Positron Production Experiment: On 16 April 2009, an LLNL/LLE team performed a Laboratory Basic Science (LBS) experiment on the OMEGA EP Laser System to study positron production from high-intensity laser interactions with high-Z targets. The OMEGA EP backlighter produced ~1 kJ in a 10-ps laser pulse that interacted with a 1-mm-thick Au target. The positrons emitted from the rear side of the target were measured with a Thomson parabola magnetic positron spectrometer. A quasi-monoenergetic positron beam was observed with a maximum energy of ~20 MeV (Fig. 1). It is estimated that 10^{12} positrons were produced. This is a factor of ~10 more than were produced with a 260-J, 10-ps laser in LLNL experiments.[1] It was anticipated that the number of positrons produced would scale approximately with the laser energy.[2] The quasi-monoenergetic positron spectrum is likely caused by positron acceleration from the sheath formed by escaping electrons on the rear surface of the target. The differences between the two experiments will be studied to understand the consequences of these results. The positron production rate during the laser shot appears to be the highest ever observed in the laboratory.

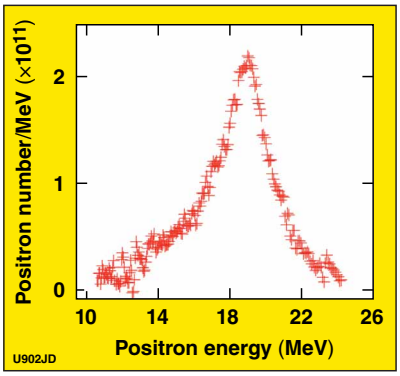

Figure 1. Positron spectrum measured on the OMEGA EP Laser System.

OMEGA Laser Users Group (OLUG) Workshop: On 29 April–1 May 2009, 110 researchers from 29 universities, and laboratories from 4 countries gathered at LLE for the first OLUG workshop (see Fig. 2). The purpose of the workshop was to facilitate communications among users and between users and the facility; 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 at LULI or NIF); and to provide an opportunity for graduate students and postdoctoral scholars (postdocs) to present their OMEGA-related research. Some 32 students and postdocs (see Fig. 3), 27 of whom were supported by travel grants from NNSA, attended the workshop and presented 31 of the 48 contributed presentations on topics ranging from target fabrication to experiments simulating important aspects of supernovae. Sixteen contributed presentations were made by scientists and academics conducting research in high-energy-density physics. In the near future, workshop presentations, both contributed and overview, will be available at the OLUG workshop website (http://meetings.lle.rochester.edu/omega09/index.php). An important practical function of the workshop was the work that OLUG users conducted to develop a set of recommendations and findings to help set future priorities of the OMEGA facilities. These findings will comprise a report that will help give the OMEGA Facility management guidance in their decision process. This report will also be available at the workshop website.

Figure 2. Photograph of first OLUG Workshop attendees.

Figure 3. Photograph of graduate students and postdocs attending the OLUG workshop.

OMEGA Operations Summary: The Omega Facility carried out 149 target shots in April (121 on OMEGA and 28 on OMEGA EP) with an average shot effectiveness of 97.0% (96.7% on OMEGA and 98.2% on OMEGA EP). LLE and LLNL led teams conducted 50 NIC shots and 33 target shots were conducted for the HED program (13 for LLNL and 20 for LANL). Twenty-five LLNL-led target shots were carried out for the LBS program and 14 target shots were dedicated to 3 NLUF experiments led by scientists from MIT, the University of California at San Diego, and the University of Michigan, respectively. AWE (UK) and CEA (France) carried out 14 and 13 target shots, respectively.

1. H. Chen *et al.*, Phys. Rev. Lett. **102**, 105001 (2009).
2. J. Myatt *et al.*, Bull. Am. Phys. Soc. **52**, 66 (2007).