DIRECTED ENERGY PROFESSIONAL SOCIETY

Annual Directed Energy Science & Technology Symposium

Technical Program

8 – 12 April 2019
Destin, Florida

General Information

Security

- Attendees will be issued conference specific badges on site and must have valid government ID available at all Symposium events.
- Wireless electronic devices are prohibited in classified sessions.
- 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 and your information forwarded to authorities.

Buses

Buses will be available to transport to the offsite location one hour prior to the start of the session and will end service 15 minutes after the last talk completes. The drive to the facility is 35 min so it will not be possible to make a “quick trip" to catch a single talk. Do not bring cell phones, laptops, or notebooks on the bus. DEPS staff will not be responsible for your items once you arrive.

Bus schedule:

Tuesday:	1430 to 1730
Wednesday:	0700 to 1730
Thursday:	0700 to 1730

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.

AUDIO AND VIDEO RECORDING IS PROHIBITED AT ALL DEPS SPONSORED EVENTS

MONDAY

SHORT COURSES

All Courses at Sandestin Hotel

Morning Courses 0800-1200

- **Introduction to HEL Systems**
- **Introduction to HPM Systems *(Distro C)***
- **Introduction to Beam Control**
- **Introduction to HEL Lethality Test and M&S *(Distro C)***
- **DE Bio-Effects *(Distro D)***
- **Windows & Coatings**

Afternoon Courses 1300-1700

- **HEL Modeling *(Distro C)***
- **HPM Directed Energy Weapons and Their Effects *(Distro C)***
- **Atmospheric Laser Propagation *(Distro C)***
- **Warfighter 101**
- **Introduction to USPL: Systems, Propagation, and Interactions *(Distro D)***
- **Intro to High Power Semiconductor Laser Pump Sources *(Distro C)***

Laser Safety Officer for Research & Development Training*
Sunday and Monday 0800-1700
***brought to you by the Laser Institute of America (LIA)**

Join us for the

UK/US Directed Energy Workshop

22 - 26 July 2019
Swindon, UK

www.deps.org

TUESDAY MORNING

Plenary Session (Open)
Sandestin Hotel, Magnolia A

0700 **Breakfast and Registration at Sandestin**

0800 **Welcome Statement**
Dr. Nick Morley and Col. Hasse

0820 **Airborne Laser- Peace Through Light Lessons learned for the Directed Energy Community**
Retired General Ellen Pawlikowski

0900 **Bridging the Gap: The Role of Transition**
Dr. Larry Grimes, Directed Energy Joint Technology Office

0930 **Emergence of DE in the UK MoD**
Mr. Matt Cork, MOD (UK) Directed Energy

1000 **Break**

1020 **OSD Operational Energy**
Dr. Clint Novotny

1050 **USSOCOM Directed Energy Initiatives**
Ms. Lisa Sanders, SOCOM Directed Energy

1115 **Weapons System Safety Explosive Review Board (WSSERB) Process**
Mr. Dale Sisson, US Navy WSSERB

1140 1 minute/ 1 slide Poster Explanations

TUESDAY AFTERNOON

Invited Talk (Limited D)
Sandestin Hotel, Magnolia A

1330 **Air Base Defense & Directed Energy**
Mr. Mark Gunzinger, CSBA

Open and Limited Poster Sessions
Azalea 3 (Open) and Camellia 1 (Limited)
1330-1530

TUESDAY AFTERNOON

Student Workshop I (Open)
Sandestin Hotel, Azalea 1
Chair: *Steven Alderete*

1330 **Introduction to Student Workshop**
Steven Alderete, DE JTO

1335 **Introduction to the Educational Initiative**
Mark Neice, DEPS

1350 **The 2019 AFIT Directed Energy Summer Intern Program** (A)
Sara Kraft, Center for Directed Energy AFIT

1410 **Transition of Electron Emission and Gas Breakdown Mechanisms from Microscale to Nanoscale** (A)
Amanda Loveless, Purdue University

1430 **Recent Progress on the Harmonic Recirculating Planar Magnetron** (A)
Drew Packard, University of Michigan

1450 **Automated Coordinated Unmanned Aerial Systems Flight with Light Attachment** (A)
Samuel Myren, Rose-Hulman Inst. of Tech.

1510 **Effect of Acoustic Disturbances on Aero-Optical Measurements** (A)
Brian Catron, University of Notre Dame

1530 **Break**

1550 **Atmospheric Characterization Through Measurement of Optical Turbulence in the Area Surrounding the U.S. Military Academy** (A)
Tina Le, U.S. Military Academy, West Point

1610 **Thermal Characterization of a High Voltage Nanodielectric Composite Capacitor** (A)
Luke Brown, University of Missouri-Columbia

1630 **Rapid Detection of High Energy Laser Strikes Using Distributed Optical Fiber Sensors** (A)
Adam Kong, United States Naval Academy

1650 **Advanced Triggering Technologies for Compact Pulsed Power** (A)
Jon C. Pouncey, University of New Mexico

1710 **Vortex Flows Formed by Flow-Control Fences on a Spherical Turret** (A)
Barry Pawlowski, University of Notre Dame

1730 **Exhibitor Reception at Sandestin Hotel**

HEL Lethality I (Limited/Open)

Sandestin Hotel, Magnolia C

Chairs: *David Loomis & Chris Lloyd*

1500 **Profilometry Diagnostic for Dynamic Target Surface Characterization under High Energy Laser Irradiation** (D)
Michael Sheyka, Air Force Research Laboratory

1525 **Breaux-T Analytical Model** (D)
Ronak Patel, NSWCDD

1550 **LaserFX Tool Suite update** (D)
Michael Sheyka, Air Force Research Laboratory

1615 **Engaging Steel Coupons with High Energy Lasers: Analysis of Full-Beam Penetration Time as a Function of Orientation** (C)
Jafr Kazmi, United States Military Academy

1640 **Laser Target Board for HEL Characterization** (A)
Christopher Giranda, DHPC Technologies

1705 **Comparison of laser-induced damage for silica windows with antireflective surfaces using CW and pulsed laser sources** (A)
Lynda Busse, Naval Research Laboratory

1730 **Exhibitor Reception** at Sandestin Hotel

Modeling & Simulation Applied Analysis

(Secret)

Offsite Location

Chair: *Linda Lamberson*

1430 **Buses to Offsite Location**

1530 **Self-Protect High Energy Laser Demonstrator (SHiELD) Study Analysis**

1600 **EO/IR Sensor Modeling and Simulation Analysis with Comparison to Field Test Data**

1630 **M&S Processes Used for the HyDRA Inc. II Military Utility Study**

DE Systems and Programs (Secret)

Offsite Location

Chair: *Joseph Paranto*

1700 The Need for a Coordinated DEW and EW cUAS Defense System for Base and Port Protection

Atmospheric Characterization (Limited/Open)

Sandestin Hotel, Azalea 1

Chairs: *Michael Steinbock & Steven Fiorino*

0630 **Breakfast and Registration at Sandestin**

0800 **Sensing of Turbulence Altitude-Scaling for Elevated Slant Paths** (D)
Matthew Whiteley, MZA Associates

0825 **Shipborne Atmospheric Extinction Lidar: Data from CABLE-TRAX/WEST Experiment** (D)
David Sonnenfroh, Physical Sciences Inc.

0850 **SOR Atmospheric monitoring** (D)
Margie Stewart, Boeing LTS

0915 **Design, Flight Test, and Operations of Meteorological Unmanned Aerial Vehicle for Directed Energy Field Testing** (D)
Alex Clark, IERUS Technologies

0940 **Aerosol, Turbulence, and Meteorological Characterization for Atmospheric Extinction during the 2019 Solid State Laser-Technology Maturation Test Event** (C)
Ryan Yamaguchi, Naval Postgraduate School

1005 **Break**

1030 **Turbulence Surveillance LIDAR (TSL): 24/7 Eye-Safe Optical Turbulence Measurement System for Volumetric Profiles of Cn2** (C)
Leda Sox, Georgia Tech Research Institute

1055 **Optical Turbulence in the Marine Atmospheric Surface Layer** (C)
Benjamin Wauer, Naval Postgraduate School

1120 **First look at profiling atmospheric turbulence using time-lapse imagery from two cameras** (C)
Santasri Bose-Pillai, AFIT CDE

1145 **A modified slope structure function for atmospheric turbulence phase statistics measurement** (A)
Ian Gabalski, US Army Space and Missile Defense Command

1200 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

WEDNESDAY MORNING

Beam Control Technologies I (Open/Limited)

Sandestin Hotel, Magnolia B

Chair: *Don Seeley*

0630 **Breakfast and Registration at Sandestin**

0800 **Phase Compensation in the presence of uncorrelated speckle and anisoplanatism** (A)
Derek Burrell, University of Central Florida College of Optics and Photonics

0825 **Monolithic doped-semiconductor platform for optical devices in the infrared** (A)
Ray Wambold, University of Wisconsin - Madison

0850 **Modal influence function analysis of a deformable mirror for least-squares wave-front fitting** (A)
Barton Plimmer, Applied Technology Associates

0915 **Long-Range, Low-Latency Adaptive Optics System at LLNL** (A)
Stephen Ammons, Lawrence Livermore National Laboratory

0940 **Break**

1005 **Optical Measurement of Aero-Optical Effects in a Supersonic Wind Tunnel Environment** (D)
Cameron Radosevich, AFRL

1030 **Deep Turbulence Beam Compensation using Digital Holography Wavefront Sensing** (C)
Philip Gatt, Lockheed Martin Coherent Technologies

1055 **Dual-Sensor technique for spatio-temporal characterization of Deformable Mirrors** (C)
Vladimir Markov, Advanced Systems **&** Technologies, Inc.

1120 **Algorithms for estimating wavefront errors from digital holography data** (D)
Samuel Thurman, Lockheed Martin Coherent Technologies

1145 **Ultrashort Pulse Lasers and Adaptive Optics: Beacons and Nonlinear Control** (D)
Gregory DiComo, U.S. Naval Research Laboratory

1200 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

HEL Lethality II (Limited/Open)

Sandestin Hotel, Magnolia C

Chairs: *Chris Lloyd & David Loomis*

0630 **Breakfast and Registration at Sandestin**

0800 **Jet Engine HEL Vulnerability** (D)
Jesse Croyle, Radiance Technologies

0825 **C-UAV Fixed Wing Tailboom Lethality** (D)
Daniel Duffin, Radiance Technologies

0850 **Modeling Tissue-Damage and Flashblindness Bioeffects from a Complex Broadband Transient Source** (C)
Chad Oian, 711 HPW/RHDO

0915 **Modeling and Simulation of Blue Aircraft Survivability to HEL Irradiation (MSAS) - Phase II Software Development and Test Plans** (C)
Ron Dexter, SURVICE Engineering

0940 **HEL Fire Control Decision Aid Architecture** (D)
Thomas Cormier, NSWCDD

1005 **Break**

1030 **JLaSE Weaponeering Tool** (D)
Justin Becker, AFRL

1055 **End-to-End Simulation of a Laser Weapon System** (D- NOFORN)
Daniel Cargill, Lockheed Martin

1120 **Phenomenological Model of Laser-Driven Patterning of Solid Deformable Substance** (A)
Misha Grinfeld, ARL

1200 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

WEDNESDAY MORNING

HEL Technologies I (Limited/Open)

Sandestin Hotel, Azalea 2

Chairs: *Daniel Matyas & Adam Aberle*

0630 **Breakfast and Registration at Sandestin**

0800 **kW Fiber Laser Demonstration** (D)
Dr. Charles Yu, Lawrence Livermore National Laboratory

0825 **Power, Efficiency, and Thermal Enhancements for High Power Directed Energy Fiber Amplifiers** (C)
Daniel Creeden, Coherent | Nufern

0850 **High Power Demonstration of Optical Components for Directed Energy Amplifiers** (C)
Clifford Headley, OFS Laboratories

0915 **Wavelength-Agile Lasers Based on Quasi-Phase Matching in Gas/Liquid Filled Hollow Fibers** (D)
Luke Ausley, Air Force Research Laboratory: Munitions Directorate

0940 **Parameters and considerations for power scaling of kW-class Yb fiber amplifiers** (A)
Justin Cook, University of Central Florida

1005 **Break**

1030 **Anti-Resonant Hollow Core Fibers and their Applications in Directed Energy** (A)
Amy Van Newkirk, Penn State University

1055 **The case for multi-kW Thulium fiber lasers - a game-changer in HEL architecture?** (A)
Martin Richardson, University of Central Florida- CREOL

1120 **Narrow linewidth 100 W widely tunable Thulium fiber laser for atmospheric propagation experiments** (A)
Patrick Roumayah, University of Central Florida, Laser Plasma Laboratory

1200 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

Beamed Energy Propulsion (Open/Limited)

Sandestin Hotel, Camellia 1

Chairs: *Wesley Green & Avram Bar-Cohen*

0630 **Breakfast and Registration at Sandestin**

0800 **Breakthrough Starshot - A Photon Engine Overview** (A)
Wesley Green, Breakthrough Starshot

0825 **Efficient and stable laser beam propulsion of Starshot lightsail: photonic designs and stability criteria** (A)
Artur Davoyan, University of California, Los Angeles

0850 **Stable long range airborne laser driven propulsion and tractor beam** (A)
Artur Davoyan, University of California, Los Angeles

0915 **A Demonstration Rocket for the Millimeter-Wave Thermal Launch System** (A)
Alexander Bruccoleri, Izentis LLC

0940 **Beam director needs for microwave and laser thermal rockets** (A)
Kevin Parkin, Parkin Research, LLC

1005 **Break**

1030 **Millimeter wave interactions with high temperature ceramic composite susceptors for power beaming applications** (C)
Brad Hoff, AFRL

1055 **Wireless Power GUI** (D)
Alex Zellner, NSWC Crane

1120 **Rectenna Optimization for High Altitude Wireless Powered Aircraft** (A)
James McSpadden, Raytheon

1200 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

WEDNESDAY MORNING

USPL I: Propagation & Filamentation (Open/Limited)

Sandestin Hotel, Camellia 2

Chairs: *Jennifer Elle*

0630 **Breakfast and Registration at Sandestin**

0800 **Atmospheric thermal lensing of high-peak, high-average power ultrashort pulse lasers** (A)
Joseph Penano, U.S. Naval Research Laboratory

0825 **Engineering filament formation through wavefront control** (A)
Daniel Thul, Laser Plasma Laboratory, University of Central Florida

0850 **Burst mode filament stitching** (A)
Danielle Reyes, Laser Plasma Laboratory, University of Central Florida

0915 **On the long-awaited realization of transient atmospheric waveguides** (A)
Shermineh Rostami Fairchild, Laser Plasma Laboratory, University of Central Florida

0940 **Interferometric measurements of low density laser-produced plasmas in air** (A)
Eric Welch, University of California, Los Angeles

1005 **Break**

1030 **Physical characteristics of the USLP beacon for laser beam control** (C)
Vladimir Markov, Advanced Systems & Technologies, Inc.

1055 **Microwave Radiation measurements from Ultrashort Pulse Interactions with Metallic Targets (D)**
Gregory DiComo, U.S. Naval Research Laboratory

1120 **Effect of laser noise on the propagation of laser radiation in dispersive and nonlinear media** (A)
Joshua Isaacs, University of Maryland, College Park

1145 **Clearing a path through fog droplets using short (sub-nsec) IR laser pulses** (A)
Richard Fischer, NRL

1210 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

Atmospheric Propagation Modeling & Simulation I (Limited)

Sandestin Hotel, Magnolia A

Chair: *Jaclyn Schmidt*

0630 **Breakfast and Registration at Sandestin**

0800 **Surface Level Turbulence Modeling using Meteorological Observations** (D)
Dr. Yakov Diskin, MZA Associates Corporation

0825 **Performance Prediction for Decision Aids Using Near Real-Time Meteorological Conditions** (D)
Eric Magee, MZA Associates Corporation

0850 **HEL Performance Forecasting for Field Experiments using Weather Cubes** (C)
Jaclyn Schmidt, Air Force Institute of Technology

0915 **New Developments towards METCAL-Focused M&S for HEL Propagation** (C)
Dr. Joseph A. Fiordilino, Naval Surface Warfare Center Corona Division

0940 **Updates and Applications for the Navy Atmospheric Vertical Surface Layer Model (NAVSLaM) Version 2.0** (C)
Paul Alan Frederickson, Naval Postgraduate School

1005 **Break**

1030 **Global Cloud Free Line of Sight (CFLOS) Characterizations using Numerical Weather Prediction Data** (C)
Jaclyn Schmidt, Air Force Institute of Technology

1055 **Scene Generation Tool for High-Fidelity Tracker Design and Testing** (C)
Dr. Michael Steinbock, Air Force Research Laboratory

1120 **WaveJET Software Modeling and Simulation Platform for HEL DE Applications: Overview** (C)
Svetlana L. Lachinova, II-VI Optical Systems Optonicus

1200 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

HPM Technologies & Effects I (Secret)

Offsite Location

Chair: *Adam Conway & Larry Bacon*

0630 **Breakfast and Registration at Sandestin**

0700 **Buses begin to offsite location**

0800 **Building the Effectiveness Story for the HIJENKS Program**

0820 **Exploring New Applications of HPM/HPRF for Countering Improvised Threat Devices**

0840 **Virtual Prototyping the HIJENKS Source**

0900 **Komodo Dynamic Demonstration Overview, with Detection Results**

0920 **Light Bulb: IED Dudding Test Results**

0940 **Ultrashort Microwave Pulse Compressor (USPC) for High-Power Microwave (HPM) Applications**

1000 **Break**

1020 **Short Pulse Research and Evaluation for sUAS (OSPRES): Drivers and Effects Status Update**

1040 **HPM Sensor-Level Effects Testing for UAS in a GTEM Environment**

1100 **Development of A Mapping Technique for Fixed UAV HPM Interrogation Data to Predicted Free-Flight Performance**

1120 **An Adaptive Experimental Design Strategy to Expedite cUAS HPM Development**

1140 **Exploring New Applications of HPM/HPRF for Countering Improvised Threat Devices**

1210 **Lunch**
Honoring Dr. Sam Blankenship and Fellows Awards

Beam Propagation (Limited/Open)

Sandestin Hotel, Magnolia C

Chair: *Lew DeSandre*

1330 **Evaluation of beam characteristics of Laguerre-Gauss and Bessel-Gauss modes for directed energy applications** (D)
Kyle Novak, US Naval Research Lab

1355 **Modeling the Effects of Ship-Induced Optical Turbulence on High Energy Laser Beam Propagation** (D)
Joseph Blau, Naval Postgraduate School

1420 **Impacts of turbulence thermal blooming interaction** (D)
Mark Spencer, AFRL/RDLTS

1445 **Investigating Diffractive Effects in Tilt-Based Turbulence Estimation through Simulation** (C)
Jack McCrae, AFIT/ENP

1510 **Break**

1535 **The Apparent Coupling of Surface Layer Turbulence and PM2.5 Aerosol Concentrations and Effects on HEL Propagation** (C)
Steven Fiorino, AFIT/ENP

1600 **Comparative Analysis of Fiber-array and Conventional Beam Director Systems in Volume Turbulence with Accounting for Thermal Blooming Effects** (A)
Mikhail Vorontsov, University of Dayton

1625 **Laser Beam Characterization in the Lower Atmosphere for Directed Energy Applications** (A)
Mikhail Vorontsov, University of Dayton

1650 **Peculiarities of the lightwave propagation at slant-path geometry** (A)
Vladimir Markov, Advanced Systems & Technologies, Inc.

1715 **Session Adjourns**

Beam Control Systems and Technologies (Limited)

Sandestin Hotel, Magnolia B

Chair: *Amanda Clark*

1330 **HADES Field Test Results** (D)
Jeffrey Barchers, Nutronics

1355 **ATHENA Beam Control - Challenges of Target Engagement in a Tactical Environment** (C)
Deborah Heicklen, Lockheed Martin

1420 **ABLE Progress and Track Testing Results** (D)
Robert Pawlak, NSWC

1445 **ABCD First Test Results** (D)
Darren Forman, Nutronics, Inc.

1510 **Break**

1535 **Collaborative research in beam control** (D)
Mark Spencer, AFRL/RDLTS

1600 **Minimized Beam Control for a Single Laser Weapon System** (D)
Patrick Saunders, AFRL/RD

1625 **High Speed Compact Inexpensive Beam Control with FPGAs** (D)
Ben Bean, MZA Associates Corporation

1650 **Session Adjourns**

Students and Early Career Professionals:

Join us for a

Roundtable Reception

Wednesday, 1730-1900

Appetizers and 1 drink ticket* will be provided
(*Must be 21 or older)

HPM Technologies & Effects II (Open/Limited)

Sandestin Hotel, Magnolia A

Chairs: *Adam Conway & Larry Bacon*

1330 **HPM Testing of Modern Electronic Components** (A)
Andrew Sandoval, Sandia National Laboratories

1400 **Novel Application of the Random Coupling Model to Directed Energy Waveforms** (A)
Dr. Bisrat Addissie, U.S. Naval Research Laboratory

1430 **Sensitivity Analysis of a Sparse Array of Antennas** (A)
Michael Walker, Sandia National Laboratories

1500 **Break**

1530 **Planar High Efficiency and Low Impedance Gyromagnetic Nonlinear Transmission Lines** (C)
Michael Geiler, Metamagnetics Inc.

1600 **HPEM in Combined EM and Mechanical Vibe Environments** (C)
Dr. Jeffery Williams, Sandia National Laboratories

1630 **Multipath Analysis for 5MW source with high gain** (C)
Laura Wessels, NSWC Directed Energy Weapons

1700 **Relativistic Source Test Bed Pulsed Power System Development and Testing** (D)
Jon Cameron Pouncey, University of New Mexico

1730 **Session Adjourns**

WEDNESDAY AFTERNOON

HEL Technologies II (Limited/Open)

Sandestin Hotel, Azalea 2

Chairs: *Daniel Matyas & Adam Aberle*

1330 **Forward Photonics' High Power Direct Diode Laser** (C)
Mike Cruz, Forward Photonics

1400 **Characterization of a diode pumped alkali laser with a flowing gain medium** (D)
Tracy Mallette, Air Force Research Laboratory

1430 **High pressure lineshapes of the cesium 6 2P3/2 → 8 2S1/2 transition with helium (He), argon (Ar) and krypton (Kr)** (D)
Christopher Rice, Air Force Institue of Technology

1500 **Break**

1530 **Study operation of Potassium DPAL with and without hydrocarbon containing gain medium** (A)
Boris Zhdanov, US Air Force Academy

1600 **Excitation dynamics and scaling of diode-pumped rare-gas lasers** (A)
W. Rawlins, Physical Sciences Inc.

1630 **Brightness Improvements in Quantum Cascade Lasers** (A)
Timothy Newell, Gryphon Technologies LC

1700 **Mode Engineering and Beam Combining for Future High Power, High Brightness Direct Diode Laser Systems** (A)
Lin Zhu, Clemson University

1730 **Session Adjourns**

Conference Overview by Room Assignment

	Tues PM	Wed AM	Wed PM	Thurs AM	Thurs PM
Camellia 1	LIMITED POSTER SESSION	BEAMED ENERGY PROPULSION			
Camellia 2		USPL I	WIRELESS POWER BEAMING	USPL III	USPL IV
Azelea 1	STUDENT WORKSHOP I	ATMOSPHERIC CHARACTER	STUDENT WORKSHOP II		STUDENT WORKSHOP III
Azelea 2		HEL TECH I	HEL TECH II	POWER & THERMAL FOR DE I	POWER & THERMAL FOR DE II
Azelea 3	OPEN POSTER SESSION		M&S APPLICATIONS & TESTING	DE SYSTEMS & PROGRAMS	
Magnolia A	INVITED TALK	ATMOS PROPAGATION M&S I	HPM TECH AND EFFECTS II	HPM TECH AND EFFECTS III	HPM TECH AND EFFECTS IV
Magnolia B		BEAM CONTROL TECH I	BC SYSTEMS & TECH	BEAM CONTROL TECH II	BEAM CONTROL M&S
Magnolia C	HEL LETHALITY I	HEL LETHALITY II	BEAM PROPAGATION	ATMOS PROPAGATION M&S II	ACQUISITION TRACKING & POINTING
Offsite	M&S APPLIED ANALYSIS	HPM TECH AND EFFECTS I	USPL II	HEL LETHALITY & EFFECTS I	HEL LETHALITY & EFFECTS II

Wireless Power Beaming (Open)

Sandestin Hotel, Camellia 2

Chairs: *Avram Bar-Cohen & Wesley Green*

1330 **Status Update on Laser Beam Wireless Power Transfer SBIR** (A)
Christopher Giranda, DHPC Technologies

1355 **Energy Emancipation of the Battlefield with Beamed Directed Energy** (A)
Eric Sundberg, Retired USAF

1420 **Remote Power Beaming with Adaptive Fiber-Array Laser Sources** (A)
Mikhail Vorontsov, University of Dayton

1445 **Experimental Analysis of Atmospheric Turbulence…Laser Power Beaming System** (A)
Mikhail Vorontsov, University of Dayton

1510 **Break**

1535 **Long Range Laser Power Beaming Along Vertical Paths** (A)
Richard Fischer, NRL

1600 **Automated Active Safety System for Laser Power Beaming** (A)
Tom Nugent, PowerLight Technologies

1625 **Non-Uniformity Effects on Free Space Optical Power Receivers** (A)
Phillip Jenkins, Naval Research Laboratory

1650 **Field Testing of an Integrated Automatic Power Beaming System** (A)
Tom Nugent, PowerLight Technologies

1715 **Session Adjourns**

Modeling and Simulation Applications and Testing (Limited/Open)

Sandestin Hotel, Azalea 3

Chair: *Dustin Culbertson*

1330 **Integrated Weapons Environment for Analysis (IWEA): Pioneering Synergistic Effects** (D)
Judith Sherrill, Air Force Research Laboratory

1400 **AFSIM Directed Energy Weapon Model Development** (C)
Jim Sewell, Air Force Research Laboratory

1430 **Simulations of secondary emission driven RF generation in waveguide cavities** (C)
Dr. Nicholas Myers,Verus Research, LLC

1500 **Break**

1530 **Quantification of Propagating Uncertainties in Computer Code Chains** (A)
Dr. Manuel Thomas Alan, Verus Research, LLC

1600 **Directed Energy Integrated Power and Thermal Management Systems (IPTMS) Modeling and Simulation** (A)
Michael Young, Honeywell Aerospace

1630 **Testing Energy Magazine Concepts Using Power Hardware-in-the-Loop Simulation** (A)
Dr. Michael Steurer, Florida State University Center for Advanced Power Systems

1700 **Session Adjourns**

Student Workshop II (Open)

Sandestin Hotel, Azalea 1

Chair: *Steven Alderete*

1330 **Fundamental Investigation of a Weakly-Compressible Two-Dimensional Shear Layer** (A)
Jonathan Wells, University of Notre Dame

1350 **Research on transparent ceramic materials at Alfred University** (A)
David Carloni, Alfred University

1410 **Measured Performance of a Laser Beam Carrying Orbital Angular Momentum in Real Atmospheric Turbulence in a near-Maritime Environment** (A)
Joe Wiedemann, U.S. Naval Academy

1430 **Quantifying HEL Weapon System Performance in a Coastal FOG Environment** (A)
Zachary Daniels, Naval Postgraduate School

1450 **Adapting Macrometeorology-Based Models of Optical Turbulence to Suit the Near-Maritime Environment** (A)
ENS Miles Oakley, U.S. Naval Academy

1510 **Break**

1530 **Experimental assessment of electrode effects on gas breakdown for microscale gaps** (A)
Russell Brayfield, Purdue University

1550 **Grain Size-dependent Thermal Transport in NiTi Shape Memory Alloys for Thermal Storage in DEW Platforms** (A)
Nicholas Vu, U.S. Naval Academy

1610 **Phonon Transport in Titania Nanoparticle Polymeric Thin Films** (A)
Jay Wallen, U.S. Naval Academy

1630 **Micro/nanostructured copper and silver surfaces created using dual-pulse and chirped-pulse femtosecond laser surface processing** (A)
Aaron Ediger, University of Nebraska-Lincoln

1650 **Characterization of Weak Scattering and Absorption in Spinel and Sapphire from the Near Infrared to the Visible** (A)
Jessica Ma, Johns Hopkins University

1710 **A broad study of failure modes for high power lasers** (A)
Patrick D Roumayah, Uni. of Central Florida

1730 **Session Adjourns**

USPL II (Secret)

Offsite Location

Chairs: *Brittany Lynn*

1330 **Lessons Learned from 20 years of USPL Research for Military Utility**

1400 **Siren**

1430 **Electronic/Acoustic effects from filament interaction**

1500 **Break**

1530 **Enhanced Emission from Nonlinear Interactions in Materials using**

1600 **Burst-mode ablation: a new concept for filament interaction with targets**

1630 **A Comparative Study of HEL and USPL Material Interactions**

1700 **Session Adjourns**

Atmospheric Propagation Modeling & Simulation II (Limited/Open)

Sandestin Hotel, Magnolia C

Chair: *Steve Hammel*

0630 **Breakfast and Registration at Sandestin**

0800 **Characterization and Reduction of Platform-Induced Aero-Effects Associated with Turrets** (D)
Scott Sherer, AFRL/RQVA

0830 **Using numerical simulation to predict vaporization regime of HEL exposed water drops** (A)
Stefano Pineda, USNA

0900 **Boundary layer atmospheric turbulence characterization with numerical weather prediction modeling** (A)
Mikhail Vorontsov, University of Dayton

0930 **Analytic Propagation Variances and PSDs from a Wave-Optics Perspective** (A)
Scot Shaw, MIT Lincoln Laboratory

1000 **Break**

1030 **Wave-optics modeling and analysis of Differential Image Motion Monitors for atmospheric profiling** (A)
Daniel Whitley, The University of Alabama in Huntsville

1100 **Wave-optics modeling and analysis of Shack-Hartmann wavefront sensors for atmospheric profiling** (A)
Daniel Whitley, The University of Alabama in Huntsville

1200 **Lunch**
DEPS AGM Presentation

Beam Control Technologies II (Limited/Open)

Sandestin Hotel, Magnolia B

Chair: *Gar Hassall*

0630 **Breakfast and Registration at Sandestin**

0800 **Spectral Beam Combined Laser Wavefront and Pointing Evaluation (**D)
Justin Mansell, MZA Associates Corporation

0830 **Sensor Evaluation Updates** (C)
Michael Steinbock, AFRL/RDSS - Starfire Optical Range

0900 **Geiger-mode Avalanche Photodetector Camera Technology at Ball Aerospace: Technology Overview, Status Update, and Path Forward** (C)
Peter Kondratko, Ball Aerospace

0930 **High speed KTN deflectors for large capacity laser beam combining and high precision laser beam control** (A)
Shizhuo Yin, Penn State University

1000 **Break**

1030 **Optical Cavity Spatial Mode Spectra for Sensing Wavefront Aberrations and Turbulence** (A)
Dr. Joseph Talghader, University of Minnesota

1100 **Orbital Angular Momentum makes the Rytov Parameter Saturate** (A)
Darryl Sanchez, AFRL

1130 **Orthogonal Gradient Reconstruction Experiment (OGRE) - latest testing** (A)
Denis Oesch, Leidos

1200 **Lunch**
DEPS AGM Presentation

HPM Technologies & Effects III (Limited)

Sandestin Hotel, Magnolia A

Chairs: *Larry Bacon* & *Adam Conway*

0630 **Breakfast and Registration at Sandestin**

0800 **Zagorodnov Conformal Simulations in ICEPIC** (C)
Dr. Travis Garrett, Air Force Research Laboratory

0830 **Compact Gallium Nitride Photoconductive Switches for High Power Microwave Generation** (C)
Andrew Koehler, U.S. Naval Research Laboratory

0900 **Maximizing Si-PCSS Efficiency for HPM Sources** (C)
Spencer Fry, University of Missouri - Kansas City

0930 **Driving HPM with Si-PCSS for OSPRES** (C)
Eliot Myers, University of Missouri - Kansas City

1000 **Break**

1030 **Dopant and Geometry Dependent Photo-conductivity in Silicon Carbide** (C)
Noah Kramer, University of Missouri - Kansas City

1100 **Design and fabrication of Drift Step Recovery Diodes** (D)
Lars Voss, Lawrence Livermore National Laboratory

1130 **Photoconductive Semiconductor Switches for High Power Microwave applications** (C)
Adam Conway, Lawrence Livermore National Lab

1200 **Lunch Break**
DEPS AGM Presentation

Power and Thermal for DE I (Open)

Sandestin Hotel, Azalea 2

Chair: *Matt Kendall*

0630 **Breakfast and Registration at Sandestin**

0800 **Directed Energy Integrated Power and Thermal Management Systems (IPTMS) Modeling and Simulation** (A)
Jeff Troester, Honeywell Aerospace Directed Energy Systems

0830 **Power and Thermal Management SWaP Analysis for Generic, Mobile Directed Energy Platforms** (A)
Todd Bandhauer, Colorado State University

0900 **Reversible Martensitic transformations: a new approach to managing DE thermal transients** (A)
Darin Sharar, U.S. Army Research Laboratory

0930 **Enhanced Two-Phase Flow Heat Transfer with Minichannels that are Functionalized Using Femtosecond Laser Surface Processing** (A)
Craig Zuhlke, University of Nebraska-Lincoln

1000 **Break**

1030 **Thermal Behavior of Cryogenic Microcoolers for High Power Laser Diode Arrays** (A)
Kyoung Joon Kim, Pukyong National University

1100 **High Voltage Capacitors in the 10kV to 80kV Range for Pulse Shaping, Resonance and DC Block Applications** (A)
Quentin Diduck, Ballistic Devices Inc.

1200 **Lunch**
DEPS AGM Presentation

USPL III: MWIR (Open/Limited)

Sandestin Hotel, Camellia 2

Chairs: *Eric Rosenthal*

0630 **Breakfast and Registration at Sandestin**

0800 **Recent results from the AFOSR mid-IR MURI** (A)
Howard Milchberg, UMD

0830 **Novel high power infrared lasers for strong field science** (A)
Zenghu Chang, CREOL

0900 **Air filamentation with SWIR and MIR ultrashort-pulse lasers** (A)
Pavel Polynkin, College of Optical Sciences, University of Arizona

0930 **Development of a mid-infrared, high-power optical parametric amplifier for the investigation of intense light propagation in atmosphere** (A)
Kevin George, Innovative Scientific Solutions, Inc.

1000 **Break**

1030 **Comparison of Near and Mid-Infrared Laser Generation of Broadband Microwaves from Air Plasmas** (C)
Alexander Charles Englesbe, University of Michigan / Air Force Research Laboratory

1100 **Mid-Infrared Spectroscopy of Nonlinear Optics for Countermeasures** (D)
Dr. Laura Rose Vanderhoef, US Army Research Laboratory

1130 **Development of the Dual Chirp - Optical Parametric Amplifier** (A)
Sean Crystal, University of Arizona, OSC

1200 **Lunch**
DEPS AGM Presentation

DE Systems and Programs

(Open/Limited)

Sandestin Hotel, Azalea 3

Chairs: *Joseph Paranto & David Price*

0630 **Breakfast and Registration at Sandestin**

0800 **Wargaming for studying future operations with directed energy and hypersonic weapons and potential countermeasures** (A)
John Tiller, John Tiller Software

0830 **Systems Engineering in real world DE applications** (A)
Talbot Smith, Sandia National Laboratories

0900 **RF Quality Sensor for HIJENKS Platform** (A)
Quentin Ward, Sandia National Laboratories

0930 **New HEL Test Facilities at the TISTEF Laser Range** (A)
Robert Bernath, University of Central Florida

1000 **Break**

1030 **Joint Laser Deconfliction Safety Software - Modular Design** (D)
James Latourell, NSWC Dahlgren Division

1200 **Lunch**
DEPS AGM Presentation

THURSDAY MORNING

HEL Lethality & Effects I (Secret)

Offsite Location

Chairs: *Dave Loomis & Chris Lloyd*

0630 **Breakfast and Registration at Sandestin**

0800 **Modeling and Simulation to Support Navy Lethality Testing**

0825 **Parametric Engagement Analysis in Support of the Navy C-ASCM Mission**

0850 **Development of Target Cards for the Compact Laser Weapon System**

0915 **End-to-End Simulation of Directed Energy Weapon Systems (DEWS)**

0940 **HEL Lethality Test Results of Surrogate Radar Components**

1005 **Break**

1030 **Status of Ground Target Testing in Support of JLaSE**

1055 **Results of HEL-Material Interaction Testing in Subsonic Airflow**

1120 **Recent Full-scale Counter-RAM Lethality Testing**

1145 **Laser Testing of Aircraft-Grade Wiring**

1210 **Lunch**
DEPS AGM Presentation

THURSDAY AFTERNOON

Acquisition, Tracking & Pointing (Limited/Open)

Sandestin Hotel, Magnolia C

Chair: *Richard Guthrie*

1330 **Design Considerations for a Tactical Vehicle Beam Director** (D)
Joseph Hayden, L3 Brashear

1400 **Aimpoint Degradation from Blackbody Radiation during HEL Engagement** (C)
Amanda Clark, USASMDC/ARSTRAT

1430 **Acquisition and Tracking of drones and mortars in high clutter backgrounds** (C)
Amanda Clark, USASMDC/ARSTRAT

1500 **Break**

1530 **S-band Interferometric RF Sensor for Target Acquisition and Tracking** (C)
Rebecca Nagurney, United States Army

1600 **Multiplexed digital-holographic detection for atmospheric imaging and wavefront sensing** (A)
Matthias Banet, University of Rochester, The Institute of Optics

1630 **Diffractive Anisoplanatism and Tracker Bandwidth Limitations** (A)
Scot Shaw, MIT Lincoln Laboratory

1700 **Session Adjourns**

Beam Control Modeling & Simulation
(Limited)

Sandestin Hotel, Magnolia B

Chair: *Noah Van Zandt*

1330 **Aero-Optic Sensitivity to Computational Sample Length** (D)
Craig Smith, Air Force Research Laboratory

1355 **Improved Adaptive-Optics Performance through Polychromatic Beacon Illumination for Speckle Mitigation** (D)
Noah Van Zandt, Air Force Research Laboratory

1420 **Impact of Engagement Scenarios on an Airborne Laser System** (D)
Chung-Jen John Tam, Air Force Research Laboratory

1445 **Flow Control for Beam Directors** (D)
Sarah Sanetti, Air Force Research Laboratory

1510 **Session Adjourns**

HPM Technologies & Effects IV
(Limited/Open)

Sandestin Hotel, Magnolia A

Chairs: *Adam Conway & Larry Bacon*

1330 **Studies on Antenna Characterization and Propagation of High Power Pulsed Electromagnetic Waves with Minimal Spatial Dispersion** (C)
Dr. Deb Chatterjee, University of Missouri - Kansas City

1400 **Agile RF Coupling Assessment Methodology** (C)
John Lancaster, University of Missouri - Kansas City

1430 **Recent Developments at CCDC-Soldier Center in Microwave Reflective Materials for Soldier protection** (C)
Francisco Aranda, U.S. Army Futures Command

1500 **Break**

1530 **A Broadband High-Gain HPM- & UWB-Capable Active Electronically Scanned Array** (C)
Dr. Robert Koslover, Sara, Inc.

1600 **Drift Step Recovery Diodes for Pulsed Power Applications** (D)
Nicholas Flippin, University of Missouri Kansas City

1630 **Enhanced Diode-based NLTL for HPM Generation** (A)
Plamen Doynov, University of Missouri Kansas City

1700 **Session Adjourns**

Power and Thermal for DE II (Limited/Open)

Sandestin Hotel, Azalea 2

Chair: *Matt Kendall*

1330 **Enabling Ultra-High Discharge Battery Systems with Advanced Thermal Management** (D)
Mario Sadana, Roccor

1355 **Dopant and Geometry Dependent Photoconductivity in Silicon Carbide** (C)
Noah Kramer, University of Missouri Kansas City

1420 **Cooling of High Energy Lasers on High-Altitude Aircraft** (C)
Roger Hill, Creare LLC

1445 **A Full-Scale Thermal Management System for DEWS** (C)
Joel Crawmer, Advanced Cooling Technologies, Inc.

1510 **Break**

1535 **Size and Weight Improvement of Thermal Management System for High Energy Lasers in Mobile Military Platforms** (C)
Tadej Semenic, Teledyne Scientific Company

1600 **Advanced Cold Plate that Enable Single Loop HEL TMS** (A)
Dr. David Sykes, Mainstream Engineering Corporation

1625 **Consolidation of Broad Spectrum HEL Cooling Pump Designs into Discrete Product Families** (A)
Christopher Rista, Barber-Nichols Inc.

1650 **Session Adjourns**

USPL IV: LWIR & Material Interactions (Limited/Open)

Sandestin Hotel, Camellia 2

Chairs: *Gregory DiComo*

1330 **Harmonic SWIR and Visible Light Generation in Optical Materials Following Exposure to Mid-IR USPL** (D)
Christopher Wolfe, US Army Research Laboratory

1355 **Long-wave Infrared Megafilament in the Atmosphere** (A)
Sergei Tochitsky, Department of Electrical Engineering, UCLA

1420 **Physics of Nonlinear Propagation, Self-trapping and Filamentation of LWIR Multi-Joule Pulses in Air** (A)
Jerry Moloney, University of Arizona

1445 **Development of a terawatt carbon dioxide laser** (A)
Yu-hsin Chen, Plasma Physics Division, Naval Research Laboratory

1510 **Break**

1535 **Spatio-temporal Control of Laser Induced Plasma by Spatial Light Modulation of USPL** (A)
Michael Ross, SPAWAR Systems Center Pacific

1600 **Hydrodynamic Modeling of Laser-Solid Interactions and Integration of Equations-of-State Capabilities** (A)
Asher Davidson, Naval Research Lab

1625 **Nonlinear optical properties of semiconducting materials in the mid-infrared** (A)
Jamie Gengler, UES, Inc.

1650 **Session Adjourns**

THURSDAY AFTERNOON

Student Workshop III (Open)

Sandestin Hotel, Azalea 1

Chair: *Steven Alderete*

1330 **Thomson, Scattering, Langmuir & Impedance Probe Development on the Helicon Plasma Experiment (HPX)** (A)
1/c Anita Green, U.S. Coast Guard Academy

1350 **Zero Mass Water Hydropanel Analysis and its Application on Vessels** (A)
1/c Ayleen Brewer, U.S. Coast Guard Academy

1410 **Wavefront Analysis Using the Stitching Method** (A)
Matthew Kemnetz, University of Notre Dame

1430 **Multiplexed digital-holographic detection for atmospheric imaging and wavefront sensing** (A)
Matthias Banet, University of Rochester, The Institute of Optics

1450 **Image Degradation Due to Various Aero-Optical Environments** (A)
Matthew Kalensky, University of Notre Dame

1510 **Break**

1530 **A Machine Learning Approach to Jitter Mitigation in a Beam Control System** (A)
Roland Hentz, University of New Mexico

1550 **An Investigation of Nonlinear Filters Applied to Jitter Mitigation in Beam Control Systems** (A)
Jonathan Lussier, University of Denver

1610 **Monolithic doped-semiconductor platform for optical devices in the infrared** (A)
Ray Wambold, University of Wisconsin - Madison

1630 **Epitaxial Regrowth for Photonic Crystal Surface Emitting Lasers (PCSELs)** (A)
Kevin Reilly, University of New Mexico

1650 **Performance and limitations of single-mode chalcogenide fibers** (A)
Justin Cook, University of Central Florida

1730 **Session Adjourns**

THURSDAY AFTERNOON

HEL Lethality & Effects (Secret)

Offsite Location

Chairs: *Dave Loomis & Chris Lloyd*

1330 **EHEL PA Navy Lethality Effects Testing**

1355 **Testing ASCM Components Under Representative Flight Conditions**

1420 **C-UAV COTS Multirotor Lethality**

1445 **Helicopter Aimpoint Vulnerabilities**

1510 **Break**

1540 **BQM Target Drone Vulnerability Assessment in Support of SSL-TM Land Test**

1605 **Laser Vulnerability Assessment for a Radio Frequency Air-to-Air Missile**

1630 **Session Adjourns**

FRIDAY MORNING

Wrap Up Plenary Session (Open)

Sandestin Hotel, Magnolia A

0700 **Breakfast and Registration at Sandestin**

0800 **Session Outbriefs**

1200 **Symposium Adjourns**

Symposium Chair

Nick Morley

Program Committee

Acquisition, Tracking and Pointing
Richard Guthrie

Atmospheric Propagation
Michael Steinbock

Beam Control Systems and Technologies
Don Seeley & Amanda Clark

DE Systems and Programs
Joseph Paranto

HEL Lethality and Effects
Christopher Lloyd & David Loomis

HEL Technologies
Adam Aberle & Daniel Matyas

HPM Technologies and Effects
Adam Conway & Larry Bacon

Laser Comm
Junji Urayama & Aaron Van Tassle

Modeling and Simulation
Linda Lamberson

Particle Beam Weapons & Assoc. Technologies
Thomas Ehrenriech

Power and Thermal for DE
Matt Kendall

Power Beaming and Propulsion
Wes Green & Avi Bar-Cohen

Student Workshop
Steven Alderete

Ultra Short Pulse Laser
Andreas Schmitt-Sody & Mike Helle

Wargaming
David Price

Symposium Coordinator
Cynnamon Spain

Security and Registration Coordinator
Tiffany Bjelke

Technical Program Coordinator and Short Courses
Cristina Crowson

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