

21-25 APRIL 2014

SANTA FE, NM

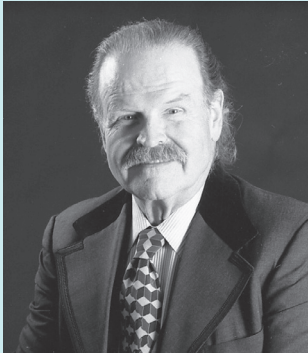
# HPLA/BEP

INTERNATIONAL HIGH POWER LASER ABLATION AND BEAMED ENERGY PROPULSION

## TECHNICAL PROGRAM

21 - 25 April 2014  
La Fonda on the Plaza  
Santa Fe, New Mexico USA  
[www.usasymposium.com/hplabep](http://www.usasymposium.com/hplabep)





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Dr. Claude R. Phipps  
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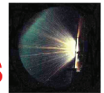
Attire for the HPLA/BEP Conference is business casual.

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## Program Committee

### HPLA Program Committee

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Prof. Andrei Ionin, P. N. Lebedev Physical Institute (Russia)

Prof. In-Seuck Jeung, Seoul National University (South Korea)

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Prof. Marco Minucci, Centro Technico Aeroespacial (Brazil)

Dr. Leik Myrabo, Lightcraft Technologies, Inc. (USA)

Dr. Kevin Parkin, NASA Ames Research Center (USA)

Dr. Yuri Rezunkov, Research Institute for Optical Instrument Engineering (Russia)

Prof. Akihiro Sasoh, Nagoya University (Japan)

Dr. John Sinko, Saint Cloud State University (USA)

Prof. Rongqing Tan, Chinese Academy of Sciences (China)

Prof. Zhiping Tang, University of Science and Technology (China)

Dr. Shigeaki Uchida, Tokyo Institute of Technology (Japan)

Prof. Takashi Yabe, Tokyo Institute of Technology (Japan)



## Agenda | At-a-Glance

### Mon, 21 April 2014

1330 -> | **Bradbury Science Museum Tour**

1500 - 1800  
Early Check-in & Badging

### Tue, 22 April 2014

0700 - 0800 | Light Continental Breakfast

0700 - 1700 | Registration Open

1200 - 1630 | Poster Set-up

0800 - 0825 | Welcome & Administrative Announcements

0825 - 0910 | **Keynote Presentation: Prof. Johannes Pedarnig**

### Locations:

**Registration** is located in the Mezzanine

**Technical Sessions** are located in the Lumpkins Ballroom North & South

**Tuesday Reception & Poster Session** is located in the New Mexico Room

**Thursday's dinner** is in the Lumpkins Ballroom North & South

### Tue, 22 April 2014, cnd.

0910 - 1005  
Track One: **HP01: Fundamental Physics and Simulation of Laser-Materials Interactions**  
Track Two: **BE01: Microwave Power Beaming and Propulsion**

1005 - 1030 | Break

1030 - 1200  
Track One: **HP01, continued**  
Track Two: **BE01, continued**

1200 - 1330 | Lunch Break

1330 - 1445/1450  
Track One: **HP02: Nanoengineering and Material Processing**  
Track Two: **BE03: Space Based Laser Systems and Applications I**

1445 - 1515 | Break

1515 - 1550  
Track One: **HP02, continued**  
Track Two: **BE03, continued**

1550 - 1720  
Track One: **HP03: Biological Applications**  
Track Two: **BE02: Research Facilities and Measurement Techniques**

1720 - 1830 | **Welcome Reception & Poster Technical Interchange**

### Wed, 23 April 2014

0700 - 0800 | Light Continental Breakfast

0700 - 1700 | Registration Open

0800 - 0805 | Administrative Announcements

0805 - 0845 | **Keynote Presentation: Prof. Eric Mazur**

0845 - 0955  
Track One: **HP04: Promising New Laser and Optical Technologies**  
Track Two: **BE06: Advanced BEP Concepts**

0955 - 1030 | Break

1030 - 1135  
Track One: **HP04, continued**  
Track Two: **BE06, continued**

1135 - 1300 | Lunch Break

1300 - 1510/1455  
Track One: **HP05: Fundamentals & Simulations Session**  
Track Two: **HP11: Laser Direct Writing**

1455 - 1530 | Break

1530 - 1700/1705  
Track One: **HP05: Electric Discharge & Optically Pumped Lasers**  
Track Two: **BE07: Space Debris & Removal & Beyond**

### Thu, 24 April 2014

0700 - 0800 | Light Continental Breakfast

0700 - 1700 | Registration Open

0800 - 0805 | Administrative Announcements

0805 - 0845 | **Keynote Pres.: Dr. Bruno Esmler**

0845 - 1000/0955  
Track One: **HP07: Ultrashort Pulse Effects**  
Track Two: **BE05: Laser Ablation Propulsion (Macro and Micro-)**

0955 - 1030 | Break

1030 - 1140/1145  
Track One: **HP07, continued**  
Track Two: **BE05, continued**

1140 - 1300 | Lunch Break

1300 - 1500/1455  
Track One: **HP09: Imaging Materials & Plumes at the Limits of Spatial and Time Resolution**  
Track Two: **BE04: Space Based Laser Systems and Applications II**

1455 - 1525 | Break

1525 - 1700 | **Panel: Understanding & Overcoming Technological Roadblocks**

### Thu, 24 April 2014, cnd.

1700 - 1800 | **Final Poster Viewing & Voting**

1800 - 2100 | **Poster Awards & Symposium Dinner with Entertainment**

### Fri, 25 April 2014

0700 - 0800 | Light Continental Breakfast

0700 - 1200 | Registration Open

0800 - 0805 | Administrative Announcements

0805 - 0845 | **Keynote Presentation: Prof. David Neely**

0845 - 1010  
Track One: **HP10: MAPLE, PLD and Processing of Advanced Materials**  
Track Two: **BE08: Breakthrough Propulsion / Postdeadline**

1010 - 1040 | Break

1040 - 1155/1220  
Track One: **HP10, continued**  
Track Two: **BE08, continued**

1220 | Symposium Adjourns

1230 -> | **Canyon Road Tour & Lunch on the Town**

## Ultra Fast Framing and Streak Cameras from Specialised Imaging



The SIM Ultra Fast Framing Cameras from Specialised Imaging Ltd. offer the ultimate in Framing Camera Technology. With up to 32 Frames, with 1360 x 1040 x 12 bit pixels per frame at all framing rates to 1 Billion FPS with 3 nanoseconds exposure times. Cameras have Ethernet control. The NEW SIMD and SIMX versions offer Periscope view finders for easy setup and alignment. It also offers the additional optical port for coupling to other recording devices such as Streak Cameras or HS Video Cameras. Color and Multi Spectral options are available.

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## Detailed Agenda

MON

MON

### Monday, 21 April 2014

1330 --> Bradbury Science Museum  
1500 - 1800 Early Registration

### Tuesday, 22 April 2014

TUESDAY

TUESDAY

Tuesday, 22 April 2014			
Track One <i>Lumpkins Ballroom North</i>		Track Two <i>Lumpkins Ballroom South</i>	
HP01: Fundamental Physics and Simulation of Laser-Materials Interactions		BE01: Microwave Power Beaming and Propulsion	
0700 - 0800	Light Continental Breakfast		
0700 - 1700	Registration		
1200 - 1630	Poster Set-Up		
	Welcome & Keynote <i>Lumpkins Ballroom North</i>		
0800 - 0825	Welcome & Administrative Announcements Symposia Chair, Dr. Claude Phipps, Photonic Associates, LLC		
0825 - 0830	Keynote Introduction Dr. Leonid Zhigilei, University of Virginia		
0830 - 0910	Keynote: Review on Laser-Induced Plasma Spectroscopy: From Basic Science to Industrial Applications Dr. Johannes Pedarnig, Johannes Kepler University Linz [Invited]		
0910 - 0915	Session Introduction Dr. Leonid Zhigilei, University of Virginia	0910 - 0915	Session Introduction Dr. Kevin Parkin, Carnegie Mellon University
0915 - 0940	Atomic-Scale Modeling of Laser-Solid Interactions Including Electronic Excitations Dr. Patrick Schelling, University of Central Florida [Invited]	0915 - 0940	Overview of the Millimeter-Wave Thermal Launch System (MTLS) Program Dr. Kevin Parkin, Carnegie Mellon University [Invited]
0940 - 1005	Energy Relaxation and Transport in Laser-Excited Solids Dr. Baerbel Rethfeld, Technical University of Kaiserslautern [Invited]	0940 - 1005	Development and Testing of a Refractory Millimeter-Wave Absorbent Heat Exchanger Mr. Thomas Lambot, Universities Space Research Association (USRA) [Invited]
1005 - 1030	Break		
1030 - 1055	Comparison of Continuum and Molecular Dynamics Methods for Simulation of Laser Ablation of Metals Dr. Mikhail Povarnitsyn, Joint Institute for High Temperatures RAS [Invited]	1030 - 1055	Directed Transfer of MW Radiation in Sliding-Mode Plasma Waveguides Produced by UV Laser in Atmospheric Air Dr. Vladimir Zvorykin, P N Lebedev Physical Institute [Invited]
1055 - 1120	Modeling of Laser Ablation of LiF - Influence of Defects Dr. Herbert Urbassek, University of Kaiserslautern [Invited]	1055 - 1110	Microwave Rocket with Quasi-Optical Microwave Power Transmission System and Flight Demonstration Mr. Masafumi Fukunari, The University of Tokyo
1120 - 1145	Pulsed Laser Modification of Transparent Dielectrics: What Can Be Foreseen and Predicted in Numerical Experiments? Prof. Nadezhda Bulgakova, HiLASE, Institute of Physics ASCR [Invited]	1110 - 1125	Development and Short-Range Testing of a 100 kW Side-Illuminated Millimeter-Wave Thermal Rocket Dr. Alexander Bruccoleri, Izentis LLC
		1125 - 1140	Development and Short-Range Testing of a 100 kW End-Illuminated Millimeter-Wave Thermal Rocket Dr. Leik Myrabo, Lightcraft Technologies, Inc.
1145 - 1200	Discussion with Authors	1140 - 1200	Discussion with Authors
1200 - 1330	Lunch Break - On Your Own		
Track One <i>Lumpkins Ballroom North</i>		Track Two <i>Lumpkins Ballroom South</i>	
HP02: Nanoengineering and Material Processing		BE03: Space Based Laser Systems and Applications I	
1330 - 1335	Session Introduction Dr. Boris Chichkov, Laser Zentrum Hannover	1330 - 1335	Session Introduction Prof. Willy Bohn, BohnLaser Consult
1335 - 1400	Laser-Matter Interaction in the Near and Far Field: Fundamental Aspects and Applications Dr. Wolfgang Kautek, University of Vienna [Invited]	1335 - 1400	Flight Analysis of Lightcraft Using Actively-Controlled Beam Based on Genetic Algorithm Mr. Masayuki Takahashi, Tohoku University [Invited]
1400 - 1415	Dynamics of Ultrafast Laser Induced Liquid Spallation Dr. Steven Yalisove, University of Michigan	1400 - 1425	Review on Laser Lightcraft Research at DLR Stuttgart Dr. Stefan Scharring, Institute of Technical Physics, German Aerospace Center (DLR) [Invited]
1415 - 1430	Modeling the Intra-Film and Interface Removal Dynamics of a Thin Nickel Film on Glass Dr. Ben Torralva, University of Michigan	1425 - 1450	Development of Energetic Propellant for Laser Microthrusters Mr. Keisuke Kondo, Tokai University [Invited]
1430 - 1445	Plasmon-Mediated Ultimate Femtosecond Laser Nanostructuring of Solid Surfaces Prof. Andrey Ionin, Lebedev Physical Institute of Russian Academy of Sciences		
1445 - 1515	Break		



## Detailed Agenda (cont.)

TUESDAY	1515 - 1530	<b>Atomistic Simulation Study of Short Pulse Laser Interactions with Metal Targets under Conditions of Spatial Confinement</b> Ms. Eaman Abdul Karim, University of Virginia	1515 - 1550	Discussion with Authors
	1530 - 1550	Discussion with Authors		
		<b>Track One</b> <i>Lumpkins Ballroom North</i> HP03: Biological Applications		<b>Track Two</b> <i>Lumpkins Ballroom South</i> BE02: Research Facilities and Measurement Techniques
	1550 - 1555	<b>Session Introduction</b> Prof. Jack Yoh, Seoul National University	1550 - 1555	<b>Session Introduction</b> Dr. Hans-Albert Eckel, DLR Institute of Technical Physics
	1555 - 1610	<b>Enhancement in Drug Deliverance for Laser Generated Microjet Injector</b> Mr. Hunjae Jang, Seoul National University	1555 - 1620	<b>A Fundamental Study of Laser Propulsion: Plasma Diagnostics and Role of Ionization Waves On Propagation of Laser Supported Detonation</b> , Mr. Kohei Shimamura, University of Tokyo
	1610 - 1635	<b>Bio-Interfaces Engineering using Laser Based Methods for Biomedical Applications</b> Dr. Valentina Dinca, National Institute for Lasers [Invited]	1620 - 1645	<b>Laser Propulsion Research Facilities at DLR Stuttgart</b> Ms. Stephanie Karg, German Aerospace Center (DLR) [Invited]
	1635 - 1700	<b>Application of Laser-Based Methods for the Fabrication of Captopril Transdermal Patches</b> Dr. Alexandra Papavlu, National Institute for Lasers, Plasma and Radiation Physics [Invited]	1645 - 1700	<b>Study on the Dynamic Behavior of Matter using Laser-Driven Flyer Plate</b> Mr. Hyeonju Yu, Seoul National University
	1700 - 1720	Discussion with Authors	1700 - 1720	Discussion with Authors
	1720 - 1830	Welcome Reception & Poster Technical Interchange		
	<b>Wednesday, 23 April 2014</b>			
WEDNESDAY	0700 - 0800	Light Continental Breakfast		
	0700 - 1700	Registration		
		Welcome & Keynote <i>Lumpkins Ballroom North</i>		
	0800 - 0805	<b>Administrative Announcements, &amp; Keynote Introduction</b> Dr. Thierry Sarnet, Harvard University & Aix-Marseille University		
	0805 - 0845	<b>Keynote: Ultrashort Lasers to Increase Efficiency in Solar Energy Harvesting via Intermediate States</b> Prof. Eric Mazur, Harvard University [Invited]		
		<b>Track One</b> <i>Lumpkins Ballroom North</i> HP04: Promising New Laser and Optical Technologies		<b>Track Two</b> <i>Lumpkins Ballroom South</i> BE06: Advanced BEP Concepts
	0845 - 0850	<b>Session Introduction</b> Dr. Thierry Sarnet, Harvard University & Aix-Marseille University	0845 - 0850	<b>Session Introduction</b> Prof. Akihiro Sasoh, Nagoya University
	0850 - 0915	<b>When Light Plays with Metal Nanoparticles in Optical Waveguides and Creates Spontaneously Active Color Filters</b> Prof. Nathalie Destouches, University of Lyon [Invited]	0850 - 0915	<b>Replacement of Chemical Rocket Launchers by BEP</b> Prof. Kimlya Komurasaki, The University of Tokyo [Invited]
	0915 - 0940	<b>Laser Microprinting of Liquids: Analysis of the Jetting Dynamics</b> Dr. Pere Serra, University of Barcelona [Invited]	0915 - 0940	<b>Feasibility of Laser Propulsion to Deliver Small Scientific Payloads to Mars Orbit in the Near Future</b> Mr. Edward Montgomery IV, U. S. Army Space and Missile Defense Command/ Army Forces Strategic Command [Invited]
	0940 - 0955	<b>Picosecond-Laser Texturing of Solar Cells Using Laser Beam Interference</b> Dr. Gediminas Raciukaitis, Center for Physical Sciences and Technology	0940 - 0955	<b>Laser Electric Propulsion System for Microsatellites' Orbit Maintenance</b> Dr. Vjacheslav Tugaenko, Rocket and Space Corporation "Energia"
	0955 - 1030	Break		
	1030 - 1045	<b>Genesis of Femtosecond-Induced Nanostructures on Solid Surfaces</b> Dr. Juergen Reif, Brandenburg Technical University (BTU)	1030 - 1055	<b>Pulsed Laser Interactions with Reactive Foils</b> Dr. Ryan Murphy, Sandia National Laboratories [Invited]
	1045 - 1110	<b>Laser Processing of 2D &amp; 3D Metamaterial Structures</b> Dr. Alberto Piqué, Naval Research Laboratory [Invited]	1055 - 1120	<b>Impulse Control for Stable Flight of Beamed Energy Vehicle</b> Dr. Naofumi Ohnishi, Tohoku University [Invited]
	1110 - 1135	Discussion with Authors	1120 - 1135	Discussion with Authors
	1135 - 1300	Lunch Break - On Your Own		
		<b>Track One</b> <i>Lumpkins Ballroom North</i> HP05: Fundamentals & Simulations Session		<b>Track Two</b> <i>Lumpkins Ballroom South</i> HP11: Laser Direct Writing
	1300 - 1305	<b>Session Introduction</b> Dr. Baerbel Rethfeld, Technical University of Kaiserslautern	1300 - 1305	<b>Session Introduction</b> Prof. Craig Arnold, Princeton University

## Detailed Agenda (cont.)

WEDNESDAY

WEDNESDAY

1305 - 1330	<b>Simulations of Nonthermal Structural Phenomena with CHIVES</b> Dr. Eeuwze Zijlstra, University of Kassel [Invited]	1305 - 1330	<b>Laser-Induced Transfer of Nanoparticles for Gas-Phase Analysis</b> Dr. Alexander Bulgakov, University of Edinburgh [Invited]
1330 - 1355	<b>AC Conductivity in Non-Equilibrium Warm Dense Gold</b> Prof. Andrew Ng, University of British Columbia [Invited]	1330 - 1355	<b>Pulsed Laser Deposition (PLD) of Dielectrics – Is Femtosecond Laser Ablation Better Than Nanosecond Ablation?</b> Dr. Jørgen Schou, DTU Fotonik, Technical University of Denmark [Invited]
1355 - 1420	<b>Warm Dense Matter Properties for the Modeling of Laser-Ablation</b> Dr. Dirk Gericke, University of Warwick [Invited]	1355 - 1410	<b>Copper Vapor Laser for Direct Writing, Cutting, Drilling Materials</b> Mr. Mishik Kazaryan, Lebedev Physical Institute
1420 - 1435	<b>Molecular Dynamics Simulations of Silicon: The Influence of Electron-Temperature Dependent Interactions</b> Dr. Johannes Roth, University of Stuttgart	1410 - 1435	<b>Acoustic Effects in High Repetition Rate Laser Direct Write Printing</b> Prof. Craig Arnold, Princeton University [Invited]
1435 - 1450	<b>Excitation and Relaxation Dynamics in Dielectrics Irradiated by Intense, Ultrashort Laser Pulses</b> Mr. Nils Brouwer, Technical University of Kaiserslautern	1435 - 1455	<b>Discussion with Authors</b>
1450 - 1510	<b>Discussion with Authors</b>		
1455 - 1530	<b>Break</b>		
	<b>Track One</b> <i>Lumpkins Ballroom North</i>		<b>Track Two</b> <i>Lumpkins Ballroom South</i>
	<b>HP06: Electric Discharge and Optically Pumped Lasers</b>		<b>BE07: Space Debris Removal &amp; Beyond</b>
1530 - 1535	<b>Session Introduction</b> Prof. Andrey Ionin, Lebedev Physical Institute of Russian Academy of Sciences	1530 - 1535	<b>Session Introduction</b> Prof. Willy Bohn, BohnLaser Consult
1535 - 1550	<b>Hybrid CO Laser System Emitting in the Spectral Band of 2.5-8.3 Micron</b> Prof. Andrey Ionin, Lebedev Physical Institute of Russian Academy of Sciences	1535 - 1600	<b>Space Demonstration Experiment of Laser-Assisted Space Debris De-Orbiting</b> Prof. Akihiro Sasoh, Nagoya University [Invited]
1550 - 1615	<b>Optical Pumped Oxygen – Iodine Laser</b> Prof. Oleg Danilov, Vavilov State Optical Institute	1600 - 1615	<b>Phase Conjugate Light Generation for Space Debris Removal</b> Ms. Kotomi Kawakami, University of Tokyo
1615 - 1700	<b>Discussion with Authors</b>	1615 - 1630	<b>Impacts of Tug and Debris Sizes on Electrostatic Tractor Beam Performance</b> Mr. Erik Hogan, University of Colorado
		1630 - 1645	<b>Laser Ablation for Orbital Debris Reduction: Opportunities and Issues</b> Mr. Joseph Carroll, Tether Applications, Inc.
		1645 - 1705	<b>Discussion with Authors</b>
1700 -- >	<b>Free Evening to Explore Santa Fe</b>		

## Thursday, 24 April 2014

THURSDAY

THURSDAY

0700 - 0800	<b>Light Continental Breakfast</b>		
0700 - 1700	<b>Registration</b>		
	<b>Welcome &amp; Keynote</b> <i>Lumpkins Ballroom North</i>		
0800 - 0805	<b>Administrative Announcements, &amp; Keynote Introduction</b> Prof. Willy Bohn, BohnLaser Consult		
0805 - 0845	<b>Keynote: CLEANSPACE - Space Debris Removal by Ground Based Laser: Progress of the European Project</b> Dr. Bruno Esmler, Astrium Space Transportation		
	<b>Track One</b> <i>Lumpkins Ballroom North</i>		<b>Track Two</b> <i>Lumpkins Ballroom South</i>
	<b>HP07: Ultrashort Pulse Effects</b>		<b>BE05: Laser Ablation Propulsion (Macro- and Micro-)</b>
0845 - 0850	<b>Session Introduction</b> Dr. Klaus Sokolowski-Tinten, University of Duisberg-Essen	0845 - 0850	<b>Session Introduction</b> Prof. Hideyuki Horisawa, Tokai University
0850 - 0905	<b>Evidence of New High-Pressure Silicon Phases in Fs-Laser Induced Confined Microexplosion</b> Prof. Andrei Rode, Australian National University	0850 - 0915	<b>Overview of Laser Propulsion Research Activities at Tokai University</b> Prof. Hideyuki Horisawa, Tokai University [Invited]
0905 - 0920	<b>Propagation and Self-Focusing of Intense Femtosecond Shaped Beams and Applications to Laser Material Processing</b> Dr. Pavel Polynkin, University of Arizona	0915 - 0940	<b>Overview of Laser Ablation Micropropulsion Research Activities at DLR Stuttgart</b> Dr. Hans-Albert Eckel, DRL-German Aerospace Center [Invited]



## Detailed Agenda (cont.)

THURSDAY

THURSDAY

0920 - 0945	<b>Opportunities for Laboratory Astro- and Planetary Physics at the Matter in Extreme Conditions End Station at LCLS</b> Dr. Bob Nagler, SLAC National Accelerator Laboratory [Invited]	0940 - 0955	<b>Short-Pulse Laser-Optical System Requirements for Reducing the Space Debris Threat</b> Dr. Claude Phipps, Photonic Associates, LLC
0945 - 1000	<b>Physics and Material Dynamics Resulting From Sequenced Multipulse Femtosecond Laser Interactions with Metallic Surface</b> Dr. Dennis Alexander, University of Nebraska-Lincoln		
0955 - 1030	<b>Break</b>		
1030 - 1055	<b>Femtosecond Microscopy of Laser-Produced Plasmas in Dielectrics: A Tool for Optimized fs Laser Processing</b> Dr. Jan Siegel, Instituto de Optica, CSIC [Invited]	1030 - 1045	<b>Laser Ablation Propulsion with High Frequency Repetitive Pulsed-Laser at Various Atmospheric Pressures</b> Dr. Bin Wang, Nagoya University
		1045 - 1100	<b>Experimental Study on Laser Micropulsion</b> Dr. Long Jiao, University of Science and Technology of China
1055 - 1120	<b>Transient Optical Properties of a Dielectric Excited By Intense Ultra-Short Laser Pulse</b> Prof. Eugene Gamaly, Australian National University [Invited]	1100 - 1125	<b>Laser Chemical Propulsion and Its Preliminary Experimental Study</b> Prof. Zhiping Tang, University of Science and Technology of China [Invited]
1120 - 1140	<b>Discussion with Authors</b>	1125 - 1145	<b>Discussion with Authors</b>
1140 - 1300	<b>Lunch Break - On Your Own</b>		
	<b>Track One</b> <i>Lumpkins Ballroom North</i>		<b>Track Two</b> <i>Lumpkins Ballroom South</i>
	<b>HP09: Imaging Materials and Plumes at the Limits of Spatial and Time Resolution</b>		<b>BE04: Space Based Laser Systems and Applications II</b>
1300 - 1305	<b>Session Introduction</b> Prof. Andrei Kanaev, University of Paris 13	1300 - 1305	<b>Session Introduction</b> Prof. Willy Bohn, BohnLaser Consult
1305 - 1330	<b>Ultrafast Laser-Induced Processes and Processing on Surfaces at the Micro/Nano-Scale by Temporally Shaped fs Laser Pulses</b> Dr. Panagiotis Loukakos, Foundation for Research & Technology - Hellas [Invited]	1305 - 1330	<b>Elastic Waves Related to Pulsed Laser Propulsion</b> Dr. Janez Možina, University of Ljubljana [Invited]
1330 - 1355	<b>Ultralong Standing Frozen Threads Forming Rim around an Ablation Crater Created by Femtosecond Laser</b> Dr. Nail Inogamov, Landau Institute for Theoretical Physics, RAS	1330 - 1355	<b>A Space-Based Laser System for the Deflection and Manipulation of Asteroids</b> Ms. Alison Gibbings, University of Strathclyde [Invited]
1355 - 1410	<b>Real Time Reflectivity Changes during Periodic Surface Structures Formation on Copper Thin Films by Nano and Picosecond UV Lasers</b> Dr. Nadjib Semmar, CNRS-University Orleans	1355 - 1420	<b>DE-STAR - A Planetary Defense and Exploration System</b> Prof. Philip Lubin, University of California-Santa Barbara [Invited]
1410 - 1425	<b>Mass Spectrometry Imaging at the Nanoscale by Extreme Ultraviolet Laser Ablation</b> Prof. Carmen Menoni, Colorado State University	1420 - 1435	<b>Laser Space Solar Power Systems and their Applicability to Laser Propulsion</b> Dr. Kazuhisa Fujita, The Graduate School for the Creation of New Photonics Industries
1425 - 1440	<b>Short Pulse Laser-Induced Switching of Phase Change Materials Studied by Time-Resolved X-Ray Scattering</b> Dr. Klaus Sokolowski-Tinten, University of Duisburg-Essen		
1440 - 1500	<b>Discussion with Authors</b>	1435 - 1455	<b>Discussion with Authors</b>
1455 - 1525	<b>Break</b>		
	<b>Panel: What Are the Issues We Should Be Putting More Effort On in Terms of Understanding and/or Overcoming Technological Roadblocks?</b> <i>Lumpkins Ballroom North</i>		
1525 - 1700	<b>Panel Introduction &amp; Moderation</b> , Dr. Henry Helvajian, The Aerospace Corporation Panel Members Include: Dr. Claude Phipps, Photonic Associates, LLC; Dr. Kevin Parkin, Carnegie Mellon University; Dr. Johannes Pedarnig, Johannes Kepler University Linz; Prof. Nadezhda Bulgakova, HiLASE, Institute of Physics ASCR; and other invited panelists		
1700 - 1800	<b>Final Poster Viewing &amp; Voting</b>		
1800 - 1815	<b>Poster Award Winner Announcements</b> <i>Lumpkins Ballroom North &amp; South</i>		
1815 - 2100	<b>Dinner with Entertainment</b> <i>Lumpkins Ballroom North &amp; South</i>		

## Friday, 25 April 2014

FRIDAY

FRIDAY

0700 - 0800	<b>Light Continental Breakfast</b>
0700 - 1200	<b>Registration</b>
	<b>Welcome &amp; Keynote</b> <i>Lumpkins Ballroom North</i>
0800 - 0805	<b>Administrative Announcements, &amp; Keynote Introduction</b> Dr. Claude Phipps, Photonic Associates, LLC



## Detailed Agenda (cont.)

0805 - 0845	Keynote: <b>Advanced, Diode-Pumped, High Average Power Lasers for Orbital Debris Removal and Other Applications</b> Prof. David Neely, STFC Rutherford Appleton Laboratory, Didcot (UK)		
	<b>Track One</b> <i>Lumpkins Ballroom North</i>		<b>Track Two</b> <i>Lumpkins Ballroom South</i>
	HP10: MAPLE, PLD and Processing of Advanced Materials		BE08: Breakthrough Propulsion/Postdeadline
0845 - 0850	<b>Session Introduction</b> Prof. Adrienne Stiff-Roberts, Duke University	0845 - 0850	<b>Session Introduction</b> Dr. Young Bae, Y.K. Bae Corporation
0850 - 0915	<b>Modification of ZnO Thin Films Induced by High-Density Electronic Excitation</b> Dr. Andrei Kanaev, CNRS-LSPM [Invited]	0850 - 0915	<b>Past, Present and Future of Photon Propulsion</b> Dr. Young Bae, Y.K. Bae Corporation [Invited]
0915 - 0940	<b>Matrix Assisted Pulsed Laser Evaporation of Thin Films for Biomedical Applications</b> Dr. Roger Narayan, UNC/NCSU Joint Department of Biomedical Engineering [Invited]	0915 - 0930	<b>Space Photonic Laser Thruster</b> Prof. John Sinko, Saint Cloud State University
0940 - 0955	<b>Coarse-Grained Molecular Dynamics Simulations of Matrix-Assisted Pulsed Laser Evaporation (MAPLE) with Minimum Amounts of Matrix</b> Dr. Leonid Zhigilei, University of Virginia	0930 - 0955	<b>Melt Dynamics and Melt-Through Time in Continuous Wave Laser Ablation: Comparative Analysis of Contributions from the Recoil Vapor Pressure and Marangoni Effect</b> Dr. Alexey Volkov, University of Alabama [Invited]
0955 - 1010	<b>MAPLE for Functional Coatings with Applications in Tissue Engineering</b> Dr. Flavian Stokker-Cheregi, National Institute for Lasers, Plasma and Radiation Physics	0955 - 1010	<b>Epitaxial Growth of 3C-SiC Thin Films on Si by Pulsed Laser Deposition</b> Ms. Elena Pavlova, National Research Nuclear University MEPhI
1010 - 1040	Break		
	<b>Track One</b> <i>Lumpkins Ballroom North</i>		<b>Track Two</b> <i>Lumpkins Ballroom South</i>
	HP10: MAPLE, PLD and Processing of Advanced Materials, <i>cntd.</i>		BE08: Breakthrough Propulsion/Postdeadline, <i>cntd.</i>
1040 - 1105	<b>Engineering Morphology in Thin Films via Laser Ablation</b> Prof. Rodney Priestley, Princeton University [Invited]	1040 - 1055	<b>Generating and Characterizing Secondary Graphite Debris using High-Power Laser-Driven Shocks and Various Laser Diagnostics</b> Mr. Gabriel Seisson, CEA CESTA
		1055 - 1120	<b>Conducting Channel for Energy Transmission</b> Prof. Victor Apollonov, General Physics Institute [Invited]
1105 - 1120	<b>Nanoscale Domains in Blended Organic Thin Films Deposited by RIR-MAPLE</b> Mr. Ryan McCormick, Duke University	1120 - 1145	<b>Isochoric Heating using Proton Beams and Shock Compression Generated by UHI Lasers</b> Prof. Markus Roth, Technische Universität Darmstadt [Invited]
1120 - 1135	<b>Laser Deposition of Catalysts for Carbon Nanotube Growth: From First Steps to Technological Applications</b> Prof. Chantal Boulmer-LeBorgne, CNRS-University Orleans	1145 - 1200	<b>Shock, Ablation and Formation of Nanostructures in Metals Induced by Femtosecond Laser</b> Dr. Sergey Ashitkov, Joint Institute for High Temperature, RAS
1135 - 1155	<b>Discussion with Authors</b>	1200 - 1220	<b>Discussion with Authors</b>
1220	Symposia Adjourn		
1230 ---->	Canyon Road Tour & Lunch on the Town		

## Lunch & Dinner Suggestions

### Geronimo

724 Canyon Rd., 505-982-1500  
Website: <http://chrismharvey.wix.com/geronimo>

### The Compound Restaurant

653 Canyon Rd., 505-982-4353  
Website: [www.compoundrestaurant.com/](http://www.compoundrestaurant.com/)

### Galisteo Bistro

227 Galisteo Street, 505-982-3700  
Website: [http://galisteobistro.com/Home\\_Page.html](http://galisteobistro.com/Home_Page.html)

### Jinja Asian Café

North DeVargas Mall Across from Albertson's 510 N. Guadalupe St., 505-982-4321  
Website: <http://jinjabistro.com/index.html>

### Old House Restaurant

309 West San Francisco St., 505-995-4530 Website: [http://www.eldoradohotel.com/old\\_house\\_restaurant/](http://www.eldoradohotel.com/old_house_restaurant/)

### Cleopatra Café

418 Cerrillos Road, 505-820-7381

### Bumble Bee's Baja Grill

301 Jefferson, 505-820-2862  
Website: <http://www.bumblebeesbajagrill.com/>

### The Pantry Restaurant

1820 Cerrillos Rd., 505-986-0022  
Website: <http://www.pantry santafe.com/>

### Marisco's Costa Azul

2875 Cerrillos Rd., 505-473-4594  
Website: <http://www.mariscocostaazul.com/>

### Cowgirl BBQ

319 S Guadalupe, 505-982-2565  
Website: <http://www.cowgirlsantafe.com/menus>

### El Farol

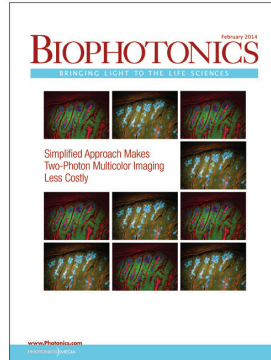
808 Canyon Road, 505-983-9912  
Website: <http://www.elfarol.com/>

### The Teahouse

821 Canyon Road, 505-992-0972,  
Website: <http://teahousesantafe.com>



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## Poster Session

Please take time to view the array of technical poster papers in the Mexico Room. Authors will be available throughout the week for discussion. The posters will be available for viewing on Tuesday from 1730 - 1830, Wednesday from 0730 - 1700, and Thursday from 0730 - 1800.

- **Electronic Non-Equilibrium in UV Laser Induced Plasma from a Metal Sample**, Miss Amina Ait Oumeziane, Aboubekr Belkaid University Tlemcen Algeria
- **High Repetition Rate P-P Lasers for Space Debris Elimination**, Prof. Victor Apollonov, General Physics Institute
- **CO Laser for Production of Nuclear Fuel from Tailings**, Prof. Igor Baranov, Baltic State Technical University
- **Investigation of Ultrashort Pulsed Laser Induced Ablation Process in CZTS Thin-Films**, Dr. Paulius Gecys, Center for Physical Sciences and Technology
- **A Space-Based Laser System for the Deflection and Manipulation of Asteroids**, Ms. Alison Gibbings, University of Strathclyde
- **An Optimized Protocol for Femtosecond Ablation of Dielectric Films**, Mr. Gabe Guss, Lawrence Livermore National Laboratory
- **Demonstration of Enhanced Surface Mobility of Adsorbate Cluster Species by Surface Acoustic Wave Excitation Induced by a Pulsed Laser**, Dr. Henry Helvajian, The Aerospace Corporation
- **Induction Phenomena of a Laser-Assisted Pulsed Plasma Thruster**, Prof. Hideyuki Horisawa, Tokai University
- **First Principal Calculations of Metals with Excited Electron Subsystem**, Dr. Nail Inogamov, Landau Institute for Theoretical Physics, RAS
- **Research on Application of Rectangular Beam in Micro Laser Propulsion**, Dr. Long Jiao, University of Science and Technology of China



## Poster Session *(cont.)*

- **Research on Discrete Meso-Dynamic Simulation of Micro Laser Propulsion**, Dr. Long Jiao, University of Science and Technology of China
- **Microwave Propulsion Combustion Chamber Design**, Dr. Donald Johansen, EMF Kinetics
- **Plasma Filaments and Shock Wave Formation in Microwave Thruster**, Mr. Yoshiaki Kageyama, Tohoku University
- **Laser Micro Cutting of Thin Substrates**, Mr. Sostaine Kaya-Boussougou, GREMI
- **A Laser Thermal Microthruster with a Novel Fiber Tip Heat Source**, Mr. Keisuke Kondo, Tokai University
- **Experimental Investigation and Atomistic Simulation of Short Pulse Laser Interactions with Spatially Confined Metal Targets**, Dr. Zhibin Lin, Electro Scientific Industries, Inc.
- **Intense Pulsed Neutron Source Using a Petawatt Laser Irradiation of Deuterium Cluster Foils**, Dr. George Miley, University of Illinois
- **Structural Profiling of Laser-Absorption Layer in Laser-Produced Plasma of Different Gas Media using 2-wavelength Mach-Zehnder Interferometry**, Mr. Joseph Ofosu, The University of Tokyo
- **Numerical Study of Nano-Sized Cluster Formation in Femtosecond Laser Ablation**, Dr. Naofumi Ohnishi, Tohoku University
- **Impulse Vector Characteristics of a Laser Ablation Vehicles for Atmospheric Flight Applications**, Mr. Takumi Oyama, Tokai University
- **Gas Sensing by Single Walled Carbon Nanotube Chemiresistors Fabricated by Laser-Induced Forward Transfer**, Dr. Alexandra Papavlu, Paul Scherrer Institut
- **Numerical Analysis of Ultrashort Laser Ablation: Application for Fabrication of Nanoparticles and Nanostructures**, Dr. Mikhail Povarnitsyn, Joint Institute for High Temperatures RAS
- **Mobile Laser Technological Systems for Industrial Application**, Prof. Anatoly Rodin, SRC RF TRINITY
- **Laser Acceleration of Small Projectiles for Hypervelocity Impact Experiments**, Prof. Markus Roth, Technische Universität Darmstadt
- **Impulse Generation of Pulsed Laser Ablation of Polyacetal**, Prof. Takeharu Sakai, Nagoya University
- **Effects of Confinement on Planar Laser Ablation Propulsion**, Prof. Akihiro Sasoh, Nagoya University
- **Supersonic Aerodynamics Control using Repetitive Laser Pulses**, Prof. Akihiro Sasoh, Nagoya University
- **Beam-Riding Simulation and Diagnostics for Beamed-Energy Vehicles**, Dr. Stefan Scharring, Institute of Technical Physics, German Aerospace Center (DLR)
- **Open Access Tools for the Simulation of Ultrashort-Pulse Laser Ablation**, Dr. Stefan Scharring, Institute of Technical Physics, German Aerospace Center (DLR)
- **Pulsed Laser Deposition (PLD) of Chalcogenide Films by Nanosecond Lasers**, Dr. Jørgen Schou, Technical University of Denmark, DTU Fotonik
- **Characterization of Thermophysical Phenomena Generated by a Pulsed Laser on Metal Alloy Surface: Experimentation and Modeling**, Dr. Nadjib Semmar, CNRS-University Orleans
- **Atomistic Simulations and Experimental Study of Nanoparticle Generation in Femtosecond Laser Ablation of Thin Metal Films**, Mr. Cheng-Yu Shih, University of Virginia
- **One-Dimensional Control Volume Analysis and Limit of Laser-Supported Detonation for High Propulsive Efficiency**, Mr. Kohei Shimamura, University of Tokyo
- **Time-Resolved Microscopy Studies at fs Laser-Irradiated Surfaces**, Dr. Klaus Sokolowski-Tinten, University of Duisburg-Essen
- **Rapid Small Package Delivery Service to Mars via Beamed Energy**, Prof. Grover Swartzlander, Jr., Rochester Institute of Technology
- **Microwave Plasma Filaments Supported by Magnetic Field at Lower Pressure**, Mr. Masayuki Takahashi, Tohoku University
- **Experimental Study on Laser Chemical Propulsion and its Mechanism**, Prof. Zhiping Tang, University of Science and Technology of China
- **Repetitive Pulse Impulse Performance with 1- $\mu$ m Laser Ablation**, Mr. Hisashi Tsuruta, Nagoya University
- **Laser Propulsion and Laser Electric Propulsion, Pros and Cons for Spacecrafts**, Dr. Vjatcheslav Tugaenko, Rocket and Space Corporation "Energia"
- **Ablation of a Nanostructured Metal Surface by Ultrashort X-Ray Pulses**, Dr. Herbert Urbassek, University of Kaiserslautern



## Group Tours

### **Bradbury Science Museum**

Monday, 21 April 2014, 1330

Join fellow HPLA/BEP attendees on a tour of the Bradbury Science. The museum is located at 15th and Central in downtown Los Alamos, the home of Los Alamos National Laboratory. The museum serves as a bridge between the Laboratory and the community, helping to improve science education and science literacy. The museum also serves as a window to the Laboratory, interpreting the Laboratory's history and current research. The museum's 40 interactive exhibits trace the history of the WWII Manhattan Project, highlight the Laboratory's current and historic research projects related to defense and technology, and focus on Laboratory research related to national and international economic, environmental, political, and social concerns. These exhibits together with extensive educational and community programs draw nearly 80,000 visitors a year.

The museum is 45 minutes away from La Fonda on the Plaza Hotel. Transportation will not be provided, but if you are interested in ride sharing please meet in the hotel lobby at 1230. The group will then meet in the museum lobby at 1330 for a guided tour.

### **Canyon Road Lunch & Tour**

Friday, 25 April 2014, 1215

Over a Hundred Galleries, Boutiques and Restaurants in one half mile. Since its early Native American and Spanish roots, Canyon Road has been a trail of abundance – initially as a farming community, later as the site of an art colony, and today as one of the country's top shopping experiences. While gracious adobe architecture gives Canyon Road its Old World charm, diversity is its claim to fame. Whether you prefer Contemporary, Traditional, or Native American fine art, it's all here, including paintings, indoor and outdoor sculptures, glass, jewelry, clothing, accessories, home furnishings, gifts, antiques, rugs, folk art and crafts. The array of specialty shops, boutiques, and galleries is vast. Make time for Canyon Road's other inspired experiences: From El Zaguán's huge chestnut trees, which have shaded the trail since the mid-19th century, to hidden courtyards, musical fountains, benches with a view, spring lilacs, summer hollyhocks, glorious fall foliage, and winter's hot cider and bonfires.

Please join fellow HPLA/BEP attendees in the hotel lobby at 1215 on Friday, April 25th for this one mile walk to Canyon Road. HPLA founder, and local expert, Dr. Claude Phipps will lead this walking tour. There are many restaurants along Canyon Road and close to La Fonda, so plan to catch lunch along the way and then head back at your own pace.

For more information visit: <http://visitcanyonroad.com/about.html> or <http://www.canyonroadarts.com/index.html>.

## Thursday Dinner Entertainment



Please plan to join your colleagues for dinner and entertainment on Thursday, April 24th, 2014 at 1800. The event will kick off with Poster Paper Awards Ceremony and will be followed by dinner, entertainment and dancing. Dinner tickets are included with the registration fee. Guest tickets can be purchased for \$70 in advance. Entertainment includes Flamenco entertainment by Esther Marion and Company & music by The Jimmy Stadler Band, Winner of the New Mexico Music Awards "Best CD Of The Year."





## Dedication

We dedicate HPLA/BEP 2014 to **Dr. Ray Kidder**, a retired scientist, Lawrence Livermore National Laboratory, Laser Research Program Leader (1962-1972) estimated an ignition energy of 500 kilojoules (1964 simulation) followed by a four-fold increase to 2 mega-joules (1980) to account for indirect drive, the value now on target at the National Ignition Facility; and derived the seminal sixth-power relation between ignition energy and fuel convergence ratio (1991). He was our lead keynote speaker for the very first HPLA meeting in 1998. He is still very active and working on various controlled fusion concepts at age 90 years.