Flippo (LANL), Mark Koepke (WVU, Vice Chair), and Peter Norreys (Rutherford Laboratory, UK).



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Figure 152.34

(a) Mingsheng Wei (GA) and (b) Johan Frenje (MIT) led the Findings and Recommendations discussion and presentation to LLE management on Friday morning.

7. More options of spectral range coverage for the imaging x-ray Thomson spectrometer (IXTS) and high-resolution spectrometer 2 (HRS2).
8. An optical Thomson-scattering capability for OMEGA EP.
9. An update/expansion of the flat-fielding database of x-ray framing cameras.
10. A Dante radiation temperature analysis and time-history result available during shot day.
11. Several upgrades and improvements of the active shock breakout (ASBO) and streak optical pyrometer diagnostics, including (a) suppressing the “wiggles” in OMEGA EP ASBO, (b) a smaller field of view to accommodate smaller targets, (c) an absolute calibration of OMEGA EP ASBO, (d) faster timing combs, and (e) a centralized server to archive and make available all necessary calibration details.
12. A three-wavelength VISAR (velocity interferometer system for any reflector) for OMEGA EP.
13. Improving the beam combiner optic lifetime and/or replacement capability to support year-round interleaved joint OMEGA–OMEGA EP shots.
14. The option of taking photos of OMEGA EP shots.
15. Investigating the extension of the duration of OMEGA EP UV beams to 15 to 20 ns.
16. Investigating the feasibility of splitting one of the OMEGA EP short-pulse beams into two focal spots.
17. Continuing the work to improve the Principal Investigator (PI) portal and web-based resources, in particular, with emphasis on data permission access.
18. A web-based system and better microphones for pre-shot briefings so offsite attendees can improve their involvement and participation in the discussions.
19. The addition of a web-based meeting option to Monday morning’s experiment briefings so PI’s who want to join the meeting after their experiment can do so.



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Figure 152.35

OLUG Chair Roberto Mancini (UNR) adjourned the workshop with the announcement of the “mid-year” meeting of OLUG at the 2017 APS Division of Plasma Physics conference and the next annual OLUG Workshop in April 2018.

ACKNOWLEDGMENT

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