

Technical Program



Directed Energy Systems Symposium

25 – 29 October 2021
Washington DC

General Information

Security

- Attendees will be issued conference specific badges on site and must have valid gov't ID available at all Symposium events
- No cameras or photography allowed
- Limited distribution sessions: Attendees must power off all computers and phones
- Audio and video recording is prohibited
- Security concerns should be addressed to a DEPS Security Team member
- Failure to adhere to security standards could result in denied/revoked Symposium registration

COVID-19

Proof of COVID-19 vaccination or proof of a negative test within 72 hours is required to attend the Systems Symposium, as per Washington DC requirements.

ALL participants will be required to wear a mask while indoors at the event. DEPS adheres to all CDC's recommendations and local DC mandates.

Hand sanitizer stations are available throughout the event. Hand washing and limited physical touching (handshakes, hugs, etc.) is important in helping reduce the spread of COVID-19.

Join Us for the **Joint Conference on T&E Support to Prototyping and Experimentation**

A Joint DEPS - ITEA Event

**31 January – 3 February 2021
Albuquerque, New Mexico
Call for Papers opening soon -Dec 10**

Nominations for 2022 Fellows

**Please submit your nominations
to the DEPS office NLT 1 November 2021.
New Fellows will be inducted at the DEPS**

**Annual Science & Technology Symposium
25-29 April 2022, Mobile AL**

Nomination forms at www.deps.org

Join Us for the **US/UK DE Workshop**

**July 18-22, 2022
Call for Papers Now Published**

MONDAY

Short Courses

All short courses are on the second floor of the Hyatt Hotel

Morning Courses 0800-1200

- 1: **HEL Modeling (C)**
Yellowstone Room
- 2: **DE Warfighter 101 (A)**
Yosemite Room
- 3: **Combat Systems Engineering (D)**
Glacier Room

Afternoon Courses 1300-1700

- 5: **Directed Energy Bio-effects (D)**
Yosemite Room
- 6: **Systems Engineering & Modular Open Systems Approach (MOSA) (A)**
Glacier Room
- 7: **HPM DE Weapons and their Effects (C)**
Yellowstone Room
- 8: **Atmospheric Laser Propagation (C)**
Everglades Room

TUESDAY

Plenary Session (Limited Distribution D)

Hyatt Hotel, Regency B

- 0630 **Breakfast and Registration at Hyatt**
- 0800 **Conference Welcome**
*Mr. Adam Aberle, USSMDC and
Mr. Mark Neice, Executive Director, DEPS*
- 0815 **MOSA Brief**
*Mr. Steve Davidson, MITRE Corp
(for OUSD R&E/DE)*
- 0845 **Army RCCTO**
*Dr. Craig Robin, Deputy Director, DE Project
Office, Army RCCTO*
- 0915 **Navy N9**
*CAPT Robert Bryans, OPNAV N96C,
Deputy for Weapons and Sensors*
- 0945 **Break**
- 1000 **AF/A3**
*Dr. Nick Morley, Senior Laser Scientist,
AFRL/RD*
- 1030 **DE Lethality: We're Certain, It Depends...**
Dr. Chris Lloyd, NSWC Dahlgren
- 1100 **Challenges for Directed Energy Weapon
Systems**
Dr. James Trebes, OUSD (R&E)
- 1130 **Keynote**
*Honorable Dr. Heidi Shyu, OUSD Research &
Engineering*
- 1215 **Lunch**

POSTER SESSION

Thursday Lunch 1200 – 1400

Limited Distribution poster
session, Hyatt Hotel

TUESDAY AFTERNOON

HPM Programs, Systems, and Technology I

Hyatt Hotel, Regency C

Chair: *Phillip Meyerhofer*

- 1330 **Development of the Alternative Source System Experiment (ASSET) at NSWC Dahlgren** (D/Export Controlled)
Dr. Jon Cameron Pouncey, Naval Surface Warfare Center - Dahlgren Division
- 1400 **Coaxial Ringdown Oscillator (CRO)** (D/Export Controlled)
Joshua Harp, University of Missouri-KC
- 1430 **Short Pulse Research and Evaluation for sUAS (OSPRES): Program Update** (D/Export Controlled)
Joshua Harp, University of Missouri-KC
- 1500 **Break**
- 1530 **ONR Short Pulse Research and Evaluation for c-sUAV: Supporting and Sub-Programs Overview** (D)
Dr. Anthony Caruso, University of Missouri-KC
- 1600 **Multidisciplinary Design Optimization and Analysis of Aircraft Design and End Effector Characteristics for Rapid Design Iteration and Selection** (D/Export Controlled)
Dr. Travis Fields, University of Missouri-KC
- 1630 **A Comparative Analysis of Heuristic Solutions for the Multiple Traveling Salesmen Problem with Moving Targets** (D/Export Controlled)
Dr. Travis Fields, University of Missouri-KC
- 1700 **Session Adjourns**
- 1730 **Exhibitor Reception at the Hyatt Regency**

TUESDAY AFTERNOON

HEL Systems & Needs

Hyatt Hotel, Regency B

Chair: *Dr. Joseph Paranto*

- 1330 **DE-IFPC Prototyping Program Overview** (D/Export Controlled)
LTC William H Cabaniss, US Army RCCTO
- 1400 **DE M-SHORAD Prototyping Program Overview** (D/Export Controlled)
COL Gary Scott McLeod, US Army RCCTO
- 1430 **Modular Counter Small Unmanned Aerial Systems HEL Weapon System** (D)
Dr. Brett Hokr, Radiance Technologies
- 1500 **Break**
- 1530 **Joint Laser Deconfliction Safety System - Battlespace Deconfliction Capability** (D)
James Latourell, Naval Surface Warfare Center-Dahlgren Division
- 1600 **Highway to HEL - USMC Expeditionary Employment of a High Energy Laser to Counter Drone Threats** (D)
CPT Jonathan Shelton, US Army and
MAJ Meg Vermillion, US Army
- 1630 **INTERSECT Status** (D/Export Controlled)
Jedediah Diller, nLight
- 1700 **Transformational Beam Director Design** (D/Export Controlled)
Simone Michaels, Lockheed Martin
- 1730 **Session Adjourns**
- 1730 **Exhibitor Reception at the Hyatt Regency**

TUESDAY AFTERNOON

CDEW I: Systems & Materials

Hyatt Hotel, Lexington

Chairs: *Dr. John McElhenny* | *Dr. Joe Miragliotta*

- 1330 **Electro-Optical Vulnerability Analysis Facility (EOVAF) Capabilities and Future Threat Discussion (D)**
Bruce Odom, Army Combat Capabilities Development Command
- 1400 **Counter Directed Energy Weapons: Protection of Dismounted Soldiers and Equipment (D)**
Maj Angela Burton, Maj Kit Miaga, and CPT Andre Polk, US Army
- 1430 **Intelligent Decision Aids for Counter Directed Energy Warfare (A)**
Dr. Bonnie Johnson, Naval Postgraduate School
- 1500 **Break**
- 1530 **Laser Detection and Locating Strategies (C)**
Richard Preston, Sensing Strategies, Inc.
- 1600 **Development of Solid-State Counter Directed Energy Weapons Materials (D/Export Controlled)**
Ryan O'Donnell, Army Research Laboratory
- 1630 **Initial Continuous Wave Laser Induced Damage Threshold Measurements of Germanium at 1.07 microns (D/Export Controlled)**
Dr. John McElhenny, DEVCOM Army Research Laboratory
- 1700 **Materials Approach to CDEW: Diffusely Reflecting Non-Charring Coatings (D/Export Controlled)**
Dr. Robert Cozzens, Naval Research Lab
- 1730 **Session Ajourns**
- 1730 **Exhibitor Reception at the Hyatt Regency**

TUESDAY AFTERNOON

CUAS Capabilities

Hyatt Hotel, Regency D

Chair: *Don Seeley*

- 1330 **Directed Energy Project Office (DEPO) Counter-small Unmanned Aircraft System (C-sUAS) Overview (D/Export Controlled)**
LTC K Derrick Rice, US Army RCCTO
- 1400 **Update on Directed Energy Counter-UAS Prototyping (D/Export Controlled)**
Dr. Sean Ross, AFRL/RDMP
- 1430 **First Light Results from Compact Spectral Beam Combiner for Air Base Defense (D/Export Controlled)**
David O'Brien, BlueHalo
- 1500 **Break**
- 1530 **Optical Dazzling Interdictor, Navy (ODIN) AN/SEQ-4 Program (C)**
Melissa A Olson, Naval Surface Warfare Center, Dahlgren Division
- 1600 **Mobilization of High Energy Laser Weapons into the Field (C)**
Nicholas Maniscalco, Raytheon Technologies
- 1630 **Army Directed Energy Overview High Power Microwave (HPM) Focus (D/Export Controlled)**
LTC (P) William Cabaniss, Directed Energy Project Office, RCCTO
- 1700 **AF SDPE System Agnostic Training Activity for Directed Energy Weapons (D/Export Controlled)**
Dion Smith, Booz Allen Hamilton
- 1730 **Session Adjourns**
- 1730 **Exhibitor Reception at the Hyatt Regency**

WEDNESDAY MORNING

DE Bio-effects

Hyatt Hotel, Regency D

Chair: *Dr. Robert Thomas*

- 0700 **Breakfast and Registration at Hyatt**
- 0800 **Multi-Physics Simulations of Regional Brain and Skin Heating Scenarios at GHz Frequencies (C/Export Controlled)**
Jason Payne, AFRL (711 HPW/RHD)
- 0825 **Bioeffects Evaluation of Intense Pulsed Microwave Exposures (C/Export Controlled)**
Brent Voorhees, AFRL (711 HPW/RHD)
- 0850 **Radiofrequency Induced Non-Thermal Damage in Cells (C)**
Dr. Tim Andreadis, Naval Research Lab
- 0915 **An Analysis of Burn Injury Histology Results from 8.2 and 95-GHz Microwave Exposures (A)**
William Voorhees, AFRL (711 HPW/RHD)
- 0940 **Bioeffects Update for Laser Suprathreshold Effects (C/Export Controlled)**
Michael Delisi, SAIC
- 1015 **Break**
- 1030 **Artificial Eyes for Use in Laboratory and Field Experiments (C)**
Wesley T. Kinerk, Lt Col, USAF, BSC
- 1055 **Component Computational Libraries for Directed Energy Bioeffects (D/Export Controlled)**
Dr. Robert Thomas, AFRL (711 HPW/RHD)
- 1120 **The Use of SySML Tools to Represent Humans in Directed Energy Environments and Systems (C/Export Controlled)**
Aaron Hoffman, AFRL (711 HPW/RHD)
- 1145 **Direct and Reflected Beam Analysis for High-Energy Laser (HEL) with Integrated Optical-dazzler and Surveillance (HELIOS) Target Engagement Scenario (D)**
Dr. Semih S. Kumru, AFRL (711 HPW/RHD)
- 1210 **Lunch**

WEDNESDAY MORNING

Platform Integration

Hyatt Hotel, Regency B

Chair: *Dr. Iain McKinnie*

- 0700 **Breakfast and Registration at Hyatt**
- 0800 **Optical Dazzling Interdictor, Navy (ODIN) AN/SEQ-4 Program - Deployment to the Fleet (C/Export Controlled)**
Melissa Olson, Naval Surface Warfare Center, Dahlgren Division
- 0830 **Fits Like A Glove: Integrating 50-kW Laser Weapon Module Onto The DE M-SHORAD Stryker (D/Export Controlled)**
Justin Martin, Raytheon Technologies
- 0915 **Design and Building of a 500-kW Optical Beam Dump and Power Meter (D/Export Controlled)**
Dr. Elijah Dale, Radiance Technologies
- 0945 **Aperture and Power Scaling in Big Aperture Shack Hartmann Wavefront Sensors (D/Export Controlled)**
Dr. Elijah Dale, Radiance Technologies
- 1015 **Break**
- 1030 **Deployment Update for the Laser Weapon System Demonstrator (LWSD) (D)**
Donna Howland and Till Liepmann, Northrop Grumman
- 1115 **HELIOS, The Surface Navy Foundation for Integrated LWS Capability (D)**
Kris Bigs, CAPT, USN (Ret.), Lockheed Martin
- 1200 **Lunch**

WEDNESDAY MORNING

HPM Effects & Systems I

Hyatt Hotel, Regency C

Chairs: *Dr. Sterling Beeson* | *Dr. Jordan Chaparro*

- 0700 **Breakfast and Registration at Hyatt**
- 0800 **HIJENKS Pod Kit (D/Export Controlled)**
Dr. Peter Duselis, Science, Engineering Management Solutions, LLC.
- 0830 **Compact Pulsed Power Components and Systems for HIJENKS (D/Export Controlled)**
Emily Schrock, Sandia National Laboratories
- 0900 **Conformal Slotted Waveguide Antenna Array for Pulsed Power Applications (D/Export Controlled)**
Douglas Wilson, NSWC Dahlgren
- 0930 **Live-Fire HPM Testing, Forensics, and Analysis (D/Export Controlled)**
Dr. Travis Fields, University of Missouri-KC
- 1000 **Break**
- 1030 **Fixed HPM Effector Capabilities Realized Through Computational Wargaming (D/Export Controlled)**
Dr. Travis Fields, University of Missouri-KC
- 1100 **Red Team UAS Hardening for Counter HPM (D/Export Controlled)**
Dr. Travis Fields, University of Missouri-KC
- 1200 **Lunch**

WEDNESDAY AFTERNOON

HEL Technologies

Hyatt Hotel, Regency B

Chair: *Dr. Joseph Paranto*

- 1330 **Next Generation Yb-doped Gain Fibers for Decreasing Operating Linewidth in HEL Systems (A)**
Jeffrey Nicholson, OFS
- 1400 **Multi-kW Yb & Tm Fiber Lasers for Directed Energy - The Potential and Challenges (C)**
Justin Cook, UCF
- 1430 **Characterization of the RELI Laser with the Small Measurement and Analysis System (D/Export Controlled)**
John Mason, Radiance Technologies
- 1500 **Break**
- 1530 **High Energy Laser Target and Diagnostic (HEL-TAD) Module (D/Export Controlled)**
Kimberly Urness, nLight
- 1600 **Determining Performance Requirements for Active Track in ETEM (D/ExportControlled)**
Dr. Edwin Ahn, Air Force Research Laboratory
- 1630 **Silent Saber 1.5 kW Laser Explosive Ordnance Disposal (EOD) System (D/Export Controlled)**
Joseph Paranto, Applied Research Associates (ARA)
- 1700 **Session Adjourns**

WEDNESDAY AFTERNOON

CDEW II: Computer-Based & HPM

Hyatt Hotel, Lexington

Chair: *Dr. John McElhenny* | *Dr. Joe Miragliotta*

- 1330 **Laser Modeling Topic** (C/Export Controlled)
Richard Westhoff, MIT Lincoln Laboratory
- 1400 **Virtual Reality (VR) Simulation of Laser Dazzle/Glare** (C)
Leon McLin, AFRL 711HPW/RHDO
- 1430 **CDEW Phase Masks Imager with Machine Learning Image Restoration** (D)
Abbie Watnik, U.S. Naval Research Lab
- 1500 **Break**
- 1530 **Development of Textile-Based Metamaterials for c-HPM**
(D/Export Controlled)
Andrew Abbott, University of Missouri-KC
- 1600 **Current Research at CCDC-Soldier Center in Microwave Reflective Materials for the Dismounted Soldier** (C)
Dr. Francisco Jose Aranda, US Army CCDC-Soldier Center
- 1630 **Session Adjourns**

WEDNESDAY AFTERNOON

DE Manufacturing

Hyatt Hotel, Regency D

Chair: *Jenny Niles*

- 1330 **Program for Improved Manufacturability for Pump Combiners, Pump Signal Combiners, and Gain Fiber for DE Applications** (D)
Cari August, OFS
- 1400 **Advancing Large OAP Mirror Manufacturing for DE Applications** (D)
Mike Hyman, Optimax SI
- 1430 **High Brightness High Efficiency >600W Low SWaP 976 nm Diode Laser Pump Manufacturing for Directed Energy Lasers** (D)
Dr. Manoj Kanskar, nLight, Inc.
- 1500 **Session Adjourns**

WEDNESDAY AFTERNOON

HPM Effects & Systems II

Hyatt Hotel, Regency C

Chairs: *Dr. Jordan Chaparro* | *Dr. Cameron Pouncey*

- 1300 **UAV UHF Narrow Band Effects Summary**
(D/Export Controlled)
Joshua Harp, University of Missouri-KC
- 1330 **Komodo: Counter Improvised Explosive Device (CIED) Effectiveness Test Results**
(D/Export Controlled)
Dr. James Camp, NSWC Dahlgren Division
- 1400 **Initial Test Results of No Contact Pre-Emplaced Vehicle Stopper** (D/Export Controlled)
Dr. James Camp, NSWC Dahlgren Division
- 1430 **Distinguishing Between HPEW, HPM, EW, and Cyber** (D/Export Controlled)
Dr. Tim Andreadis, Naval Research Lab
- 1500 **Break**
- 1530 **PEO STRI Advanced Wide Band Source and Other High Power Radio Frequency Sources** (C/Export Controlled)
Jeffrey Schleher, American Systems
- 1600 **LLNL Progress in Solid State Switches**
(C/Export Controlled)
Lars Voss, Lawrence Livermore National Lab
- 1630 **Session Adjourns**

THURSDAY MORNING

Laser Effects, Propagation and Analysis I

Hyatt Hotel, Regency B

Chair: *Dr. Chris Lloyd*

- 0700 **Breakfast and Registration at Hyatt**
- 0800 **Use of High Energy Laser Target Boards for Operational Test and Evaluation**
(C/Export Controlled)
David Ward, SemQuest Inc
- 0825 **Imaging Laser Ablation at 1 million Frames Per Second Using a Rotary Mirror Strobe System (C)**
Dr. Joel Bixler, Air Force Research Laboratory 711HPW/RHDO
- 0850 **Design and Implementation of a Flow Control System for a Hemispherical Turret**
(D/Export Controlled)
Aaron Roeder, Applied Technology Associates, a BlueHalo Company
- 0915 **Target Vulnerability Analysis using Computational Fluid Dynamics**
(D/Export Controlled)
Caleb Thomas, The University of Minnesota-Twin Cities
- 0940 **The Army Mobile Precision Scoring System**
(D/Export Controlled)
Chuck Malone, CLM Enterprises
- 1015 **Break**
- 1030 **Test and Analysis of Directed Energy Aviation Target Aimpoints** (D/Export Controlled)
Dr. Glenn Romanczuk, U.S. Army Space & Missile Defense Command (SMDC)
- 1055 **US Army SMDC Engine Vulnerability Summary** (D/Export Controlled)
Jesse Croyle, Radiance Technologies
- 1120 **High Energy Laser Lethality Smart Vulnerability Module Development**
(D/Export Controlled)
Nahim Flores, Army Space and Missile Defense Command
- 1145 **OUSD Thermal Blooming Initiative (D)**
Dr. Joseph Penano, U.S. Naval Research Lab
- 1210 **Lunch and Poster Session**

THURSDAY MORNING

USPL Effects I

Hyatt Hotel, Regency D

Chair: *Dr. Joseph Penano*

- 0700 **Breakfast and Registration at Hyatt**
- 0800 **Developing Beam Control Requirements to Improve the Propagation of Broadband Laser Sources (C/Export Controlled)**
Dr. Kevin Werner, DEVCOM Army Research Lab
- 0830 **Machine Learning for Atmospheric Laser Propagation and Adaptive Optics (D/Export Controlled)**
Gregory DiComo, U.S. Naval Research Lab
- 0900 **Diogenes Mobile Laboratory for Long-Distance Laser Propagation and Interaction Studies (D/Export Controlled)**
Dr. Michael Helle, U.S. Naval Research Lab
- 0930 **High-Altitude USPL Filamentation (C)**
Jessica Pena, Laser Plasma Laboratory, Center for Directed Energy (CDE), UCF
- 1000 **Break**
- 1030 **High-Energy Burst-Mode Lasers for Pulsed Directed Energy Effects (A)**
Dr. Daniel Thul, Spectral Energies, LLC
- 1100 **Burst-Mode USPL Ablation of Solid Targets (C)**
Haley Kerrigan, Laser Plasma Laboratory, C-DESST, UCF
- 1200 **Lunch and Poster Session**

THURSDAY MORNING

System Design, Development I&T

Hyatt Hotel, Regency C

Chair: *Carl Wellstein*

- 0700 **Breakfast and Registration at Hyatt**
- 0800 **Applying a Model Based Systems Engineering (MBSE) Approach to Directed Energy Weapon Systems (DEWS) Reference Architecture (RA) Development (D/Export Controlled)**
Saugat Sen and Davin O' Neill, MITRE Corporation
- 0830 **Aero-Effects Mitigation and Beam Control Flight Testing Developments (D/Export Controlled)**
Dr. Matthew R. Whiteley, MZA Associates Corporation
- 0900 **Status Update of HARDROC Hybrid Beam Director Development and Flight Testing (D/Export Controlled)**
Scott Sherer, AFRL/RQVA
- 0930 **Predictive AO Compensation with HARDROC Aero-Mitigation (D/Export Controlled)**
Dr. Adam Edwin Smith, MZA Associates Corporation
- 1000 **Break**
- 1030 **Aero-Effects Modeling of Hybrid Beam Director Configurations (D/Export Controlled)**
Scott Sherer, AFRL/RQVA
- 1100 **High Energy Laser Scene Generation and Tracker Evaluation (HELSGATE) Simulation (D/Export Controlled)**
Dr. Andrew Thies, Radiance Technologies
- 1130 **Jitter Modeling Methodology and Analysis for the HARDROC Beam Director Concept (D/Export Controlled)**
Nicholas De Lucca, MZA Associates
- 1200 **Lunch and Poster Session**

THURSDAY MORNING

HEL Systems & Needs

Hyatt Hotel, Lexington Room

Chair: *Dr. Joseph Paranto*

- 0800 **DE Roadmap for the Indo-Pacific Area of Responsibility (D/Export Controlled)**
Dr. Mark Spencer, USINDOPACOM
- 0830 **Large Aperture Beam Director Effectiveness Analysis for 10-km Class High Energy Laser Engagements (D/Export Controlled)**
James Mulroy, Lockheed Martin
- 0900 **HEL Active Imaging of Deep Spaces (D/Export Controlled)**
Dr. Thomas Karr, Alamo Scientific LLC
- 1200 **Lunch and Poster Session**

THURSDAY LUNCH

Poster Session

Hyatt Hotel, Ballroom

- Tradespace Analysis of a Phased Array of Microstrip Patch Electrically Small Antennas (ESAs)**
*Bidisha Barman, University of Missouri-Kansas City
Missouri Institute for Defense & Energy*
- Photoconductive Semiconductor Switch Enabled Multi-Stage Optical Source Driver**
*Paul Bhamidipati, University of Missouri - Kansas City,
Missouri Institute for Defense & Energy, Kansas City, MO*
- All Solid-State High-Power Pulse Sharpeners**
Gyanendra Bhattarai, Missouri Institute for Defense & Energy
- Efforts to Reduce Physical Aperture Area of Ultra-Wideband Arrays**
Kalyan Durbhakula, Missouri Institute for Defense and Energy
- Machine Learning Based Ultra-Wideband Antenna Array Optimization and Prediction**
Kalyan Durbhakula, Missouri Institute for Defense and Energy
- TCAD Optimization of Epitaxially Grown Drift-Step Recovery Diodes and Pulsar Performance**
Jay Eifler, Missouri Institute for Defense & Energy
- DSRD-IES Pulsed-Power Generator Topology Study Using Machine-Learning-Based Feature Selection Optimization and Predictive Learning**
Dewan Fahim Noor, Tuskegee University Missouri Institute for Defense and Energy
- Diode-Based Nonlinear Transmission Lines Capable of GHz Frequency Generation at Single MW Peak Powers**
*Nicholas Gardner, University of Missouri-Kansas City,
Missouri Institute for Defense & Energy*
- A Predictive-Package for Electromagnetic Coupling to Nonlinear-Electronics using Equivalent-Circuits and Characteristic-Modes (PECNEC)**
Ahmed Hassan, University of Missouri-Kansas City
- The Shielding Effectiveness of UAV Frames to External RF Interference**
Ahmed Hassan, University of Missouri-Kansas City
- Development of an Evaluation Network for Drift Step Recovery Diodes through an Augmented Design of Experiment**
Megan Hyde, Missouri Institute of Defense & Energy
- A Scalable Multilevel-Modular 10 kV Silicon Carbide MOSFET Architecture for Pulsed Power Applications**
Faisal Khan, University of Missouri, Kansas City

THURSDAY LUNCH

Poster Session

Hyatt Hotel, Ballroom

Systematic Topological Optimization of DSRD-Based IES Pulse Generator

Sourov Roy, Missouri Institute of Defense and Energy

Tubular Core Optical Power Amplifier

Scott Shepard, University of Missouri - Kansas City
Missouri Institute for Defense and Energy

A Novel Method of Cooling a Semiconductor Device through a Jet Impingement Thermal Management System: CFD Modeling and Experimental Evaluation

Sarvenaz Sobhansarbandi, University of Missouri-Kansas City

Heat Transfer Enhancement of a Jet Impingement Thermal Management System: A Comparison of Various Nanofluid Mixtures

Sarvenaz Sobhansarbandi, University of Missouri-Kansas City

Ultra-Compact Integrated Cooling System Development

Sarvenaz Sobhansarbandi, University of Missouri-Kansas City

Minimizing On-State Resistance in GaN:X

Photoconductive Semiconductor Switches (PCSSs) for Direct Modulation

Heather Thompson, University of Missouri - Kansas City
Missouri Institute for Defense & Energy

New Paradigm in Fabrication of Semiconductor Opening Switches for Pulsed Power

Alex Usenko, University of Missouri-Kansas City, Missouri Institute for Defense & Energy

THURSDAY AFTERNOON

HPM Programs, Systems, and Technology II

Hyatt Hotel, Regency C

Chair: *Dr. Emily Schrock*

1400 New Techniques for Time-Reversal-Based Ultra-wideband Microwave Pulse Compression (D/Export Controlled)

Dr. Zachary Drikas, U.S. Naval Research Lab

1425 PTERA: Enabling Parity through Airborne and Air-Emplaced Microwave Energy (D)

Dr. Anthony Caruso, University of Missouri-KC

1450 PTERA Fundamental: High-Risk Development of Air Emplaced Directed Energy (D)

Dr. Anthony Caruso, University of Missouri-KC

1515 Break

1530 PTERA-I: Empowering National Security with Airborne HPM Effectors (D/Export Controlled)

Roy Allen, Missouri Institute for Defense & Energy

1555 PTERA-II: Empowering Offensive Electronic Attack with Airborne Microwave Energy (D/Export Controlled)

Alexander Green, Missouri Institute of Defense and Energy

1620 DoD HPM and HPRF Weapons: METCAL Support (C)

Ignacio Espinosa, Naval Surface Warfare Center (NSWC), Corona Division

1645 High PRF Air-Cooled DSRD-based Pulsed-Power Systems (C)

Roy Allen, Missouri Institute for Defense & Energy

1710 Comparison of Fixed vs Mobile HPM Generation Systems (A)

Plamen Doynov, EMP Shield, Inc.

1735 Session Adjourns

THURSDAY AFTERNOON

Laser Effects, Propagation and Analysis II

Hyatt Hotel, Regency B

Chair: *Dr. Chris Lloyd*

- 1400 **Experimental and Numerical Studies of Convective Blooming at 1 & 2 μm (C)**
Justin Cook, University of Central Florida
- 1425 **The High Energy Laser Atmospheric Characterization System (HACS) - Initial Design and Laboratory Measurements (C)**
Dr. Christopher Valenta, Georgia Tech Research Institute
- 1450 **Characterizing Spatial Light Modulators for the use of Simulating Multi-Layer Atmospheric Turbulence (D)**
Marie Grasse, Mathematics Department, University of Notre Dame
- 1515 **Break**
- 1530 **DoD Laser Lethality Database (LLDB) (D/Export Controlled)**
Vincent Deprenger, Booz Allen Hamilton Inc.
- 1645 **US Army's High Energy Laser Consolidated Modeling & Engagement Simulation (HELCOMES) 4.0 Release (D)**
Fabiola Lopez, USA SMDC
- 1620 **Radiometric Calculations for Optical Radiation Collateral Hazards (C)**
Aaron Hoffman, AFRL 711HPW/RHDO
- 1645 **Session Adjourns**

THURSDAY AFTERNOON

USPL Effects II

Hyatt Hotel, Regency D

Chair: *Dr. Joseph Penano*

- 1400 **Propagation of Orbital Angular Momentum Beams in the Atmosphere (A)**
Henry Francis Elder, Naval Surface Warfare Center, Carderock Division
- 1425 **THz Photonics of Stratified Laser Plasmas (A)**
Dr. Serge Kalmykov, Leidos
- 1450 **Break**

DEWRAP Process

Chair: *Dave Kiel*

- 1530 **SDPE Experiment 1 DEW RAP (D)**
Dion M Smith, Booz Allen Hamilton
- 1600 **Directed Energy: Laser Weapon Systems & Normalization (D)**
Dennis Monahan, Booz Allen Hamilton
- 1630 **Session Adjourns**

THURSDAY AFTERNOON

HEL Integration into a UCAV Platform - Overview (DEPS/AIAA collaboration)

Hyatt Hotel, Lexington Room

Chairs: *Dr. DJ Wittich / Mark Neice*

- 1400 **HEL Integration into a UCAV Platform Introduction** (D/Export Controlled)
Dr. DJ Wittich, AFRL/RD
- 1425 **Systems Engineering** (D/Export Controlled)
Dale Parkes, Boeing Laser & Electro-Optics Systems
- 1450 **Aero Effects/Modeling & Simulation** (D/Export Controlled)
Dr. Scott Sherer, AFRL/RQ
- 1515 **Break**
- 1530 **Components & Integration** (D/Export Controlled)
John Erhart, Senior Principal Engineer, MTSI
- 1555 **Test & Evaluation/Airworthiness Certification** (D/Export Controlled)
Dr. Bryan Kelchner, Senior Electro-Optics Engineer, Teknikare
- 1620 **Session Adjourns**

FRIDAY MORNING

Session Summaries

Hyatt Hotel, Regency B

- 0800 **Plenary Session Summary**
- 0820 **HPM Programs, Systems, and Technology I & II | HPM Effects & Systems I, II & III**
Brad Hoff & Ryan Hoffman
- 0840 **HEL Systems & Needs | HEL Technologies**
Joseph Paranto
- 0900 **CDEW I: Systems & Materials | CDEW II: Computer-based & HPM | CDEW III**
Dr. John McElhenny & Dr. Joe Miragliotta
- 0920 **CUAS Capabilities**
Don Seeley
- 0940 **DE Bio-effects**
Dr. Robert Thomas
- 1000 **Break**
- 1020 **Platform Integration | System Design, Development I&T**
Dr. Iain McKinnie
- 1040 **DE Manufacturing | DEWRAP Process**
Jenny Niles & Dave Kiel
- 1100 **USPL Effects I & II**
Dr. Joseph Penano
- 1120 **Laser Effects, Propagation & Analysis I & II**
Dr. Chris Lloyd
- 1140 **Airborne DE Systems Integration Committee**
Mr. Mark Neice
- 1200 **Symposium Adjourns**

Symposium Organizing Committee

Symposium Chairs

Adam Aberle

Symposium Committee

Brad Hoff

Joe Miragliotta

Ryan Hoffman

Jenny Niles

Dave Kiel

Joseph Paranto

Chris Lloyd

Joseph Penano

John McElhenny

Don Seeley

Iain McKinnie

Robert Thomas

Symposium Coordinator

Cynnamon Spain

Security

Kat Gonzales

Registration and Receipts

Dawn Gutierrez

Technical Program Coordinator / Short Courses

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