DIRECTED ENERGY PROFESSIONAL SOCIETY

Technical Program

Thirteenth Annual Directed Energy Symposium

15-19 November 2010
Bethesda, Maryland

and

Directed Energy Education Workshop
19 November 2010
SPONSORED BY: HEL JTO

Symposium Information

Locations of Symposium Events

Most symposium sessions will be held at the Marriott Bethesda North Conference Center; rooms are identified in the program. Exceptions include:
Reception Wednesday evening - Newseum
Classified sessions - Offsite Location

Transportation

Bus transportation will be provided from the hotels to the classified sessions. Buses begin transporting at 1230 Tuesday and run until 15 minutes after the end of the sessions. Morning buses will leave at 0700 and run continually approximately every 15 minutes. No writing materials, computers, or bags will be allowed on the bus. You may bring cell phones and leave them outside of the sessions, but the area will not be secured. Badges and IDs will need to be visible at all times both on the bus and at the classified facility. The Wednesday evening reception will be held at the Newseum, a short Metro ride from the Marriott. Metro passes will be provided. We encourage those able to take the Metro to do so; limited bus transportation will be provided for those unable to take the Metro.

Breakfasts

Breakfast will be served every morning at the Marriott starting at 0630. Speakers are encouraged to eat breakfast with their session chairs on the day of their presentation. Look for table tents to designate your session's breakfast table.

Lunches and Breaks

Lunch will be served Tuesday - Thursday at the Marriott. Limited coffee and snacks during breaks will be available at the Marriott and the offsite location Tuesday - Friday morning.

Directed Energy Education Workshop

The DE Education Workshop is a separate event from the Symposium, scheduled for Friday, 6 November, at the hotel. Any Symposium registrant may attend the Workshop.

AUDIO AND VIDEO RECORDING IS PROHIBITED AT ALL DEPS SPONSORED EVENTS

MONDAY

Short Courses

0700 **Registration at Marriott Hotel**

0800 **Short Courses Begin**

All Courses on Lower Level of Marriott Hotel

1. Introduction to High Energy Laser Systems

2. Introduction to High Power Microwave Systems

3. Diode Pumped Alkali Lasers (DPALs)

4. Windows, Substrates, and Coatings for HEL Applications

5. ALL DAY COURSE
Introduction to Free Electron Laser Systems

1200 **Break for Lunch**

1300 **Afternoon Short Courses Begin**

6. Intellectual Property Considerations

7. Counter Directed Energy

8. Power and Energy for DE Applications

9. Introduction to LEWAT (Limited)

TUESDAY MORNING

Plenary Session (Open)

Marriott, Upper Level, Ballroom C

0800 **Call to Order, Administrative Remarks**
Dr. John Pellegrino, Director, Sensors and Electron Devices, Army Research Laboratory

0815 **Keynote**
Dr. David Honey, Director, Research Office of the Director, Defense Research and Engineering

0900 **Invited Presentation**
Dr. Thomas Killion, Biometrics Identity Management Agency

0930 **Invited Presentation**
Dr. Donald Erbschloe, Chief Scientist, Air Mobility Command (AMC), Scott Air Force Base, Ill

1000 **Break**

1030 **Invited Presentation**
Mr. Michael Deitchman, Deputy Chief of Naval Research, Naval Air Warfare and Weapons Science & Technology Department, Office of Naval Research

1100 **Invited Presentation**

1130 **DEPS Status and Recognitions**
Mr. Ed Pogue, DEPS President

1200 **Lunch**

TUESDAY AFTERNOON

Laser Propagation (Limited/Open)

Chairs: *Ken Billman,* Lockheed Martin
Marriott, Upper Level, Ballroom C

Session is Limited

1300 **Characterizing Real Beams for System Propagation Codes (Limited)**
Charles Albers, BAE Systems

1325 **Tip-Tilt Correction of Turbulence Using High-Power, Single-Mode Fiber Lasers (Limited)**
Richard Fischer, Naval Research Laboratory

Session is Now Open

1350 **High-Power Fiber Laser Propagation in a Maritime Environment with Aerosols**
Richard Fischer, Naval Research Laboratory

1415 **Laser Beam Characterization of Propagation through a Marine Atmospheric Channel**
Svetlana Avramov-Zamurovic, U.S. Naval Academy

1440 **Break**

1510 **Atmospheric Propagation for Potassium Diode Pumped Alkali Laser Using A Rugged TDLAS System**
Christopher Rice, Air Force Institute of Technology

1535 **A Fast Beam Propagation Method**
Andrew Motes, Air Force Research Laboratory/RVSE

1730 **Evening Exhibitor Reception at Marriott**

Sponsored by BAE Systems

TUESDAY AFTERNOON

DE Effects Testing and Evaluation (Limited)

Chair: *Gordon Hengst,* 711 HPW/RHD

Marriott, Upper Level, Ballroom H

1300 **BSDF and Performance Characterization of Short-Pulse, Laser-Ablated IR Optical Windows**
Andrea Brown, Johns Hopkins University

1325 **Precision Radiometric Surface Temperature (PRST) Sensor**
James Daly, Bodkin Design & Engineering, LLC

1350 **Can Optical Pyrometry Determine Temperature of HEL-Heated Target Surfaces?**
James Griggs, DETEC

Non-Lethal Counter-Personnel Active Denial Technologies (Limited)

Chair: *Rick Scott*, Joint Non Lethal Directorate

1415 **Quasi-Optical W-band Sheet Beam Klystron (QO-WSBK) for Active Denial System (ADS) Applications**
Larry Barnett, University of California

1440 **Break**

1510 **Active Denial Technology Power and Energy Demands and Tradespace**
Dennis Ladd, US Army ARDEC

1535 **Solid-State Active Denial System RF Source and Antenna Development Update**
George Bates, Northrop Grumman

Invited Presentation (Open)

1600 **Will We Ever Field Directed Energy Systems? - A Common Sense Approach to Success**
William Decker, Defense Acquisition University

1730 **Evening Exhibitor Reception at Marriott**
Sponsored by BAE Systems

TUESDAY AFTERNOON

Invited Presentation (Secret)

Offsite Location, Building B, Auditorium

1330 **Air Force Space Command Vision for Directed Energy**

1430 **Break**

DE Transition and Policy Panel (Secret)

Chair: *Sue Payton,* SCI Aerospace, Inc.

1500 **Panel Begins**

Policy and Safety (Secret)

Chair: *Kraig Sheetz,* US Military Academy

1630 **International Directed Energy Technology for U.S. Cooperation Considerations**

1730 **Evening Exhibitor Reception at Marriott**
Sponsored by BAE Systems

TUESDAY AFTERNOON

DE Threats & INTEL (Secret)

Chair: *Robert Peterkin,* Air Force Research Laboratory/RD

Offsite Location, Building A, Room C

1330 **The FBI's Critical National Assets Program and Directed Energy: An Insight into Counterintelligence Concerns**

1400 **NRL Laser Dosimeter**

1430 **First-Hand Observations of High Power Microwave Research in China**

1500 **Technological Assessment of RFW Development**

1530 **Break**

1600 **Technological Assessment of DEW Development**

1630 **Technological Assessment of Foreign Relay Mirror Testing**

1730 **Evening Exhibitor Reception at Marriott**

Sponsored by BAE Systems

WEDNESDAY MORNING

Solid State - Bulk and Diode Lasers (Open)

Chair: *Gary Wood,* Army Research Laboratory

Marriott, Upper Level, Ballroom C

0630 **Registration and Breakfast at Marriott**

Breakfast Sponsored by Boeing

0800 **High Brightness (600W, 200 micron, NA 0.2) Fiber Coupled Laser Diode Source**
Jason Alexander, Dilas Diode Lasers

0830 **Er:YAG vs Er-doped Sesquioxides: Cryogenic Power Scaling Potential**
Larry Merkle, US Army Research Laboratory

0900 **Z-scan Measurement of Upconversion in Er:YAG**
Jeffrey White, US Army Research Laboratory

0930 **Break**

1000 **High Quality Single Crystal CVD Diamond for High Power Lasers**
Peter Santini, E6 Technologies, Element Six Ltd.

1030 **Thermal Management of Solid-State Lasers via Silicon Carbide Face Cooling**
G. Alex Newburgh, Army Research Laboratory

1100 **Temperature Dependent Studies of the Antiguiding Parameter in Optically Pumped Mid-Infrared Semiconductor Lasers**
Cody Mart, Air Force Research Laboratory/DELS

1130 **Surrogate High-Power Laser Source for Development of Predictive Laser Lethality Capability**
Howard Lowdermilk, Lawrence Livermore National Laboratory

1200 **Lunch**

Hosted by Lockheed Martin

Directed Energy Bioeffects (Open)

Chair: *Gordon Hengst,* 711 HPW/RHD

Marriott, Upper Level, Ballroom H

0630 **Registration and Breakfast at Marriott**

Breakfast Sponsored by Boeing

1000 **Temperature Increase of Ex-Vivo Corneas from Multiple 2.01 Micron Incident Laser Pulses**
Edward Kelly, Colorado State Universit

RF Effect Testing, M&S (Limited)

Chair: *Keith Cartwright*, Air Force Research Laboratory/RDHE

1030 **Prospects for First Principles Modeling of HPM Effects**
Larry Bacon, Sandia National Laboratory

1100 **Finding Potentially Susceptible Electronics Using Time-Frequency Analysis**
Walter Wall, US Naval Research Laboratory

1130 **Vunerability Characteristics of Computers and Network Devices by Electromagnetic Pulse for UWB Pulser**
Seung Ho Han, Agency for Defense Development

1200 **Lunch**

Hosted by Lockheed Martin

DE Power and Energy (Limited/Open)

Chair: *Ed Shaffer,* Army Research Laboratory

Marriott, Lower Level, Brookside Room

0630 **Registration and Breakfast at Marriott**

Breakfast Sponsored by Boeing

Session is Limited

0800 **Megawatt Class Power and Thermal Management Systems (Limited)**
Frank Gulczinski, Air Force Research Laboratory/RZP

0830 **3-D Simulations of RF Energy Coupling to Ionized Air Channels (Limited)**
Heidi Tierney, Los Alamos National Laboratory

0900 **Conceptual Design of a Lightweight, Compact Superconducting MW-Class Power Transmission Cable (Limited)**
Timothy Haugan, Air Force Research Laboratory

0930 **Break**

1000 **High Power Nonlinear Transmission Lines Using Lead Magnesium Niobate (PMN) and Barium Strontium Titanate (BST) Dielectrics (Limited)**
Susan Heidger, Air Force Research Laboratory/RDHP

Session is now Open

1030 **500 kW Battery and Power Distribution System**
Emilio Gomez, Saft America SDD

1100 **Solid Pulse Forming Lines for HPM Compact Pulsed Power**
Matt Domonkos, Air Force Research Laboratory

1200 **Lunch**

Hosted by Lockheed Martin

Student Session (Limited/Open)

Chair: *Don Seeley,* High Energy Laser Joint Technology Office

Marriott, Lower Level, White Flint Amphitheater

Session is Limited

0630 **Registration and Breakfast at Marriott**

Breakfast Sponsored by Boeing

0800 **Recognizing HPM Susceptible Targets in an Image (Limited)**
Laura Freyman, Naval Research Laboratory

Session is Now Open

0820 **Extensions of the Random Coupling Model of HPM Effects**
Jen-Hao Yeh, University of Maryland

0840 **Modeling Light Diffraction Using the Finite Element Software COMSOL**
John Bamonte, U.S. Naval Academy

0900 **Laser Detection Systems Embedded Within a Composite**
Michael Moberg, U.S. Naval Academy

0920 **Break**

0940 **Measurement and Analysis of Quantum Efficiency of Cesium Auride Photocathodes**
Blake Riddick, University of Maryland

1000 **Analysis and Modeling of Propagation of Electromagnetic Radiation in Periodic Media**
Zach Bunting, U.S. Naval Academy

1020 **Electromagnetic Wave Focusing by Time Reversal**
Biniyam Taddese, University of Maryland

1040 **Electromagnetic Effects in CMOS Voltage-Controlled Oscillators**
Cristina Allen, University of Maryland

1200 **Lunch**

Hosted by Lockheed Martin

DE Systems & Programs (Secret)

Chair: *Brian Strickland*, Space and Missile Defense Command

Offsite Location, Building B, Auditorium

0800 **Electric Laser on a Large Aircraft (ELLA)**

0825 **Airborne Laser Test Bed (ALTB); the Imaging Seeker**

0850 **ABL**

Beam Control (Secret)

Chair: *Jorge Beraun,* Air Force Research Laboratory

0915 **New Paradigm for Optical Signature Prediction**

0940 **Break**

Laser Material Effects (Secret)

Chair: *Gordon Hengst*, 711 HPW/RHD

1010 **Laser Effects Material Response Data: Status and Measurement Needs**

1035 **Laser Material Interaction Data Requirements from Broad Target Assessment Study**

Directed Energy Bioeffects (Secret)

Chair: *Gordon Hengst*, 711 HPW/RHD

1100 **Health Risk Assessment of a High Average Power DE Weapon**

Novel Concepts and Technologies (Secret)

Chairs: *Kraig Sheetz,* US Military Academy *and Jack Slater,* Schafer

1125 **Terawatt Laser-Material Interactions for Naval Applications**

1200 **Lunch**

Hosted by Lockheed Martin

WEDNESDAY MORNING

RF Effect Testing, M&S (Secret)

Chair: *Keith Cartwright*, Air Force Research Laboratory/RDHE

Offsite Location, Building A, Room C

0630 **Registration and Breakfast at Marriott**

Breakfast Sponsored by Boeing

0800 **Micro Electromechanical System Susceptibility to HPM: Update to UAV**

0830 **RF Susceptibility Levels of Commercially Available UAV's**

0900 **HPM Software Institute Capability Overview and Demonstration**

0930 **RF Susceptibility Levels of GaAs and GaN** Based Low Noise Amplifiers Update

1000 **Break**

Poster Session (Secret)

1030 **Posters Displayed**

- **Laser Effects Material Response Data: Status and Measurement Needs**
- **Laser Material Interaction Data Requirements from Broad Target Assessment Study**
- **The FBI's Critical National Assets Program and Directed Energy: An insight into Counterintelligence Concerns**
- **Temperature Measurements in the NCRF Injector Tests**
- **Imaging Seeker Countermeasure Development**
- **Exploration of Alternative Uses for 95GHz Active Denial Technology**
- **Active Denial Technology (ADT) Program Status Update**

1200 **Lunch**

Hosted by Lockheed Martin

WEDNESDAY AFTERNOON

Solid State Fiber/Bulk Lasers (Limited/ Open)

Chair: *Sarwat Chappell*, Office of Naval Research

Marriott, Upper Level, Ballroom C

Session is Limited

1300 **1kW cw, Coherent (<0.5GHz), 1-um Fiber-MOPA for Multi-Aperture Phase-Locked Directed-Energy Laser Source (Limited)**
Shantanu Gupta, Fibertek, Inc.

Session is Now Open

1330 **High Power Multimode Fiber MOPA with SBS Beam Cleanup and Wavefront Reversal**
John McElhenny, Army Research Laboratory

1400 **How to Pack Fiber Laser Array More Efficiently than Close-Packing**
Chunching Shih, Northrop Grumman Aerospace Systems

1430 **Break**

1500 **Comparative Study and Scaling of Resonantly Cladding-Pumped, LMA Yb-Free Er-Doped Fiber Lasers**
Jun Zhang, Army Research Laboratory

1530 **A Theoretical and Experimental Investigation of Stimulated Brillouin Scattering in Phase-Modulated Fiber Amplifiers**
Clint Zeringue, Air Force Research Laboratory

1830 **Reception at Newseum**

RF Effect Testing, M&S (Open)

Chair: *Keith Cartwright*, Air Force Research Laboratory/RDHE

Marriott, Upper Level, Ballroom H

1300 **Toward a Better Understanding of HPM Coupling**
Jeffery Williams, Sandia National Laboratory

1325 **Application of the Random Coupling Model to the Prediction of EM-Induced Voltages in Complex 3D Environments**
Zachary Drikas, Naval Research Laboratory

1350 **Measured and Modeled Statistics of EM Coupling in Cavities with Complex Boundary Conditions**
John Rodgers, University of Maryland

1415 **Extensions of the Random Coupling Model of HPM Effects**
Jen-Hao Yeh, University of Maryland

1440 **Break**

1510 **Electromagnetic Wave Focusing by Time Reversal**
Biniyam Taddese, University of Maryland

1535 **Microwave Nonlinear Dynamics in CMOS Circuits**
John Rodgers, University of Maryland

1830 **Reception at Newseum**

DE Power and Energy (Open)

Chair: *Ed Shaffer,* Army Research Laboratory

Marriott, Lower Level, Brookside Room

1300 **High Power Microwave System Efficiencies**
John Krile, Texas Tech University

1330 **Army Explosive Pulsed Power Programs**
Larry Altgilbers, US Army

1400 **Advances in High-Power Inductive Output Tube Modeling and Simulation**
Edward Wright, Beam Wave Research Inc

1830 **Reception at Newseum**

Concurrent Sessions by Room and Time

OPEN	LIMITED	LIMITED AND OPEN	SECRET

	Marriott Ballroom C	Marriott Ballroom H	Marriott Brookside	Marriott White Flint	Offsite Bld B Auditorium	Offsite Bld A Room C
Tuesday 1300	Laser Propagation *Page 3*	DE Effects T&E Non-Lethal Active Denial Invited Talk *Page 4*			Invited Talk DE Panel Policy & Safety *Page 5*	DE Threats & INTEL *Page 6*
Wednesday 0800	Solid State - Bulk & Diode *Page 7*	DE Bioeffects RF Effect Testing, M&S *Page 8*	DE Power & Energy *Page 9*	Student Session *Page 10*	DE Sys & Prog Beam Control Laser Mat Eff DE Bioeffects Novel Concepts *Page 11*	RF Effects Testing, M&S Classified Poster Session *Page 12*
Wednesday 1300	Solid State - Fiber & Bulk *Page 13*	RF Effect Testing, M&S *Page 14*	DE Power & Energy *Page 15*	Student Session *Page 18*	RF Counter IED RF Sources & Technology *Page 19*	
Thursday 0800	DE Systems & Programs *Page 20*	Gas/DPALs *Page 21*	Policy & Safety RF Sources & Technology *Page 22*		Non-Lethal Counter-Materiel Technologies *Page 23*	
Thursday 1300	FELs & Gas Lasers *Page 25*	Gas/DPALs *Page 26*	RF Sources & Technologies *Page 27*		Non-Lethal Counter-Materiel Technologies *Page 28*	
Friday 0800	Beam Control *Page 29*	Non-Lethal Effectiveness *Page 30*	Novel Concepts and Technolgies *Page 31*	DE Education Workshop *Page 33*	Non-Lethal Hailing Non-Lethal AD Technologies *Page 32*	

Student Session (Open)

Chair: *Don Seeley,* High Energy Laser Joint Technology Office

Marriott, Lower Level, White Flint Amphitheater

1300 **Experimental and Numerical Studies of a Pulsed Rubidium Diode Pumped Alkali Metal Vapor Laser (DPAL)**
Nathan Zameroski, The University of New Mexico

1320 **Implementing the Line-of-Sight Reference Frame and On-Platform Orientation Sensors into a DE Beam Control System**
Connor Dunn, US Naval Academy

1340 **Sodium Vapor Laser Pumped by a Dye Ring Laser**
Matthew Guy, US Air Force Academy

1400 **Development of Control System to Track Moving Target**
Mark Galligan, Naval Research Laboratory

1830 **Reception at Newseum**

RF Counter IED (Secret)

Chair: *Kobi O'Malley,* US Army RDECOM-ARDEC and *Matt McQuage,* Naval Surface Warface Center

Offsite Location, Building B, Auditorium

1330 **System-Level RF Effects Testing of Improvised Explosive Devices**

1400 **Testing of IED-related Electronics for RF Susceptibility**

1430 **Radio Frequency Directed Energy for Route Clearance**

1500 **Neutralization of Vehicle-Borne IEDs using Directed Energy**

1530 **Break**

RF Sources and Technologies (Secret)

Chair: *Peter Mardahl*, Air Force Research Laboratory

1600 **Radio Frequency Weapons-- Facts and Myths**

1630 **Wide Band Source Development for ARDEC HPM Military Utility Study**

1830 **Reception at Newseum**

DE Systems & Programs (Limited/Open)

Chair: *Brian Strickland,* Space and Missile Defense Command

Marriott, Upper Level, Ballroom C

0630 **Registration and Breakfast at Marriott**

Session is Limited

0800 **Lockheed Martin's RELI Program (Limited)**
Richard Humphreys, Lockheed Martin

0830 **The Solid State Laser Testbed Experiment and Future HEL Research Plans at HELSTF (Limited)**
Travis Taylor, USA Space and Missile Defence Command

0900 **US Army High Energy Laser Technology Demonstrator (HEL TD) Weapons Capability (Limited)**
William Gnacek, USA Space and Missile Defence Command

0930 **Break**

1000 **High Energy Laser Phased Array System (HELPAS) Architectures (Limited)**
Kevin Probst, The CORE Group, Inc.

Session is Now Open

1030 **Raman Fiber Amplifier System for Laser Guide Star Applications**
Christopher Vergien, Air Force Research Laboratory

1100 **Airborne Target Irradiance and Imagery Measurement Test-bed**
Mike Bertin, Science Applications Internation Corporation

1200 **Lunch**

Gas/DPALs (Limited/Open)

Chair: *Kevin Hewett*, Air Force Research Laboratory

Marriott, Upper Level, Ballroom H

0630 **Registration and Breakfast at Marriott**

Session is Limited

0800 **Transversely Pumped Alkali Vapor Lasers (Limited)**
Jason Zweiback, Reconnaissance Systems Group

0825 **Development of a Diode Pumped Alkali Laser with a Flowing Gain Medium (Limited)**
David Hostutler, Air Force Research Laboratory

0850 **High Fidelity Modeling of Static and Flowing DPALs (Limited)**
Reece Neel, AeroSoft, Inc.

0915 **Compact, High Efficiency, High Pressure COIL (Limited)**
John McCord, Air Force Research Laboratory

0940 **Break**

1010 **Development of a High Energy Laser Tactical Decision Aid (HELTDA) (Limited)**
Steven Fiorino, Air Force Institute of Technology

1035 **Calculations on Laser Beam Quality in a Transverse Flowing DPAL System (Limited)**
Siva Mani, Schafer Corporation

Session is Now Open

1100 **Development of a Power Scaling Technique for Alkali Lasers**
Boris Zhdanov, US Air Force Academy

1125 **High Power All Fiber Yb PCF Fiber Amplifier**
Donald Sipes, Optical Engines Inc.

1200 **Lunch**

Policy and Safety (Open)

Chair: *Kraig Sheetz*, US Military Academy

Marriott, Lower Level, Brookside Room

0630 **Registration and Breakfast at Marriott**

0800 **The Impact of New Laws and DoD Policies on Directed Energy Programs**
William Decker, Defense Acquisition University

0830 **Directed Energy and ITAR**
Genesis Smith, NAWCWD

0900 **Break**

RF Sources and Technology (Limited)

Chair: *Andrew Greenwood*, Air Force Research Laboratory

1030 **Modeling Shock Discharge of 95/5 PZT as a Function of Electrical Load**
Wesley Hackenberger, TRS Technologies, Inc.

1100 **The AFRL A66-HH Relativistic Magnetron**
Peter Mardahl, Air Force Research Laboratory

1200 **Lunch**

Non-Lethal Counter-Materiel Technologies (Secret)

Chair: *Donna Reedal*, Joint Non Lethal Directorate

Offsite Location, Building B, Auditorium

0630 **Registration and Breakfast at Marriott**

0800 **Effects of High Power Ultra Wide Band Waveforms on Outboard Engines**

0830 **High Power Wideband RF for Non-Lethal Vessel Stopping**

0900 **RF Vessel Stopper**

0930 **Susceptibility of Maritime Outboard Motors to High Power Microwave / Radio Frequency Directed Energy**

1000 **Break**

1030 **Rapid Development of Pulsed Current Injection Vehicle Stopper Prototype**

1100 **Overview of Effects Testing Efforts Supporting the RF Vehicle Stopper System**

1130 **Compact, Lighweight, Highly-Efficient Cooling of a High Power Magnetron**

1200 **Lunch**

THURSDAY NOON

Poster Session (Open and Limited)

Limited Poster Session

An Approach to Passive Beam Combining of Fiber Lasers in Very Large Arrays - *Erik Bochove*, AFRL/RDLAF

Numerical Simulations of the 100L Magnetron - *Timothy Fleming*, AFRL/RDHE

Active Denial Technology Power and Energy Demands and Tradespace - *Dennis Ladd*, US Army ARDEC

Simulation of a High Average Current Electron Gun for High-Power FELs - *Chad Mitchell*, National Research Council Fellow

System Efficiency Studies of High Power Free Electron Lasers - *Michael Phillips*, Advanced Energy Systems

Design and Analysis of a LCCO for Compact HPM Applications - *John Shannon*, Naval Surface Warfare Center

Open Poster Session

Simulation of a High Average Current Electron Gun for High-Power FELs - *Stephen Bayne*, Texas Tech University

Airborne Target Irradiance and Imagery Measurement Test-bed - *Mike Bertin*, SAIC/DETEC

Nonlinearity as the Cause of Self-Q-Switching Instability in Passively-Phased Fiber Laser Arrays - *Erik Bochove*, AFRL/RDLAF

Fabrication and Characterization of Cesium Auride Photocathodes for Free Electron Lasers - *Saara Khan*, University of Maryland

Space Charge Investigations on Intense Electron Beams of Relevance to FELs - *Rami Kishek*, University of Maryland

Tactical Checkpoing - Hail/Warn and Suppress/Stop - *Elizabeth Mezzacappa*, ARDEC

Controlled Cesium Flow from Dispenser Photocathodes - *Eric Montgomery*, University of Maryland

Computer Model for Diode Pumped Alkali Lasers, Validation, and Predicted Characteristics - *Alan Paxton*, Air Force Research Laboratory/RDLAS

Targeting Success is Disrupted by a Green Laser: Static, Unpredictable Targets Under Low Light - *Kenneth Short*, Target Behavioral Response Lab, ARDEC

Targeting of Convoy Vehicles is Not Disrupted by a Green Laser: Moving, Predictable Targets in Bright Lighting *Kenneth Short*, Target Behavioral Response Lab, ARDEC

Chaos in a Transmission Line Connected to Nonlinear Circuits - *Ioana Triandaf*, Naval Research Laboratory

THURSDAY AFTERNOON

Free Electron Lasers and Gas Lasers (Limited/Open)

Chair: *Quentin Saulter,* Office of Naval Research
Marriott, Upper Level, Ballroom C

Session is Limited

1330 **High Power FEL R&D Progress (Limited)**
Alan Todd, Advanced Energy Systems

1355 **RF Gated Thermionic Guns for High Average Power FELs (Limited)**
Phillip Sprangle, Naval Research Laboratory

1420 **Comparison and Status of Free-Electron Electron Source Development for the LANL NCRF Photoinjector (Limited)**
Andrew Moody, Los Alamos National Laboratory

1445 **Break**

1515 **CW NCRF Injector with a Diamond Field-Emission Array Cathode (Limited)**
Heather Andrews, Los Alamos National Laboratory

1540 **Simulation Codes and Algorithms (Limited)**
Henry Freund, Science Applications International Corporation

Session is Now Open

1605 **Electron Emission Modeling and the Photocathode / Diamond Amplifier Development Effort**
Kevin Jensen, Naval Research Laboratory

1630 **Progress Towards the Development of a Diamond Current Amplifier**
Joan Yater, Naval Research Laboratory

Gas/DPALs (Open)

Chair: *Kevin Hewett,* Air Force Research Laboratory

Marriott, Upper Level, Ballroom H

1330 **Atom Recycle Rate for an Optically Pumped Potassium Laser at High Pump Intensity**
Edward Hurd, Air Force Institute of Technology

1355 **Rates for Spin-Orbit Relaxation in the Cs Diode Pumped Alkali Laser System**
Greg Pitz, Air Force Institute of Technology

1420 **Dynamics of Alkali Atom Excitation and Population Inversion in Optically Pumped Rare-Gas Exciplex Systems**
Steven Davis, Physical Sciences Inc.

1445 **Catalytic Enhancement of Singlet Oxygen for Hybrid Electric Discharge Oxygen-Iodine Laser Systems (Limited)**
Wilson Rawlins, Physical Sciences Inc.

RF Sources and Technologies (Limited/Open)

Chair: *Peter Mardahl,* Air Force Research Laboratory

Marriott, Lower Level, Brookside Room

Session is Limited

1330 **Results from a Compact, Repetitively-Pulsed, L-band Relativistic Magnetron (Limited)**
Brad Hoff, Air Force Research Laboratory

1400 **Virtual Prototyping of a 1.5 MW Conventional Magnetron (Limited)**
Michael Lambrecht, Air Force Research Laboratory/DED

1430 **NLTL Development at Sandia National Laboratories (Limited)**
John Borchardt, Sandia National Laboratories

1500 **Break**

Session is Now Open

1530 **Synchronous Wave Operation of a Ferrite Loaded NLTL**
Dale Coleman, Sandia National Laboratories

1600 **Spatial and Temporal Focusing of an Arbitrary RF Pulse Based on the Time-Reversal Technique**
Sun Hong, Naval Research Laboratory

1630 **Frequency-Hopping HPM Source Development**
John Rodgers, University of Maryland

THURSDAY AFTERNOON

Non-Lethal Counter-Materiel Technologies (Secret)

Chair: *Donna Reedal,* Joint Non Lethal Directorate

Offsite Location, Building B, Auditorium

1330 **RF Vehicle Stopper System Overview**

1400 **Microwave Electronic Ground Attack (MEGA) Development**

1430 **Non-Lethal UAV (NLUAV) High Power Microwave Payload Program Overview**

1500 **Modeling the Susceptibility of Small Engines to Intentional Electromagnetic Interference**

FRIDAY MORNING

Beam Control (Limited)

Chair: *Jorge Beraun,* Air Force Research Laboratory

Marriott, Upper Level, Ballroom C

0630 **Registration and Breakfast at Marriott**

0800 **Geometrical Theory of Image-Shift Estimation**
Charles Albers, BAE Systems

0830 **Gaussian Beams from a Beam Control Perspective**
Charles Albers, BAE Systems

0900 **Impact of Temporal Resolution on Thermal Blooming Phase Compensation Instability**
Mark Spencer, Air Force Institute of Technology

0930 **Break**

1000 **Experimental Results for Target-in-the-Loop Incoherent Beam Combining with Six Independent Transmitters**
Tanwin Chang, Northrop Grumman/Adaptive Optics

1200 **Symposium Adjourns**

Non Lethal Effectiveness (Limited/Open)

Chair: *Wesley Burgei* and *Alicia Owsiak,* Joint Non Lethal Directorate

Marriott, Upper Level, Ballroom H

0630 **Registration and Breakfast at Marriott**

Session is Limited

0800 **Effects of Lasers on Driving**
Gordon Cooke, ARDEC, Target Behavioral Response Laboratory

Session is Now Open

0830 **Tactical Checkpoint - Hail/Warn and Suppress/Stop**
Elizabeth Mezzacappa, ARDEC, Target Behavioral Response Laboratory

0900 **Targeting Success is Disrupted by a Green Laser: Static, Unpredictable Targets Under Low Light**
Kenneth Short, ARDEC, Target Behavioral Response Laboratory

0930 **Break**

1000 **Targeting of Convoy Vehicles is Not Disrupted by a Green Laser: Moving, Predictable Targets in Bright Lighting**
Kenneth Short, ARDEC, Target Behavioral Response Laboratory

1200 **Symposium Adjourns**

Novel Concepts and Technologies (Limited/Open)

Chair: *Kraig Sheetz,* US Military Academy and *Jack Slater,* Schafer

Marriott, Lower Level, Brookside Room

0630 **Registration and Breakfast at Marriott**

Session is Limited

1000 **Plasma-Enhanced Lethality of High-Energy Laser Beams and Directed Energy Applications of Ultra-Short Pulse Lasers (Limited)**
Joseph Penano, Naval Reseach Laboratory

1030 **Guided Wave by Laser Induced Filamentation: Mathematical Characteristics (Limited)**
William Roach, Air Force Research Laboratory/RDLA

Session is Now Open

1100 **Some Electrical Properties of an Ultrashort Pulse Laser Induced Plasma Channel in Air**
David French, Rose-Hulman Institute of Technology

1130 **Low Frequency Generation and Field Test of NRL Underwater Laser Acoustic Source**
Theodore Jones, Naval Research Laboratory

1200 **Symposium Adjourns**

Non-Lethal Hailing, Warning and Suppression Technologies (Secret)

Chair: *David Law,* Joint Non Lethal Directorate

Offsite Location, Building B, Auditorium

0630 **Registration and Breakfast at Marriott**

0800 **Distributed Sound and Light Array for use as a Hail-and-Warn System Update**

0830 **Non-Lethal Laser Ocular Interruption Overview**

0900 **Non-Lethal Laser Induced Plasma Effects**

0930 **Break**

Non-Lethal Counter-Personnel Active Denial Technologies (Secret)

Chair: *David Law and Rick Scott,* Joint Non Lethal Directorate

1000 **ADS System 1 Beam Characterization Using A High Sampling Speed Detector Array for Direct Measurement of Millimeter Wave Beam Uniformity in Active Denial Systems**

1030 **Solid State Active Denial Weapons**

1100 **2.5 MW Active Denial Technology Gryrotron: Background and Updates**

1200 **Symposium Adjourns**

Directed Energy Education Workshop (Open)

Marriott, Lower Level, White Flint Amphitheater

0800 **Opening Remarks**
Don Seeley, HEL JTO

0815 **DEPS Education Programs**
Samuel Blankenship, DEPS

0830 **Experimental and Numerical Studies of a Pulsed Rubidium Diode Pumped Alkali Metal Vapor Laser (DPAL)**
Nathan Zameroski, University of New Mexico

0850 **DE Scholars Program at the Army Research Laboratory**
Larry Merkle, US Army Research Laboratory

0910 **High Power Multimode Fiber MOPA with SBS Beam Cleanup and Phase Conjugation**
Steven Rogers, Army Research Laboratory

0930 **Break**

1000 **Development of Control System to Track Moving Target**
Mark Galligan, Naval Research Laboratory

1020 **Experimental and Numerical Studies of Thermal Lensing in Optical Materials**
Samantha Franklin, USAF 711 HPW/RHDO

1040 **Integration of JTO Sponsored Codes with RHDO Software A HELCOMES / LHAZ Implementation Example**
Jeremy Hartsell, TASC AFRL/RHDO

1100 **The 2010 AFIT Directed Energy Summer Intern Program**
Eric Smith, Center for Directed Energy

Poster Papers

Analysis and Mitigation of Flight Induced Vibrations - *Joshua Brown*, Center for Directed Energy

Field and Laboratory Validation of Surface Layer Optical Turbulence - *Adam Downs*, Center for Directed Energy

Characterizing In-flight Disturbance Data from Multiple Tactical Platforms and Operating Regimes - *David Huber*, Center for Directed Energy

Polarimetric Reflectance Measurements of Diffuse Scatterers - *Matthew Niemiec*, Center for Directed Energy

Lab Measurements to Support Modeling Terahertz Propagation in Brownout Conditions - *Julian Spinoza,* Center for Directed Energy

Testing and Documenting HELEEOS 3.0 and LEEDR 3.0 - *Joshua Woyak*, Center for Directed Energy

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