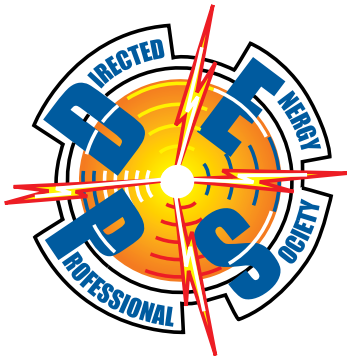


**Technical Program**



**DE Systems  
Symposium**

**14 - 18 September 2015  
Norfolk, Virginia**

# General Information

## Security

- DE Systems Symposium is SECRET/ NOFORN
- Attendees will be issued conference specific badges on site and must have valid gov't ID available at all Symposium events
- Wireless electronic devices are prohibited in classified sessions
- Classified materials must be processed through DEPS security
- No note-taking in any classified facility
- Classified discussions and sensitive unclassified discussions are restricted to designated meeting rooms only
- No cameras or photography allowed
- 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

## Buses

The off site location is an 8 to 10 minute drive. Buses will be available to transport to and from each location approximately every 30 min and will end service 15 minutes after the last talk completes. Do not bring cell phones, laptops, or notebooks on the bus. DEPS staff will not be responsible for your items.

Bus schedule:

Tuesday: 1130 to 1730

Wednesday and Thursday: 0700 to 1730

Friday: 0700 to 1230

*Please note: The buses will not be able to travel back to the hotel from the offsite facility after the final speaker begins. Drivers are required to remain available for the entire groups departure and cannot be pulled away for just a few. Those that are not on the buses immediately following the last presentation will be responsible for their own taxi ride back to the hotel.*

## SHORT COURSES

### ALL SHORT COURSES AT RENAISSANCE HOTEL

#### MONDAY 14 SEPTEMBER

##### Morning Courses

- 1: Introduction to High Energy Laser Systems  
Renaissance, Port I, 0800-1200
- 2: Introduction to RF Systems  
Renaissance, Port VII, 0800-1200

##### All Day Course

- 3: Tri-Service HEL Lethality Testing & Modeling (Limited C)  
Renaissance, Port VIII, 0800-1700

##### Afternoon Course

- 4: Synergistic DE/KE Analysis (Limited D)  
Renaissance, Port VII, 1300-1700

#### WEDNESDAY AND THURSDAY 16-17 SEPTEMBER

##### Evening Courses

- 5: Atmospheric Optics for HELs (Limited C)  
Renaissance, Port VIII, 1800-2000 both evenings
- 6: Laser Deconfliction (Limited C)  
Renaissance, Port III, 1800-2000 both evenings

## DE Outreach and DE2DC Planning Meeting

Tuesday, 15 September  
1700-1730

Renaissance Hotel Admiral Room

**AUDIO AND VIDEO RECORDING IS  
PROHIBITED AT ALL DEPS SPONSORED EVENTS**

## TUESDAY MORNING

### JOINT SESSION

#### Opening Plenary

Secret Session, Offsite Location

- 0630 **Breakfast at Renaissance**
- 0700 **Registration at Renaissance**
- 0700 **Buses to Off Site Location**
- 0800 **Welcome and Security Notes (D)**  
*Dr. James Horkovich & Ms. Tiffany Bjelke*
- 0815 **Systems Introduction**  
*Gen G. Michael Hostage, USAF (ret)*
- 0830 **Insights from the Navy Warfare Development Center (D)**  
*RADM Scott Stearney, Navy Warfare Development Center*
- 0900 **Air Combat Command Directed Energy Interest (D)**  
*Mr Ted Uchida, Deputy Director for Operations, Air Combat Command*
- 0930 **High Power RF Systems Overview (D)**  
*Dr Ryan Hoffman, ONR*
- 1000 **Break**
- 1020 **Joint Non-Lethal Weapons Program (D) Overview**  
*Mr. David Law, JNLWD*
- 1045 **Summary from the DE Summit (D)**  
*Col Mark Gunzinger, USAF (ret), Center for Strategic and Budgetary Assessments*
- 1100 **Directed Energy Weapons: Promise & Prospects (D)**  
*Dr. Jason Ellis, Center for a New American Security*
- 1135 **Buses Depart for Lunch**
- 1200 **Lunch at Renaissance**

## TUESDAY AFTERNOON

### BEAM CONTROL

#### BC Components, Coatings and Environments

Renaissance, Port V, Limited Distribution C

Chair: *Dr. Jim Lasche, AFRL*

- 1330 **High Energy Laser Integration on Submarines - Material Characterization of Maritime Effects on Aperture Element (A)**  
*Clayton Petty, Naval Postgraduate School*
- 1400 **Predicting TIRU (Tactical Inertial Reference Unit) Performance under F15 Pod Platform Vibration (C)**  
*James Lasche, AFRL*
- 1430 **Progress on Development of an Active Primary Deformable Mirror (C)**  
*Justin Mansell, MZA Associates Corporation*
- 1500 **Break**

#### Laser Program

Renaissance, Port V, Limited Distribution D

Chair: *Dr. Bob Pawlak, NSWC Dahlgren*

- 1530 **A Methodology for Government Personnel to Independently Assess Laser Weapon System Performance (C)**  
*Timothy Wolfe, AFRL*
- 1600 **Beam Control System Study to Support Indirect Fires Protection Capability Analysis of Alternatives Requirements (D)**  
*Charles LaMar, SMDC*
- 1630 **Field Testing of Horizontal Path Non-Beacon Hit-Spot Adaptive Optics (C)**  
*Justin Mansell, MZA Associates Corporation*
- 1730 **Exhibitor Reception and Poster Session at Renaissance**

## TUESDAY AFTERNOON

### DE MODELING & SIMULATION

#### End-to-End System Modeling

Renaissance, Port VII, Limited Distribution D

Chair: *Ms. Linda Lamberson, AFRL/RDMW*

- 1330 **Integrated Weapons Environment for Analysis (IWEA) Overview and Update (D)**  
*Michael Murphy, AFRL/RDMW*
- 1400 **IWEA Tactical Battle Manager Overview (D)**  
*Brian Hughes, AFRL/RDMW (Aegis)*
- 1430 **Systems Engineering for the IWEA Program (D)**  
*Daniel Sharpes, AFRL/RDMW*
- 1500 **Break**
- 1530 **HELSEEM 3.0 (C)**  
*Robin Ritter, Tau Technologies*
- 1600 **Impact on LWS Resulting from Operation of IPTMS Hardware with Emulated SS HEL and Turbine Engine Prime Power (C)**  
*Chuck Oberly, UES Inc*
- 1630 **Combining Multiple Models and Simulation Tools for Virtual Prototyping of HEL Weapon Systems (D)**  
*Gamze Erten, Raytheon SAS*
- 1730 **Exhibitor Reception and Poster Session at Renaissance**

## TUESDAY AFTERNOON

### EMPLOYMENT OF DE WEAPONS

#### Employment Session I

Offsite Location, Secret

Chair: *Mr. Dan Marker, AFRL*

- 1300 **Buses to Offsite Location**
- 1330 **Invited: AFSOC Speaker**  
*Maj Gen Scott Howell, AFSOC*
- 1415 **Nutronics Employment of DE Weapons Conference (C)**
- 1445 **Multifunction Applications of Digital Holographic Imaging (C)**
- 1515 **Break**
- 1530 **Target Card Development for the Navy Laser Weapon System (F)**
- 1600 **Characterization of Laser-Material Interactions (C)**
- 1630 **The Deployed LaWS and its Development/ Status Onboard the USS PONCE (C)**
- 1700 **Potential Employment of Army High Energy Laser Weapon Systems (A)**
- 1730 **Exhibitor Reception and Poster Session at Renaissance**

## TUESDAY AFTERNOON

### NON-LETHAL DE WEAPONS

#### NL DEW Session I

Offsite Location, Secret

Chairs: *Mr. Scott Griffiths and Mr. Matt Ketner,*  
NSWC Dahlgren

- 1300 Buses to Offsite Location
- 1330 Pre-Emplaced Electric Vehicle Stopper (PEVS) (C)
- 1400 Compact, Limited-Use, Lightweight (CLL) Pre-Emplaced Electric Vehicle Stopper (PEVS) (C)
- 1430 Lethality Analysis Driven HPRF System Design (C)
- 1500 Break
- 1530 Radio Frequency Vehicle Stopper Prototype Development (C)
- 1600 Counter-Vehicle and Outboard Motor Lethality Studies (C)
- 1630 Vessel Stopping Prototypes (VSP) Electromagnetic (EM) Modeling and Simulation (M&S) Results (C)
- 1700 Counter-Unmanned Aerial Systems (C-UAS) Using Radio Frequencies (RF) (C)
- 1730 Exhibitor Reception and Poster Session at Renaissance

## TUESDAY EVENING

### JOINT SESSION

#### Poster Session at 1800

Renaissance Hotel, Limited Distribution C

**Laser Detection and Characterization with Auto-Calibrated Multistatic Sensors (C)**

*John deGrassie, SSC Pacific*

**NWP-Based Spatiotemporal Estimation of Atmospheric Turbulence in a Near-Surface Horizontal Test Channel at NSWC-DD (C)**

*Eric Hallenborg, SPAWAR Systems Center*

**Airborne Integration of High Energy Laser Weapon Systems in the Maritime Environment (A)**

*Nick Holman, Naval Postgraduate School*

**Navy Efforts in Directed Energy Weapons: Importance of Metrology and Calibration (A)**

*Subrata Sanyal, NSWC*

## WEDNESDAY MORNING

### BEAM CONTROL

#### Aero Optics

Renaissance, Port V, Limited Distribution D

Chair: *Mr. John-Paul Sena, AFRL/RDLET*

0630 **Breakfast at Renaissance**

0700 **Registration at Renaissance**

0800 **Tactical Beam Control Aero-Optics Simulation Laboratory (C)**  
*David Dayton, Applied Technology Associates*

0825 **Aero-Optic Disturbance Generation & Tilt Mitigation Testbed (D)**  
*Jonathan Stohs, AFRL/RDL*

0850 **Supersonic Turret Aero-Effects Testing and Results (D)**  
*Matthew Whiteley, MZA Associates Corp*

0915 **Transonic Aero-Optical Mitigation Flight Program (D)**  
*Matthew Whiteley, MZA Associates Corp*

0940 **Flight Testing of the Aero-Adaptive/ Aero-Optic Beam Control (ABC) Turret (D)**  
*Donald Wittich, AFRL/RD*

1005 **Break**

#### Beam Propagation

Renaissance, Port V, Limited Distribution C

Chair: *Mr. Albert Ogloza, NSWCPHD*

1030 **Interactions Between a Laser and a Large Water Droplet (A)**  
*Timothy Tracey, U.S. Naval Academy*

1100 **Polarization Signatures and Propagation of Polarized Light Through Fog and Rain (C)**  
*Joseph Pezzaniti, Polaris Sensor Technologies*

1130 **Laser Detection and Characterization with Auto-Calibrated Multistatic Sensors (C)**  
*John deGrassie, SSC Pacific*

1200 **Lunch at Renaissance**

1230 **Lunch Presentation:  
Directed Energy Technology Transition**  
*Dr. Bill Decker, Defense Acquisition University*

## WEDNESDAY MORNING

### DE MODELING & SIMULATION

#### M&S for Test Validation

Renaissance, Port VII, Limited Distribution D

Chair: *Mr. Robin Ritter, Tau Technologies*

0630 **Breakfast at Renaissance**

0700 **Registration at Renaissance**

0800 **Validation of Modeling & Simulation Predictions using ATLAS Field Test Results (C)**  
*Deborah Tjin, Nutronics, Inc.*

0830 **Using the Laser Performance Code ANCHOR to Evaluate High Energy Lasers in Various Atmospheric Conditions (C)**  
*Joseph Collins, Naval Postgraduate School*

0900 **First Hundred Meters Atmospheric Characterization System (A)**  
*Amanda Black Clark, SMDC*

0930 **Break**

1000 **HEL MD Fiber Laser Spot Sizes Compared to HELCOMES (C)**  
*Theron Henderson, Scientific Inc.*

1030 **GPU-Based Real-Time Integrated Deconfliction (GRID) (C)**  
*Robin Ritter, Tau Technologies*

1100 **HELEEOS Validation for Field Test Forensics (D)**  
*Noah Van Zandt, AFIT*

1200 **Lunch at Renaissance**

1230 **Lunch Presentation:  
Directed Energy Technology Transition**  
*Dr. Bill Decker, Defense Acquisition University*

## WEDNESDAY MORNING

### EMPLOYMENT OF DE WEAPONS

#### Employment Session II

Renaissance, Port VIII, Limited Distribution D

Chair: *Dr. Douglas Nelson*, Naval Postgraduate School

- 0630 **Breakfast at Renaissance**
- 0700 **Registration at Renaissance**
- 0800 **A Comparison of a Conformal Array and a Turret for High Energy Laser Integration onto a Tactical Aircraft (D)**  
*Kurt Chankaya*, Lockheed Martin Aeronautics
- 0830 **Implications of Combat Systems Engineering for High Energy Laser Weapons System Development (D)**  
*Douglas Nelson*, Naval Postgraduate School
- 0900 **Impact of Aero-Optics on Laser Employment for Transonic and Supersonic Aircraft (D)**  
*Matthew Whiteley*, MZA Associates Corp
- 0930 **Break**
- 1000 **Improved On-The-Move Detection of Buried IEDs via Laser Emission (C)**  
*Charlene Rusnak*, US NRL
- 1030 **Effects of Tip Damage on High Power Fiber Laser Performance (C)**  
*Arthur Hassall*, AFRL/RDLT
- 1100 **Creation of Ultrashort Pulses Using an Extended Cavity KGW Laser (A)**  
*Taylor Powell*, U.S. Military Academy
- 1130 **The Effects of High and Low Frequency Rotation on the Laser Heating of Cold Rolled Steel (A)**  
*Daniel Mauldin*, U.S. Military Academy
- 1200 **Lunch at Renaissance**
- 1230 **Lunch Presentation: Directed Energy Technology Transition**  
*Dr. Bill Decker*, Defense Acquisition University

## WEDNESDAY MORNING

### NON-LETHAL DE WEAPONS

#### NL DEW Session II

Renaissance, Port I, Open

Chairs: *Mr. David Law*, JNLWD and *Ms. Ericka Neveu*, American Systems

- 0630 **Breakfast at Renaissance**
- 0700 **Registration at Renaissance**
- 0800 **Next-Generation Compact Active Denial System (A)**  
*Rick Scott*, JNLWD
- 0830 **Human Effects of Directed Energy Non-Lethal Weapons (NLWs) (A)**  
*Ashley Raba*, American Systems
- 0900 **An Integrated Human Test Surrogate to Assess Injury Risk and Measure Non-Lethal Exposure (A)**  
*Keith Sedberry*, CFD Research Corporation
- 0930 **Break**
- 1000 **High Power Density Solutions for Directed Energy Weapon System Applications (A)**  
*Hernando Munevar*, Candent Technologies
- 1030 **Metamaterial Reflector Antennas for High Power Vehicle-Stopping and Vessel-Stopping (A)**  
*Douglas Werner*, Penn State University
- 1100 **Metamaterial-Enabled Compact Antennas (A)**  
*Douglas Werner*, Penn State University
- 1130 **Self-Contained, Directed, Solid-State Driven High Power Microwave (HPM) System Based on Phased-Array Antenna Architecture (A)**  
*Hoon Ahn*, Wireless Technology Associates, Inc.
- 1200 **Lunch at Renaissance**
- 1230 **Lunch Presentation: Directed Energy Technology Transition**  
*Dr. Bill Decker*, Defense Acquisition University

## WEDNESDAY MORNING

### SSDLTR

#### High Energy Lasers

Renaissance, Port III, Limited Distribution D

Chair: *Dr. David Mordaunt*, Raytheon Space and Airborne Systems

0630 **Breakfast at Renaissance**

0700 **Registration at Renaissance**

0800 **Lockheed Martin's 30 kW Fiber SBC Laser -- A Year of Field Testing (D)**  
*Robert Afzal*, Lockheed Martin Aculight

0830 **GBAD High Energy Laser: Status on Path to a "First of its Kind" All-Electric, Ruggedized and Ultra-Compact 30kW CW Laser (D)**  
*Timothy McGoldrick*, Raytheon Space and Airborne Systems

0900 **Lightweight, 600W Fiber-Coupled Module With >50% Power-Conversion Efficiency (C)**  
*Mehmet Dogan*, Science Research Laboratory, Inc.

0930 **Break**

1000 **Power and Energy Storage Requirements for Integration of Solid State Lasers on Naval Platforms (A)**  
*Joshua Valiani*, Naval Postgraduate School

1030 **Amplifier Development for Fiber Combining (D)**  
*Dale Martz*, MIT Lincoln Laboratory

1100 **High Power Fiber Amplifiers for Beam Combining (D)**  
*Craig Robin*, Lockheed Martin

1200 **Lunch at Renaissance**

1230 **Lunch Presentation: Directed Energy Technology Transition**  
*Dr. Bill Decker*, Defense Acquisition University

## WEDNESDAY MORNING

### HEL LETHALITY

#### HEL Lethality Demonstrations

Offsite Location, Secret

Chair: *Dr. Christopher Lloyd*, NSWCDD

0630 **Breakfast at Renaissance**

0700 **Registration at Renaissance**

0715 **Buses to Offsite Location**

0830 **Atmospheric Propagation Data Collection During AN-SEQ-3(XN-1) testing on USS PONCE (A)**

0900 **Test Results for Lethality Test Aboard USS Ponce (D)**

0930 **An Analysis of the First Operational Demonstration of the U.S. Navy's AN/SEQ-3(XN-1) Laser Weapon System (LaWS) (D)**

1000 **Break**

#### Target Vulnerability Assessment

Offsite Location, Secret

Chair: *Mr. Steven Baird*, SMDC

1030 **High Energy Laser Effectiveness Against Unmanned Aerial Systems of Interest (D)**

1100 **UAV Dynamic Shoot Down - Fuel Bladder Aimpoint (F)**

#### Systems Engineering Modeling and Analysis

Offsite Location, Secret

Chair: *Mr. Steven Baird*, SMDC

1130 **HEL Dynamic Engagement Analysis for a Realistic Scenario (D)**

1200 **Lunch at Renaissance**

1230 **Lunch Presentation: Directed Energy Technology Transition**  
*Dr. Bill Decker*, Defense Acquisition University



## WEDNESDAY MORNING

### RF DEW WEAPONS

#### RF DEW Session I

Offsite Location, Secret

Chair: *Mr. Ryan Hoffman*, ONR

- 0630 **Breakfast at Renaissance**
- 0700 **Registration at Renaissance**
- 0715 **Buses to Offsite Location**
- 0800 **Maritime Improvised Explosive Device Investigation (MIEDI) Overview (C)**
- 0830 **History of HPRF Maritime IED Research (C)**
- 0900 **Maritime HPRF Source Optimization (C)**
- 0930 **Break**
- 1000 **Maritime CIED HPRF Concept of Employment (C)**
- 1030 **Maritime CIED HPRF Capabilities and Limitations (C)**
- 1200 **Lunch at Renaissance**
- 1230 **Lunch Presentation:**  
**Directed Energy Technology Transition**  
*Dr. Bill Decker*, Defense Acquisition University

## WEDNESDAY AFTERNOON

### BEAM CONTROL

#### Beam Propagation

Renaissance, Port V, Limited Distribution C

Chair: *Mr. Albert Ogloza*, NSWV PHD

- 1330 **Piston Phase Fluctuations in Non-Kolmogorov Turbulent Atmosphere (C)**  
*Jeremy Bos*, Michigan Technological University
- 1400 **Optical Propagation and Ray-Bending in the Atmospheric Surface Layer (A)**  
*Steve Hammel*, SPAWAR Systems Center Pacific

#### Deep Turbulence / BC Algorithms

Renaissance, Port V, Limited Distribution D

Chair: *Dr. Lewis DeSandre*, Naval Postgraduate School

- 1430 **Dynamic Modal Decomposition Applied to the Analysis of Scintillation Measurements of Laser Illuminator Beams (C)**  
*David Dayton*, Applied Technology Associates
- 1500 **Advanced Beam Control Demonstration Program (C)**  
*Jeffrey Barchers*, Nutronics, Inc.
- 1530 **Break**
- 1600 **Deep-Turbulence Wavefront Sensing Using Digital Holography (C)**  
*Samuel Thurman*, Lockheed Martin Coherent Technologies
- 1630 **Digital Holographic Wave-front Sensing in the Presence of Strong Atmospheric Turbulence and Thermal Blooming (A)**  
*Mark Spencer*, AFRL
- 1700 **Adaptive Optics Considerations with Extended Rough Targets (D)**  
*Michael Steinbock*, AFIT

## Conference Overview by Room Assignment

	Tues AM	Tues PM	Wed AM	Wed PM	Thurs AM	Thurs PM	Fri AM
Port I			NON-LETHAL DEW Pg 11	NON-LETHAL DEW Pg 20	NON-LETHAL DEW Pg 27	NON-LETHAL DEW Pg 31	
Port III			SSDLTR Pg 12	SSDLTR Pg 21			
Port V		BEAM CONTROL Pg 3	BEAM CONTROL Pg 8	BEAM CONTROL Pg 15	BEAM CONTROL Pg 24	BEAM CONTROL Pg 30	
Port VII		DE M&S Pg 4	DE M&S Pg 9	DE M&S Pg 18	DE M&S Pg 25		
Port VIII			EMPLOYMENT Pg 10	EMPLOYMENT Pg 19	EMPLOYMENT Pg 26		
Off Site Location	OPENING PLENARY Pg 2	EMPLOYMENT Pg 5	RF DEW Pg 14	RF DEW Pg 23	RF DEW Pg 29	DE M&S Pg 32	CLOSING PLENARY Pg 33
Off Site Location		NON-LETHAL DEW Pg 6	HEL LETHALITY Pg 13	HEL LETHALITY Pg 22	HEL LETHALITY Pg 28		

## WEDNESDAY AFTERNOON

### DE MODELING & SIMULATION

#### Uncertainty Quantification, Verification, and Validation

Renaissance, Port VII, Limited Distribution D

Chair: *Dr. Richard Carreras*, AFRL/RDLE

- 1330 **DALE V&V and Updates (C)**  
*Robin Ritter*, Tau Technologies
- 1400 **Prioritizing Verification and Validation by Quantifying the Value of Decreasing Uncertainties (D)**  
*Linda Lamberson*, AFRL/RDMW
- 1430 **Integration of DAKOTA into AFRL Toolset for Uncertainty Quantification (D)**  
*Richard Carreras*, AFRL/RDLE
- 1500 **Break**
- 1530 **A General Wave Optics Scaling Law Mode (C)**  
*Sami Shakir*, Tau Technologies
- 1600 **SHaRE Modeling and Validation of Irradiance Statistics (F)**  
*Eric Magee*, MZA Associates Corporation
- 1630 **An Efficient Matrix Approach to Optical Wave Propagation (C)**  
*Sami Shakir*, Tau Technologies

## WEDNESDAY AFTERNOON

### EMPLOYMENT OF DE WEAPONS

#### Employment Session III

Renaissance, Port VIII, Open

Chair: *Dr. Douglas Nelson*, Naval Postgraduate School

- 1330 **Predictive Dynamic Digital Holography for Phased Arrays (A)**  
*Steve Gibson*, UCLA
- 1400 **High-Energy Laser Systems Study-Birth to Death of the Photons (A)**  
*James Davis*, Consultant
- 1430 **Battle Field Human Hazard Analysis from Directed Energy Weapons Reflections (A)**  
*Amanda Clark*, USASMDC/ARSTRAT
- 1500 **Break**
- 1530 **Testing of Windows with Antireflective Surface Structures for High Energy Laser Systems in Operational Environments (A)**  
*Lynda Busse*, NRL
- 1600 **High Voltage Breakdown and High Frequency Analysis of Double-Positive Metamaterials (A)**  
*Randy Curry*, University of Missouri
- 1630 **Airborne Integration of High Energy Laser Weapon Systems in the Maritime Environment (A)**  
*Nick Holman*, Naval Postgraduate School

## WEDNESDAY AFTERNOON

### NON-LETHAL DE WEAPONS

#### NL DEW Session III

Renaissance, Port I, Open

Chairs: *Mr. David Law*, JNLWD and *Ms. Ericka Neveu*, American Systems

- 1330 **High Power and Gain S-band and W-band Steerable Antennas (A)**  
*Alexei Smirnov*, RadiaBeam Technologies, LLC
- 1400 **Reduced Size, Weight, and Power Cooling System of Directed Energy Weapons (A)**  
*John Durbin*, The Durbin Group and Thermal Form and Function

## WEDNESDAY AFTERNOON

### SSDLTR

#### Solid State and Diode Lasers

Renaissance, Port III, Limited Distribution D/ Open

Chair: *Ms. LeAnn Brasure*, HEL JTO

- 1330 **Eye-Safe Laser System for LIDAR Applications (D)**  
*Graham Allen*, LLNL
- 1400 **Illuminator Development for High Energy Laser Weapon Systems (C)**  
*David Mordaunt*, Raytheon Space and Airborne Systems
- 1430 **Reliability of a low-SWaP 600W, >50% Efficient Fiber-Coupled Pump-Module (C)**  
*Richard Chin*, Science Research Laboratory, Inc.
- 1500 **Break**
- 1530 **Amplification in Clad Pumped Single Crystal Yb:YAG Fiber (A)**  
*Brandon Shaw*, NRL
- 1600 **High-Brightness, 976 nm Laser Diode Modules for Directed Energy Fiber Laser Pumping (A)**  
*Manoj Kanskar*, nLight

## WEDNESDAY AFTERNOON

### HEL LETHALITY

#### System / Sub-System Test Results

Offsite Location, Secret

Chair: *Mr. Robert Ulibarri*, AFRL/RDLE

- 1300 Buses to Offsite Location
- 1330 Propagation Testing Under Harsh Conditions (D)
- 1400 Dynamic Engagement Testing Setup and Results (F)
- 1430 Test Efforts to Explore DE/KE Combined Effects (F)
- 1500 UAS 8 Hardware in the Loop Testing (D)
- 1530 Break
- 1600 UAS Drone 3 Hardware in the Loop Lethality Testing (D)
- 1630 RAM Materials Interaction Test Results (D)
- 1700 Counter Sensor Lethality

## WEDNESDAY AFTERNOON

### RF DEW WEAPONS

#### RF DEW Session II

Offsite Location, Secret

Chair: *Mr. Ryan Hoffman*, ONR

- 1300 Buses to Offsite Location
- 1345 HPRF System Design and Lab Testing (C)
- 1415 HPRF Counter Maritime IED Delivery System Testing (C)
- 1445 Break
- 1515 HPRF Counter Maritime IED Component Testing (C)
- 1545 HPRF Prototype Testing (C)

## THURSDAY MORNING

### BEAM CONTROL

#### Turbulence Measurements / Characterization

Renaissance, Port V, Limited Distribution D

Chair: *Mr. Albert Ogloza*, NSWCPHD

- 0630 **Breakfast at Renaissance**
- 0700 **Registration at Renaissance**
- 0800 **Image-Based Turbulence Assessment and Atmospheric Mitigation (A)**  
*Kristofor Gibson*, SSC Pacific
- 0830 **NWP-Based Spatiotemporal Estimation of Atmospheric Turbulence in a Near-Surface Horizontal Test Channel at NSWC-DD (C)**  
*Eric Hallenborg*, SPAWAR Systems Center
- 0900 **In-Situ Atmospheric Characterization in Support of LAWS FST, May-June 2014 (A)**  
*Kevin McBryde*, SPAWAR Systems Center
- 0930 **Climatological Vertical Profiles of Optical Extinction and Turbulence in Maritime Environments (A)**  
*Kevin McBryde*, SPAWAR Systems Center
- 1000 **Break**
- 1030 **Compact Turbulence Range for Laboratory Testing of Atmospheric Laser Systems (A)**  
*Jason Schmidt*, MZA Associates Corporation
- 1100 **Atmospheric Turbulence Characterization with Fine Track Sensors (D)**  
*Matthew Whiteley*, MZA Associates Corp
- 1130 **Minimum Field Measurement Requirements for High Energy Laser Testing (C)**  
*Matthew Krizo*, AFIT Center for Directed Energy
- 1200 **Lunch at Renaissance**

## THURSDAY MORNING

### DE MODELING & SIMULATION

#### Physics, Atmospheric, and Weather Considerations

Renaissance, Port VII, Limited Distribution D

Chair: *Dr. Steven Fiorino*, AFIT/ENP

- 0630 **Breakfast at Renaissance**
- 0700 **Registration at Renaissance**
- 0830 **Efficient Energy Conversion Between High Average Power Electron and Laser Beams (A)**  
*Joseph Duris*, UCLA Dept of Physics
- 0900 **High-Fidelity Laser Simulations Using BLAZE Multiphysics (A)**  
*David Carroll*, CU Aerospace
- 0930 **Break**
- 1000 **Developing a Weather Effects Metric/Index Encompassing Turbulence, Extinction, & Thermal Blooming (C)**  
*Steven Fiorino*, AFIT/ENP
- 1030 **Aero-Optics Compensation Modeling in SHaRE (D)**  
*David Goorskey*, MZA Associates Corporation
- 1100 **LightLike: A New Tool for Wave Optics Modeling of Advanced Optical Systems (D)**  
*Steve Coy*, TimeLike Systems
- 1200 **Lunch at Renaissance**

## THURSDAY MORNING

### EMPLOYMENT OF DE WEAPONS

#### Employment Session IV

Renaissance, Port VIII, Limited Distribution C

Chair: *LTC Lou Florence*, U.S. Military Academy

0630 **Breakfast at Renaissance**

0700 **Registration at Renaissance**

0800 **Atmospheric Characterization of the Marine Base Layer for a Submarine Based High Energy Laser (C)**

*Daniel Martell*, Naval Postgraduate School

0830 **Digital Holography Wave-Front Sensing in the Presence of Strong Atmospheric Turbulence (A)**

*Ivan Dragulin*, AFRL

0900 **Phased Beam Projection from Tiled-Aperture Systems with Varying Beam Quality (A)**

*Colleen Gross*, The Ohio State University

0930 **Break**

1200 **Lunch at Renaissance**

## THURSDAY MORNING

### NON-LETHAL DE WEAPONS

#### NL DEW Session IV

Renaissance, Port I, Limited Distribution C

Chairs: *Mr. Herman Pfaeffle* and *Mr. John Schaub*, JNLWD

0630 **Breakfast at Renaissance**

0700 **Registration at Renaissance**

0800 **US Army Solid-State Active Denial Technology (SS-ADT) Program (C)**  
*Edward Robinson*, US Army ARDEC  
RDAR-WSW-A

0830 **US Army Solid State Active Denial Technology (SSADT) System Technologies (C)**  
*Ken Brown*, Raytheon

0900 **Department of Defense's Next-Generation 95 GHz GaN Solid State Sources (C)**  
*Nicholas Kalias*, Raytheon

0930 **Break**

1000 **Micro Tube Heat Exchangers for Advanced Thermal Management of Directed Energy Systems (C)**  
*Michael Meyer*, International Mezzo  
Technologies

1030 **Compact Lightweight Modular Prime Power for Directed Energy Systems (C)**  
*Eric Sandoz*, Toyon Research Corporation

1100 **Ranged Eye-Safe Laser-Induced Flashbang Enabling System (RESLIFE) (C)**  
*Ninad Patnekar*, Physical Optics Corporation

1200 **Lunch at Renaissance**

## THURSDAY MORNING

### HEL LETHALITY

#### Material Interaction / High Fidelity Modeling

Offsite Location, Secret

Chair: *Mr. Darren Luke*, AFRL/RDLE

- 0630 Breakfast at Renaissance
- 0700 Registration at Renaissance
- 0715 Buses to Offsite Location
- 0800 HEL Lethality of Carbon Fiber Reinforced Composites: Mechanism and Model (D)
- 0830 Modeling Hole Growth in Metals (C)
- 0900 Army UAS Fiberglass Testing (D)
- 0930 Combined DE/KE Effects Modeling Phase I (F)
- 1000 Break

#### Test Facilities, Instrumentation, Diagnostics and Techniques

Chair: *Mr. David Lyman*, LEIDOS

- 1020 Dynamic Engagement Diagnostic (D)
- 1045 Results of the Recent Engineering Flight and AFRL/RDLE Diagnostic Pod Supporting DLWS (F)
- 1110 Calibration of the Beam Irradiance on Target System (C)
- 1135 HEL Beam Diagnostic Results using Thermal Plates (D)
- 1200 Lunch at Renaissance

## THURSDAY MORNING

### RF DEW WEAPONS

#### RF DEW Session III

Offsite Location, Secret

Chair: *Dr. Donald Shiffler*, AFRL/RDH

- 0630 Breakfast at Renaissance
- 0700 Registration at Renaissance
- 0715 Buses to Offsite Location
- 0800 Payload Military Utility Analysis (C)
- 0830 Effectiveness of a Wideband, Photoconductive, Switch-Based High-Power-Microwave Source for Counter-Electronics Applications (D)
- 0900 Photoconductive Switch-Based High-Power Microwave Sources: Technology and Capabilities (D)
- 0930 Break
- 1000 Microwave Electronic Air Defense (MEAD) (C)
- 1030 HPM Susceptibility of Low-Cost UAVs (D)
- 1100 Design and Simulation of a Giga-Watt Class Relativistic Inverted Magnetron (A)
- 1200 Lunch at Renaissance



## THURSDAY AFTERNOON

### BEAM CONTROL

#### Tiled & Phased Array

Renaissance, Port V, Limited Distribution D

Chair: *Mr. Jeff Barchers*, Nutronics, Inc

1330 **Update: High-Power Adaptive Directed Energy System (HADES) (D)**

*Dan Marker*, AFRL/RDL

1400 **Towards Performance Evaluation of Fiber-array Technology in Marine Boundary Layer Conditions: Overview of DARPA/MTO SeaHawk Effort (D)**

*Mikhail Vorontsov*, Optonicus LLC

1430 **Conformal Phased Array Field Test Results (C)**

*Jeffrey Barchers*, Nutronics, Inc.

1500 **Determination of Near Optimum Illuminator Positions for Multi-Aperture and Multi-Illuminator Coherent Imaging Systems Using Non-Iterative Phasing Techniques (D)**

*Jeffrey Kraczek*, University of Dayton

1530 **Break**

1600 **Adaptive Phase-Locked Fiber Array Controller Platform (A)**

*Jony Liu*, ARL

1630 **Design of Compact Non-Cooled Fiber Laser Array with 100% Throughput and 70% Efficiency of Focusing into Diffraction Limited Spot (C)**

*Leonid Beresnev*, ARL

## THURSDAY AFTERNOON

### NON-LETHAL DE WEAPONS

#### NL DEW Session V

Renaissance, Port I, Limited Distribution C

Chair: *Mr. Herman Pfaeffle and Mr. John Schaub*, JNLWD

1330 **GEOST's Non-Lethal Laser Induced Plasma Effects (C)**

*Michael Butterfield*, GEOST

1400 **High Voltage Breakdown and High Frequency Analysis of Double-Positive Metamaterials (C)**

*Randy Curry*, University of Missouri

1430 **High Energy Density Nanodielectric Capacitors for Directed Energy Systems (C)**

*Randy Curry*, University of Missouri

1500 **Break**

1530 **Design of a Multifrequency HPM Array for Advanced Directed Energy Applications (C)**

*Randy Curry*, University of Missouri

1600 **PolyStrata: Affordable Millimeter Wave Beam Steering Modules (C)**

*Jean-Marc Rollin*, Nuvotronics, Inc.

1630 **Vessel Stopping Prototypes (VSP) Electromagnetic (EM) Modeling and Simulation (M&S) Results (C)**

*Willie Catoe*, NSWC Dahlgren

## THURSDAY AFTERNOON

### DE MODELING & SIMULATION

#### Engagement, Mission, and Campaign Assessments

Offsite Location, Secret

Chair: *Mr. Daniel Selph*, MEI Technologies

- 1300 Buses to Offsite Location
- 1330 Adding Advanced Technology Capabilities into Campaign Modeling & Simulation (D)
- 1400 DoD Efforts in High Energy Laser (HEL) Propagation: A Study of HEL Simulation Programs and the Need for Further Experiments (D)
- 1430 Kinetic and Directed Energy Weapons Working Together - An Example Analysis of Collaborative Employment at the Mission Level (D)
- 1500 Break
- 1530 ACE 15 Overview (D)
- 1600 Extended Airborne Target Engagement Range of Future AAMs Using LADAR Updates (D)

## FRIDAY MORNING

### JOINT SESSION

#### Wrap-Up Plenary

Secret Session, Offsite Location

- 0630 Breakfast at Renaissance
- 0700 Registration at Renaissance
- 0700 Buses to Offsite Location
- 0800 Beam Control Conference (D)
- 0830 SSDLTR (D)
- 0900 Employment Conference (D)
- 0930 Break
- 1000 HEL Lethality Conference (D)
- 1030 Modeling and Simulation Conference (D)
- 1100 RF DE Weapons Workshop (D)
- 1130 Non-Lethal Weapons Conference (D)
- 1200 Symposium Adjourns

# Symposium Organizing Committee

## Symposium Chairs

*James Horkovich, Gen Michael Hostage, USAF (Ret)*

## Beam Control Conference

*Al Ogloza, David Loomis*

## DE Modeling and Simulation Conference

*Dustin Culbertson*

## Employment of DE Weapons

*David Kashinski, Lou Florence, Dan Marker*

## High Energy Laser Lethality Conference

*J. Thomas Schriempf, Christopher Lloyd, Dave Loomis*

## Non-Lethal Directed Energy Weapons Systems and Enabling Technologies Conference

*David Law*

## RF DE Weapons Workshop

*Donald Shiffler, Ryan Hoffman, Mark Rader*

## Solid State and Diode Laser Technology Review

*David Mordaunt, LeAnn Brasure, Timothy Newell*

## Symposium Coordinator/ Short Courses

*Cynnamon Spain*

## Security, Registration and Receipts

*Tiffany Bjelke*

**Directed Energy Professional Society**

**7770 Jefferson Street NE, Suite 440**

**Albuquerque, NM 87109**

**Tel: 505-998-4910**

**Fax: 505-998-4917**

**[www.deps.org](http://www.deps.org)**