

Technical Program



Directed Energy Systems Symposium

12 - 16 September 2016
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 presentations 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: 0715 to 1730

Wednesday - Thursday: 0730 to 1730

Friday: 0715 to 1230

Please note: The buses will not be able to travel back to the hotel from the offsite facility after the final speaker for each session 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 12 SEPTEMBER

Morning Courses

- 1: Introduction to High Energy Laser Systems
Renaissance, Holley I
- 2: Introduction to RF Systems (Limited D)
Renaissance, Holley II
- 3: An Intuitive Introduction to the Physics of High Energy Lasers (Limited C)
Renaissance, Jefferson

All Day Course

- 4: Introduction to Laser Beam Quality Measures
Renaissance, Madison
- 5: Tri-Service HEL Lethality Testing & Modeling
Renaissance, Holley IV

Afternoon Course

- 6: Laser Deconfliction (Limited C)
Renaissance, Holley III
- 7: Transitioning DE Technology to the Warfighter
Renaissance, Holley I
- 8: Testing High Power Radio Frequency Weapon Systems (Limited C)
Renaissance, Holley II

DE Outreach and DE2DC Planning Meeting

Tuesday, 13 September

1630-1730

Jefferson Room, Renaissance Hotel

TUESDAY MORNING

JOINT SESSION

Opening Plenary

Offsite Location

- 0630 **Breakfast and Registration at Renaissance**
- 0715 **Buses to Off Site Location**
- 0800 **Welcome and Security Notes**
Dr Howard Meyer, Symposium Chair
- 0805 **Army Program Updates**
MG Bo Dyess, Army Capabilities Integration
- 0840 **Navy Program Updates**
RADM Nevin Carr, US Navy (ret), former Chief of Naval Research
- 0915 **Air Force Program Updates**
Dr Kelly Hammett, Air Force Research Laboratory
- 0950 **Break**
- 1020 **JFlame Project Brief**
Mr Scott Boyd, Naval Surface Warfare Center DD
- 1050 **Updates to the Joint Non-Lethal Weapons Program's Next Generation Non-Lethal Directed Energy Weapons Portfolios**
Dr David B. Law, Joint Non Lethal Weapons Program Office
- 1120 **DE Summit Outbrief**
Mr Joe Shepard, Booz Allen Hamilton
- 1150 **Buses Depart for Hotel**
- 1200 **Lunch at Renaissance**

TUESDAY AFTERNOON

JOINT SESSION

Employment / HEL Systems / M&S Conference - Technology Transitions

Renaissance, Holley IV, Limited Distribution D

Chairs: *Dan Marker, Air Force Research*

Laboratory/RDLT and

Douglas Neson, Naval Postgraduate School

- 1330 **Application of System and Integration Readiness Levels to Department of Defense Research and Development (A)**
Sean Ross, Air Force Research Laboratory/RDLA & SAF/AQR

- 1400 **Investigation and Selection of Inert Substitutes for the Energetic Content of Munitions in High Energy Laser Effects Research (A)**

Jordan Johnson, Department of Chemistry and Life Science

- 1430 **The Effects of Rotation and Inert Thermal Sinks on the Laser Heating of Cold Rolled Steel (A)**
Daniel Mauldin, US Military Academy

- 1500 **Break**

- 1530 **A Systems Engineering Approach to the Employment of High Energy Lasers (HELs) in a Multi-Platform Engagement Scenario (D)**
Erika Urena, Naval Postgraduate School

- 1600 **Tactical Energy Management To Enable Operational Employment of Directed Energy Weapons (D)**
Eric Schroeder, Naval Surface Warfare Center DD

- 1630 **Initial Operational Employment of Directed Energy Weapons: the Review and Approval Process as an Acquisition Aid (D)**
Dennis Monahan, Booz Allen Hamilton

- 1700 **Progress towards DE Joint Munitions Effectiveness Manuals (JMEm) (C)**
Bryan Knott, Naval Surface Warfare Center DD

- 1730 **Exhibitor Reception at Renaissance**

TUESDAY AFTERNOON

DE MODELING & SIMULATION

Full Kill Chain M&S

Renaissance, Portsmouth VI-VIII,

Limited Distribution D

Chair: *Noah Van Zandt*, Air Force Institute of Technology

- 1330 **Using Climatology and/or Numerical Weather Model Data to Characterize Ground-Based HEL Performance (C)**
Steven Fiorino, Air Force Institute of Technology/ENP
- 1400 **Imaging and Tracking Modeling including Earth Reflection and Multiple Scattering (C)**
Noah Van Zandt, Air Force Institute of Technology/ENP
- 1430 **Preliminary EO/IR Image Synthesis Results for the HyDRA Increment 1 Study (D)**
Richard Carreras, Air Force Research Laboratory /RDLEM
- 1500 **Break**
- 1530 **Synthetic Scene Generation for Active Tracking**
Jonathan Stohs, Air Force Research Laboratory /RDLT
- 1600 **Tactical Rule Based Entity Controller (TRBEC) Overview (D)**
Brian Hughes, Air Force Research Laboratory /RDMW (AEgis Technologies)
- 1630 **Modeling the High Energy Laser Heating of a Rotating Target (D)**
Tsu Kreidler, US Military Academy
- 1730 **Exhibitor Reception at Renaissance**

TUESDAY AFTERNOON

DE TEST & EVALUATION AND RF SYSTEMS

DE T&E Conference Session

Renaissance, Madison, Limited Distribution C

Chair: *Steve Conyne*, AEgis Technologies, Inc.

- 1330 **HEL Field Test Forensic Analysis Using High Fidelity Laser Propagation Scaling Law Model and V&V - Atmospheric Characterization Code (C)**
Kathryn O'Connor, Air Force Institute of Technology/ENP
- 1400 **Measuring Currents Inside a Computer Under Attack Using the Differential-Mode Optically-Based Current Sensor (DOCS) (C)**
Jeffrey Schleher, American Systems
- 1430 **Test Capabilities of the Compact Hard Tube Vircator (CHTV) (C)**
Joseph DelGrande, Trovar Engineering
- 1500 **Break**
- 1530 **Lifetime Testing of High Energy Density Metalized Film Capacitors (A)**
Seth Miller, Sandia National Laboratories

RF Systems Conference Session

Renaissance, Madison, Limited Distribution C

Chair: *Jacob Walker*, Naval Surface Warfare Center DD

- 1600 **Simulation and Testing of a Dielectric Waveguide Lens for a High Power, Wide Bandwidth L-Band Antenna (C)**
Randy Curry, University of Missouri
- 1730 **Exhibitor Reception at Renaissance**

TUESDAY AFTERNOON

NON-LETHAL DE WEAPONS

NLDEW Conference Session

Offsite Location

Chair: *David Law*, Joint Non-Lethal Weapons Directorate

- 1315 Buses to Offsite Location
- 1330 (U) RF/HPM Vehicle Stopper Project Updates (Secret/D)
- 1400 (U) RF/HPM Vessel Stopping Project Updates (Un/E)
- 1430 (U) JNLWD RF/HPM & Other NLDEW Technologies (Portfolio) Overview (Un/D)

DE Outreach and DE2DC Planning Meeting

Tuesday, 13 September
1630-1730

Jefferson Room, Renaissance Hotel

WEDNESDAY MORNING

DE MODELING & SIMULATION

Weather & Atmospheric

Renaissance, Portsmouth VI-VIII,
Limited Distribution C

Chair: *Eric Hallenborg*, SPAWAR Systems Center

- 0630 Registration and Breakfast at Renaissance
- 0800 Validation of Modeling & Simulation Predictions using ATLAS Field Test Results (A)
Jack McCrae, Air Force Institute of Technology /ENP
- 0830 Weather Cubes and 4D Visualizations of Atmospheric and Radiative Effects (C)
Steven Fiorino, Air Force Institute of Technology/ENP
- 0900 A Three-Dimensional Global Aerosol Climatology from Satellite Lidar Observations for Directed Energy Applications (A)
James Campbell, Naval Research Laboratory
- 0930 Break
- 1000 An Examination of Tatarskii-Based Tropospheric Cn2 Models Using NWP and Radiosondes (C)
Stephen Hammel, SPAWAR Systems Center
- 1030 Assessment of Cn2 Turbulence Models using High Frequency Airborne Measurements (C)
Eric Hallenborg, SPAWAR Systems Center
- 1100 Development of Instrumentation for Dynamic Atmospheric Characterization (C)
Oswaldo Alvarenga, Naval Air Warfare Center, Weapons Division
- 1200 Lunch at Renaissance
- 1245 Poster Session

WEDNESDAY MORNING

NON-LETHAL DE WEAPONS

NLDEW Conference: Session I

Renaissance, Amphitheater, Open

Chairs: *Scott Griffiths*, Naval Surface Warfare Center and *Matt Ketner*, Joint Non-Lethal Weapons Directorate

0630 **Breakfast and Registration at Renaissance**

0800 **Status Update “High Power Density Solutions for Directed Energy Systems” (A)**
Hernando Munevar, Candent Technologies Inc.

0830 **Toyon Research Corporation’s Compact Lightweight Modular Prime Power for Directed Energy Systems (A)**
Eric Sandoz, Toyon Research Corp.

0900 **Next-Generation Thermal Management Systems for Directed Energy Weapons (A)**
John Durbin, Durbin Group

0930 **Break**

1000 **An Integrated Human Test Surrogate to Assess Injury Risk and Measure Non-Lethal Exposure (A)**
Keith Sedberry, CFD Research Corporation

1030 **Next-Generation Compact Active Denial System (A)**
Randy Woods, Naval Surface Warfare Center DD

1100 **Agile-Beam High-Power Microwave Antennas Enabled by Reconfigurable Metasurfaces (A)**
Douglas Werner, Penn State University

1200 **Lunch at Renaissance**

1245 **Poster Session**

WEDNESDAY MORNING

INTEL

Intel Session

Offsite

Chair: *Colin Smith*, WSSIC Directed Energy Weapon Subcommittee

0630 **Breakfast and Registration at Renaissance**

0730 **Buses to Offsite Location**

0800 **Worldwide Laser Weapon Developments**

0900 **Worldwide Radio Frequency Weapon Developments**

INVITED PRESENTATIONS

Offsite

Chair: *Mark Neice*, DEPS

1030 **NASA’s Optical Communications Program for 2017 and Beyond**
Dr Don Cornwell, NASA

1100 **Invited Talk**
RADM Manazir, OPNAV Warfare Systems

1130 **Breakthrough Starshot: A Technology Challenge for the 21st Century**
Dr Bob Fugate, retired

1200 **Lunch at Renaissance**

1245 **Poster Session**

WEDNESDAY LUNCH

POSTER SESSION

Lunchtime Open Poster Session

Renaissance Upstairs Hallway, Open

1245-1330

Power and Thermal Challenges in the Integration of Laser Weapon Systems for DoD Platforms (A)

Sean Ross, Air Force Research Laboratory/RDLA (SAF/AQR)

Integration and System Readiness Levels (A)

Sean Ross, Air Force Research Laboratory/RDLA (SAF/AQR)

Agile-Beam High-Power Microwave Antennas Enabled by Reconfigurable Metasurfaces (A)

Douglas Werner, Penn State University

Tuneable Optically Paired Source - Vector Modulator for Active Denial Technologies (A)

Jonathon Jerothe, University of Delaware

A Dual-Frequency, Folded-Topology, Dielectric Waveguide Lens Antenna (A)

Randy Curry, University of Missouri

Evidence and Implications of Differences in Optical Turbulence Behavior on Opposite Coastal Environments (A)

William Bourque, US Naval Academy

WEDNESDAY AFTERNOON

JOINT SESSION

Employment and HEL Systems

Renaissance, Holley IV, Limited Distribution D

Chair: *Dan Marker*, Air Force Research Laboratory /RD and *Walter Fink*, HEL JTO

1330 Self Protect High Energy Laser Demonstration (SHIELD) Program (D)

Richard Bagnell, Air Force Research Laboratory

1355 SMDC High Energy Laser Mobile Test Truck's Participation in MFIX-16 (C)

Adam Aberle, US Army SMDC/ARSTRAT

1420 Solid State Laser Technology Maturation Program Overview

Ron Flatley, Naval Surface Warfare Center DD

1445 Availability Analysis of LaWS after 2 Years Onboard the PONCE

Jason Bickford, NAVSEA

1510 Break

1540 Top 5 ATL Lessons for the HEL Gunship (D)

Bryan Kelchner, Teknikare, Inc.

1605 High Power Adaptive Directed Energy System (HADES) Performance Projections for HEL Weapon Systems (C)

Jeffrey Barchers, Nutronics, Inc.

1630 J-FLaME Joint Test Laser Weapon TTP—Integrating Directed Energy Lasers into the Joint Battlespace (D)

David Frost, J-FLaME Joint Test

1655 Operationalizing Directed Energy (A)

David Stoudt, Booz Allen Hamilton, Inc.

WEDNESDAY AFTERNOON

DE MODELING & SIMULATION

Atmospheric Propagation

Renaissance, Portsmouth VI-VIII,

Limited Distribution D

Chair: *Rich Carreras*, Air Force Research Laboratory /RDLEM

- 1330 **Scaling for High Energy Laser and Relay Engagements (SHaRE) Verification and Validation (C)**
Eric Magee, MZA Associates
- 1400 **A Rapid Method for Accurate Modeling of HEL Propagation (D)**
Sami Shakir, Tau Technologies
- 1430 **Scaling for High Energy Laser and Relay Engagements (SHaRE) API Integration with Galaxy Simulation Builder (GSB) (D)**
Eric Magee, MZA Associates
- 1500 **Break**
- 1530 **Wave Optics Modeling of Laser Systems Using DE HSAI Supercomputing Capabilities (C)**
Steve Coy, Timelike Systems
- 1600 **Equivalent Beam Concept for General Wave-Propagation Scaling Law Modeling (D)**
Sami Shakir, Tau Technologies
- 1630 **DALE Overview and Updates (C)**
Alan Andrews, Tau Technologies

WEDNESDAY AFTERNOON

OPTICAL COMMUNICATIONS

Free Space Optical Communications I

Renaissance, Madison, Limited Distribution D

Chair: *Jim McNally*, Applied Technology Associates

- 1330 **General Overview of Developments and Programs for Free Space Optical Communications (FSOC) (D)**
Jim McNally, Applied Technology Associates
- 1400 **An Optical Communication Terminal for Small Spacecraft (D)**
Matthew Hansen, MIT Lincoln Laboratory
- 1430 **A Teletenna Concept for Deep-Space Hybrid Optical and Microwave Communications (A)**
Robert Romanofsky, NASA Glenn Research Center
- 1500 **Break**
- 1530 **Design Approach to Stabilized Platforms for Deep Space Optical Communications (D)**
Nick Jacka, Applied Technology Associates
- 1600 **Integration of Geographic Information System Data for Atmospheric Turbulence Modeling (D)**
Paul Shubert, Applied Technology Associates

WEDNESDAY AFTERNOON

NON-LETHAL DE WEAPONS

NLDEW Session II

Renaissance, Amphitheater, Limited Distribution C

Chair: *David Law*, JNLWD and *Scott Griffiths*, Naval Surface Warfare Center

1330 **Self-Contained, Directed, Solid-State Driven High Power Microwave (HPM) System Based on Phased-Array Antenna Architecture (C)**

Hoon Ahn, Wireless Technology Associates Inc.

1400 **HPRF Waveform Development Experimentation Process (C)**

Matt McQuage, Naval Surface Warfare Center DD

1500 **High Energy Density Nanodielectric Capacitors for Directed Energy Systems (A)**

Randy Curry, University of Missouri

1530 **Compact High Power, NanoDielectric Microwave Antenna for Man Power Systems (A)**

Randy Curry, University of Missouri

WEDNESDAY AFTERNOON

EMPLOYMENT

Employment Session

Offsite Location

Chair: *Douglas Nelson*, Naval Postgraduate School

1315 **Buses to Offsite Location**

1330 **A History of the Development and Use of Radio Frequency Weapons (D)**

1400 **Integration of a Laser Weapon System into the Battlefield - Analysis of a HEL Ground Capability against Unmanned Aerial System (UAS) Raid Vignette (D)**

1430 **Airborne High Energy Laser Phase II Study (D)**

1500 **Break**

1530 **Aero-Effects for Aircraft Laser Systems (D)**

1600 **C-130 Aero-Optic Estimates from AAOL, AAOL-T, & ABC Data (D)**

1630 **Dynamic Disturbances for Airborne Laser Turrets (D)**

Conference Overview by Room Assignment

| | Tues AM | Tues PM | Wed AM | Wed PM | Thurs AM | Thurs PM | Fri AM |
|-------------------------------|-------------------------------------|--|--|-------------------------------------|-------------------------------------|------------------------------------|--------------------------------------|
| Holley IV | | JOINT SESSION Pg 5 | | JOINT SESSION Pg 13 | HEL SYSTEMS Pg 24 | HEL SYSTEMS Pg 31 | |
| Portsmouth VI-VIII | | DE M&S Pg 6 | DE M&S Pg 9 | DE M&S Pg 14 | DE M&S Pg 21 | | |
| Amphitheater | | | NON-LETHAL DEW Pg 10 | NON-LETHAL DEW Pg 16 | NON-LETHAL DEW Pg 26 | | |
| Madison | | T&E and RF DEW Pg 7 | | OPTICAL COMM Pg 15 | OPTICAL COMM Pg 25 | USPL Pg 32 | |
| Lee | | | | | DE M&S Pg 22 | DE M&S Pg 30 | |
| Jefferson | | | | | EMPLOY- MENT Pg 23 | | |
| Offsite Location | OPENING PLENARY Pg 4 | | INTEL and INVITED Pg 11 | EMPLOY- MENT Pg 17 | USPL Pg 28 | DE M&S Pg 33 | CLOSING PLENARY Pg 35 |
| Offsite Location | | NON-LETHAL DEW Pg 8 | | HEL LETHALITY Pg 20 | HEL LETHALITY Pg 27 | HEL LETHALITY Pg 34 | |

WEDNESDAY AFTERNOON

LETHALITY

System/Sub-System Test Results

Offsite Location

Chair: *Steven Baird, SMDC*

- 1315 **Buses to Offsite Location**
- 1330 **Dynamic Lethality Testing of Small UAVs (F)**
- 1400 **Laser Vulnerability Testing and Modeling of a Group 1 UAS**
- 1430 **Small UAV Lethality Overview (F)**
- 1500 **Break**
- 1530 **Small UAV Tailboom Lethality Evaluations (F)**
- 1600 **HEL Lethality of Carbon Fiber Materials (F)**

THURSDAY MORNING

DE MODELING & SIMULATION

CFD for Aero-Optics Effects

Renaissance, Portsmouth VI-VIII,

Limited Distribution D

Chair: *Scott Sherer, Air Force Research Laboratory /RQVA*

- 0700 **Breakfast and Registration at Renaissance**
- 0800 **Design of a Water Table for Qualitative Flow Visualization around a Hemispherical Turret (D)**
William Koehrsen, Air Force Research Laboratory/RDLEM
- 0830 **CFD Simulation of Canonical Hemispherical Turret (D)**
David Weston, Air Force Research Laboratory
- 0900 **CFD Analysis of a Canonical Shape (D)**
Michael Frede, Air Force Research Laboratory /RQVA
- 1200 **Lunch at Renaissance**
- 1245 **Poster Session**

THURSDAY MORNING

DE MODELING & SIMULATION

Modeling and Simulation Showcase

Renaissance, Lee, Limited Distribution D

- 0700 **Breakfast and Registration at Renaissance**
- 0800 **AFIT Tools: High Energy Laser End-to-End Operational Simulation (HELEEOS), Laser Environmental Effects Definition and Reference (LEEDR), Physics-based Imaging and Tracking of Ballistics, UAVs, and LEO Satellites (PITBUL)**
Steve Fiorino, Air Force Institute of Technology
- 0930 **Break**
- 0945 **High Energy Laser Consolidated Modeling Engagement Simulation (HELCOMES)**
Stan Patterson, USARMY RDECOM AMRDEC
- 1045 **Break**
- 1100 **High Energy Laser System End-to-End Model (HELSEEM)**
Robin Ritter, Tau Technologies
- 1200 **Lunch at Renaissance**
- 1245 **Poster Session**

THURSDAY MORNING

EMPLOYMENT

Atmospheric Phenomena

Renaissance, Jefferson, Limited Distribution D

Chair: *Douglas Nelson, Naval Postgraduate School*

- 0700 **Breakfast and Registration at Renaissance**
- 0800 **Compensation in the Presence of Deep Turbulence Using Tiled-Aperture Architectures (C)**
Mark Spencer, Air Force Research Laboratory/RDLTS
- 0830 **Digital Holography Wave-Front Sensing in the Presence of Deep Turbulence (A)**
Matthias Banet, Air Force Research Laboratory/RDLTS
- 0900 **Effects of Beacon Anisochromatism on HEL Performance (A)**
Colleen Gross, Air Force Research Laboratory
- 0930 **Break**
- 1000 **Naval Postgraduate School SE and NAVAIR Point Mugu Near Maritime Atmospheric Optical Turbulence Measurement Technique (D)**
Douglas Nelson, Naval Postgraduate School
- 1030 **Evidence and Implications of Differences in Optical Turbulence Behavior on Opposite Coastal Environments (A)**
William Bourque, US Naval Academy
- 1100 **Development of System Level Performance Requirements for Airborne High Energy Laser Weapon Systems in the Maritime Environment (D)**
Nicholas Holman, Naval Postgraduate School
- 1200 **Lunch at Renaissance**
- 1245 **Poster Session**

THURSDAY MORNING

HEL SYSTEMS

Atmospheric Propagation and Performance in Harsh Environments and Laser System Integration

Renaissance, Holley IV, Limited Distribution D

Chair: *David Mordaunt*, Raytheon

0700 **Breakfast and Registration at Renaissance**

0800 **Enhanced LOCSET/IPALS Array Tilt Correction Using a Local Phasing Loop (D)**
Milo Hyde, Air Force Institute of Technology

0825 **Real-Time Turbulence Characterization for Laser Fire Control and Optimized Beam Control (D)**
Matthew Whiteley, MZA Associates Corporation

0850 **Predictive Adaptive Optics Control with Aero-Optical Mitigation (D)**
Adam Smith, MZA Associates Corporation

0915 **Status and Updates for the Advanced Beam Control Demonstration Program (C)**
Jeffrey Barchers, Nutronics, Inc.

0940 **Break**

1010 **Real-Time Atmospheric Imaging and Processing for HEL Targets Acquisition and Tracking (A)**
Jony Liu, US Army Research Laboratory

1035 **The Application of New Generation Fuel Cells to Power DE Weapons Systems**
William Smith, Infinity Fuel Cell and Hydrogen, Inc.

1100 **ZAP IT/MATRIX Field Testing of Five Coherently Combined Lasers (C)**
Patrick Saunders, Air Force Research Laboratory/RD

1125 **Power and Thermal Challenges in the Integration of Laser Weapon Systems for DoD Platforms**
Sean Ross, Air Force Research Laboratory/RDLA (SAF/AQR)

1200 **Lunch at Renaissance**

1245 **Poster Session**

THURSDAY MORNING

OPTICAL COMMUNICATIONS

Free Space Optical Communications II

Renaissance, Madison, Limited Distribution D

Chair: *Robert Romanofsky*, NASA Glenn Research Center

0700 **Breakfast and Registration at Renaissance**

0800 **An Economic Assessment of an Optical Array versus a Monolithic Telescope Ground Station for Deep-Space Communications (A)**
Robert Romanofsky, NASA Glenn Research Center

0830 **Free-Space Optical Datalink Network System (D)**
Jiang Liu, AMRDEC

0900 **Laser Communication as a Secure, High Bandwidth Airborne Communication Link (A)**
Lester Begg, General Atomics-Aeronautical Systems Inc.

0930 **Break**

1000 **System Design of Low SWaP Optical Terminals for Free Space Optical Communications (D)**
Paul Shubert, Applied Technology Associates

1030 **Design Approach to Stabilized, Compact Gimbals for Space-Based Free Space Optical Communications (D)**
Andrew Cline, Applied Technology Associates

1200 **Lunch at Renaissance**

1245 **Poster Session**

THURSDAY MORNING

NON-LETHAL DE WEAPONS

NLDEW Session III

Renaissance, Amphitheater, Limited Distribution C

Chairs: *David Law*, Joint Non-Lethal Weapons Directorate and *Scott Griffiths*, Naval Surface Warfare Center

0700 **Breakfast and Registration at Renaissance**

0800 **Updates to Radiabeam High Power and Gain S-band and W-band Steerable Antennas (C)**

Alexei Smirnov, Radiabeam

0830 **Solid-State Active Denial Technology (SSADT) Autonomous Module with Enhanced Electronic Steering Program (C)**

Ken Brown, Raytheon Rancho Innovations

0900 **High Power Radio Frequency Collaboration with United Kingdom for Vehicle & Vessel Stopping (C)**

Matt McQuage, Naval Surface Warfare Center DD

0930 **Break**

1000 **Ranged Eye-Safe Laser Induced Flashbang Enabling System (RESLIFE) (C)**

Ninad Patnekar, Physical Optics Corporation

1030 **Updates to GEOST's Non-Lethal Laser Induced Plasma Effects (C)**

Mike Butterfield, GEOST

1100 **Updates to and Uses for the Pre-Emplaced Electric Vehicle Stopper (PEVS) Prototypes (A)**

Joshua Pompeii, Naval Surface Warfare Center DD

1200 **Lunch at Renaissance**

1245 **Poster Session**

THURSDAY MORNING

LETHALITY

Lethality - Lethality Topics

Offsite Location

Chair: *J. Thomas Schriempf*, NAVSEA

0700 **Breakfast and Registration at Renaissance**

0730 **Buses to Offsite Location**

0800 **Utilizing M&S in Support of HEL Lethality Testing for Specular Reflection and Hazard Prediction (D)**

0830 **Generic Rules of Thumb for Employing a High Energy Laser Weapon (D)**

0900 **Remote Neutralization of Homemade Explosives with High Energy Lasers (D)**

0930 **Break**

1000 **US Army HEL Counter-RAM Program (D)**

1030 **Solid State Laser Testbed Beam Diagnostics (C)**

1100 **SSLT Dynamic Scoring: Upgrades and Performance Results**

1130 **High Energy Laser Vulnerability Analysis of Anti-Ship Cruise Missile (D)**

1200 **Lunch at Renaissance**

1245 **Poster Session**

THURSDAY MORNING

ULTRA SHORT PULSE LASERS

USPL Session

Offsite Location

Chair: *Ryan Hoffman*, Office of Naval Research

0700 Breakfast and Registration at Renaissance

0730 Buses to Offsite Location

0800 ALPER Program Overview (C)

0830 Laser Induced Emission Dependence on Laser Parameters (C)

0900 Characterization of Wideband Laser Induced Emissions (C)

0930 Break

1000 Laser Induced Emission Dependence on Material Sample Properties (C)

1030 Laser Induced Emission Effects Modeling (C)

1200 Lunch at Renaissance

1245 Poster Session

THURSDAY LUNCH

POSTER SESSION

Lunchtime Limited Distribution Poster Session

Renaissance, Lee Room, Limited Distribution D
1245-1330

A Systems Engineering Approach to the Employment of High Energy Lasers (HELs) in a Multi-Platform (D)

Erika Urena, Naval Postgraduate School

Tactical Energy Management To Enable Operational Employment of Directed Energy Weapons (D)

Eric Schroeder, Naval Surface Warfare Center DD

2017 DEPS EVENTS

19th Annual Symposium
13-17 February
Huntsville, Alabama

DE2DC Annual Showcase
27 -31 March
Washington DC

US-UK DE Workshop
12-16 June
Shrivenham UK

DEPS Systems Symposium
25 -29 September
Monterey, California

THURSDAY AFTERNOON

DE MODELING AND SIMULATION

Modeling and Simulation Showcase

Renaissance, Lee, Limited Distribution D

- 1330 **Integrated Weapons Environment for Analysis (IWEA)**
Michael Murphy and John Becker, Air Force Research Laboratory /RDMW
- 1500 **Break**
- 1530 **Effectiveness Tool Box (ETB)**
Bryan Knott, Naval Surface Warfare Center DD

THURSDAY AFTERNOON

HEL SYSTEMS

Major Beam Control Systems, Experiments, and Demonstrations

Renaissance, Holley IV, Limited Distribution D

Chair: *David Loomis, DNL Consulting*

- 1300 **Aero-Optical Fixed Wing Demonstrator (AeroFWD) (D)**
Matthew Whiteley, MZA Associates Corporation
- 1330 **High Agility Beam Director (D)**
Jeff Maloney, L3 - Brashear
- 1400 **Compact, Ruggedized Off-Axis Beam Expander (D)**
Jeff Maloney, L3 - Brashear
- 1430 **Dynamic Acquisition For HEL Integration (DAFHI) Project - First Year Assessment and Findings (D)**
Timothy Wolfe, Air Force Research Laboratory, Laser Technology Branch
- 1500 **Break**
- 1530 **Dynamic Disturbances for Airborne Laser Beam Turrets (D)**
Lawrence Sher, Wind Mountain Research Associates
- 1600 **Development of Fast Adaptable Narrow Beam HEL Transmitter (C)**
Anthony Valenzuela, US Army Research Laboratory
- 1630 **Evaluation of the Navigation-Capable Inertial Reference Unit (C)**
Even Threlkeld, Air Force Research Laboratory

THURSDAY AFTERNOON

ULTRA SHORT PULSE LASERS

USPL Session

Renaissance, Madison, Limited Distribution C

Chair: *Ryan Hoffman*, Office of Naval Research

- 1330 **Measurements of Nonlinear Laser Propagation through Distributed Turbulence (C)**
Greg DiComo, Naval Research Laboratory
- 1400 **Simulations of AO Operation on Laser Propagation in the Near-IR and Mid-IR (C)**
Joe Penano, Naval Research Laboratory
- 1430 **Short-Pulse CO₂ Laser Modeling (C)**
Luke Johnson, Naval Research Laboratory
- 1500 **Interaction of Electromagnetic Energy with USPL Induced Plasma (C)**
Brittany Lynn, SPAWAR Systems Center Pacific

THURSDAY AFTERNOON

DE MODELING AND SIMULATION

Wargaming & Mission Analysis

Offsite Location

Chair: *Ross Dudley*, AEGIS Technologies

- 1315 **Buses to Offsite Location**
- 1330 **Advanced Concepts Event 2017 (ACE-17) and 3D DE Models for AFSIM Mission Level Virtual M&S (D)**
- 1400 **Microwave Electromagnetic Air Defense (MEAD) Update (C)**
- 1430 **ATL Performance Modeling and Predictions (D)**
- 1500 **Break**
- 1530 **High Power Electromagnetic Weapons Modeling in the AFSIM Framework (C)**
- 1600 **Mission-Level HEL Implementation in the Kill Chain for Area Defense (D)**
- 1630 **Hybrid Defense of Restricted Airspace (HyDRA) HEL Engagement Analysis Preliminary Results (D)**

THURSDAY AFTERNOON

LETHALITY

Material Interaction / High Fidelity Modeling

Offsite Location

Chair: *Christopher Lloyd*, Naval Surface Warfare Center DD

- 1315 Buses to Offsite Location
- 1330 Recent HEL Lethality of Carbon Fiber Reinforced Polymer Composites (D)
- 1400 HEL Lethality of Various UAS Skin Materials and Configurations (D)
- 1430 Cleanly HEL Ablating Camouflage Coatings (D)
- 1500 Break
- 1530 Dual Dynamic Bidirectional Reflectance Distribution Function Measurement of Materials Heated Through Melt (D)
- 1600 2-Dimensional Correction For Laser Heating of Encased Explosives (D)

FRIDAY MORNING

JOINT SESSION

Wrap-Up Plenary Session

Offsite Location, Secret

- 0700 Breakfast and Registration at Renaissance
- 0715 Buses to Offsite Location
- 0800 High Energy Laser Systems Conference
- 0825 Employment of DE Weapons Conference
- 0850 Free Space Optical Communications
- 0915 HEL Lethality Conference
- 0940 Break
- 1010 DE Modeling and Simulation Conference
- 1035 Test and Evaluation Conference and RF DE Weapons Workshop
- 1100 Non-Lethal DE Weapons Systems and Enabling Technologies Conference
- 1125 Ultrashort Pulse Laser Workshop
- 1200 Symposium Adjourns

Symposium Organizing Committee

DE Modeling and Simulation Conference

Dustin Culbertson, Ryan Carn

DE Test and Evaluation Conference

Pat Cannon, Steven Conyne, Ed Trzecienski

Employment of DE Weapons

*David Kashinski, Douglas Nelson, Dan Marker,
John Hartke, Lou Florence*

Free Space Optical Communications

*Jim McNally, David Robie, Bryan Robinson,
Bob Romanofsky, Julie Smith*

High Energy Laser Lethality Conference

*Chuck LaMar, Steven Baird, David Loomis,
J. Thomas Schriempf, Robert Roybal, Christopher
Lloyd, Robert Ulibarri, David Lyman*

High Energy Laser Systems Conference

*Walt Fink, David Mordaunt,
David Loomis, LeAnn Brasure*

High Power RF Systems Conference

Donald Shiffler, Ryan Hoffman

Non-Lethal DE Weapons Systems and Enabling Technologies Conference

David Law

Ultrashort Pulse Laser Workshop

Ryan Hoffman, Charlene Rusnak

Symposium Coordinator/ Short Courses

Cynnamon Spain, Cristina Crowson

Security, Registration and Receipts

Tiffany Bjelke

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