

Technical Program

Advanced High Power Lasers



2nd Annual Free Electron Laser
Conference

1st Annual Gas Laser Conference

24th Annual Solid State and Diode
Laser Technology Review

9th Annual Ultrashort Pulse Laser
Workshop

6 - 9 June 2011
Santa Fe, New Mexico

SESSIONS BY CONFERENCE

All Conferences

Monday	
Short Courses	1
Tuesday AM	
Plenary Session	2
Tuesday Evening	
Poster Session	5

Free Electron Laser Conference

Tuesday PM	
FEL Tours	5
Wednesday AM	
Conference Session 1 (Limited/Open)	6
Wednesday PM	
Conference Session 2 (Open)	11
Thursday AM	
Conference Session 3 (Secret)	16

Gas Laser Conference

Wednesday AM	
Alkali Laser Basic Research (Limited/Open)	7
Wednesday PM	
Gas Laser Development (Limited)	12

Solid State and Diode Laser Technology Review

Tuesday PM	
Diode Lasers I (Limited/Open)	3
Wednesday AM	
Solid State Lasers (Open)	8
Power and Thermal Management (Limited/Open)	9
Wednesday PM	
High Energy Systems (Limited/Open)	13
Materials (Limited/Open)	14
Thursday AM	
Diode Lasers II (Open)	17
Fiber Lasers (Limited/Open)	18
Thursday PM	
Fiber Beam Combination (Limited/Open)	20

Ultrashort Pulse Laser Workshop

Tuesday PM	
Physics & Technology I (Open)	4
Wednesday AM	
Applications, Techniques, and Diagnostics I (Open)	10
Wednesday PM	
Physics & Technology II (Limited)	15
Thursday AM	
Applications, Techniques, and Diagnostics II (Open)	19
Thursday PM	
Classified Session (Secret)	21

MONDAY

Short Courses

- 0700 Registration at Omni Resort
- 0800 Short Courses Begin
1. Introduction to Free Electron Laser Systems
FULL DAY COURSE - Public Release
Instructor: *Dinh Nguyen*
 2. Introduction to Laser Beam Quality Measures
- **Public Release**
Instructor: *Sean Ross*
 3. Ultra-Short Laser Induced Filaments
- **Limited Distribution C**
Instructor: *Pat Roach*
- 1200 Break for Lunch
- 1300 Afternoon Course Begins and Full Day Course Resumes
4. Diode Pumped Alkali Lasers (DPALs)
- **Public Release**
Instructor: *Glen Perram*

SECURITY NOTE:

Letters listed in this agenda after presentation titles indicate distribution statements as follows:

- A - information is open, public release
- C - information is limited to U.S. citizens who are employees of the U.S. Federal Government or its contractors
- D - information is limited to U.S. citizens who are employees of the U.S. Department of Defense or its contractors

TUESDAY MORNING

JOINT SESSION

Plenary Session (Open)

La Fonda Hotel

- 0630 **Breakfast**
- 0700 **Registration at the La Fonda Hotel**
- 0830 **Welcome**
Dr. Samuel Blankenship, DEPS
- 0845 **DASL... Dynamite At the Speed of Light...
The Long Road to Deployment**
RADM Jay Cohen, USN (ret)
- 0915 **Detailed Physical Modeling of Lasers**
*Dr. Timothy Madden, Air Force Research
Laboratory/Directed Energy Directorate*
- 0945 **Break**
- 1030 **Ultra Short Pulse Lasers and Potential
Applications**
*Dr. Phillip Sprangle, Naval Research
Laboratory*
- 1115 **Design Goals for Flight-Worthy Laser System
Development: Avoiding the Valley of Death**
*Dr. Sean Ross, Air Force Research
Laboratory/Directed Energy Directorate*
- 1145 **Lunch**
Co-Hosted by Dilas Diode Laser, Inc



TUESDAY AFTERNOON

SSDLTR

Diode Lasers I (Limited/Open)

Chair: *Andrew Ongstad, Air Force Research
Laboratory*
La Fonda Hotel, Ballroom North

Session is Limited

- 1300 **An Overview of Diode Lasers for Defense
Applications (Limited C)**
Steve Patterson, Dilas Diode Laser, Inc.

Session is now Open

- 1325 **Extremely High Brightness, kW-Class Fiber
Coupled Diode Lasers with Wavelength
Stabilization**
Robin Huang, TeraDiode, Inc
- 1350 **A 13-kW Fiber-Coupled Diode Laser at 938
nm for Solid State Laser Pump Applications**
David Matthews, Laserline Inc
- 1415 **8xx nm Laser Diode Arrays for High-
Temperature and High-Power QCW
Applications**
*Jeremy Junghans, Northrop Grumman
Cutting Edge Optronics*
- 1440 **Break**
- 1510 **High-Brightness, Narrow-Linewidth
532.5 nm Laser Diode Modules For In-Band
Pumping of Er:YAG**
Paul Leisher, nLight Corporation
- 1535 **High-Power, High-Efficiency Cryogenic
Diode Laser Stacks for Solid State Lasers**
Jason Brasseur, Directed Energy Solutions
- 1600 **Cryogenic Kilowatt Diode Pumps for
Cryogenic Yb:YAG Disk Lasers**
Kurt Linden, Spire Corporation
- 1730 **Poster Session**
Reception at La Fonda Hotel

TUESDAY AFTERNOON

USLPW

Ultrashort Pulse Laser Physics and Technology I (Open)

Chair: *Pete Latham*, Air Force Research Laboratory
La Fonda Hotel, Santa Fe

- 1300 **The Challenges Facing Filamentation Today Invited**
Jean-Claude Diels, University of New Mexico
- 1340 **Femtosecond Pulse Coherently Combined Parallel Chirp Pulsed Fiber Amplifier Arrays**
Almantas Galvanauskas, University of Michigan
- 1410 **Mode-Locked Thulium Doped Silicate Fiber Laser**
Shibin Jiang, AdValue Photonics Inc.
- 1440 **Ultrashort Pulse Thulium Fiber Lasers**
Lawrance Shah, University of Central Florida
- 1510 **Break**
- 1530 **Development of a Joule-Level Diode-Pumped High Repetition Rate Picosecond Laser - Invited**
Jorge Rocca, CSU
- 1610 **Next Generation High Power OPCPA Femtosecond Laser Systems**
Ben Webb, University of Central Florida
- 1730 **Poster Session**
Reception at La Fonda Hotel

TUESDAY AFTERNOON

FEL

Los Alamos Tour

- 1330 **Tour departs La Fonda Hotel**
- 1630 **Tour returns**

TUESDAY EVENING

JOINT SESSION

Poster Session

- Frequency Stabilization of the NCRF Injector**
Cynthia Heath, Los Alamos National Laboratory
- Transmission Measurements in the 2 Microns Wavelength Regime**
Pankaj Kadwani, University of Central Florida
- Electron Beamline for High-Current Beam Tests**
Frank Krawczyk, Los Alamos National Laboratory
- First Operation of the LANL/AES NCRF Injector**
Nathan Moody, Los Alamos National Laboratory
- ARL-WMRD Studies of Filament Propagation and Interaction with Obscurants and its Impact on Object Illumination**
Chase Munson, Army Research Laboratory

WEDNESDAY MORNING

FEL

FEL Conference Session 1 (Limited/Open)

Chair: *David Schwamb*, Boeing
La Fonda Hotel, Exchange Room

0630 **Breakfast**

0700 **Registration at the La Fonda Hotel**

0800 **Welcome**

Session is Limited

0800 **Drive Laser for the NCRF Injector (Limited C)**
Heather Andrews, Los Alamos National Laboratory

0830 **Novel FEL Cavity Optic (Limited C)**
Michelle Shinn, Jefferson Laboratories

0900 **First Operation of the LANL/AES NCRF Injector**
Nathan Moody, Los Alamos National Laboratory

0930 **High-QE Photocathodes**
Nathan Moody, Los Alamos National Laboratory

1000 **Break**

1030 **Adaptive Beam Halo Monitor for Free Electron Lasers**
Ralph Fiorito, University of Maryland

1100 **Rapid FEL Facility Build-Up Experiences**
Sandra Biedron, Colorado State University

1130 **End-Point Energy Measurements**
Dinh Nguyen, Los Alamos National Laboratory

1200 **Lunch**

WEDNESDAY MORNING

GAS

Alkali Laser Basic Research (Limited/Open)

Chair: *David Hostutler*, Air Force Research Laboratory

La Fonda Hotel, Coronado Room

0630 **Breakfast**

0700 **Registration at the La Fonda Hotel**

Session is Limited

0800 **DPAL Propagation (Limited C)**
Stephen Hammel, SPAWAR Systems Center

Session is now Open

0830 **Review of Diode Pumped Alkali Laser Kinetics**
Glen Perram, Air Force Institute of Technology

0900 **Alkali Atoms**
Will Happer, Princeton University

0930 **Break**

1000 **Multi-Photon Processes in Diode Pumped Alkali Lasers**
Glen Perram, Air Force Institute of Technology

1030 **Collisional Processes in Optically Pumped Atomic Gas Lasers**
Michael Heaven, Emory University

1200 **Lunch**

WEDNESDAY MORNING

SSDLTR

Solid State Lasers (Open)

Chair: *Mark Dubinskii*, Army Research Laboratory
La Fonda Hotel, Ballroom North

- 0630 **Breakfast**
- 0700 **Registration at the La Fonda Hotel**
- 0800 **Diode Pumped Ho³⁺:YVO₄ Laser at 2.1-micron with Resonant Excitation**
George Newburgh, Army Research Laboratory
- 0825 **Diode-Pumped Er³⁺:Y₂O₃ Ceramic Laser - Power Scaling at 2.7 μm**
Tigran Sanamyan, Army Research Laboratory
- 0850 **High-Wall-Plug-Efficiency, High-Power Green Laser with Diffraction-Limited Beam Quality**
Dan Hu, Lockheed Martin Aculight
- 0915 **Break**
- 0945 **Transition Metal-Doped Cd(1-x)Mn(x)Te for Tunable Mid-IR Applications**
Mark Dubinskii, Army Reserach Laboratory
- 1010 **Resonantly Pumped Performance of Er³⁺-Doped Double Tungstate Crystals**
Viktor Fromzel, US Army Research Laboratory
- 1200 **Lunch**

WEDNESDAY MORNING

SSDLTR

Power and Thermal Management (Limited/Open)

Chair: *Charles Oberly*, Air Force Research Laboratory/RZPA
La Fonda Hotel, New Mexico Room

- 0630 **Breakfast**
- 0700 **Registration at the La Fonda Hotel**

Session is Limited

- 0800 **Lab Simulation of Power and Thermal Management Systems (PTMS) for Megawatt Solid State Lasers on Aircraft (Limited D)**
Charles Oberly, Air Force Research Laboratory/RZPA
- 0825 **Significant Developments Relating to 2.5-MW Generator for Airborne DEW Systems (Limited C)**
Kevin Yost, Air Force Research Laboratory/RZPG
- 0850 **Break**

Session is now Open

- 0920 **Compact High-Power Battery for Directed Energy Applications**
Emilio Gomez, Saft America, Inc.
- 0945 **Power and Thermal Management for Aircraft Directed Energy Weapons**
Vipul Patel, Honeywell International
- 1010 **Enhanced Lateral Flow Cooler for High-Power Laser Diode Bars**
Henry Eppich, Science Research Laboratory, Inc.
- 1200 **Lunch**

WEDNESDAY MORNING

USPLW

Ultrashort Laser Applications, Techniques, and Diagnostics I (Open)

Chair: *Pat Roach*, Air Force Research Laboratory
La Fonda Hotel, Santa Fe

- 0630 **Breakfast**
- 0700 **Registration at the La Fonda Hotel**
- 0820 **Computational Models for Optical Filamentation and Ultrashort Pulse Propagation - Invited**
Miroslav Kolesik, University of Arizona
- 0900 **ARL-WMRD Studies of Filament Ablation Dynamics and Electron Density Characterization**
Anthony Valenzuela, Army Research Laboratory
- 0930 **Pulse Shaping and Air Filament Length Tripling by Coherently Driven Quantum Wakes**
Howard Milchberg, University of Maryland
- 1000 **Break**
- 1020 **Experimental Program on Ultrafast Laser Filamentation at the University of Arizona Invited**
Pavel Polynkin, University of Arizona
- 1100 **On the Use of Multiple Laser Pulses for Improved Plasma Parameters in Filaments**
Patrick Rambo, Sandia National Laboratories
- 1130 **Effect of Polarization Evolution and Pre-Focus Propagation on Filament Formation**
Ladan Arissian, University of New Mexico
- 1200 **Lunch**

WEDNESDAY AFTERNOON

FEL

FEL Conference Session 2 (Open)

Chair: *Roy Whitney*, Jefferson Laboratory
La Fonda Hotel, Exchange Room

- 1300 **Navy Free Electron, Space Applications**
Bill Colson, Naval Postgraduate School
- 1330 **Method for Importing Particle Distributions into the NPS 4D Amplifier FEL Code**
Connor Pogue, Naval Postgraduate School
- 1400 **Status of Beam Physics Laboratory at NPS**
John Lewellen, Naval Postgraduate School
- 1430 **Break**
- 1500 **Propagation of High-Power FEL Beams in Maritime Environments**
Joseph Penano, Naval Research Laboratory
- 1530 **High Average Power Seeded Free Electron Laser Amplifiers**
Phillip Sprangle, Naval Research Laboratory
- 1600 **Spokes Cavity for High-Current Accelerators**
Frank Krawczyk, Los Alamos National Laboratory
- 1630 **Closing Comments**

WEDNESDAY AFTERNOON

GAS

Gas Laser Development (Limited)

Chair: *John McCord*, Air Force Research Laboratory
La Fonda Hotel, Coronado Room

- 1300 **Investigation of a Diode Pumped Alkali Laser with a Flowing Gain Medium (Limited C)**
David Hostutler, Air Force Research Laboratory
- 1330 **Physics-Based Modeling of a Flowing DPAL System (Limited C)**
Reece Neel, AeroSoft, Inc.
- 1400 **Advanced COIL Research at AFRL (Limited C)**
John McCord, Air Force Research Laboratory

WEDNESDAY AFTERNOON

SSDLTR

High Energy Systems (Limited/Open)

Chair: *David Mordaunt*, Raytheon Space and Airborne Systems
La Fonda Hotel, Ballroom North

Session is Limited

- 1300 **Spectral Beam Combining of Fiber Lasers for Directed Energy Applications (Limited D)**
Eric Honea, Lockheed Martin Laser Systems
- 1325 **Northrop Grumman Coherently Combined High-Power Fiber Laser for the RELI Program (Limited D)**
Martin Wacks, Northrop Grumman Aerospace System
- 1350 **Raytheon Planar Waveguide Architecture for the RELI Program (Limited D)**
David Mordaunt, Raytheon Space and Airborne Systems
- 1415 **Program Update on Electric Laser on a Large Aircraft (ELLA) Program (Limited C)**
Sean Ross, Air Force Research Laboratory/RDLAS
- 1440 **Break**

Session is now Open

- 1510 **Study of Multi-Core Fiber Modes Using a Fast Mode Solver and Propagator**
Andrew Motes, Air Force Research Laboratory
- 1535 **Four-Beam Combined Laser Using SBS-PCMs With the Wave-Front Dividing Scheme**
Hong Jin Kong, KAIST
- 1600 **Measurement of Thermally Induced Wavefront Distortions Using a Shack-Hartmann Wavefront Sensor**
Christina Willis, University of Central Florida
- 1625 **Comparison of Absolute Measurements of Laser Power Using Next-Generation NIST High-Power Radiometer and Air Force High-Power Calorimeter**
Marla Dowell, NIST

WEDNESDAY AFTERNOON

SSDLTR

Materials (Limited/Open)

Chair: *Nick Traggis*, Precision Photonics Corporation
La Fonda Hotel, New Mexico Room

Session is Limited

- 1300 **IR Nonlinear Absorption Leading to Laser-Induced Damage in Ge & GaSb (Limited C)**
Torrey Wagner, Air Force Research Laboratory/RDLA

Session is now Open

- 1325 **Progress in Materials Development - Enabling Higher Performance Laser Sources**
F. Kenneth Hopkins, Air Force Research Laboratory
- 1350 **Polishing, Surface Quality, and Coatings for High Power Fibers**
Chris Wood, Precision Photonics Corporation
- 1415 **Break**
- 1430 **Thin Disk Laser “Updates”: M & S Guided New Thermal Management Needs and Designs for High Brightness, CW Operation**
L. A. (Vern) Schlie, Integral Laser Solutions
- 1455 **Doped Sesquioxides for High-Power Solid-State Laser Materials**
Woohong (Rick) Kim, Naval Research Laboratory

WEDNESDAY AFTERNOON

USPLW

Ultrashort Laser Physics and Technology II (Limited)

Chair: *Tony Valenzuela*, Army Research Laboratory
La Fonda Hotel, Santa Fe Room

- 1300 **High Gain and High Power Ultrashort Pulse Amplifier - Invited (Limited C)**
Paul Lundquist, Applied Energetics
- 1340 **Cryogenically-Cooled Ultrashort Pulsed Lasers (Limited C)**
Darren Rand, MIT Lincoln Labs
- 1410 **Ultrafast Fiber Lasers to Surpass the Millijoule Level (Limited C)**
Mike Mielke, Raydiance
- 1440 **Break**
- 1510 **Development of Broad-Band Laser Glasses for Exawatt Lasers (Limited C)**
Nathan Carlie, Schott North America
- 1540 **Physical Processes in Semiconductor Materials Irradiated by Ultrashort Pulsed Lasers (Limited C)**
Pete Latham, Air Force Research Laboratory

THURSDAY MORNING

FEL

FEL Conference Session 3 (Secret)

Chair: *Roy Whitney*, Jefferson Laboratory
Offsite Location

- 0630 **Breakfast**
- 0700 **Registration at the La Fonda Hotel**
- 0800 **Buses depart for offsite location**
- 0830 **Electron Beam Optimizations for High Power FELs**
- 0900 **Multibeam Directed Energy Weapons System**
- 0930 **A High Current FEL Injector Using a Gridded Thermionic Electron Gun**
- 1015 **Buses return from offsite location**

THURSDAY MORNING

SSDLTR

Diode Lasers II (Open)

Chair: *Andrew Ongstad*, Air Force Research Laboratory
La Fonda Hotel, Ballroom North

- 0630 **Breakfast**
- 0700 **Registration at the La Fonda Hotel**
- 0800 **High-Temperature Continuous Wave Interband Cascade Lasers Spanning the 3-5 μm Band**
Jerry Meyer, Naval Research Laboratory
- 0825 **Wavelength-Beam-Combining of Quantum-Cascade-Laser Arrays**
Anish Goyal, MIT Lincoln Laboratory
- 0850 **GaSb-Based Diode Lasers Emitting from 1.9 to 3.4 μm**
Leon Shterengas, Stony Brook University
- 0915 **Break**
- 0945 **High Brightness Optically Pumped Mid-Infrared Semiconductor Lasers**
Heather Greatting, Air Force Research Laboratory/RDLAS
- 1010 **25-W Single Laser Diode for Cesium Vapor Pumping**
Leonid Glebov, University of Central Florida
- 1200 **Lunch**

Fiber Lasers (Limited./Open)

Chair: *Torrey Wagner*, Air Force Research
Laboratory/RDLAF

La Fonda Hotel, New Mexico Room

0630 **Breakfast**

0700 **Registration at the La Fonda Hotel**

Session is Limited

0800 **Experimental Studies of Segmented
Acoustically Tailored Photonic Crystal Fiber
(Limited C)**

Craig Robin, Air Force Research Laboratory

Session is now Open

0825 **Ribbon Fiber Geometry for Power Scaling in
Continuous Wave Fiber Lasers**

Jay Dawson, Lawrence Livermore National
Laboratory

0850 **Spectral Beam Compression and
Combination Using Fiber Laser Sources**

Sean Moore, Sandia National Laboratories

0915 **Pulsed Blue Laser Source Based on a
Frequency Quadrupled Tm Fiber Laser**

Eric Honea, Lockheed Martin Laser System

0940 **Experimental Investigation of Intracavity
Fiber Array Beam Combining**

Sergey Dimakov, S&IC Vavilov State Institute

1005 **Break**

1035 **Instability Due to Optical Nonlinearity in
Passively Phased High-Power Fiber
Amplifier Arrays**

Erik Bochove, Air Force Research Laboratory

1100 **Demonstration of the Mitigation of
Nonlinear Effects by Counter-Pumping in
Fiber Amplifiers**

Sami Shakir, TASC Inc

1125 **Single Mode, High Power, Narrow
Line-Width Fiber Amplifiers**

John Edgecumbe, Nufern

1150 **kW-Level Exploration of Single-Frequency,
Single-Transverse Mode and Robust
Polarization Yb-Doped CCC Fiber MOPA**

Almantas Galvanauskas, University of
Michigan

1215 **Lunch**

**Ultrashort Laser Applications, Techniques,
and Diagnostics II (Open)**

Chair: *Miro Kolesik*, University of Arizona
La Fonda Hotel, Santa Fe Room

0630 **Breakfast**

0700 **Registration at the La Fonda Hotel**

0830 **Femto-Second Laser Induced Breakdown
Spectroscopy of Surface Nitrate Chemicals
for Remote Sensing - Invited**

Tony Ting, Naval Research Laboratory

0910 **Ultrafast Measurement of the Optical
Nonlinearity in Air Constituents**

Jared Wahlstrand, University of Maryland

0940 **Break**

1010 **Engineered Filaments**

Mathew Weidmann, University of Central
Florida

1040 **The Ultrafast Nonlinear Response of Air
Molecules and its Effect on Femtosecond
Laser Filaments in Atmosphere**

Yu-Hsin Chen, University of Maryland

1110 **RF Emission from Filament Induced Laser
Plasmas**

Nicholas Barbieri, University of Central
Florida

1200 **Lunch**

THURSDAY AFTERNOON

SSDLTR

Fiber Beam Combination (Limited/Open)

Chair: *Phil Peters*, Naval Air Warfare Center
La Fonda Hotel, Ballroom North

Session is Limited

- 1300 **Coherent Combining of High Power Yb Fiber Amplifiers (Limited C)**
Charles Yu, MIT Lincoln Laboratory

Session is now Open

- 1325 **Nonlinear Passive Phasing of Very Large High-Power Fiber Amplifier Arrays**
Erik Bochove, Air Force Research Laboratory/RDLAF
- 1350 **Coherent Laser Combination and Phase Locking of High-Power Fiber Lasers Using a Self-Fourier Cavity**
Frederic Durville, Corcoran Engineering Inc
- 1415 **Regenerative Feedback Opens the Scaling Bottleneck of Passive Fiber Laser Arrays**
Will Ray, Oak Ridge National Laboratory
- 1440 **Break**
- 1510 **A 7x1 All-Fiber Coherent Beam Combiner**
Sami Shakir, TASC Inc.
- 1535 **Spectral and Coherent Combining of Fiber Lasers by Volume Bragg Gratings**
Leonid Glebov, University of Central Florida
- 1600 **Chirp-Precompensated Spectral Beam Combining**
Eric Cheung, Northrop Grumman
- 1625 **High-Power Spectral Beam Combination of Thulium: fiber MOPAs**
Lawrence Shah, University of Central Florida

THURSDAY AFTERNOON

USPLW

Classified Session (Secret)

Chair: *Gerald Manke*, Naval Surface Warfare Center
Offsite Location

- 1300 **Buses depart for offsite location**
- 1330 **HEL-JTO Ultra Short Pulsed Laser Military Utility Study**
- 1400 **Ultra Short Pulse Laser Effects - Invited**
- 1445 **Ultrashort Pulse Laser (USPL) Material Interactions and Ultra-wideband Emission**
- 1515 **Break**
- 1530 **An Application of Ultra Short Pulse Lasers for Ship Defense**
- 1600 **Directed Energy Range Safety Data Collection II - Preparation and Execution**
- 1630 **Directed Energy Range Safety Data Collection II - Detailed Data**
- 1700 **Buses return from offsite location**

Conference Organizers

Free Electron Lasers Conference

Edward Pogue, Boeing

Roy Whitney, Jefferson Laboratory

Gas Laser Conference

Kevin Hewett, Air Force Research Laboratory

Michael Heaven, Emory University

Solid State and Diode Laser Technology Review

Sean Ross, Air Force Research Laboratory

Greg Quarles, B.E. Meyers

Ultrashort Pulse Laser Workshop

Martin Richardson, University of Central Florida

Pete Latham, Air Force Research Laboratory

Event Coordinator

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Registration and Short Courses

Donna Storment, DEPS

Payments and Receipts

Tiffany Bjelke, DEPS

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