LASERFEST FINAL REPORT

July, 2011

LaserFest was the yearlong celebration, during 2010, of the 50th anniversary of the demonstration of the first working laser, which took place in the laboratory of Theodore Maiman at Hughes Research Laboratories (HRL) in Malibu, California, on May 16, 1960.

The goals of LaserFest were:

--to highlight the impact of the laser in its manifold commercial, industrial and medical applications, and as a tool for ongoing scientific research;

--to use the laser as one example that illustrates, more generally, the route from scientific innovation to technological application;

--to use the laser as a vehicle for outreach, to stimulate interest among students and the public in aspects of physical science;

--to recognize and honor the pioneers who developed the laser and its many applications.

--to increase awareness among policymakers of the importance of R&D funding as evidenced by such technology as lasers.

LaserFest began in a conversation in 2008 between two officers of the American Physical Society (APS) and the Optical Society (OSA), who both happened to be at Stanford. The two Societies agreed to devote significant resources of their own to LaserFest, and also applied for federal funding to both NSF and DOE. Each agency granted $150,000 to LaserFest, with the principal investigator being Alan Chodos, Associate Executive Officer of APS, and the co-principal investigator Elizabeth Rogan, Chief Executive Officer of OSA. Soon thereafter, two more societies, IEEE-Photonics Society and SPIE, joined APS and OSA as Founding Partners of LaserFest. In the course of the celebration, 79 other societies and organizations from around the world participated as LaserFest partners. There were three government sponsors (NSF, DOE and a smaller grant from NIST), and 11 corporate sponsors as well as some individual donations. The complete list of partners and sponsors is included as Appendix A to this report, and can be found online at http://www.laserfest.org/support/index.cfm

One way in which LaserFest sought to meet its goals was to encourage relevant activities at a local level all across the country -- and also abroad -- that would be identified with the larger purposes of the celebration and would carry the LaserFest name. Organizers were encouraged to record and advertise these events through a continually updated web-based calendar. An

events map is shown below, and an extensive list of over 200 such events and descriptions can be found at http://tinyurl.com/6jcnyxc .

One of the events, which took place on May 16, 2010 at HRL, was a plaque presentation by APS President-elect Barry Barish, recognizing the laboratory as a physics historic site in honor of Maiman's achievement there exactly 50 years earlier, and thereby adding HRL to the APS Register of Historic Sites (see http://www.aps.org/programs/outreach/history/historicsites/index.cfm).

A key step in promoting LaserFest was the creation of the LaserFest website, at www.laserfest.org . In addition to hosting the events calendar mentioned above, the website has been a veritable cornucopia of information about all facets of the laser, and a valuable resource for the laser community and the public alike. Featured on the site are, *inter alia*: a laser history timeline, a section about how lasers work and how to use them safely, a collection of "faces in laser science" highlighting outstanding individuals in the field; a constantly-updated page on lasers in the news, a description of many important laser innovations, a collection of

videos related to lasers, an image gallery, a video contest, and links to several other sites with additional resources.

Over the course of its existence, so far, the website has garnered over 130,000 visits, with more than 12,000 in the peak month of May, 2010 (the actual 50th anniversary of Maiman's laser demonstration). The content of the site has been overseen by a LaserFest Technical Advisory Committee of distinguished senior laser scientists, and it has been maintained by the LaserFest Project Coordinator, based at APS. This position was held by Nadia Ramlagan through mid-2009, and has been filled since then by James Roche, who continues as an Outreach Specialist at APS now that the LaserFest year has concluded.

As an indication of the value of this website, APS, working with its Division of Laser Science, plans to maintain and update it indefinitely, with generous support from Thorlabs.

We turn now to the four projects that were explicitly detailed in the proposals submitted to NSF and DOE. The two agencies supported these projects in different ways: NSF funding supported them directly, whereas DOE funding was used primarily for salary and benefits of the LaserFest Project Coordinator. But in both cases, the impact of the funding was to enable the LaserFest team to create these projects and to execute them successfully.

The four projects are: 1) LaserFest on the Road; 2) Videos; 3) Educational material; and 4) Laser Days. APS was primarily responsible for projects 1 and 3; 2 was shared between APS and OSA; and project 4 was carried out by OSA.

LaserFest on the Road: in the late summer of 2009, we issued a request for proposals for a series of mini-grants to support LaserFest outreach activities. The RFP is attached as an Appendix B to this report. We received a total of 87 proposals, of which 59 were from within the United States. A selection committee, composed of volunteers from the American Physical Society, the Optical Society, and SPIE, considered the proposals and made recommendations, on the basis of which 20 proposals were selected in the Fall of 2009 for full or partial funding (funding was capped at a maximum of $10,000, with the average award being in the neighborhood of $6000). All of these initial 20 proposals were from the US.

In January of 2010, we approached the Lounsbery Foundation with a request to fund proposals that came from abroad, and a grant of $60,000 was obtained. With this funding, together with additional funds from APS and contributions from OSA and SPIE, we were able to fund 15 international as well as 2 more domestic projects.

Each grant recipient signed an MOU with APS as a condition of receiving the funds. A list of all sponsored outreach teams is attached as Appendix C. Among the requirements imposed by this

agreement was that of submitting material detailing the sponsored activities. We continue to collect much of this material on the web at http://www.laserfest.org/events/ontheroad/index.cfm and we hope the reader will visit this site to get a sense of what was accomplished by the participants.

Videos: A total of three videos were produced; all of them are available on the LaserFest website, and have been shown at scientific meetings and on other suitable occasions. They have also been distributed for free in DVD format, and material from the videos continues to be in demand for use in various contexts, including educational settings.

For each of the three videos, an external professional production company was involved in the process, using funding provided by the grants. The three videos include two interviews with Charles Townes, an early laser pioneer and Nobel Prize winner in physics. The interviews were conducted in the spring of 2009; in one, he talks about the history of the laser, and in the other about the laser itself and its numerous applications.

The third video, produced by OSA, is titled "Lasers Transforming Life". Told in a compelling, easy-to-understand manner, it features an overview of how lasers play a role in everyday technologies, such as the Internet and laser surgery, and highlights laser research that may lead to future clean energy sources or help understand such mysteries as black holes. NPR host Ira Flatow is featured, along with video from NASA, DARPA and IBM, among others.

This video was distributed, in particular, at the National Science Teachers Association (NSTA) annual meeting in the spring of 2010, at the Conference on Lasers and Electro Optics (CLEO) in May of 2010, at a Congressional reception (described later in this report) in April of 2010, to over 400 members of the Association of Science-Technology Centers (ASTC), and to more than 200 classrooms in conjunction with LaserFest in the Classroom kits.

Educational Materials: APS produced a series of three hands-on, classroom-tested lessons on the laser, for high school students. APS staff worked with a physics education consultant who is an expert in lasers and curriculum writing, as well as having high school teaching experience to develop and test the lessons. The series is titled "The Physics of Lasers" and the individual lessons are:

1. What's So Special About Laser Light?
2. How Does a Laser Work?
3. What Are Some Applications of Lasers?

The set of three laser lessons introduces students to the properties of lasers, the fundamental components of a laser, and some applications of lasers. The first lesson provides students with hands-on experiences to gain understanding of the special properties of laser light: monochromatic, collimated, and coherent. The second lesson focuses on the parts of a laser (an energy source, an active medium, and a resonant cavity), and has students explore how to build a laser using a computer simulation (PhET simulator from the University of Colorado at Boulder). In the third lesson students investigate applications of the laser. Students explore how information is transmitted using light, use lasers to measure the width of a hair, model X-ray diffraction of DNA, and produce a speckle pattern like that used to measure blood flow. By the end of these lessons students should have a good idea of what makes laser light special, how it is produced, and how it can be used.

APS organized a number of teacher workshops and provided equipment kits as well as student and teacher workbooks to all participants. The workshop schedule (including some future workshops) is listed below:

- OSA Educator's Day, San Jose, CA, 19 October 2011
- APS Teacher's Day at DAMOP meeting, Atlanta, GA, 16 June 2011
- APS Teacher's Day, Dallas TX, 23 March 2011
- OSA Educator's Day, Rochester, NY, 27 October 2010
- APS/AAPT High School Physics Teacher's Day, Houston, TX, 29 May 2010
- Michigan Section of AAPT, Holland, MI, 24 April 2010
- APS/AAPT High School Physics Teachers' Day, Portland, OR, 16 March 2010

Teachers had very high praise for the lessons. At the Teachers Day event in Portland, nearly all participants gave the workshop the highest rating indicating they felt was "very useful." Here is a small sample of teacher comments from the written evaluations:

- "High-quality materials, very useful ideas, classroom ready."
- "I really like the lab ideas and pedagogy ideas. Thank you!"
- "Great presentation. Understanding of lasers with connections to atomic theory."
- "Nice kit provided. I'm excited about using materials and lessons in class."
- "Very good background to share with my students. The demos are much appreciated."
- "Great new ideas--thank you! Very thorough--great detailed handouts."
- "Very good job balancing concept with hands-on activities--good for freshmen!"
- "Learned a lot and very practical and useful for my class."

APS also supported a number of institutions that organized teacher workshops by providing lesson books and kits for workshop participants. A total of 700 kits have been given to teachers, and PDFs of the lessons are available at www.laserfest.org/resources/lessons.cfm .

APS will continue to distribute kits as long as supplies last (550 kits are left) and offer professional development to teachers.

Laser Days: Laser Days aimed to engage students, teachers, families, industry and community groups at the grassroots level. The events encourage students to explore the enjoyment of science through a series of programs held at schools, universities, science centers, corporations, libraries, and planetariums. OSA encouraged the organization of local events celebrating the use of the lasers in everyday life with OSA's global network of 26 Local Sections and 243 Student Chapters. Over 50 student grants were awarded across the globe.

As a whole, Laser Days was a multifaceted program involving 3 activities organized by the student chapters, and a variety of grants to other institutions.

The first student-chapter activity was "Hit the Target" which helped teach middle-high school students about the science of lasers and optics by having the students predict where the laser will hit. The more mirrors incorporated in the activity, the harder it is to predict. 23 awards were given to help defray travel costs and supplies.

The second activity, "Laser Graffiti," was designed to creatively spread the word about the lasers and LaserFest to a broad general audience via YouTube. Around the world, student chapters created videos incorporating an instructional segment about the science and technology of lasers and using "graffiti" created by lasers (e.g. shining the LaserFest logo on the side of the wall of their university). Videos competed for YouTube views and were judged on technical merit and creativity. All Laser Graffiti videos were posted to YouTube for voting in time for the LaserFest anniversary date which was Sunday, May 16, 2010 at CLEO. Prizes were awarded for Technical Merit (panel review) and People's Choice (number of views). Three winners and two runners-up were chosen.

The third activity, the "Laser Maze and Candy Alarm" demonstrated fun and inventive ways of using optics and lasers. The maze was an obstacle course that utilized a music-integrated laser system to project music via a series of beams. Participants tried to walk or move through this designated course without breaking any of the beams. If the person stepped in the way of a beam and disrupted it, the music would stop playing. To aid participants in this effort, a fog machine was used to refract a small part of the beam which made it slightly easier to get around. The Candy Alarm targeted people who would reach for the candy in the bowl, and their hand would interrupt the laser beam thus setting off an alarm. 9 awards were given out.

In addition, the Exploratorium in San Francisco was awarded a grant to help the museum rebuild their laser demonstration as part of LaserFest LaserDays at the Exploratorium. The

Exploratorium is a museum of science, art and human perception founded in 1969. The demonstration and exhibit showed Laser beams and White light in contrast, and included topics like Wavelength of light, Color, Beam and Scattering, Refraction, Reflection, Polarization, and Diffraction.

The University of California, Berkeley was also awarded a grant for a LaserFest Exhibit at the Lawrence Hall of Science. These events successfully reached thousands of adults and children and the semi-permanent exhibit in the department continues to do so today. The Physics Department partnered with the Lawrence Hall of Science, one of the Bay Area's premier science museums, and the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory (LLNL), to produce a 3-day hands-on exhibit for children. About 30 physics students, both graduate and undergraduate, along with 5 people from NIF, worked as volunteers and guided young people through several experiments involving lasers (laser radio, laser fountain, lasers and chalk dust, laser patterns etc.). Large boards explaining how lasers work and the history of the discovery of the laser were created and used at this exhibit. About 800 children and their adult companions toured the exhibit and played safely with lasers. 30+ physics students, primarily graduate, served as exhibit facilitators, along with staff from the Lawrence Hall of Science and NIF.

LaserFest in Times Square was a video montage that appeared on a jumbo-tron in New York City during the month of December, promoting the "Lasers: Transforming Life" –mentioned above. More than 1.5 million people were estimated to have viewed the montage. The montage included an overview of how lasers play a role in everyday technologies, such as the Internet and laser surgery, and highlighted laser research that may lead to future clean energy sources or may help understand such mysteries as black holes.

In addition to these four major programs, funded both by contributions from NSF and DOE as well as resources allocated by APS and OSA, we wish to describe some other LaserFest activities that contributed to the success of the overall yearlong celebration.

There were two events located in Washington, DC that brought the LaserFest message to the Washington policy community. The first was a gala event held at the Smithsonian Museum of American History on February 12, 2010, just before the APS annual meeting. Guests included scientists, representatives of professional societies, and a spectrum of individuals from both the Administration and Capitol Hill. Among the honored guests were many of the laser pioneers, including a number of Nobel Prize winners. The keynote address was given by Secretary of Energy Steven Chu, himself both a laser scientist and a recipient of the Nobel Prize. Despite the unusually severe winter weather, several hundred people attended the event.

Enjoying the celebration are (left to right) Optical Society Chief Executive Officer Elizabeth Rogan, Secretary of Energy Steven Chu, and APS Executive Officer Kate Kirby.

The second event was a reception held on April 28 on Capitol Hill, in conjunction with the annual "Congressional Visit Days", in which scientists from across the nation visit their representatives to emphasize the importance of science. The reception included exhibits by eleven different organizations, including LaserFest, all of which featured the laser and its applications. In addition, a series of posters throughout the room detailed the many ways in which the laser has had commercial, medical and scientific impact, and the attendees heard a brief address about LaserFest by Dr. Thomas Baer of Stanford University, 2009 OSA president and one of the founders of LaserFest.

During the LaserFest year, APS and OSA exhibited at 16 scientific meetings and conventions. In addition to their own meetings, such as the APS annual meeting in February, the APS March meeting, and the OSA annual meeting in October (which is held in conjunction with the annual meeting of the APS Division of Laser Science), there was the CLEO meeting in San Jose in May that featured a LaserFest symposium, which featured presentations from several laser pioneers and Nobel laureates and the reading of a letter from President Obama, commemorating the laser anniversary. We list all the meetings in Appendix D.

LaserFest also received recognition from the U.S. House of Representatives in May with the passage of H.R. 1310, "Recognizing the 50th Anniversary of the Laser." During the debate of the resolution, members of Congress spoke on the House floor about the importance of the laser, its impact on society and the need for basic R&D investment.

LaserFest also participated in two science festivals, one in Cambridge, MA in the spring, and the other, the USA Science and Engineering Festival, on the Mall in Washington in late October. Because of the proximity to Hallowe'en for the festival on the mall, the LaserFest exhibit, containing seven different laser demonstrations, was called the LaserFest Haunted House, and was visited by about 15,000 festival-goers, many of whom had to wait in long lines to get in.

Since 2005, APS has been running an annual program for middle-schoolers entitled PhysicsQuest. These are kits distributed to about 13,000 middle-school classrooms, reaching several hundred thousand students per year. They contain a narrative-based set of four experiments; by correctly performing the experiments, the students can help the hero of the narrative achieve his or her goal. In the past, the heroes were famous physicists, but for the LaserFest year, APS Head of Public Outreach Rebecca Thompson, working with APS Art Director Kerry Johnson, created a fictional laser superhero, Spectra, who possesses laser superpowers, and who is featured in a comic book that accompanies the PhysicsQuest kits. The Spectra comics (as well as an earlier one featuring Nikola Tesla) enabled APS to participate in the gigantic Comic-Con (a comic book convention) in San Diego in July, 2010, becoming the first professional society ever to make an appearance there. Comic-Con attracts about 125,000 visitors per day. Thousands of Spectra comics were distributed, and the LaserFest message was spread to a community that would have been very difficult to reach any other way.

Finally, we note that the impact of LaserFest can also be assessed by taking stock of how broadly it was featured in various kinds of media. Of course, there was lots of coverage in the APS membership publication, APS News, and on the APS websites aps.org and PhysicsCentral.com. In addition, paid advertising in Science News reached an estimated audience of 150,000. About 75,000 copies of the Spectra comics (there are now 3 in the series) have been widely distributed, not counting their inclusion in the PhysicsQuest kits. An extensive media outreach campaign, led by OSA, resulted in more than 400 stories in the mainstream and scientific press, with a minimum global audience reach of 350 million. Coverage of LaserFest was featured in several major media outlets, including USA Today, CNN.com, NPR, BBC, the Washington Post, MSNBC.com, Forbes.com, and Scientific American. A sampling of LaserFest media coverage can be found at www.laserfest.org/news/laserfestnews.cfm .

The total LaserFest budget was about a million dollars, of which $150,000 each were contributed by NSF and DOE. We feel that these resources were spent effectively in pursuit of the goals listed at the beginning of this report, and that, especially through the website, the videos, the educational materials, and the Spectra comics, the impact of the LaserFest celebration will continue to be felt through the years ahead.

Appendix A: Partners and Sponsors

Partner Organization	Sponsor Organization	Media Partners
Academia Mexicana de Optica	Air Force Office of Scientific Research (AFOSR)	Laser Systems Europe (LSE)
Acoustical Society of America (ASA)	AT&T Labs	LaserFocusWorld
Advanced Photonics Research Institute (APRI)	Boeing	Optics and Photonics News (OPN)
American Association of Physicists in Medicine (AAPM)	Coherent, Inc.	SPIE Professional
American Association of Physics Teachers (AAPT)	CVI Melles Griot	
American Astronomical Society (AAS)	Herbert V. Friedman, Inc.	
American Chemical Society (ACS)	Infinera Corporation	
American Institute of Physics (AIP)	Lockheed Martin	
American Meteorological Society (AMS)	Mani Bhaumik	
American Society for Laser Medicine and Surgery (ASLMS)	Newport Corporation	
Australian Optical Society (AOS)	Richard Lounsbery Foundation	
Berthold Leibinger Stiftung		
Canadian Association of Physics (CAP)		
Centro de Investigaciones Opticas (CIOp)		
Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP-CAS)		
Changchun University of Science and Technology (CUST)		
China Insitute of Communications (CIC)		
China International Optoelectronic Exposition		
Chinese Optical Society (COS)		
Coalition on the Public Understanding of Science (COPUS)		
College of William & Mary, Physics Department		
Ecole Polytechnique		
European Optical Society (EOS)		
European Physical Society - (EPS)		
Festival Della Scienza		
Fitzpatrick Institute for Photonics at Duke University		
Geological Society of America (GSA)		
HRL Laboratories		
ICFO - The Institute of Photonic Sciences		
IEEE Communications Society		
Indian Institute of Technology (IIT)		

Institute of Electronic Structure and Laser/Foundation for Research and Technology-Hellas (IESL-FORTH)

Institute of Optics (IOP)

Institute of Photonics and Nanotechnologies

International Commission on Optics (ICO)

Invest in Photonics 2010

Italian Society of Optics & Photonics (SIOF)

Kimathi University College of Technology

Laser Institute of America

Laser Optics Berlin

Laser World of Photonics

LASYS

LIGO

LiMat lightandmatter.ch

Materials Research Society

Max Planck Institute for the Science of Light

National University of Ireland, Galway

NIU STEM Outreach

Nour 21

Ophir-Spiricon, Inc.

OP-TEC: National Center for Optics and Photonics Education

Optical Society of India

Optical Society of Korea

Optikos Corporation

OSA Foundation

Osaka University

Photonics 2010 - IITG

Physical Sciences, Inc.

Physical Society of Hong Kong

Russian Academy of Sciences

Scottish Optoelectronics Meeting

Sigma Pi Sigma

SIOE 2010

SLAC National Accelerator Laboratory

SPIE Student Chapter CIOMP

Stanford Photonics Research Center (SPRC)

Swisslaser.Net

Tunisian Physical Society

Universidad del Valle

Universidade Federal de Pernambuco

University of Arizona

University of Central Florida (CREOL)

University of Pavia

University of Rochester

University of Stellenbosch

University of Strathclyde, Glasgow

Vienna University of Technology

Appendix B: LaserFest on the Road RFP

APS, OSA and SPIE Program for LaserFest Outreach: Request for Proposals

The American Physical Society, the Optical Society and the International Society for Optics and Photonics are happy to announce that they will award several grants of up to $10,000 to encourage outreach activities among APS, OSA and SPIE members during 2010's LaserFest.

About the Program

This program is designed to encourage APS, OSA and SPIE members to undertake physics outreach initiatives in their own communities and institutions during the 2010 celebration of the 50th anniversary of the laser, LaserFest. We also want to encourage innovative ideas and experimental approaches, particularly if they have the potential to lead to sustained activities beyond the duration of the grant. For more information on LaserFest please visit www.laserfest.org.

Proposals that cover any form of public outreach will be considered but activities should be focused on the LaserFest celebration and therefore must have a significant laser component. Special consideration will be given to proposals that impact women and minorities, and to proposals that are exceptionally innovative. Programs may be aimed at any age group. For those that are aimed at students, the thrust of the proposal must involve outreach, as distinct from education.

Because this program is for APS, OSA and SPIE members, the main contact person for the grant must be an APS, OSA or SPIE member. In addition, the extent to which the grant activity involves other APS, OSA and SPIE members will be a factor in the funding decision.

The grant period will be calendar 2010 and total amount of the grant will not exceed $10,000.

Application Process

To apply for these funds, please submit the following information by September 30th, 2009:
Cover sheet clearly stating the name, address, phone number, and email of the main contact person for your application. Please include the name of your program and the department and institution you represent.
CV for main contact person.

Narrative description (no more than three pages) of your program. Please include details of existing financial support (if any), and description of personnel working on the program (instructional lab technicians, students, professors, etc). Be clear about the role of the laser in your activities.

Rough budget detailing your plans for utilizing the funds.
Letter of support from your department chair or similar administrative official (this can be sent separately, as long as it clearly identifies the main contact person and institution).

Send application materials to laserfest@aps.org.
Recipients will be notified in October 2009.

Important Information

These funds cannot be used for salaries, stipends, etc. of the main participants, but can be used to hire a student or an intern if that is essential for the project

To activate the grant, the main contact person will be required to sign a memorandum of understanding with APS, OSA, and SPIE detailing the work to be undertaken and other associated responsibilities.

All selected programs must submit a final report no later than six months after the end of the funding period. Please direct questions to Rebecca Thompson-Flagg at (301) 209-3206 or laserfest@aps.org.

Appendix C: List of LaserFest on the Road teams

Domestic

- Beam Me Up Scottie!, Agnes Scott College, Georgia
- Exploring the World with Lasers, Little Shop of Physics at Colorado State University
- The Physics Factory at the University of Arizona
- Mazes and Lasers at Utah State University
- Hands-on-Optics in Guatemala from Physical Sciences Inc., Andover, Massachussetts
- Laser's 50th Birthday Celebration at Rancho San Diego Library, California
- LaserFest 2010 at the College of William&Mary, Virginia
- Traveling Laser Show for West Virginia's Primary School Children, West Virginia University
- The Function and Beauty of Lasers, Pennsylvania State University
- A Year Long Laser Festival for Outreach, Purdue University, Indiana
- Resources for the University of Oregon Optical Science Discovery Program: Outreach and Demonstration
- LaserFest at Northern Illinois University
- Minorities and Lasers in Life (ML2), University of Maryland
- Randolph College's ScienceFest: Hands-On Lasers, Virginia
- Interactive Laser Exhibits Engaging the Public in the Exploration of Lasers in Science and Society, Penn State Altoona and Quaint Corner Children's Museum and Discovery Center
- Urban Outreach: Conjuring the Spirit of a Traveling Laser Salesman, Rutgers University, New Jersey
- Laser Experiments, Addition to the Optics Suitcase, OSA Rochester Section, New York
- Idaho State University Physics Laserfest Road Show
- The Peer Pressure Team bLASING through West Texas, Angelo State University
- Hawk Eyes on Science, University of Iowa
- Lasers Today: Lighting Up Our World, Bethel University, Minnesota
- Lecture Series on Development of Lasers in Defense, Air Force Institute of Technology

International

- Tribute to Theodore Maiman and Fiftieth Anniversary of Laser Invention Symposium, Simon Fraser University, Vancouver campus, Canada
- Hands-On Optical Demonstration Laboratory, Université Laval, Quebec, Canada
- Lasers in Action, Science in Action at Simon Fraser University, BC, Canada
- Optical Art Competition, University of Toronto, Ontario, Canada
- Science in the Outback: LaserFest 2010, University of Queensland, Australia
- Traveling Outreach Project: Optics on the Road, University of Stellenbosch, South Africa
- 50th Anniversary of the Laser, Kimathi University College of Technology, Nyeri, Kenya
- LaserFest Sydney, Macquarie University, Australia
- Laser on Stage, Universidad de Salamanca, CLPU and OSAL, Spain
- Laser and Light in our Life, Universidad del Valle, Santiago de Cali, Colombia
- Science (non) Fiction: The History and Science of Lasers, University of Newcastle, Australia

- The Laser in your Life, Centro de Investigaciones Opticas, Buenos Aires, Argentina
- LaserFest 2010 Koc University, Istanbul, Turkey
- Simpliphy: Simply Physics in India, from the University of Southampton, United Kingdom
- LASERFEST-PV, University of Pavia, Italy

Appendix D: APS/OSA Exhibited Meetings

Event Description	Date(s)	Total Audience Estimate
Geological Society of America Annual Meeting	October 18-21 2009	6500
FiO 2009	October 11-15 2009	1500
AGU Fall Meeting	December 14-18 2009	16000
SPIE Photonics West	January 23-28 2010	18000
APS/AAPT April Meeting	February 13-16 2010	1250
AAAS Annual Meeting	February 18-22 2010	8000
APS March Meeting	March 15-19 2010	7500
NSTA National	March 18-21 2010	7000
Cambridge Science Festival	April 24- May 2 2010	35000
CLEO/QELS 2010	May 16-21 2010	7500
DAMOP	May 25-29 2010	1100
LASYS Stuttgart	June 8-10 2010	3870
AAPT	July 17-21 2010	1200
Comic-Con International	July 22-25 2010	125000
USA Science Festival Expo	October 23-24 2010	15000
FiO 2010	October 26-28 2010	2000
CAST Houston	November 10-13 2010	7500