External Users' Program

M. S. Wei

Laboratory for Laser Energetics, University of Rochester

Under the facility governance plan implemented in FY08 to formalize the scheduling of the Omega Laser Facility as a National Nuclear Security Administration (NNSA) User Facility, Omega Facility shots are allocated by programs following NNSA guidance. NNSA funds about 190 shot days each year on the OMEGA and OMEGA EP Laser Systems for experiments. The principal uses of Omega are for NNSA-supported research and development in high-energy-density physics recommended by the HED Council and basic science through peer-reviewed proposals. The majority (~68%) of these shot days are committed to the national Inertial Confinement Fusion (ICF) Program and the High-Energy-Density Program with shots conducted by scientists from Lawrence Livermore National Laboratory (LLNL), Los Alamos National Laboratory (LANL), Sandia National Laboratories (SNL), the Naval Research Laboratory (NRL), and LLE. In FY22, the Omega Laser Facility delivered a total of 2110 shots over 207 days, among which 1390 target shots (including 128 calibration shots) were conducted for the ICF and HED campaigns, which are ~65.9% of the overall facility shots. The successful completion of the large number of experiments at the Omega Laser Facility during the COVID-19 global pandemic is attributed to the "RemotePI" operation protocol that enabled experimental principal investigators (PI's) and collaborators to safely and effectively conduct experiments via remote access.

The Basic Science Program at the Omega Laser Facility, with projects selected through open-call and peer-reviewed processes, is typically allotted between 25% to 29% of the total NNSA-funded Omega Facility shot days. The program has two distinct components: (1) the National Laser Users' Facility (NLUF) experiments (~18% of the NNSA-funded shot time) led by researchers from U.S. academia and business; and (2) the Laboratory Basic Science (LBS) experiments (with ~11% of the NNSA-funded shot time) that are led by the NNSA HED laboratories including LLNL, LANL, SNL, NRL, and LLE and the Office of Science laboratories such as SLAC National Accelerator Laboratory, and Princeton Plasma Physics Laboratory (PPPL). In FY22, the NLUF and LBS programs obtained 314 and 224 target shots, respectively, and together accounted for ~25.5% of the overall facility shots.

Since FY20, LLE has provided a few additional shot days each year on OMEGA EP to the users of the newly established LaserNetUS network funded by the DOE Office of Fusion Sciences (FES) with user experimental proposals annually solicitated and selected by a fully independent proposal review panel process. The LaserNetUS program obtained 34 target shots on OMEGA EP in FY22.

Since FY21, a few additional shot days each year at the Omega Laser Facility have also been made available to the University of Rochester (UR)-hosted Center for Matter at Atomic Pressure (CMAP), a new Physics Frontier Center funded by the National Science Foundation (NSF). CMAP is a collaboration among faculty, scientists, researchers, and students at UR, Massachusetts Institute of Technology (MIT), Princeton University, the University of California at Berkeley and Davis, the University of Buffalo, and LLNL. CMAP researchers conduct laboratory-based exploration of planets and stars throughout the universe and obtained 55 target shots in FY22.

During FY22, the Omega Laser Facility was also used to support research grants led by LLE scientists and funded by FES (14 target shots on OMEGA) and for other externally funded programs led by teams from the Johns Hopkins University's (JHU's) Applied Physics Laboratory (APL) (36 target shots on OMEGA) and the French le Commissariat à l'énergie atomique et aux énergies alternatives (CEA) (43 target shots on OMEGA and OMEGA EP). These externally funded experiments are conducted at the facility on the basis of special agreements put in place by UR/LLE and participating institutions with the endorsement of NNSA.

The facility users who conducted experiments during this year included 23 collaborative teams participating in the NLUF Program, 20 teams led by scientists from LLNL, LANL, LLE, SLAC, and PPPL participating in the LBS Program; three project teams participating in the LaserNetUS Program; six project teams from CMAP; many collaborative teams from the national laboratories (LLNL, LANL, SNL, NRL) and LLE conducting ICF experiments; investigators from LLNL, LANL, SNL, and LLE conducting experiments for HED campaigns; and researchers from APL and CEA.

A critical part of the Omega external users' programs is the training of graduate students and postdoctoral researchers in HED and plasma physics. In total, over 70 graduate students (see Table I) from 28 other universities,18 undergraduate students, and more than 40 postdoctoral researchers participated in these external user-led research projects with experiments at the Omega Laser Facility during FY22, among which seven students successfully defended their Ph.D. theses in calendar year 2022 (see the highlighted names in Table I). It is worth noting that 25 of these graduate students are new to the Omega Laser Facility.

Table I: More than 70 graduate students from 28 universities have conducted research utilizing the Omega Laser Facility through NLUF, LBS, and LaserNetUS, and/or via collaborations with national labs and LLE during FY22. Seven students successfully defended their Ph.D. theses in calendar year 2022 (see shaded cells).

Name	Institution	Advisor(s)	Notes
A. Aghedo	Florida A&M University	Albert (LLNL)	LLNL collaboration including LBS projects
E. Grace	Georgia Tech (GT)	Trebino (GT)/ Ma (LLNL)	LLNL collaboration (PI: Swadling)
J. Gonzalez Quiles	JHU	Wicks	
Y. Li	JHU	Wicks	
T. Perez	JHU	Wicks	
Z. Ye	JHU	Wicks	
P. J. Adrian	MIT	Frenje	
C. Chang	MIT	Li/Frenje	
S. Danhoff	MIT	Frenje	
T. Evans	MIT	Frenje	
T. M. Johnson	MIT	Li	
J. Kunimune	MIT	Frenje	NNSA Laboratory Residency Graduate Fellow
J. Pearcy	MIT	Li	
B. Reichelt	MIT	Li	NNSA Laboratory Residency Graduate Fellow
R. Simpson	MIT	Winslow (MIT)/ Ma (LLNL)	LLNL collaboration; graduated in 2022; joined LLNL as Lawrence Postdoc Fellow
G. Sutcliffe	MIT	Li	Defended Ph.D. thesis in October 2022; to join LLNL as the High-Energy-Density Science Center Postdoc Fellow
J. Copley	Princeton University	Duffy	New
S. Han	Princeton University	Duffy	
C. Johnson	Princeton University	–	LBS (PI: Malko); new
D. Kim	Princeton University	Duffy	Graduated in March 2022; Postdoc at Carnegie Science
I. Ocampo	Princeton University	Duffy	

Table I: More than 70 graduate students from 28 universities have conducted research utilizing the Omega Laser Facility through NLUF, LBS, and LaserNetUS, and/or via collaborations with national labs and LLE during FY22. Seven students successfully defended their Ph.D. theses in calendar year 2022 (see shaded cells) (continued).

Name	Institution	Advisor(s)	Notes
B. Cage	Rice University	Liang	New
W. Riedel	Stanford University	Cappelli	
S. You	Stanford University	Edwards	LLNL collaboration–LBS; new
W. Gammel	University of Arizona	–	LANL collaboration (PI: Palaniyappan); new
D. Lioce	University of California, Berkeley	–	LANL collaboration (PI: Kozlowski); new
M. Harwell	University of California, Davis (UC Davis)	Stewart	CMAP
A. Postema	UC Davis	Stewart	CMAP; new
R. Lee	University of California, Los Angeles (UCLA)	Mori	
M. Sinclair	UCLA	Joshi	LLNL collaboration including LBS (PI: Albert)
K. Bhutwala	University of Califonia, San Diego (UC San Diego)	Beg	
A. Bogale	UC San Diego	Beg	
T. Cordova	UC San Diego	Beg	LLNL collaboration
A. Li	UC San Diego	Meyers	
M. Postornik	UC San Diego	Arefiev	LLNL collaboration (PI: Smith); new
G. Righi	UC San Diego	Meyers	LaserNetUS and LLNL collaboration; graduated in July 2022; postdoc at LLNL
J. Saret	UC San Diego	Beg	NLUF (PI: McGuffey, General Atomics); new
I-L. Yeh	UC San Diego	Arefiev	NLUF (PI: Willingale, UM); new
C. Frank	University of Delaware	Bose	Princeton Plasma Physics Laboratory-LBS (PI: Malko); new
K. Bolduc	University of Massachusetts, Amherst	–	LLNL collaboration (PI: Smith); new
A. Angulo	University of Michigan (UM)	Kuranz	
K. Bryant	UM	Kuranz	
S. Coffing	UM	Drake	LANL collaboration (PI: Kozlowski)
C. Fiedler-Kawaguchi	UM	Kuranz	LANL collaboration (PI: Rasmus)
K. Kelso	UM	Kuranz	
J. Kinney	UM	Kuranz	New
J. Latham	UM	Krushelnick	New

Table I: More than 70 graduate students from 28 universities have conducted research utilizing the Omega Laser Facility through NLUF, LBS, and LaserNetUS, and/or via collaborations with national labs and LLE during FY22. Seven students successfully defended their Ph.D. theses in calendar year 2022 (see shaded cells) (continued).

Name	Institution	Advisor(s)	Notes
S. Miller	UM	McBride	SNL collaboration (PI: Gomez); new
B. Russell	UM	Willingale	Graduated in Sept. 2022; postdoc at UM
M. Springstead	UM	Kuranz	NLUF and LLNL collaboration (PI: Swadling)
H. Tang	UM	Willingale	
R. Vandervort	UM	Drake/Kuranz	Graduated in July 2022; postdoc at LANL
M. Wadas	UM	Johnsen	LaserNetUS and LLNL collaboration
C. Allen	University of Nevada (UNR)	White	
J. Clapp	UNR	Mancini	new
E. Gallardo-Diaz	UNR	Mancini	
T. Griffin	UNR	White	new
J. Rowland	UNR	Mancini	
J. King	University of New Mexico	–	SNL collaboration (PI: Aguirre); new
E. Smith	University of Notre Dame	–	LANL collaboration (PI: Kozlowski); new
C. Danley	UR/LANL	–	LANL collaboration
I. Pagano	University of Texas, Austin	Downer	LLNL collaboration including LBS (PI: Albert)
C. Samulski	Virginia Tech	Srinivasan	
M. Vescovi	Helmholtz-Zentrum Dresden-Rossendorf	–	NLUF collaboration (PI: Valdivia); new
V. Valenzuela	Imperial Collage	–	LLNL collaboration including LBS (PI: Swadling); new
F. Barbato	Sapienza Università di Roma	Atzeni	LLE collaboration–LBS (PI: Igumenshchev); new
L. Savino	Sapienza Università di Roma	Atzeni	LLE collaboration–LBS (PI: Igumenshchev); new
C. Bruulsema	University of Alberta	Rozmus	LLE and LLNL collaborations
R. Loitard	University of Bordeaux	–	LLE collaboration–LBS (PI: Igumenshchev); new
S. Iaquinta	University of Oxford	Gregori	NLUF and LLE collaboration
H. Poole	University of Oxford	Gregori	NLUF and LLE collaboration
M. Khan	University of York	Woolsey	Rutherford Appleton Laboratory/York (PI: Scott) and LLE collaboration (PI: Theobald); graduated in May 2022; postdoc at York