

UNIVERSITY OF ROCHESTER
LABORATORY FOR LASER ENERGETICS

2006





OMEGA EP
TARGET CHAMBER

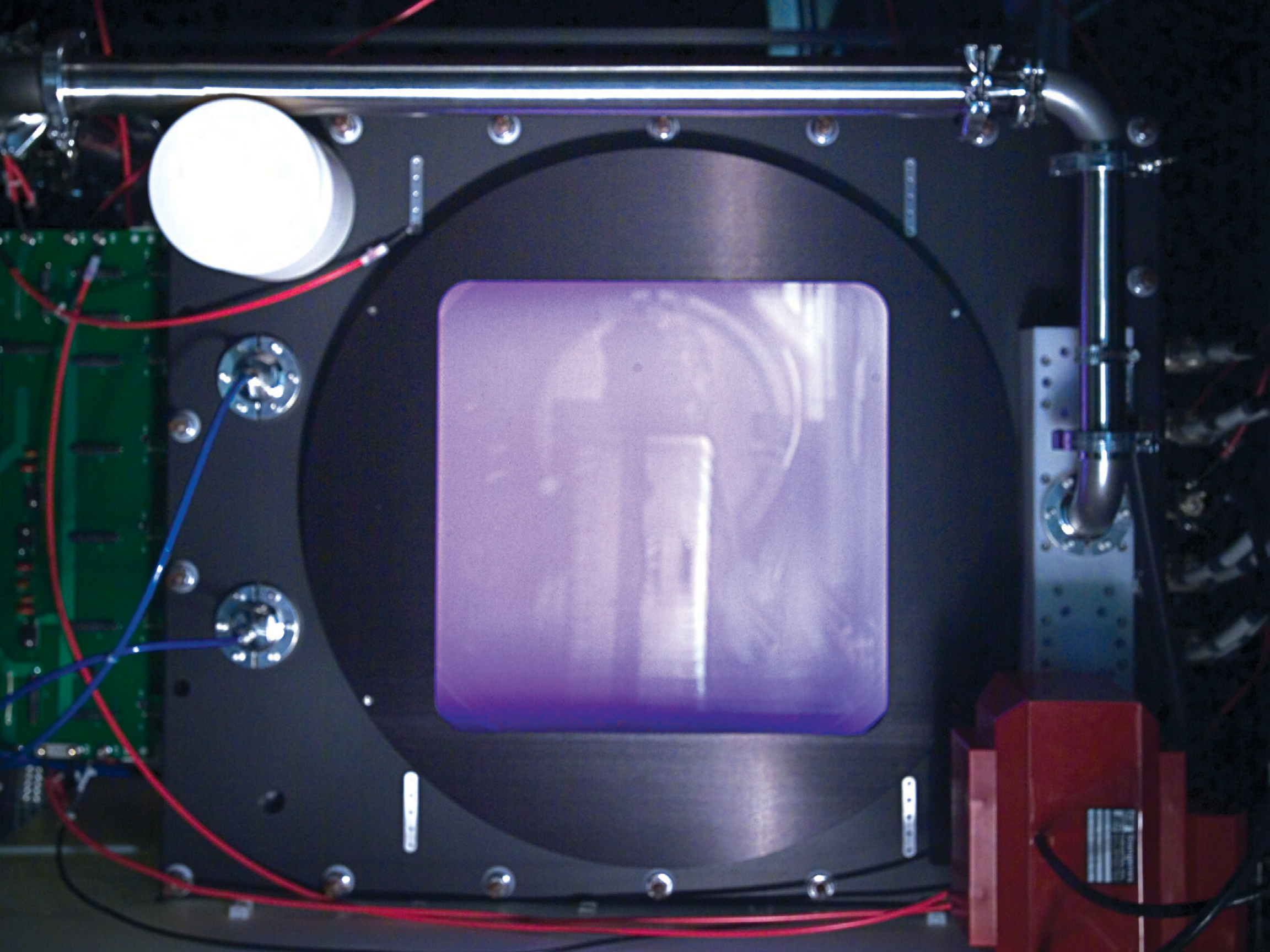
The target chamber for OMEGA EP is lowered into position within the OMEGA EP target structure. The chamber is matched in size to the OMEGA chamber with a diameter of 3.3 m.

JANUARY 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 NEW YEAR'S DAY	2 UNIVERSITY HOLIDAY	3	4	5	6 ●	7
8	9	10	11	12	13	14 ○
15	16	17	18	19	20	21
22 ●	23	24	25	26	27	28
29 ●	30	31			DECEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	FEBRUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28



**PLASMA-ELECTRODE
POCKELS CELL
(PEPC)**

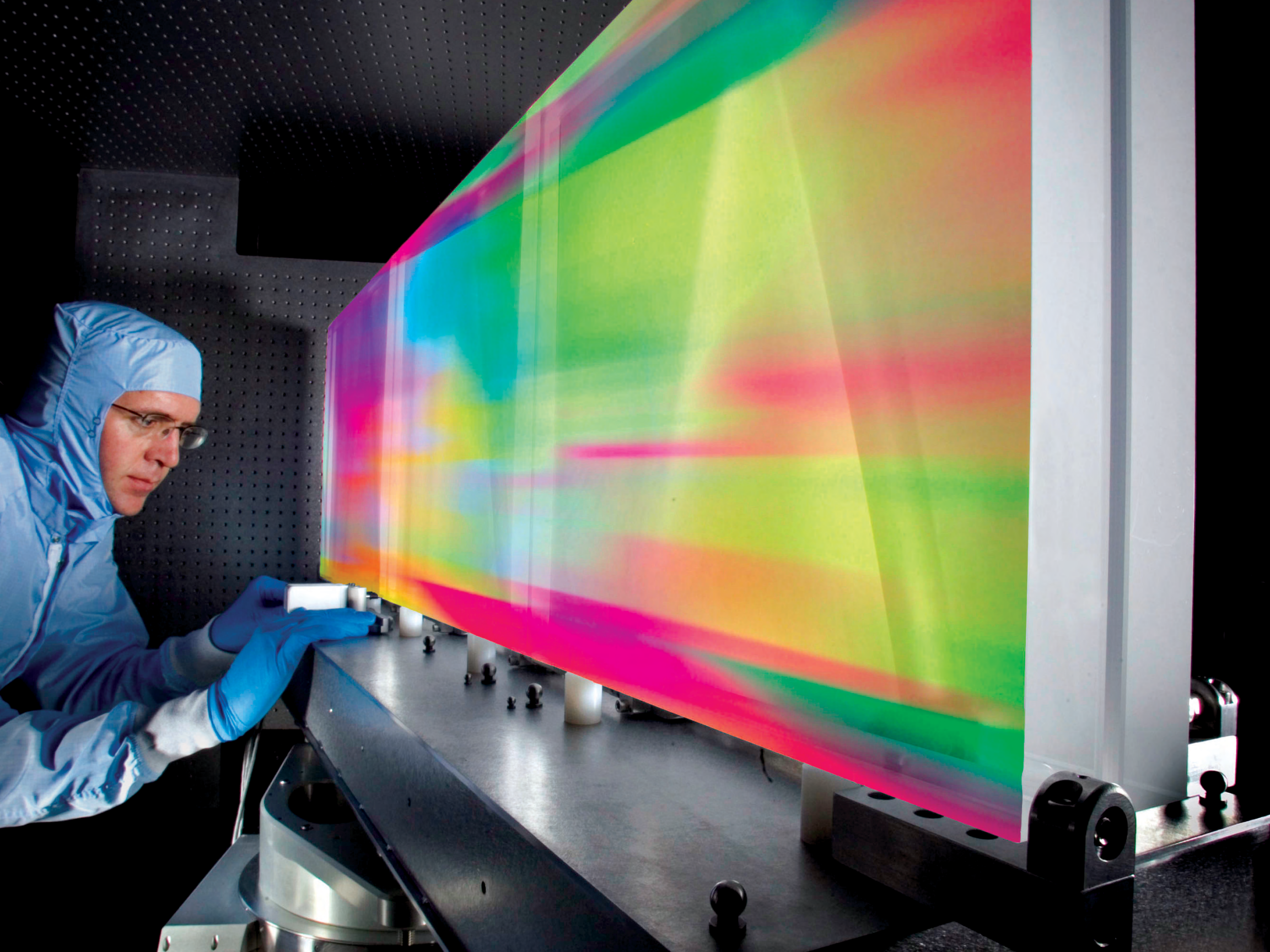
Based on NIF technology and developed with the assistance of LLNL scientists, a high-contrast plasma-electrode Pockels cell (PEPC) was built and tested at LLE in 2005. Circumstances arising from OMEGA EP's short-pulse mission imposed a requirement for minimum switching contrast well beyond the performance achieved by any previously reported PEPC systems. In laboratory testing, the LLE PEPC reliably exceeds its minimum contrast requirement.

FEBRUARY 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4
					LLE SEASON'S PARTY	
5	6	7	8	9	10	11
◦						
12	13	14	15	16	17	18
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26	27	28				
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					JANUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	MARCH S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31



OMEGA EP
 TILED-GRATING
 ASSEMBLY

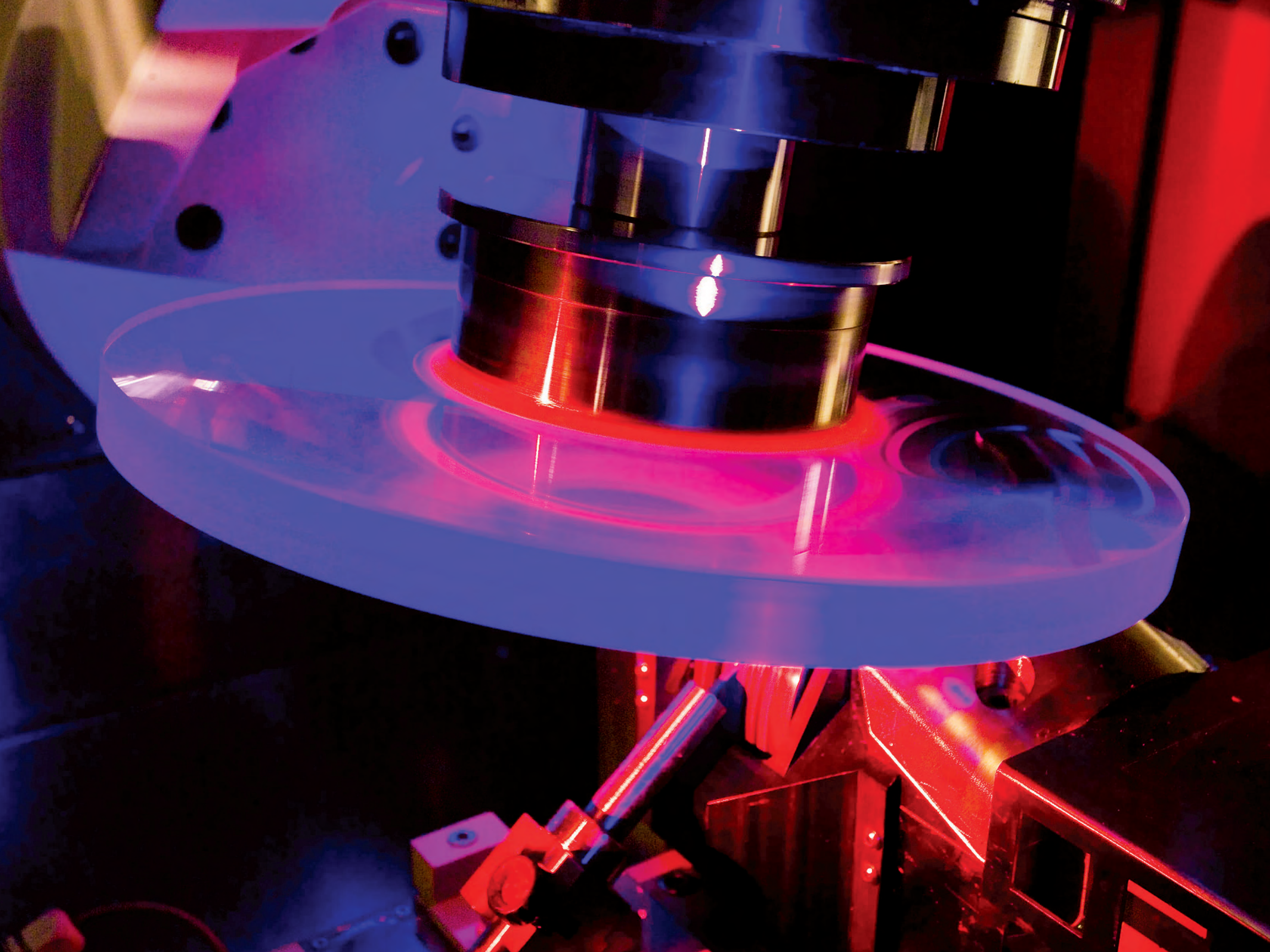
The coherent addition of multiple gratings to form a larger grating provides an alternative to meter-sized multilayer dielectric (MLD) gratings. This concept has been developed for the OMEGA EP grating compressors. Above, a LLE research engineer is aligning a full-size OMEGA EP tiled-grating assembly (TGA).

MARCH 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
FEBRUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	APRIL S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30		1	2	3	4
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OMEGA TVS-II ASPHERIC MIRROR

The OMEGA target viewing system (TVS-II) is being upgraded so that it can be used as an on-shot target diagnostic. A key feature of the new design is a 1.8-m, working-distance $f/13$ telescope that is external to the target chamber. The telescope consists of three mirrors (one spherical and two aspheric) fabricated at LLE on glass substrates. The largest mirror is 310 mm in diameter. Shown here is a 300-mm-diameter, fused-silica parent optic on LLE's Q22-Y MRF machine. When complete, two 150-mm-diameter segments will be core drilled, off-axis, from this parent.

APRIL 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
MARCH S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	MAY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					1
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16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						



THE ROBERT L. SPROULL CENTER FOR ULTRA HIGH INTENSITY RESEARCH

In May 2005, LLE dedicated the Robert L. Sproull Center for Ultra High Intensity Laser Research. This facility was named in honor of the University's seventh president and will house the OMEGA EP Laser System (interior of target chamber shown above). The Laboratory for Laser Energetics became a leading center for laser research under Dr. Sproull's leadership. Dr. Sproull (shown below) firmly believed that LLE would become a venue for training future generations of scientists and researchers, as well as the world-class facility that it is today.

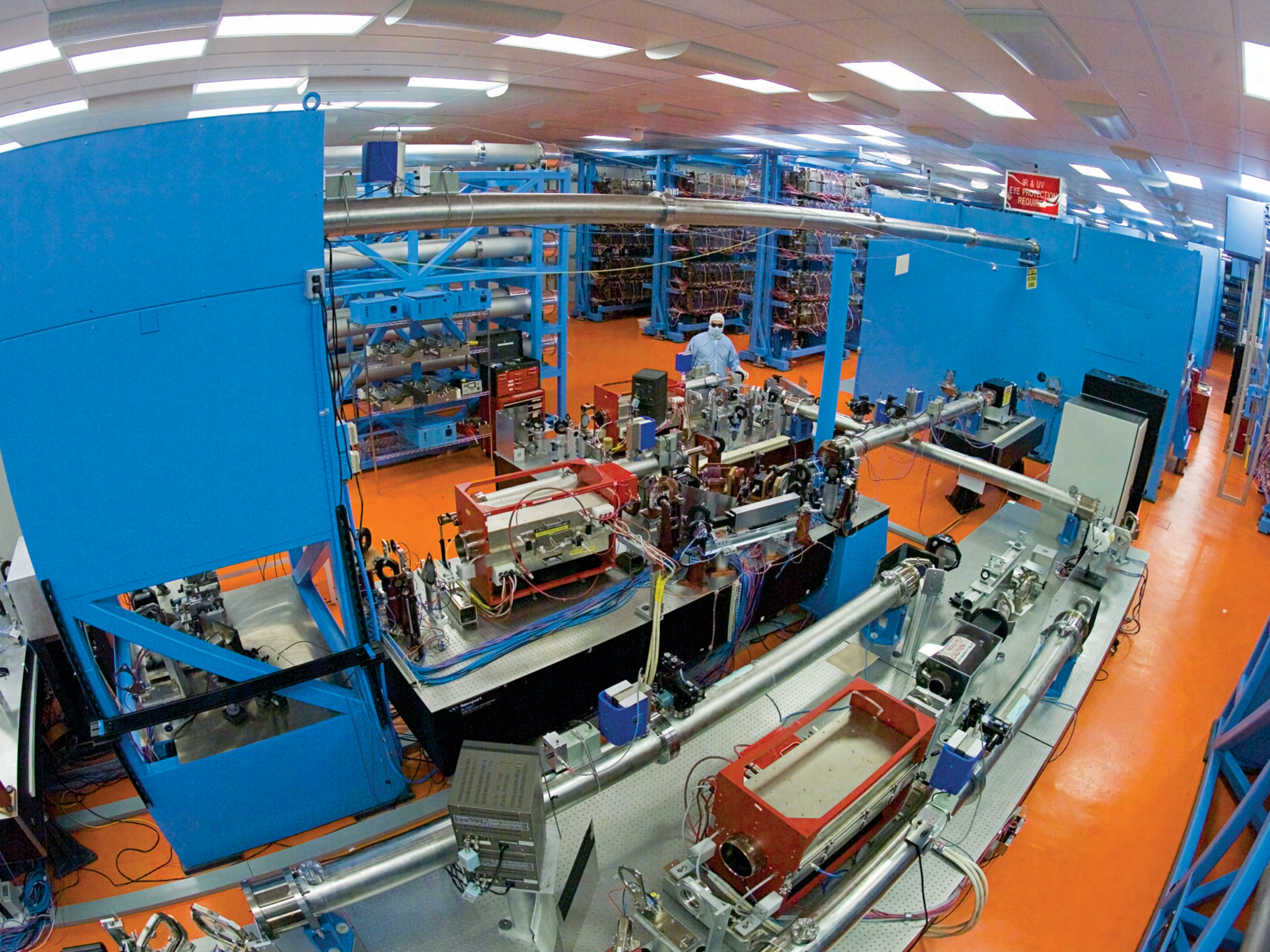
MAY 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
APRIL S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1	2	3	4	5	6
7	8	9	10	11	12	13
16TH TOPICAL CONFERENCE ON HIGH-TEMPERATURE PLASMA DIAGNOSTICS WILLIAMSBURG, VA						○
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	JUNE S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30		●
	MEMORIAL DAY UNIVERSITY HOLIDAY					





IR & UV
EYE PROTECTION
REQUIRED

OMEGA DRIVER LINES

At its front end, the OMEGA 60-beam UV laser has three independent laser drivers. Each of these systems (shown in the foreground) produces shaped seed pulses and delivers them to the stage-A splitter structure (large rectangular structure to the right).

JUNE 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<p>MAY</p> <p>S M T W T F S</p> <p>1 2 3 4 5 6</p> <p>7 8 9 10 11 12 13</p> <p>14 15 16 17 18 19 20</p> <p>21 22 23 24 25 26 27</p> <p>28 29 30 31</p>	<p>JULY</p> <p>S M T W T F S</p> <p>1</p> <p>2 3 4 5 6 7 8</p> <p>9 10 11 12 13 14 15</p> <p>16 17 18 19 20 21 22</p> <p>23 24 25 26 27 28 29</p> <p>30 31</p>			1	2	3
4	5	6	7	8	LLE PICNIC MECHANICAL/ELECTRONICS ENGINEERING	10
11	12	13	14	15	LLE PICNIC DIRECTOR'S OFFICE/ THEORY DIVISION	17
18	19	20	21	22	23	24
25	26	27	SUMMER SOLSTICE	LLE GOLF TOURNAMENT AT MILL CREEK	30	
			28	29	LLE PICNIC EXPERIMENTAL OPERATIONS/ LASER ENGINEERING	



THE ROSS

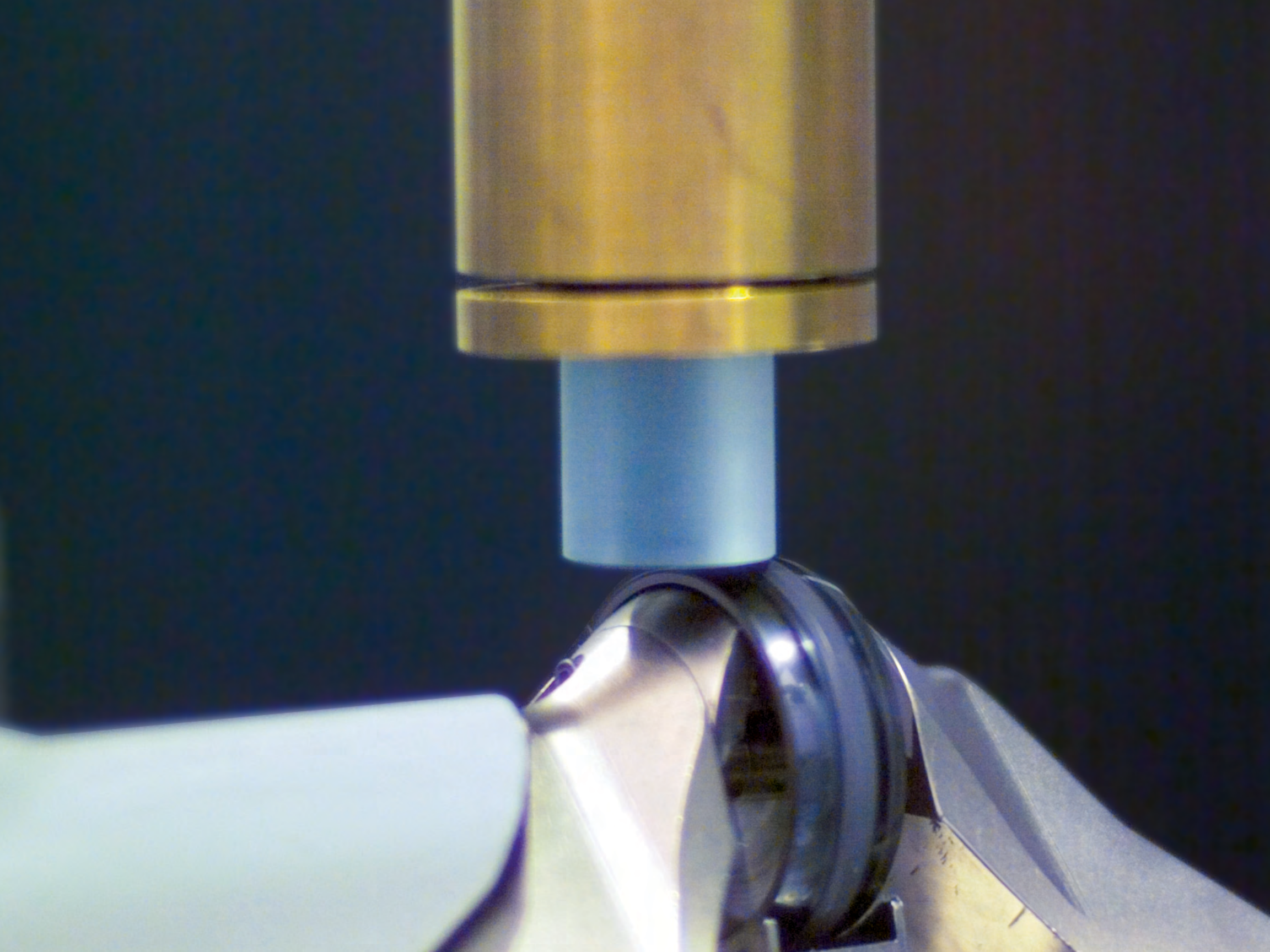
The Rochester Optical Streak System (ROSS) is a comprehensive short-pulse diagnostic system with autofocusing and self-calibration capabilities. Eight prototype cameras have operated on OMEGA for six years. This system has been commercialized by Sydor Instruments, a Rochester-based firm specializing in novel measurement technology.

JULY 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
JUNE S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	AUGUST S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					1
2	3	4	5	6	7	8
	●	INDEPENDENCE DAY UNIVERSITY HOLIDAY				
9	10	11	12	13	14	15
	○				LLE PICNIC ADMINISTRATIVE DIVISION	
16	17	18	19	20	21	22
	●				LLE GOLF TOURNAMENT AT CENTREPOINT	
23	24	25	26	27	28	29
	●					
30	31				LLE PICNIC OPTICAL TECHNOLOGY/ MATERIALS	



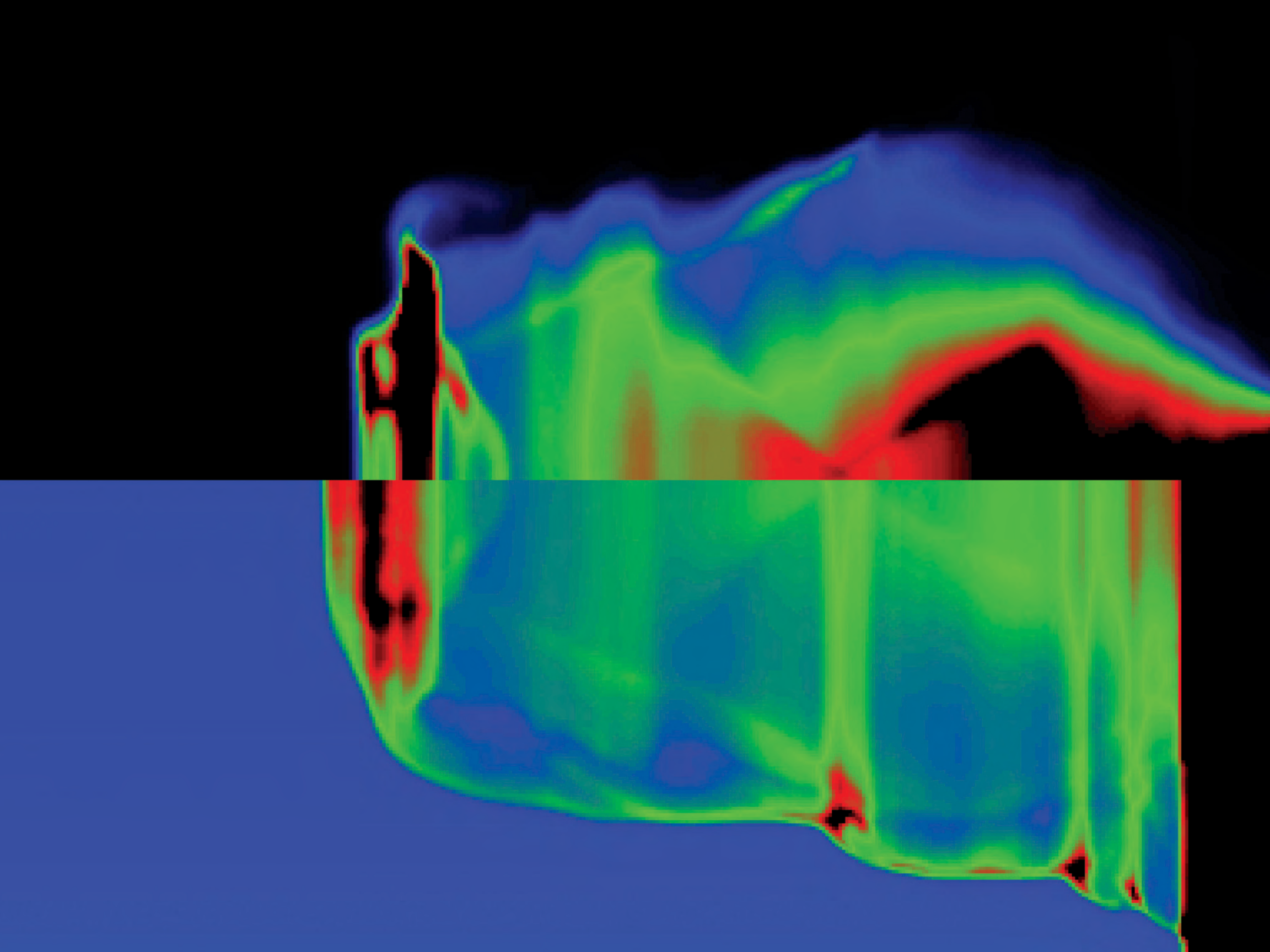
Computerized numerically controlled (CNC) finishing of most optical materials was not possible until scientists from LLE, working in collaboration with the UR Center for Optics Manufacturing (COM) and industrial partners, invented, patented, and commercialized the magnetorheological finishing (MRF) process. A MRF system is shown grinding and polishing a laser rod for use in LLE's MTW system.

AUGUST 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
			●		LLE PICNIC EXPERIMENTAL DIVISION	
6	7	8	9	10	11	12
			○		LLE GOLF TOURNAMENT AT BRISTOL HARBOUR	
13	14	15	16	17	18	19
		●			LLE PICNIC OMEGA EP	
20	21	22	23	24	25	26
			●			
27	28	29	30	31		
				●	JULY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	SEPTEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30



SIMULATION OF AN OMEGA PLASMA JET

Plasma jets are generated with the OMEGA laser to study similar phenomena observed by astronomers and are simulated by astrophysical, hydrodynamic calculations. The upper half of this picture shows the propagation of the jet core material, and the lower half shows the structure in the ambient medium as the jet “pushes” through it.

SEPTEMBER 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
AUGUST <small>S M T W T F S</small> 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	OCTOBER <small>S M T W T F S</small> 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				1	2
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	LABOR DAY UNIVERSITY HOLIDAY			○		
10	11	12	13	14	15	16
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17	18	19	20	21	22	23
					AUTUMNAL EQUINOX ●	
24	25	26	27	28	29	30
						●



WE TRUSST

**SATURN
PDD TARGET**

Polar direct drive (PDD) has been developed by LLE as a potential means to achieve direct-drive ignition on the NIF in its initial indirect-drive (two-sided) irradiation configuration. The "Saturn" target shown above is a variation of the PDD approach that relies on a plastic ring surrounding the full capsule. Upon laser irradiation, the ring forms a low-density plasma that refracts laser light toward the capsule to optimize the drive uniformity for PDD targets.

OCTOBER 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
17TH TARGET FABRICATION MEETING SAN DIEGO, CA					○	
8	9	10	11	12	13	14
					●	
15	16	17	18	19	20	21
22	23	24	25	26	27	28
●						
29	30	31				
○	48TH ANNUAL MEETING OF THE APS DIVISION OF PLASMA PHYSICS PHILADELPHIA, PA					

SEPTEMBER

S	M	T	W	T	F	S
						1 2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

NOVEMBER

S	M	T	W	T	F	S
						1 2 3 4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
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**DEFORMABLE
MIRROR
ASSEMBLY**

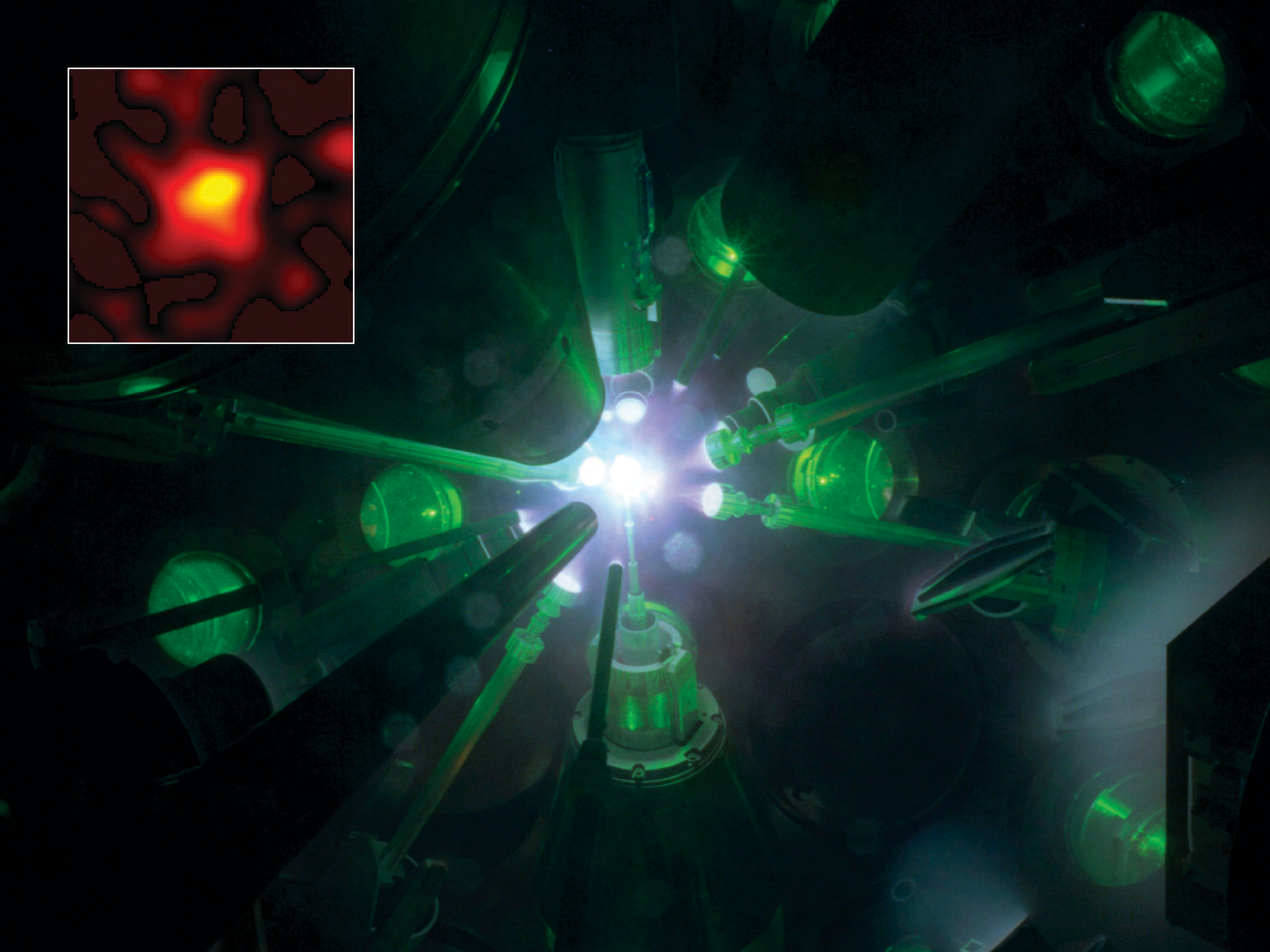
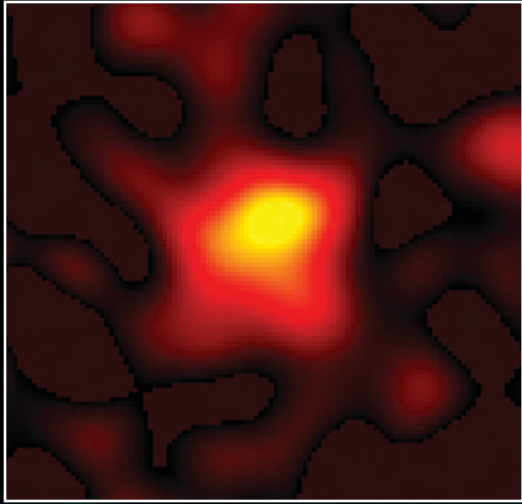
The assembly of deformable mirrors is a joint project between LLE and LLNL. LLE is producing 196 deformable mirrors for use on the NIF. Each assembly includes 39 actuators sandwiched between a coated glass faceplate and a metal reaction block. As the system's wavefront control system detects beam aberrations, information is sent to the metal reaction block. The actuators push against the reaction block to move the faceplate mirror surface and correct errors in the beam.

NOVEMBER 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4
48TH ANNUAL MEETING OF THE APS DIVISION OF PLASMA PHYSICS PHILADELPHIA, PA						
5	6	7	8	9	10	11
○						
12	13	14	15	16	17	18
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19	20	21	22	23	24	25
	●			THANKSGIVING DAY UNIVERSITY HOLIDAY	UNIVERSITY HOLIDAY	
26	27	28	29	30	OCTOBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	
		●			DECEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	



NEUTRON IMAGING OF CRYOGENIC D₂ CAPSULES

Neutron images (inset) of cryogenic D₂-filled imploded capsules were obtained on OMEGA for the first time in 2005 in a collaborative experiment with scientists from the Commissariat à l'Énergie Atomique (CEA), France. Above, an image taken of the OMEGA target chamber during a shot shows the plasma fireball created during a cryogenic capsule implosion.

DECEMBER 2006

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
NOVEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	JANUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				1	2
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	CHRISTMAS DAY UNIVERSITY HOLIDAY			WINTER SOLSTICE		

MISSION STATEMENT

The Laboratory for Laser Energetics (LLE) of the University of Rochester is a unique national resource for research and education in science and technology. The Rochester area has a history of innovation and provides a unique setting for LLE within a technologically sophisticated community. Established in 1970 as a center for the investigation of the interaction of intense radiation with matter, the Laboratory has the five-fold mission

- 1 to conduct implosion experiments and basic physics experiments in support of the National Inertial Confinement Fusion (ICF) Program;
- 2 to develop new laser and materials technologies;
- 3 to provide graduate and undergraduate education in electro-optics, high-power lasers, high-energy-density physics, plasma physics, and nuclear fusion technology;
- 4 to operate the National Laser Users' Facility (NLUF); and
- 5 to conduct research and development in advanced technology related to high-energy-density phenomena.

The 2006 LLE Calendar contains information about many of the Laboratory's programs.

We hope that you enjoy using your copy of the LLE Calendar and wish you a productive and fulfilling 2006.



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