Technical Program

Eleventh Annual Directed Energy Symposium

CO-SPONSORED BY NAVAL SEA SYSTEMS COMMAND

17 - 21 November 2008 Honolulu, Hawaii

Directed Energy Education Workshop

SPONSORED BY HEL JTO
21 November 2008 Honolulu, Hawaii
Locations of Symposium Events

Most Symposium sessions will be held at the Sheraton Hotel in rooms that are identified in the program. Exceptions include these:
Reception Wednesday evening: USS Missouri
Secret Sessions: Offsite Location

Transportation

Limited bus transportation will be provided to SECRET sessions. The Offsite Location is a short 10 minute walk from the Sheraton Waikiki.
A map is available in your registration packet.
Buses will start at 0700 and run as late as required. On Wednesday morning, buses will start at 0620. Buses will run from the Sheraton Waikiki to the Offsite Location and will shuttle between these locations continually every 20 minutes. (on the hour, 20, & 40) Do not bring cell phones, pagers, writing materials, or bags to the Offsite sessions from the Sheraton.
Bus transportation will be provided for all attendees from the Sheraton to the USS Missouri on Wednesday evening for the reception. The last bus to the reception leaves at 1800. You may not bring bags to the USS Missouri.

Breakfasts

Breakfast will be served Tuesday - Friday at the Sheraton Hotel.

Lunches

Lunch will be served Tuesday - Thursday at the Sheraton and Wednesday - Thursday at the Offsite Location. Symposium attendees may eat at either location. Limited coffee and snacks during breaks will be available at both locations.

Directed Energy Education Workshop

The DE Education Workshop is a separate event from the Symposium, scheduled for Friday 21 November at the Sheraton. Any Symposium registrant may attend the Workshop.

General Symposium Information

Overview of Sessions

MONDAY
Short Courses

TUESDAY AM
Plenary Session O

TUESDAY PM
Technology to Transition O & HEL Interaction and Diagnostics O
Student Session O
FEL Components, Systems, & Novel Concepts I O & DE Technology Programs L
HPM Systems and LI Pulse & HPM Sources, Protection, & Diagnostics S

WEDNESDAY AM
Solid State Slab O & Optical Components O
FEL Injectors I O & FEL Injectors II O
Gas Lasers L
HEL Lethality I L & Solid State Lasers L
Threat/Intelligence S & Military Utility/Programs I S

WEDNESDAY PM
Beam Control I O & Power and Thermal II O
Power and Thermal I L & Beam Control II L
HPM Modeling and Simulation L & FEL Components, Systems, & Novel Concepts II L
Military Utility/Programs II S & CIED Systems S

THURSDAY AM
Optical Systems and Propagation I O & HPM Sources, Coupling, & Computational Tools O
DE Military Utility L & Incoherent Beam Combined Systems L
HPM Effects Vehicle/Vessel S & HEL Effects S
HPM Posters S

THURSDAY PM
Fiber and Thin Disk Laser Systems O & Fiber Laser Technology O
Optical Systems and Propagation II L
HPM Technology and Systems L
HPM Susceptibility S & CIED Modeling/Susceptibility S
HEL Posters S

FRIDAY AM
Invited Talk O
FEL Theory and Simulation I O & HPM Sources, Diagnostics, and Effects O
Novel DE Technologies L & FEL Theory and Simulation II L

FRIDAY PM
DE Education Workshop O

O - OPEN L - LIMITED S - SECRET

Audio and Video Recording is Prohibited at All DEPS Sponsored Events
**TUESDAY MORNING**

**Plenary Session (OPEN)**
Sheraton, Kauai Room

- **0700** Registration at Sheraton
- **0800** Call to Order
- **0810** Welcome
  - CAPT David Kiel, U.S. Navy, Chair of the Symposium
- **0820** DEPS Welcome
  - Dr. William Baker, DEPS
- **0825** Keynote Speaker
  - The PACOM Perspective
  - RADM Charles W. Martoglio, U.S. Navy, United States Pacific Command
- **0905** The Air Force Perspective
  - Maj Gen Mike Hostage III, U.S. Air Force, Pacific Air Forces Command
- **0940** Break
- **1005** Industry’s Perspective for Creating Innovation in Military Weapon Systems
  - Mr. Barry Schuler, Raydiance, Inc.
- **1040** The Department of Homeland Security Perspective
  - Mr. Randel L. Zeller, Department of Homeland Security
- **1120** Army Science and Technology Overview
  - Mr. Matt Donohue, Office of the Deputy Assistant Secretary of the Army for Research and Technology
- **1155** DEPS Annual Report
  - Dr. William Baker, DEPS
- **1215** Lunch

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**MONDAY**

**Short Courses**

- **0700** Registration at Sheraton
- **0800** Short Courses Begin
  1. Introduction to High Energy Laser Systems
     Sheraton, Honolulu Room
  2. Introduction to High Power Microwave Systems
     Sheraton, Kahuka Room
  3. Introduction to Laser Beam Quality
     Sheraton, Oahu Room
  4. Introduction to Applications of HEL (Limited)
     Sheraton, Wailua Room
  5. Bio-Effects (SECRET)
     Sheraton, Waianae Room
  6. Free Electron Lasers - FULL DAY COURSE
     Sheraton, Waimea Canyon Room
  7. Fiber Lasers - FULL DAY COURSE
     Sheraton, Koko Crater Room
- **1200** Break for Lunch
- **1230** Golf Tournament Ko‘olau Golf Course
- **1300** Afternoon Short Courses Begin and Full Day Courses Resume
  8. Transitioning DE Technology to the Warfighter (Limited)
     Sheraton, Honolulu Room
  9. RF Directed Energy Effects (Limited)
     Sheraton, Kahuka Room
  10. Test and Evaluation of High Energy Lasers (Limited)
     Sheraton, Oahu Room
  11. Active Denial Applications (SECRET)
     Sheraton, Wailua Room

- **1200** Break for Lunch
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  10. Test and Evaluation of High Energy Lasers (Limited)
     Sheraton, Oahu Room
  11. Active Denial Applications (SECRET)
     Sheraton, Wailua Room
TUESDAY AFTERNOON

Technology to Transition  (OPEN)
Sheraton, Kauai Room
1300 Near-Term DE Transitions to the Warfighter - A Critical Need for Transitioning DE
Howard Meyer, OUSD (AT&L)
1320 Highlights and Recommendations from the DE “Quick Look” Study to Weaponize DE
Douglas Beason, Los Alamos National Lab
1340 Technical Issues Concerning HEL Deployment
Martin Stickley, Booz, Allen, Hamilton
1400 JTO HEL Program Overview
Mark Neice, Joint Technology Office
1420 Tri-Service Study Update Project
Mike Bertin, SAIC
1440 Break

HEL Interaction and Diagnostics (OPEN)
1500 High Energy Laser Ground Target Irradiance Measurement Capability
Mike Bertin, SAIC
1520 The Feasibility of Using Remote Imagery for High Energy Laser Irradiance-On Target Measurements
Larry McKee, SAIC
1540 1.07 um Irradiation of Carbon-Loaded Polymeric Materials
Christopher Lloyd, Naval Research Lab
1600 Temperature Determination of Laser-Heated Target Surfaces is Multiband Pyrometry Accurate
James Griggs, SAIC
1620 Intense Laser Acoustic Source Characterization and Nonlinear Underwater Optics Studies
Ted Jones, Naval Research Lab
1640 Comprehensive 3-D Simulation of Multiple Laser Beams Interaction with Various Targets in DE Response
Ahmed Hassanein, Purdue University
1730 Poster Sessions at Sheraton
Evening Reception

TUESDAY AFTERNOON

Student Session (OPEN)
Sheraton, Oahu Room
1300 Opening Remarks
Don Seeley, HEL JTO, Chair
1310 Laser Induced Breakdown Spectroscopy of Surrogate Explosives
Leebyn Chong, Naval Research Lab
1335 Passive Shear Layer Regularization for Aero-Optics: A Progress Report
Donald Wittich III, Notre Dame
1400 Image Based BRDF Acquisition
Phillip Grice, Air Force Institute of Technology
1425 Analysis of Multiple Laser Beam Wander in a 2-mile Propagation Experiment
Amanda Fried, Naval Research Lab
1450 Break
1510 Filament Measurements in Underwater Laser Propagation
Julie Haney, Naval Research Lab
1535 Z-scan Measurement of the Upconversion Coefficient in Er:YAG
Robert Dibiano, Army Research Lab
1600 Diode Laser Pump Source for Sodium Vapor Laser
R. Cwynar, Air Force Academy
1625 Generation of Blue 447 nm Laser Light by Frequency Doubling of Cs Vapor Laser
D. Wright, Air Force Academy
1650 Measurement of the Rb Fine Structure Mixing with Helium
G. Jemo, Air Force Academy
1730 Poster Sessions at Sheraton
Evening Reception
FEL Components, Systems, and Novel Concepts I (OPEN)  
Sheraton, Honolulu Room

1500  Undulater Technology for High Power Free Electron Lasers  
      *Stephen Gottschalk*, STI Optronics

1520  Advanced Longitudinal Diagnostics for SAFE FELs at the VISA and SPARC Facilities  
      *Gerard Andonian*, UCLA

1540  Laser Seeded FEL Amplifier R&D for MW-Class FEL Applications  
      *Jim Murphy*, Science Applications International Corp

1600  Exploring Intense Electron Beam Physics on the University of MD Electron Ring  
      *Patrick O’Shea*, University of Maryland

1620  Ion Problem in Free Electron Lasers  
      *Keith Cohn*, Stanford University

1730  Poster Sessions at Sheraton  
      Evening Reception

HPM Systems and Laser Induced Plasma Channel (SECRET)  
Offsite Location

1240  Buses to Offsite Location

1300  Field Test of the MEGA (Microwave Electronic Ground Attack) Prototype Combat Vehicle

1320  Evaluation of a Unique High Power, Wideband RF System

1340  Simulation of the Evolution of Laser-Guided Discharge Channels

1400  Scaling of Laser Guided Energy to Extended Ranges

1420  Laser Induced Plasma Channel (LIPC) Discharge Target Effects Summary

HPM Sources, Protection, and Diagnostics (SECRET)

1500  Enhancing the Communication/Radar Electronic Attack Planning Effectiveness Reference with Radio Frequency Directed Energy Effects

1520  Real-Time Adaptive High Power Microwave Generator

1540  Advances in Passive HPM Detection and Active Shielding

1600  Electromagnetic Hardening of Composite Materials

1620  RF Emissions for Weapons

1640  Main Beam Power Determination From Interference Patterns

1730  Poster Sessions at Sheraton  
      Evening Reception

DE Technology Programs (LIMITED)  
Sheraton, Lanai Room

1500  Joint High Power Solid State Laser Progress at Northrop Grumman  
      *Jay Marmo*, Northrop Grumman

1520  Status of Textron’s J-HPSSL 100kW ThinZag laser Program  
      *Daniel Trainor*, Textron Defense Systems

1540  A Technology Transfer Case Study: The Enhanced Track Illuminator for the Airborne Laser Program  
      *Olivia Koski*, Lockheed Martin

1600  DE Integration Options Overview  
      *Keith Coleman*, Boeing

1620  Ground-Based Counter Measure with Asymmetric Warfare Applications  
      *Chad Smith*, General Dynamics

1730  Poster Sessions at Sheraton  
      Evening Reception
**Solid State Slab (OPEN)**
Sheraton, Kauai Room

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>0600</td>
<td>Registration at Sheraton Breakfast-Hosted by Northrop Grumman</td>
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<tr>
<td>0800</td>
<td>Beam Quality Considerations in High Average Power Solid-State Lasers&lt;br&gt;Paul Pax, LBNL</td>
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<tr>
<td>0820</td>
<td>Advanced Transparent Ceramics for High Average Power Solid-State Lasers&lt;br&gt;Thomas Soules, LBNL</td>
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<tr>
<td>0840</td>
<td>New Concept High Power Solid State Laser System&lt;br&gt;Kenji Takeshita, Mitsubishi Heavy Industries, Ltd - Japan</td>
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<tr>
<td>0900</td>
<td>Yb:Y2O3 Ceramic Lasers&lt;br&gt;Ishwar Aggarwal, Naval Research Lab</td>
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<td>0920</td>
<td>Reasonantly-Pumped Ceramic Er:Sc2O3 Cryogenic Laser Performance&lt;br&gt;Larry Merkle, Army Research Lab</td>
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<td>0940</td>
<td>Break - Hosted by Raytheon</td>
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**Optical Components (OPEN)**

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<tr>
<td>1000</td>
<td>Increased HEL Range W/O Off-Axis Mirror Detection from Scatter&lt;br&gt;A. Danielson, Bennett Optical Research</td>
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<td>1020</td>
<td>3D Dielectric Meta-Optics for Next-Generation Laser Systems&lt;br&gt;Eric Johnson, University of North Carolina</td>
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<td>1040</td>
<td>Impact of Process Parameters and Stack Geometry on the Optical and Structural Properties of SiO2/HfO2 Multilayers&lt;br&gt;Carmen Menoni, CSU</td>
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<tr>
<td>1100</td>
<td>Spinel as Exit Aperture Window for HEL Systems&lt;br&gt;Ishwar Aggarwal, Naval Research Lab</td>
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<tr>
<td>1120</td>
<td>Epoxy Free Bonding for High Performance Lasers&lt;br&gt;Nick Traggis, Precision Photonics Corp</td>
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<td>1140</td>
<td>A 2” Voice-Coil Actuated Fast Steering Mirror&lt;br&gt;Martin Smith, ATA</td>
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<td>1200</td>
<td>Lunch - Hosted by Raytheon</td>
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**FEL Injectors I (OPEN)**
Sheraton, Honolulu Room

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<td>Development of Diamond Field-Emitter Arrays for Free-Electron Lasers&lt;br&gt;Jonathan Jarvis, Jacobs Technology</td>
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<tr>
<td>0820</td>
<td>Progress Towards a Robust, Efficient Dispenser Photocathode&lt;br&gt;Eric Montgomery, IPG Photonics</td>
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<td>0840</td>
<td>Progress on the High-Current Superconducting Injector and Energy Recovery Linac at BNL&lt;br&gt;Ilan Ben-Zvi, Brookhaven National Lab</td>
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<tr>
<td>0900</td>
<td>Semiconductor Photoemission Theory and its Application&lt;br&gt;Kevin Jensen, Naval Research Laboratory</td>
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<td>0920</td>
<td>Semiconductor Photoemission and Dark Current Modeling in the MICHELLE Code&lt;br&gt;John Petillo, SAIC</td>
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**FEL Injectors II (OPEN)**

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<td>1000</td>
<td>Electron Source Development for the LANL Normal Conducting RF Photoinjector&lt;br&gt;Nathan Moody, Los Alamos National Lab</td>
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<tr>
<td>1020</td>
<td>Commissioning of the LCLS Linac and Bunch Compressors&lt;br&gt;John Galayda, Stanford Linear Accelerator Center</td>
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<tr>
<td>1040</td>
<td>Photoemission Images of Prospective Photocathodes&lt;br&gt;Jonathon Shaw, Naval Research Lab</td>
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<tr>
<td>1100</td>
<td>Diamond Current Amplifier Development for FEL Photocathodes&lt;br&gt;Joan Yater, Naval Research Lab</td>
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<tr>
<td>1120</td>
<td>Engineering Design and Fabrication of an Ampere-Class Superconducting Photocathode Electron Gun&lt;br&gt;Thomas Schultheiss, Advanced Energy Systems</td>
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<tr>
<td>1140</td>
<td>Short Pulse High Power Fiber Lasers for Photoinjection&lt;br&gt;Pratheepan Madasamy, Aculight Corp</td>
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### WEDNESDAY MORNING

**Gas Lasers (LIMITED)**
Sheraton, Oahu Room

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<td>1000</td>
<td>Rubidium and Potassium Alkali Vapor Lasers</td>
<td>Jason Zweiback, WFK Lasers, LLC</td>
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<tr>
<td>1020</td>
<td>Path Toward a Power-Scaled Hydrocarbon-Free 795-nm Rubidium Laser</td>
<td>Sheldon Wu, Lawrence Berkeley National Lab</td>
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**Solid State Lasers (LIMITED)**

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<td>Enhanced Track Illuminator Laser for Airborne Laser</td>
<td>Daniel Ripin, MIT Lincoln Lab</td>
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<td>1020</td>
<td>New Advances in Materials Technologies for DE Applications</td>
<td>Vida Castillo, VLOC</td>
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<tr>
<td>1040</td>
<td>Radiation Balanced Yb:YAG Amplifier</td>
<td>Shawn O’Connor, Photonics Technology Branch</td>
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<tr>
<td>1100</td>
<td>Development of a 500 W Output Yb:YAG Based Ultra-Short Pulse Laser System</td>
<td>Jim Zhang, Applied Energetics</td>
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<td>High-Average Power Amplifier for Ultra-Short Pulse Lasers</td>
<td>John Vetrovec, Aqwest, LLC</td>
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**HEL Lethality I (LIMITED)**
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<td>0800</td>
<td>Simple Algorithms for HEL Lethality Evaluations</td>
<td>William Laughlin, Physical Sciences Inc</td>
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<td>0820</td>
<td>Dynamic Aimpoint Laser Engagement (DALE)</td>
<td>Robin Ritter, Tau Technologies</td>
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<td>0840</td>
<td>Imaging for Phased Array HEL Acquisition, Tracking and Pointing and Fire Control Systems</td>
<td>Paul McManamon, Exciting Technologies</td>
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<td>0900</td>
<td>Implications of DARPA APPLE Phase Array Technologies for HEL Beam Steering and Fire Control</td>
<td>Kevin Probst, The CORE Group</td>
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<td>0940</td>
<td>Break</td>
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<td><strong>Tuesday 1300</strong></td>
<td>Technology to</td>
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<td>Transition (OPEN)</td>
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<td><strong>Tuesday 1500</strong></td>
<td>HEL Interaction</td>
<td>DE Technology</td>
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<td>and Diagnostics</td>
<td>Programs (LIMITED)</td>
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<td><strong>Wednesday 0800</strong></td>
<td>Solid State Slab</td>
<td>HEL Lethality I</td>
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<td><strong>Wednesday 1000</strong></td>
<td>Optical Components</td>
<td>Solid State Lasers</td>
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<td><strong>Wednesday 1300</strong></td>
<td>Beam Control I</td>
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<td><strong>Wednesday 1500</strong></td>
<td>Power and</td>
<td>Beam Control II</td>
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<td>Thermal II (OPEN)</td>
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<td><strong>Thursday 0800</strong></td>
<td>Optical Systems</td>
<td>DE Military Utility</td>
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<td>and Propagation I</td>
<td>(LIMITED)</td>
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<td><strong>Thursday 1000</strong></td>
<td>HPM Sources,</td>
<td>Incoherent Beam</td>
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<td>Coupling, and</td>
<td>Combined Systems</td>
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<td>Computational Tools</td>
<td>(LIMITED)</td>
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<td><strong>Thursday 1300</strong></td>
<td>Fiber and Thin Disk</td>
<td>Optical Systems</td>
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<td>Disk Laser Systems</td>
<td>and Propagation II</td>
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<td>(OPEN)</td>
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<td>and Systems (LIMITED)</td>
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<td><strong>Friday 0800</strong></td>
<td>FEL Theory and</td>
<td>Novel DE</td>
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<td>Simulation I (OPEN)</td>
<td>Technologies</td>
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<td>Effects (OPEN)</td>
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<td>Breakfast-Hosted by Northrop Grumman</td>
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<td>0700</td>
<td>Worldwide Military Laser Incidents: A Threat Assessment</td>
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<td>Joint Directed Energy Effectiveness Program - Threat DE Vs Deployed Airbase</td>
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<td>Foreign Directed Energy Test Activities</td>
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<td>0800</td>
<td>National Measurement and Signature Intelligence Management Office</td>
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<td>0820</td>
<td>DE IADS in 2030</td>
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<td>0840</td>
<td>Worldwide Laser Weapons Development</td>
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<td>0900</td>
<td>2008 Update on Foreign Ground-Based Air Defense and Anti-Satellite Directed Energy</td>
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<td>Worldwide Radio-Frequency Weapons Development</td>
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<td>Break - Hosted by Raytheon</td>
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<td>1000</td>
<td>Update on the Tactical Employment of and Extensions to a High-Power Microwave Counter-Improvised-Explosive-Device System</td>
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<td>1020</td>
<td>Laser Weapon System Augmentation “What it buys the Sailor?”</td>
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<td>1040</td>
<td>Non-Kinetic Strike Capability</td>
<td></td>
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<td>1100</td>
<td>Airborne Laser</td>
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<tr>
<td>1120</td>
<td>ATL Overview</td>
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<td>1140</td>
<td>Military Worth Analysis of an Airborne HPM Counter-Electronics Platform</td>
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<tr>
<td>1200</td>
<td>Lunch - Hosted by Raytheon</td>
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<td>1300</td>
<td>Development of an Error Signal for Use in Adaptive Algorithms for the Control of Platform Induced Jitter in Directed Energy Systems</td>
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<td></td>
<td>Joseph Watkins, US Naval Academy</td>
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<td>Passive Control and Aero-Optical Measurements of Flow Over a Flat-Windowed Turret</td>
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<td></td>
<td>Jacob Cress, University of Notre Dame</td>
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<td>1340</td>
<td>Passive Shear Layer Regularization for Aero-Optics: A Progress Report</td>
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<td>Donald Wittich III, Notre Dame</td>
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<td>High Efficiency Coherent Fiber Beam Combiner</td>
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<td>Michael Wickham, Northrop Grumman</td>
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<td>1420</td>
<td>Break - Hosted by Raytheon</td>
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<td>Thermal Management System for Directed Energy Weapons</td>
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<td>John Vetrovec, Aqwest, LLC</td>
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<tr>
<td>1500</td>
<td>Tactical Very High Power Density Programmable Power System for DEW Applications</td>
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<td>Gary Grider, DRS Technologies</td>
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<td>1520</td>
<td>Compact Power Conditioning for Directed Energy Sources</td>
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<td>Randy Curry, University of Missouri</td>
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<td>1540</td>
<td>Sensitivity and Trade off Analysis of Li-ion Power Source for Lasers</td>
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<td>Kamen Nechev, SAFT America</td>
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<td>1600</td>
<td>Power and Thermal Management Evaluations for a Laser Power System on a Tactical Aircraft Platform</td>
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<td>Mysore Ramalingam, Aerospace Power &amp; Propulsion Technologies Division</td>
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<tr>
<td>1730</td>
<td>Buses Depart for USS Missouri</td>
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<tr>
<td>1800</td>
<td>Evening Reception on USS Missouri</td>
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<td>Hosted by Northrop Grumman</td>
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</tbody>
</table>
Power and Thermal I (LIMITED)
Sheraton, Honolulu Room

1300  Power and Thermal Management Systems for Directed Energy Weapons
      Frank Gulczinski, Air Force Research Lab

1320  Lightweight Compact 2.5 MW Power Generator for Airborne DEW Sytems
      Jay Vaidya, Electrodynamics Assoc

1340  Advanced Thermal and Power Management for DE Weapons: An AFRL/RZPS Program Overview
      Levi Elston, Air Force Research Lab

1400  Power and Thermal Systems for a Speed-of-Light Gunship
      Don Borger, Lockheed Martin

1420  Power and Thermal Management for a High-Energy Solid State Laser on an Aircraft
      Patrick Saunders, Air Force Research Lab

1440  Break - Hosted by Raytheon

Beam Control II (LIMITED)

1500  ABL 12-inch Fast Steering Mirrors
      Felix Morgan, Applied Technology Assoc.

1520  A Review of a FPGA Based Large High Performance Fast Steering Mirror
      Dan Eckelkamp-Baker, ATA

1540  Thermal Effects Modeling in High Average Power Beam Directors
      Joseph Penano, Naval Research Lab

1600  0.7-1.7 um InGaAs Focal Plane Array Imagers for DE Applications
      David Dawes, Goodrich ISR Systems

1620  Assessment of Track Algorithm Performance vs Tactical Targets in Clutter as a Function of SWIR Track Sensor and Atmospheric Path Characteristics
      Richard Bartell, AFIT

1640  High Optical Power Demonstration of Liquid Crystal Spatial Light Modulator for Tactical HEL Wavefront Control
      Bruce Winker, Teledyne Scientific Co.

1730  Buses Depart for USS Missouri

1800  Evening Reception on USS Missouri
      Hosted by Northrop Grumman

HPM Modeling and Simulation (LIMITED)
Sheraton, Oahu Room

1300  Numerical Model of Stacked Magnetron High Power Microwave Source
      Peter Mardahl, Air Force Research Lab

1320  ICEPIC Simulations of COTS Magnetrons and HPM Sources
      John Keisling, Science Applications International Corp

1340  Computational Research & Engineering Acquisition Tools & Environments for Antenna Design & Integration
      Keith Cartwright, Air Force Research Lab

1400  MW-Class Multiple-Beam Inductive Output Tube Modeling and Design
      E. Wright, Beam Wave Research, Inc

1420  Self-Consistent Modeling and Simulation Tools for Directed Energy Technologies
      Walter Sessions, Naval Surface Warfare Ctr

1440  Break - Hosted by Raytheon

FEL Components, Systems, and Novel Concepts II (LIMITED)

1500  INP and MW-Class FEL Accelerator Component Development
      Alan Todd, Advanced Energy Systems

1520  Plan and Outcome of the NCRF High Power Thermal Test
      D. Nguyen, Los Alamos National Lab

1540  Quality Factor Measurements of Cage Cavities
      John Noonan, Argonne National Lab

1600  Design and Fabrication of the RHIC Electron-Cooling Experiment High Beta Cavity and Cryomodule
      John Rathke, Advanced Energy Systems

1620  Systems Studies of High-Power Free Electron Lasers for Ship Defense
      Michael Phillips, Advanced Energy Systems

1640  Viability of MgB2-Coated RF Cavities for FEL Applications
      Yehoshua Agassi, NSWC

1730  Buses Depart for USS Missouri

1800  Evening Reception on USS Missouri
      Hosted by Northrop Grumman
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Details</th>
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<tbody>
<tr>
<td>0800</td>
<td>Some Recent Results of Maritime Laser Propagation Measurements over 1.35 and 7.07 km: Analysis of Turbulence Parameters and Higher-Order Statistics of Fluctuations</td>
<td>David O’Connor, NAWCWD</td>
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<tr>
<td>0820</td>
<td>Active Turbulence Control for Direct Reduction of Laser Beam Aberrations</td>
<td>Aaron Freeman, University of CA</td>
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<tr>
<td>0840</td>
<td>Coherent Combining with Discrete Cylindrical Vector Beams</td>
<td>Steven Kurti, Naval Air Warfare Center</td>
</tr>
<tr>
<td>0900</td>
<td>Atmospheric Propagation of a Beam from a Bundle of Partially-Coherent Fiber Lasers of Good Beam Quality</td>
<td>Fassil Ghebremichael, Lockheed Martin</td>
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<tr>
<td>0920</td>
<td>Laser Beam Quality Conversions</td>
<td>Sean Ross, Air Force Research Lab</td>
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<tr>
<td>0940</td>
<td>Break</td>
<td></td>
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<tr>
<td>1000</td>
<td>Automating High Power Microwave Susceptibility Testing</td>
<td>Paul Anderson, Booz Allen Hamilton</td>
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<td>1020</td>
<td>Laser Produced Air Plasmas for Directed Energy Applications</td>
<td>Daniela Gordon, Naval Research Lab</td>
</tr>
<tr>
<td>1040</td>
<td>Compact Solid State High Power Modulator for Magnetron Based Transmitter</td>
<td>Richard Thomas, Army Research Lab</td>
</tr>
<tr>
<td>1100</td>
<td>Frequency-Multiplying Gyrotrons for Non-lethal Weapons Applications</td>
<td>G. Nusinovich, University of Maryland</td>
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<tr>
<td>1120</td>
<td>Chaotic HPM Sources for Electromagnetic Effects Applications</td>
<td>John Rodgers, University of Maryland</td>
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<tr>
<td>1200</td>
<td>Lunch</td>
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### THURSDAY MORNING

#### DE Military Utility (LIMITED)
Sheraton, Lanai Room

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>0800</td>
<td>Airborne Directed Energy Weapon System - ADEWS</td>
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<td></td>
<td><em>Roy Whitney</em>, Jefferson Lab</td>
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<td>0820</td>
<td>Comparison Between the Relative Effectiveness of DE and Conventional Weapons</td>
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<tr>
<td></td>
<td><em>Michael Rozema</em>, Boeing</td>
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<td>0840</td>
<td>Aerostat Relay Mirror Ship-Based Laser Capability Enhancement</td>
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<tr>
<td></td>
<td><em>Kenneth Billman</em>, Lockheed Martin</td>
</tr>
<tr>
<td>0900</td>
<td>Alternative Exposure Policy for Radio Frequency Radiation</td>
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<td><em>John DeFrank</em>, US Army</td>
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<tr>
<td>0920</td>
<td>Directed Energy and Non Lethal Weapons Joint Munitions Effectiveness Manual Working Group Overview/Status</td>
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<td><em>John Tatum</em>, Army Research Lab</td>
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<td>0940</td>
<td>Break</td>
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#### Incoherent Beam Combined Systems (LIMITED)

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<th>Time</th>
<th>Session</th>
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<tr>
<td>1000</td>
<td>Navy Laser Weapon System (LaWS) Development</td>
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<td><em>Robert Pawlak</em>, Naval Surface Warfare Ctr</td>
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<tr>
<td>1020</td>
<td>Navy Laser Weapon System (LaWS) Beam Director Hardware Design/Validation</td>
</tr>
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<td><em>Chris Behre</em>, Naval Surface Warfare Ctr</td>
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<td>1040</td>
<td>Evaluation of Commercial Telescope and Development of Alignment Diagnostic for HEL Beam Combining</td>
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<td><em>Jason Sames</em>, Penn State University</td>
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<tr>
<td>1100</td>
<td>Atmospheric Propagation of Incoherently Combined Fiber Lasers for Tactical DE and Power Beaming Applications</td>
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<td><em>Phillip Sprangle</em>, Naval Research Lab</td>
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<td>1120</td>
<td>3-km Field Demonstration of Incoherent Beam Combining Using Fiber Layers</td>
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<td><em>Rich Fischer</em>, Naval Research Lab</td>
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<tr>
<td>1140</td>
<td>A Laser Weapon System Architecture Based on a Collection of High Beam Quality Fiber Lasers</td>
</tr>
<tr>
<td></td>
<td><em>Detlev Tiszauer</em>, Lockheed Martin</td>
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<td>1200</td>
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#### HEL Effects (SECRET)

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<td>1000</td>
<td>Representation of Target Vulnerability Criteria</td>
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<td>1020</td>
<td>System Effectiveness Modeling of a Multiple Pulse Laser Countermeasure to Imaging Missiles</td>
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<tr>
<td>1040</td>
<td>Single Mode Multi-kW Fiber Laser Lethality Testing Against Missiles</td>
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<td>1100</td>
<td>High Energy Ultra Short Pulsed Laser Testing for IRCM Applications</td>
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<td>1120</td>
<td>Changes in the Reflectivity of Painted Surfaces Due to Laser Radiation</td>
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<tr>
<td>1140</td>
<td>Update on DARPA UPSL Propogation</td>
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<td>1200</td>
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THURSDAY AFTERNOON

Fiber and Thin Disk Laser Systems (OPEN)
Sheraton, Kauai Room

1300 Thin Disk Solid State Laser Development
High Efficiency, Supportable Lasers for Battlefield Operations
Edward Pogue, Boeing

1320 Recent Progress on High Power Fiber Lasers
D. Gapontsev, IPG Photonics

1340 A High-Power, Eye-Safer Fiber Laser Using Resonant Diode Pumping of Erbium
Jason Langseth, Textron Defense Systems

1400 Progress Towards 300W “All Fiber” Narrow Frequency, Single Mode, Polarized MOPA Fiber Laser
Ray Horley, SPI Lasers UK Ltd

1420 The TRUMPF Disk Laser
Timothy Morris, TRUMPF, Inc.

1440 Break

Fiber Laser Technology (OPEN)

1500 550-W, Single-Mode Tm Fiber Laser Amplifier
Gregory Goodno, Northrop Grumman

1520 Coherent Kilo-watt Level Monolithic PM Fiber Amplifiers
John Edgecumbe, Nufern

1540 High Power Fiber Laser Pump Sources
Silke Pflueger, Laserline, Inc.

1600 High Power Pulsed Tm-Doped Fiber Amplifier System with High Pulse Energy
Daniel Creeden, BAE Systems

1620 Resonantly Cladding-Pumped, Single-Frequency, LMA Er Fiber Amplifier
Larry Merkle, Army Research Lab

1640 Novel Uses for Multicore Fibers to High-Power Fiber Lasers and Sensors
Erik Bochove, Air Force Research Lab
Optical Systems and Propagation II (LIMITED)
Sheraton, Lanai Room
1300 Broad Spectrum Overland Surface Boundary Layer Optical Turbulence Assessments from Climatological Temperature, Pressure, Humidity, & Wind
   Steven Fiorino, Air Force Institute of Technology
1320 Atmospheric Turbulence Compensation with Adaptive Optics: Demonstration Results for Tactical Laser Weapons
   Aaron Buckner, Northrop Grumman
1340 Development of a Performance Model of Laser Weapon Systems Comprised of Multiple Tiled Solid State Laser Slab or Fiber Subapertures
   Richard Bartell, Air Force Institute of Technology
1400 Precision Tracking and Aimpoint Maintenance of Maneuvering Targets in the Presence of Background Clutter
   Sadegh Siahatgar, NAVSEA
1420 Beam Control for Aircraft Self-Defense
   Alan Ullman, Boeing
1440 Break

HPM Technology and Systems (LIMITED)
Sheraton, Lanai Room
1500 A160 HPM Integration
   Keith Coleman, Boeing
1520 Innovative and Efficient HPM Test and Evaluation Facility for Precision Guided Munitions, Fuses, Avionics, Unmanned Air Vehicles, and other DOD Electronic Systems
   Maqsood Mohammed, Jacobs Technology
1540 Dielectric Wall Accelerator Technology for High Power Microwave Generation
   J. Harris, Lawrence Livermore National Lab
1600 Reltron-Based High Power Microwave Threat Simulator Facility at White Sands Missile Range
   Carl Eichenberger, L3Com/USArmy
1620 Explosive Driven High Power Microwave Demonstrator
   Larry Altgibers, USA SMDC
1640 W-Band Frequency-Multiplying Gyrotron with Permanent Magnets
   John Pasour, Naval Research Lab
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<tr>
<td>0800</td>
<td>High Fidelity Modeling of High-Brightness Electron Beams for Free-Electron Laser Applications</td>
<td>Phillipe Piot, Northern Illinois University</td>
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<td>0820</td>
<td>Electron Beam Halo: Origin, Detection and Mitigation</td>
<td>R. Kishek, University of Maryland</td>
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<td>0840</td>
<td>Characteristics and Capabilities for the GINGER FEL Simulation Code</td>
<td>William Fawley, Lawrence Berkeley National Lab</td>
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<td>0900</td>
<td>Generation, Amplification and Guiding of Coherent Optical Modes with Orbital Angular Momentum in a FEL</td>
<td>Erik Hemsing, UCLA</td>
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<td>0920</td>
<td>Enhanced Wall-Plug Efficiency in FEL Amplifiers Employing Energy Recover Linacs</td>
<td>Phillip Sprangle, Naval Research Lab</td>
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<tr>
<td>0940</td>
<td>Break</td>
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<td>1000</td>
<td>High Power Microwave Wideband Threat System</td>
<td>Cyndi Mora, SAIC</td>
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<tr>
<td>1020</td>
<td>Basic Studies of HPM Effects in Mixed-Signal Electronic Systems</td>
<td>John Rodgers, University of Maryland</td>
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<td>1040</td>
<td>HPM System and Subsystem Simulation of FOI</td>
<td>Sten Nyholm, Grindsjön Research Centre</td>
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<td>1120</td>
<td>Diagnostic Array for Characterizing Narrow Band HPM Sources</td>
<td>Dale Coleman, Sandia National Lab</td>
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<tr>
<td>1140</td>
<td>Break</td>
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<tr>
<td>1200</td>
<td>Symposium Adjourns</td>
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</table>
**FRIDAY MORNING**

**Novel DE Technologies (LIMITED)**
Sheraton, Lanai Room

0800 Compact, Scalable, High-Power THz Sources  
*H. Bluem*, Advanced Energy Systems

0820 All Cryogenic Lasers  
*Jason Brasseur*, Directed Energy Solutions

0840 Directed Energy for Stand-off Active-Interrogation: Detection of Terrorist Nukes in a Maritime Context  
*P. Turchi*, Los Alamos National Lab

0900 Compact Solid State Tunable THz Source for Threat Reduction Applications  
*Nathan Moody*, Los Alamos National Lab

0920 Class-E UHF Power Amplifier Development  
*Michael Smith*, Naval Surface Warfare Center

0940 Break

**FEL Theory and Simulation II (LIMITED)**

1000 Optical Beam Quality In Free-Electron Lasers  
*Phillip Sprangle*, Naval Research Lab

1020 Non-Conventional Tapering for Enhanced Optical Efficiency in MW-Class FEL Amplifiers  
*Joseph Penano*, Naval Research Lab

1040 Start-to-End Analysis of High Power Free Electron Laser Amplifiers  
*Sean Niles*, Naval Postgraduate School

1100 Free Electron Laser Performance with Quadrupole Magnet Misalignment from Shipboard Vibrations  
*John Lewellen*, Naval Postgraduate School

1120 Self-Amplified MW-Class FEL  
*Bahman Hafizi*, Naval Research Lab

1140 The Effect of Shot-Noise on the Start-Up of the Fundamental & Harmonics in FELs  
*Henry Freund*, Science Applications International Corp

1200 Symposium Adjourns

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**FRIDAY**

**DE Education Workshop (OPEN)**
Sheraton, Honolulu Room

1000 HEL JTO Educational Outreach  
*Don Seeley*, HEL JTO

1015 DEPS Educational Programs  
*Sam Blankenship*, DEPS

1025 2008 AFIT DE Summer Intern Program  
*Marken Houle*, AFIT/ENP, Brandon  
*McClung and Phillip Grice*, AFIT Interns

1125 Air Force HEL Center of Excellence  
*John Gaudet*, University of New Mexico

1140 The Georgia Tech Lidar Education Program  
*Leanne West and Gary Gimmestad*, GTRI

1205 Lunch

1235 Aero-Optics Research at the University of Notre Dame and Passive Shear Layer Regularization for Aero-Optics  
*DJ Wittich*, Notre Dame-Graduate DE Scholar

1300 Research Experiences for College Students: What Works, and Lessons for the Classroom  
*Lisa Hunter*, UC Santa Cruz and UH

1325 Maui Community College Program  
*Mark Hoffman*, Maui Community College

1350 Photonics and STEM Education on Kauai  
*Francis Takahashi*, Kauai Community College

1415 Huntsville City Schools Program  
*Angela Taylor and Eugene Edwards*, Huntsville City Schools

1440 Break

1500 Laser Induced Breakdown Spectroscopy of Surrogate Explosives  
*Leebyn Chong*, NRL Intern

1525 Analysis of Multiple Laser Beam Wander in a 2-mile Propagation Experiment  
*Amanda Fried*, NRL Intern

1550 Filament Measurements in Underwater Laser Propagation  
*Julie Haney*, NRL Intern

1615 Millimeter-Wave Solid-State Reactive Sintering of Nd:YAG Ceramic Laser Host Materials  
*Chad Stevenson*, NRL Intern
Symposium Organizing Committee
CAPT David Kiel, US Navy, Chair of the Symposium
Dr. Garret Polhamus, AFRL, Co-Chair of the Symposium

Program Committee
Dr. Brian Hankla, Technical Chair
  Dr. John Albertine
  Mr. Chris Behre
  Dr. Paul Berger
  Dr. Sandra Biedron
  Dr. Bob Cozzens
  Mr. Ron Flatley
  Dr. Robert Gardner
  Mr. Scott Griffiths
  Dr. Stephen Hammel
  Dr. Gerald Manke
  Mr. Fred Marcell
  Dr. Matthew McQuage
  Mr. Albert Ogloza
  Dr. Robert Pawlak
  Dr. Frank Peterkin
  Mr. Mike Richardson
  Dr. Walter Sessions
  Dr. Phillip Sprangle
  Ms. Carol Sullivan

Symposium Coordinator
Cynnamon Spain

Registration and Short Courses
Donna Storment