Twelfth Annual Directed Energy Symposium

2 - 6 November 2009
San Antonio, Texas

Directed Energy Education Workshop
6 November 2009
San Antonio, Texas
SPONSORED BY HEL JTO
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Locations of Symposium Events
Most Symposium sessions will be held at the San Antonio Convention Center in rooms that are identified in the program. Exceptions include these:
Reception Tuesday evening - Hyatt Regency Hotel,
Reception Wednesday evening - Buckhorn Museum,
Secret Sessions - Offsite Location.

Transportation
The Convention Center is a short distance from the hotels and attendees are encouraged to walk.
Limited bus transportation will be provided from the hotels to the convention center. Buses will start at 0630 and run until 15 minutes after the end of the sessions. Buses will run from the Convention Center to the Secret sessions and will shuttle between these locations continually approximately every 20 minutes (on the hour, 20, & 40). Do not bring cell phones, pagers, writing materials, or bags to the offsite sessions.

Bus transporation will be available for the DE Bioeffects Facility Tour on Wednesday. Buses will leave from the Convention Center.

The Buckhorn Museum is a short distance from the hotels and attendees are requested to walk. Limited bus transportation will be provided for those unable to walk from the hotels to the Buckhorn Museum on Wednesday evening for the reception.

Breakfasts
Pastries and coffee will be served every morning at the Convention Center. Speakers Breakfast will be available for speakers only on the day of their presentation.

Lunches
Lunch will be served Tuesday - Thursday at the Convention Center. Limited coffee and snacks during breaks will be available at the convention center and the offsite location Tuesday to Friday morning.

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

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

### Short Courses

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<tr>
<td>0800</td>
<td>Short Courses Begin</td>
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<tr>
<td>1.</td>
<td>Introduction to High Energy Laser Systems</td>
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<td>Convention Center Room 101A</td>
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<td>2.</td>
<td>Introduction to High Power Microwave</td>
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<td>Convention Center Room 101B</td>
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<td>3.</td>
<td>Introduction to Applications of HEL (Limited)</td>
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<td>Convention Center Room 102A</td>
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<td>4.</td>
<td>Scaleable Bio-Effects (Secret)</td>
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<td>Offsite Location</td>
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<td>5.</td>
<td>RF Directed Energy Effects (Secret)</td>
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<td>Offsite Location</td>
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<tr>
<td>1200</td>
<td>Break for Lunch</td>
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<tr>
<td>1300</td>
<td>Afternoon Short Courses Begin</td>
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<td>6.</td>
<td>Applying DALE in a Directed Energy System Simulation (Limited)</td>
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<td>Convention Center Room 101A</td>
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<tr>
<td>7.</td>
<td>Thin Disk Lasers and Applications (Limited)</td>
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<td></td>
<td>Convention Center Room 101B</td>
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<tr>
<td>9.</td>
<td>Laser Induced Sensor Effects (Secret)</td>
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<td>Offsite Location</td>
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<tr>
<td>10.</td>
<td>Ultrashort Bio-Effects</td>
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<td>Convention Center Room 102A</td>
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### TUESDAY MORNING

**Plenary Session (Open)**

Convention Center, Mission Ballroom A/B

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<tr>
<td>0700</td>
<td>Registration at Convention Center</td>
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<tr>
<td>0800</td>
<td>Introduction</td>
</tr>
<tr>
<td></td>
<td><em>Dr. Garrett Polhamus</em>, Chief, Directed Energy Bioeffects Division, Human Effectiveness Directorate, 711th Human Performance Wing of the Air Force Research Laboratory</td>
</tr>
<tr>
<td>0815</td>
<td>Welcome</td>
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<tr>
<td></td>
<td><em>Major General Thomas Travis</em>, Commander, 59th Medical Wing, Wilford Hall Medical Center</td>
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<tr>
<td>0845</td>
<td>Keynote</td>
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<td></td>
<td><em>Mr. Joseph Sciabica</em>, Executive Director, Air Force Research Laboratory</td>
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<tr>
<td>0930</td>
<td>The Cyber Wavefront: Exploring the Role of Directed Energy in Cyberspace</td>
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<td></td>
<td><em>Mr. Michael Kretzer</em>, Technical Director, 688th Information Operations Wing. AFSPC</td>
</tr>
<tr>
<td>1015</td>
<td>Break</td>
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<tr>
<td>1045</td>
<td>Directed Energy and Research Opportunities in Homeland Security</td>
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<td></td>
<td><em>Dr. Starnes Walker</em>, Director of Research, Department of Homeland Security</td>
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<tr>
<td>1130</td>
<td>DEPS Session</td>
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<td><em>Dr. William Baker</em>, Directed Energy Professional Society</td>
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<tr>
<td>1200</td>
<td>Lunch</td>
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</table>
Bioeffects - mmWave & HPM (Open)
Chairs: John D’Andrea, and John Ziriax, USN NAMRU/SA
Convention Center, Mission Room A

1300  W-Band High Power Sources with Permanent Magnet Transport
Baruch Levush, Naval Research Laboratory

1330  Modeling Whole-Body Millimeter-Wavelength Irradiation Irreversible Damage
Luisiana Cundin, CMI\AFRL\RHDR

1400  Modeling Millimeter-Wave Propagation
Luisiana Cundin, CMI\AFRL\RHDR

1430  Quasi-Optical W-band Sheet Beam Klystron (QO-WSBK) for Active Denial System (ADS) Applications
Larry Barnett, University of California

1500  Break

1530  Some Past Research on Bioeffects of Pulsed Electromagnetic Energy
Ronald Seaman, General Dynamics

1600  Quantification of Multiple Nanosecond Electrical Pulse Exposure in Mammalian Cells
Bennett Ibey, AFRL 711th HPW/RHDR

1630  RHDR Theory and Modeling Efforts for Short Pulse Research
William Roach, AFRL 711th HPW/RHDR

1700  Modeling Ultra-Short Blumlein Pulses
Luisiana Cundin, CMI\AFRL\RHDR

1730  Poster Sessions at Hyatt
Evening Reception

Student Session (Open)
Chair: Don Seeley, High Energy Laser Joint Technology Office
Convention Center, Mission Room B

1300  Opening Remarks
Don Seeley, HEL JTO, Chair

1310  Intracavity Second Harmonic Generation of Cs Laser
Timothy Genda and Benjamin Naumann, US Air Force Academy

1330  Measuring the Fine-Structure Mixing Rate Cross Sections of Rb(5p) with 3He
Benjamin Naumann and Timothy Genda, US Air Force Academy

1350  Development of an Optically Pumped Cesium Dimer Laser
Omar Qassim, University of New Mexico

1410  Multialkali Coatings for Dispenser Photocathodes
Eric Montgomery, University of Maryland

1430  Thermal Tuning of Volume Bragg Gratings for Spectral Beam Combining
Derrek Drachenberg, University of Central Florida

1450  Break

1520  Non-Intrusive Field Characterization with Slab Coupled Optical Sensor for Interior Packaging
Richard Gibson, Brigham Young University

1540  Millimeter-Wave Solid-State Reactive Sintering of Nd:YAG Ceramic Laser Host Materials
Chad Stephenson, Bethel College

1600  Modeling Kinematics for Optical Beam Pointing
Angela Roush, USNA

1620  Modeling Terahertz Propagation in Brownout Conditions
Phillip Grice, Brown University
FEL Technology and Testing (Open)
Chair: Quentin Saulter, Office of Naval Research
Convention Center, Mission Room A

0700  Registration at Convention Center
0800  Demonstrated Production of 1nC Bunch Charge with the JLab GTS DC Photoemission Gun
      Carlos Hernandez-Garcia, Jefferson Laboratory
0825  The Challenges of Drive Laser Systems For MW-class Free-Electron-Lasers Based On Photocathode-Injector
      Energy-Recovery-Linac
      Shukui Zhang, Jefferson Laboratory
0850  Electron Bunch Dynamics in High-Average Current Injectors for FELs
      Luke Johnson, University of Maryland
0915  Diamond Current Amplifier Fabrication and Characterization
      Joan Yater, Naval Research Laboratory
0940  Multialkali Coatings for Dispenser Photocathodes
      Eric Montgomery, University of Maryland
1005  Break
1035  RF-Gated, Field Emitter Electron Source
      Matt Virgo, Argonne National Laboratory
1105  Progress on the Development of High Quantum Efficiency Photocathodes at BNL
      Ilan Ben-Zvi, Brookhaven National Laboratory
1130  Progress on the Superconducting Injector and High-Current ERL at BNL
      Ilan Ben-Zvi, Brookhaven National Laboratory
1200  Lunch
Laser Programs and Applications (Limited/Open)
Chair: Lynn Ebbesen, Northrop Grumman
Convention Center, Room 101 A/B
0700 Registration at Convention Center
0800 Tactical Mission Concepts and Applications for Phased Array HEL Systems (Limited) Kevin Probst, The CORE Group
0830 Deployment Optimization of Multiple Cooperative Engagement HELs Using DEST Steven Hall, Lockheed Martin Space Systems
Session is now Open
0900 Status of Textron’s J-HPSSL 100 kW ThinZag Laser Program Daniel Trainor, Textron Defense Systems
0930 The Role of the Satellite Assessment Center and Laser Owner/Operators in Predictive Avoidance Bryan Blasy, Air Force Research Laboratory
1000 Break
1030 DoD Instruction 5000.02 and its Impact on Directed Energy Programs William Decker, Defense Acquisition University
1100 Spectroscopic and Kinetic Measurements on Alkali Atom-Rare Gas Excimers Steven Davis, Physical Sciences Inc.
1130 Laser System for Space Debris Cleaning Alexander Rubenchik, Lawrence Livermore National Laboratory
1200 Lunch

Bioeffects: General Topics (Limited)
Chair: Bruce Stuck, USAMRD
Convention Center, River Room
0700 Registration at Convention Center
0800 Results from the Thermal Laser Field Evaluation Semih Kumru, Air Force Research Laboratory
0830 Physiological Effects of Electro-Muscular Incapacitation Devices John Ziriax, Naval Medical Research Unit San Antonio
0900 Muscle Contraction Force Scales with the Duration of Nanosecond E-field Bursts Brian Cooper, University of Florida
0930 The Solid-State Active Denial System RF Source and Antenna Development George Bates, Northrop Grumman
1000 Break
1030 Comparison of Experimentally Obtained Specific Absorption Rate (SAR) with Results of Finite-Difference Time-Domain (FDTD) Modeling of Swine Ronald Seaman, General Dynamics
1100 What Lies Beneath the Surface - Chemical and Thermal Stimuli, Pain Perception and Behavioral Outcomes Maureen McConnell, Air Force Research Laboratory
1130 High Energy Laser Collateral Assessment Tool Albert Bailey, Northrop Grumman
1200 Lunch
WEDNESDAY MORNING

RF and HPM (Secret)
Chair: Peter Turchi, Los Alamos National Laboratory
Offsite Location
0700 Registration at Convention Center
0800 Buses Depart for Offsite Location
0830 RF Weapons - The Myths and Facts
0855 Susceptibility of COTS Passive Infrared Devices to HPM
0920 MEGA Demonstration System
0945 Thermoelastic Response of a Human Head to a Pulsed Microwave Source: A Computer Simulation Study
1010 Break
1035 Electromagnetic Field Distribution as a Function of Building Materials Using Wideband RF Technology
1100 Using DE Technology to Search for Improvised Nuclear Devices (INDs)
1130 Buses return from offsite location
1200 Lunch

WEDNESDAY MORNING

Intelligence (Secret)
Chairs: Wendy Kunkel, National Air and Space Intelligence Center, and Megan Smith, Navy/NMIC
Offsite Location
0800 Buses Depart for Offsite Location
0830 Asia RFW Threats
0850 Asia Ground-Based Air Defense and Anti-Satellite Directed Energy Weapons
0910 ROW RFW Threats Overview
0930 ROW Ground-Based Air Defense and Anti-Satellite Directed Energy Weapons
0950 Real World Lasing Incidents
1010 Break
1030 Future Naval Laser Weapons
1100 Foreign Pulsed Power for Directed Energy Weapons
1130 Buses return from offsite location
1200 Lunch

WEDNESDAY AFTERNOON

Laser Novel Concepts (Open)
Chair: Mark Neice, High Energy Laser Joint Technology Office
Convention Center, Mission Room A
1300 Prospects for High Power Diamond Raman Lasers
Richard Mildren, MQ Photonics Research Centre
1330 Underwater Intense Laser Acoustic Source Directivity and Frequency Control Demonstration
Melissa Hornstein, Naval Research Laboratory
1400 EOIL Power Scaling in a 1-5 kW Supersonic Discharge-Flow Reactor
Wilson Rawlins, Physical Sciences Inc.
1430 Catalytic Enhancement of Singlet Oxygen for Hybrid Electric Discharge Oxygen-Iodine Laser Systems
Wilson Rawlins, Physical Sciences Inc.
1500 Break
1530 Pulsed, Optically-Pumped Rubidium Laser Scaled to 24 x Threshold
Clifford Sulham, Air Force Institute of Technology
1600 Systematic Technology Development of the Electric Oxygen-Iodine Laser
David Carroll, CU Aerospace
1630 Transversely Pumped Cesium Vapor Amplifier
Boris Zhdanov, US Air Force Academy
1800 Evening Reception at the Buckhorn Museum
FEL Technology (Limited)
Chair: Jeremy Martin, Office of Naval Intelligence
Convention Center, River Room
1300  Power Beaming to UAVs, USVs and UUVs
Roy Whitney, Jefferson Laboratory
1330  FEL Seed Laser Requirements and Simulations of the Brookhaven Amplifier Experiments
Joseph Penano, Naval Research Laboratory
1400  Atmospheric Propagation of High-Average-Power FEL Pulse Trains
Bahman Hafizi, Icarus Research, Inc.
1430  High Average Power Free-electron Laser Resonator Concepts
Stephen Benson, Jefferson Laboratory
1500  Break
1530  Endpoint Energy Measurements in a High-Gradient CW NCRF Injector
Dinh Nguyen, Los Alamos National Laboratory
1600  A Driver Accelerator for High-Power FEL Systems
David Douglas, Jefferson Laboratory
1630  Optimization of Wall Plug Efficiency in a High-Power FEL System
David Douglas, Jefferson Laboratory
1800  Evening Reception at the Buckhorn Museum

Improvised Explosive Devices (IED) Defeat (Secret)
Chair: Eugene Bednarz, Air Force Research Laboratory
Offsite Location
1300  Buses Depart for Offsite Location
1330  IED Resonant Backscatter Recognition Using Non-Negative Matrix Factorization
1400  RF Energy Requirements for Initiation of Detonators
1430  System-Level RF Effects Testing of Improvised Explosive Devices
1500  Break
1530  Update on the Banshee Counter-IED System
1600  Design and Development of Radio Frequency DE IED Neutralizer Concept
1630  Buses return from offsite location
1800  Evening Reception at the Buckhorn Museum

DE Technology and Applications (Secret)
Chair: Roy Hamil, Air Force Research Laboratory
Offsite Location
1300  Buses Depart for Offsite Location
1330  Full System Performance of the Advanced Tactical Laser Prototype Hardware
1400  Impact of TREM Results on the ATL Military Utility
1430  Water Vapor Control on COIL: Performance and System Impact
1455  Importance of Multi-dimensional Heat Flow for an HEL Damaging a Tactical Target
1520  Break
1555  Air to Air Laser Lethality Using LEWAT-EF
1620  Field Tests of Susceptibility of BLACK CAT Passive Infrared Devices to RF
1645  Micro Electromechanical System Susceptibility to High Power Microwave Radiation
1710  Buses return from offsite location
1800  Evening Reception at the Buckhorn Museum
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<td>FEL Technology and Testing (Open)</td>
<td>Bioeffects: General Topics (Limited)</td>
<td>Laser Programs and Applications (Limited/Open)</td>
<td>RF and HPM Intelligence (Secret)</td>
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<td>Wednesday</td>
<td>1300</td>
<td>Laser Novel Concepts (Open)</td>
<td>FEL Technology (Limited)</td>
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<td>IED Defeat Technology and Applications (Secret)</td>
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<td>FEL - M &amp; S (Open)</td>
<td>DE - General Topics (Open)</td>
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<td>Transitioning DE Technology to the Warfighter (OPEN)</td>
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<td>Thursday</td>
<td>1300</td>
<td>Bioeffects: Laser and Terahertz (Open)</td>
<td>Laser Technology (Open)</td>
<td>Laser M&amp;S + Beam Control (Limited)</td>
<td>ADS Bioeffects and Alternative Applications (Secret)</td>
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<td>Friday</td>
<td>0800</td>
<td>Non-Lethal Weapon Technology (Limited)</td>
<td>Laser Systems + Power/Thermal Management (Limited)</td>
<td>DE Transition and Testing (Limited)</td>
<td>DE Education Workshop at Hyatt (Open)</td>
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THURSDAY MORNING

FEL - Modeling and Simulations (Open)
Chair: Roy Whitney, Jefferson Laboratory
Convention Center, Mission Room A

0700  Registration at Convention Center
0800  Status of the NPS Cathode and Superconducting Electron Gun Experiments
       John Lewellen, Naval Postgraduate School
0830  SASE & Laser Seeded FEL Amplifiers
       James Murphy, Brookhaven National Laboratory
0900  Numerical Issues in the Simulation of Free-Electron Lasers
       Henry Freund, Science Applications International Corporation
0930  Electron Transport and Photoemission in Coated Semiconductors and Thin Films
       Kevin Jensen, Naval Research Laboratory
1000  Break
1030  High-Average Current Injectors for High-Power FELs
       Phillip Sprangle, Naval Research Laboratory
1100  Electron Beam Quality and Stability Effects in FEL Amplifiers and Oscillators
       Joseph Blau, Naval Postgraduate School
1130  Comparative Study of Free-Electron Laser Simulations
       Joseph Blau, Naval Postgraduate School
1200  Lunch

THURSDAY MORNING

Directed Energy - General Topics (Open)
Chair: Jorge Beraun, Air Force Research Laboratory
Convention Center, Mission Room B

0700  Registration at Convention Center
0800  Airborne Target Irradiance and Imagery Measurement Risk Reduction Test-bed
       Larry McKee, Directed Energy Test and Evaluation Capability
0830  Effects on Electronics of Extremely High-Frequency RF Directed Energy
       Alan Mar, Sandia National Labs
0900  High Energy Laser Ground Target Irradiance Measurement Capability
       Mike Bertin, Directed Energy Test and Evaluation Capability
0930  High Bandwidth, Atmospheric Optical Turbulence Measurements Utilizing the Balloon Ring Platform
       Demos Kyrazis, R-Cubed, Inc.
1000  Break
1030  Preliminary VHF Radar and High-Data-Rate Optical Turbulence Profile Observations Using a Balloon-Ring Platform
       Frank Eaton, Air Force Research Laboratory
1100  Tri-Service Study 2011
       Minh Vuong, Directed Energy Test and Evaluation Capability
1200  Lunch

THURSDAY MORNING

Transitioning DE Technology to the Warfighter (Open)
Convention Center, Room 101A/B

1030  Invited Talk
       William Decker, Defense Acquisition University
DE Technology (Limited)
Chair: Carol Sullivan, DDR&E/Research
Convention Center, River Room

0700 Registration at Convention Center
0800 Producing Microwaves with a Ferroelectric Generator Power Source
   David Hemmert, HEM Technologies

0830 Biotechnological Nanowarfare: Directed Electromagnetic Energy Control
   Jonathan Kiel, Air Force Research Laboratory

0900 Testing of Vector Inversion Based Rf Sources at NSWCC DD
   Zac Shotts, Radiance Technologies

0930 Modeling and Measuring the Wideband Threat Source Antenna Pattern
   Jeffrey Schleher, Directed Energy Test and Evaluation Capability

1000 Break
1030 How to Validate an HPM M&S Tool Illustration with a Realistic Example of a Simulation Tool and a Test Chamber
   Maqsood Mohammed, Jacobs Technology

1100 Comparison of Optical Limiting Materials with Microsecond Visible Laser Exposure
   Molly Miller, 711 HPW/RHDO
   Air Force Research Laboratory

1130 Acceptance Test Results for the Directed Energy Test and Evaluation Capability High Power Microwave Narrowband Threat Systems
   J. Mark DelGrande, Directed Energy Test and Evaluation Capability

1200 Lunch

ADS Bioeffects and Alternative Applications (Secret)
Chair: Stephanie Miller and Noel Montgomery, Air Force Research Laboratory
Offsite Location

0700 Registration at Convention Center
0800 Buses Depart for Offsite Location
0830 Active Denial System Transition Challenges
0855 ADS Bioeffects: From Frustration Canyon to Deployment
0920 Effects of Variable Spot Size on Human Exposure to 95-Ghz Millimeter Wave Energy
0945 Design, Construction, and Testing of a High Sampling Speed Detector Array for Direct Measurement of Millimeter Wave Beam Uniformity in Active Denial Systems
1010 Break
1040 Effects of Variable Spot Size on Human Exposure to 95-Ghz Millimeter Wave Energy - Moving Subjects
1105 Pain Intolerability from Short Small Spot 95-Ghz Exposures at Various Heat Rates, Final Results
1130 Buses return from offsite location
1200 Lunch
## THURSDAY MORNING

**Laser Guided Energy (LGE) and Explosive Detection (Secret)**  
Chair: *Wallace Clark*, Air Force Research Laboratory  
Offsite Location

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<tr>
<td>0800</td>
<td>Buses Depart for Offsite Location</td>
</tr>
<tr>
<td>0830</td>
<td>Thermal and Electrical Modeling of Discharge Channel Conductivity</td>
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<tr>
<td>0900</td>
<td>Laser Guided Energy Range Scaling</td>
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<td>0930</td>
<td>Resistance and Capacitance of Long Distance Laser Filament Guided Discharges</td>
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<tr>
<td>1000</td>
<td>Break</td>
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<tr>
<td>1030</td>
<td>Sensitivity of Scattered Electromagnetic Fields to the Material Properties of Explosively Formed Penetrators</td>
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<tr>
<td>1100</td>
<td>Phenomenology Study of Resonant Backscatter from EFPs</td>
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<tr>
<td>1130</td>
<td>Buses return from offsite location for lunch</td>
</tr>
<tr>
<td>1200</td>
<td>Lunch</td>
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## THURSDAY AFTERNOON

**Bioeffects: Laser and Terahertz (Open)**  
Chair: *Robert Thomas*, Air Force Research Laboratory  
Convention Center, Mission Room A

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<tr>
<td>1300</td>
<td>Terahertz Radiation Research Summary</td>
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<td><em>Gerald Joseph Wilmink</em>, 711th HPW/RHDR Air Force Research Laboratory</td>
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<tr>
<td>1330</td>
<td>A Measurement Challenge: Exploring the Effectiveness of Directed Energy on Human Behavior</td>
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<td><em>Christina Hinojosa</em>, Conceptual MindWorks, Inc.</td>
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<tr>
<td>1400</td>
<td>Method for Measuring Threshold Temperature for Laser-Induced Cell Death</td>
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<td><em>Michael Denton</em>, Northrop Grumman</td>
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<tr>
<td>1430</td>
<td>Human Assessment of Laser Devices</td>
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<td><em>Leedjia Svec</em>, USN NAMRU-San Antonio</td>
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<tr>
<td>1500</td>
<td>Break</td>
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<tr>
<td>1530</td>
<td>Sensitive Evaluation of Laser Lesions in the Non-Human Primate Retina</td>
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<tr>
<td></td>
<td><em>Ginger Pocock</em>, Air Force Research Laboratory</td>
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<tr>
<td>1600</td>
<td>Thermal Ablation of Biological Tissue</td>
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<td><em>Elharith Ahmed</em>, Northrop Grumman</td>
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<tr>
<td>1630</td>
<td>Evaluation of Tracking and Warning Effectiveness of a Rifle-Mounted Non-Lethal Laser in Open-Water Naval Engagements</td>
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<td><em>Jeremy Beer</em>, Naval Medical Research Unit</td>
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<tr>
<td>1700</td>
<td>Adaptive Reflection Modeling</td>
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<tr>
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<td><em>Albert Bailey</em>, Northrop Grumman</td>
</tr>
</tbody>
</table>
Laser Technology (Open)
Chair: Edward Duff, Air Force Research Laboratory
Convention Center, Mission Room B

1300  Dynamical Stability Analysis of High-Power Passively Phased Fiber Laser Arrays
       Eric Bochove, Air Force Research Laboratory

1330  Nanoscopic Control of Laser Dye, Dopant and Media
       Joseph Lichtenhan, Hybrid Plastics Inc

1400  Impact of Annealing on the Optical Properties of Thin Film Oxides
       Carmen Menoni, Colorado State University

1430  Break

1500  Diode Pumped Alkali Laser Kinetics: Energy Pooling and Second Order Processes
       Paul Jones, Air Force Institute of Technology

1530  Joint High Power Solid State Laser Demonstration at Northrop Grumman
       Marty Wacks, Northrop Grumman Aerospace Systems

1600  Origin of Wavefront Aberration in Weakly-Compressible Shear Layers
       Miguel Visbal, Air Force Research Laboratory

1630  Cryogenically-Cooled Yb:YAG Ceramics Active-Mirror Laser
       Kenji Takeshita, Mitsubishi Heavy Industries, Ltd.

Laser Modeling and Simulation + Beam Control (Limited)
Chairs: Chuck LaMar, Space & Missile Defense Command
Convention Center, River Room

1300  Model Comparison for Accurately Predicting Membrane Mirror Deformation and Snap-Down
       Michael Steinbock, Air Force Institute of Technology

1330  Beam Drift Analysis
       William Laughlin, Physical Sciences Inc

1400  Performance Model of Laser Weapon Systems Comprised of Multiple Tiled Subapertures
       Richard Bartell, Air Force Institute of Technology

1430  Potential Impacts of Sea Surface Temperature Changes on Maritime High Energy Laser Engagements
       Steven Fiorino, Air Force Institute of Technology

1500  Break

1530  Optimization of Power and Aperture for the Counter Rocket, Artillery, and Mortar Mission
       Chuck LaMar, USASMDC

1600  DARPA’s Adaptive Photonic Phase-Locked Elements (APPLE) System - Test Results
       Andrew McKie, Raytheon NCS

1630  First Light from the Integrated Solid State Laser Testbed
       Sean Ross, AFRL/RDL

1700  RF Field Measurements for a TESLA Cage Cavity
       John Noonan, Argonne National Laboratory
### Active Denial System + Vehicle & Vessel Stopping (Secret)

**Chair:** Kirk Hackett, Air Force Research Laboratory  
**Offsite Location**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>1300</td>
<td>Buses Depart for Offsite Location</td>
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<tr>
<td>1330</td>
<td>An Efficient Numerical Approach to Thermal Bioeffects Modeling With an Eye on System Performance</td>
</tr>
<tr>
<td>1355</td>
<td>Effects of Pharmacological Agents on the Perception of Pain from Millimeter Wave Exposure</td>
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<tr>
<td>1420</td>
<td>Behavioral Effects of Active Denial System (ADS) on Operators of Motor Vehicles</td>
</tr>
<tr>
<td>1455</td>
<td>Small Vessel Stopping Utilizing HPM (Update)</td>
</tr>
<tr>
<td>1515</td>
<td>Break</td>
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<tr>
<td>1545</td>
<td>Evaluation of High Power Electrical Vehicle Stopping Systems for Pre-Emplaced Applications</td>
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<tr>
<td>1610</td>
<td>Evaluation of High Power RF Technology for Non-Lethal Vessel Stopping</td>
</tr>
<tr>
<td>1635</td>
<td>RF Susceptibility Levels of GaAs and GaN Based Low Noise Amplifier</td>
</tr>
<tr>
<td>1700</td>
<td>Buses return from offsite location</td>
</tr>
</tbody>
</table>
Laser Systems + Power/Thermal Management (Limited)
Chair: James Mulroy, Raytheon
Convention Center, Mission Room B

0700 Registration at Convention Center
0800 Flight Demonstrated ATL Lethality
   Bryan Kelchner, Boeing
0825 HEL Target Effects on Tracker and Aimpoint Maintenance
   Paul Knowlton, Boeing
0850 High Power Alkali Vapor Lasers
   Jason Zweiback, General Atomics Aeronautical System
0915 Optical Device Detection Using Laser Illumination
   Walter Zacherl, Photonics Research Center, USMA
0940 Test Ideas for a High Power SSL Testbed
   Josef Shwartz, Northrop Grumman Aerospace Systems
1005 Break
1035 Lightweight Power/Thermal System for Ground Platform Applications Capable of Delivering Megawatt Class Shaft Power
   Charles Oberley, Air Force Research Laboratory
1100 Thermal Energy Storage (TES) Technologies for Directed Energy Weapons
   Levi Elston, Air Force Research Laboratory
1125 Li-Ion Battery as a Pulse Power Source for DEW
   Kamen Nechev, Saft America
1200 Symposium Adjourns

Non-Lethal Weapon Technology (Limited)
Chair: David Law, Joint Non-Lethal Weapons Directorate
Convention Center, Mission Room A

0700 Registration at Convention Center
0800 Portable RF LL Device for Law Enforcement
   Portable ADS
   Joe Cecconi, National Institute Justice
0830 Overview of JNLWP Directed Energy Vehicle/Vessel Stopping Programs
   Scott Griffiths, Joint Non-Lethal Weapons Directorate
0900 JNLWD Solid State Non-Linear Transmission Line HPM Source Development at Los Alamos National Laboratory
   Steven Russell, Los Alamos National Laboratory
0930 Numerical Simulations of Efficient Generation of HPM in a Solid State, Periodically Loaded Non-linear Transmission Line
   Quinn Marksteiner, Los Alamos National Laboratory
1000 Break
1030 Design and Construction of a 1.5 KHz Rep Rate Vector Inversion Generator Based RF Transmitter for Non-Lethal Weapons Applications
   Zac Shotts, Radiance Technologies
1100 Ultra-Short Pulse Laser-Generated Plasma Flares in Air and on Dielectric Surfaces
   Joseph Penano, Naval Research Laboratory
1130 Modeling and Simulation of a Distributed Sound and Light Array for use as a Hail-and-Warn System
   Robert Baran, Naval Surface Warfare Ctr
1200 Symposium Adjourns
**FRIDAY MORNING**

**Directed Energy Transition and Testing (Limited)**

Chair: *Jimmy Fleming*, Air Force Research Laboratory

Convention Center, Room 101 A/B

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<tr>
<td>0700</td>
<td>Registration at Convention Center</td>
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</table>
| 0800  | Enabling Directed Energy Capability Through Test Infrastructure Investment  
       *Todd Steiner*, Test Resource Management Ctr                        |
| 0830  | Behavioral Response to Non-Lethal Directed Energy Technologies: A Research Framework  
       *Jimmy Fleming*, 711 HPW/RHDJ  
       Air Force Research Laboratory                                         |
| 0900  | Using International Cooperation to Transition Directed Energy       
       *Kelly McDonald*, NAVAIR Weapons Division                            |
| 0930  | Modeling HPM Coupling to IEDs                                       
       *Larry Bacon*, Sandia National Laboratory                            |
| 1000  | Break                                                                |
| 1030  | Air Armament Center (AAC) Role in Transitioning Directed Energy (DE) Technologies  
       *John Corley*, AAC/XR, Eglin AFB                                   |
| 1100  | Demonstration, Testing, and Evaluation of a Distributed Sound and Light Array for use as a Hail-and-Warn System  
       *Randy Woods*, Naval Surface Warfare Ctr                           |
| 1130  | Laser Detection and Monitoring of Non-Lethal Laser in Maritime Naval Engagements  
       *David Freeman*, HJF/ Naval Medical Research Unit-SA                |
| 1200  | Symposium Adjourns                                                   |

**FRIDAY**

**DE Education Workshop (Open)**

Hyatt Hotel

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<th>Time</th>
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<tr>
<td>0700</td>
<td>Registration at Hyatt Hotel</td>
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| 0800  | HEL JTO Overview                                                      
       *Don Seeley*, High Energy Laser Joint Technology Office             |
| 0815  | DEPS Overview                                                        
       *Sam Blankenship*, Directed Energy Professional Society            |
| 0830  | 2009 AFIT DE Summer Intern Program                                  
       *Marken Houle*, Air Force Institute of Technology                   |
| 0850  | Model Comparison for Accurately Predicting Membrane Mirror Deformation and Snap-Down  
       *Michael Steinbock*, Air Force Institute of Technology              |
| 0910  | Modeling THz Propagation in Bownout Conditions                      
       *Phillip Grice*, Air Force Institute of Technology                  |
| 0930  | Spectrograph for Use with IR Lasers                                  
       *Karlene Karrfalt*, Army Research Laboratory                       |
| 0950  | Break                                                                |
| 1020  | Thermal Effects on the Performance of Optics in Use with High Power Lasers  
       *Conor Pogue*, Naval Research Laboratory                            |
| 1040  | Millimeter Wave Solid-State Reactive Sintering of Nd:YAG Ceramic Laser Host Materials  
       *Chad Stephenson*, Naval Research Laboratory                        |
| 1100  | The Center of Excellence for High Energy Lasers - A Status Report    
       *David Hostutler*, Air Force Research Laboratory                   |
| 1120  | Enhancing Science Courses and Laboratories at a Women’s College       
       Using LIDAR                                                        
       *Gary Gimmestad*, Georgia Tech Research Institute                   |
Symposium Organizing Committee

Dr. Garret Polhamus, AFRL, Chair
Dr. John Pellegrino, ARL, Co-Chair
Dr. Michael Murphy, AFRL, Technical Chair
Jorge Beraun, AFRL, Technical Co-Chair
Roy Hamil, AFRL, Technical Co-Chair

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Kevin Anchor
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Eugene Bednarz
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Edward Duff
Lynn Ebbesen
Jimmy Fleming
Kirk Hackett
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Chuck LaMar
David Law
Howard Meyer
Stephanie Miller
James Mulroy
Mark Neice
Quentin Saulter
Don Seeley
Bruce Stuck
Robert Thomas
Peter Turchi
John Ziriax

Technical Program Support
Dave Loomis
Debbie Foster

Symposium Coordinator
Cynnamon Spain

Registration and Short Courses
Donna Storment

Payments and Receipts
Tiffany Bjelke

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