

Monday – Short Courses

0700 Registration at Hyatt Hotel
Light Breakfast at Hyatt Hotel

0800 Short Courses at Hyatt Hotel
All courses are half day unless otherwise noted. Half day courses earn .35 CEUs while full day earn .7 CEUs.

1. High Energy Laser System End-to-End Model (HELSEEM) Introduction
Mr. Robin Ritter, Tau Technologies
Pebble Room
2. Introduction to Beam Control
Dr. Paul Merritt, University of New Mexico
Beach Room
3. Verification, Validation, and Accreditation in a Cost Effective Manner
Dr. David Cook, AEGIS Technologies Group
Pacific Room
4. Laser Effects on EO Systems (FOUO), **Full Day Course**
Mr. Joel Davis, Ball Aerospace
Grove Room

1200 Lunch on-site for Short Course students

1300 Afternoon Courses Begin and Full Day Course Resumes

5. Introduction to tempus
Mr. Bob Praus, MZA Associates Corporation
Pacific Room
6. Directed Energy 101
Maj Gen George Harrison, USAF (ret.)
Beach Room

1700 Short Courses Adjourn

Tuesday – Joint Session – All Conferences

Plenary Session, Naval Postgraduate School, King Hall

- 0700 Registration at Hyatt Hotel
Continental Breakfast at NPS
- 0815 Welcome
- 0820 From the Technology Trenches
- 0835 Navy and Marine Corps Directed Energy Programs
- 0920 Break
- 0945 Space and Missile Defense Command
- 1015 The Rapid Insertion of Technology to Meet Warfighters Needs
- 1045 HDQRTS USAF XOR
- 1115 Lunch
- 1230 Directed Energy - The Power to Change
- 1300 PMS 405 DE Program Office
- 1330 OFT DE Perspectives and DE Technology Efforts
- 1500 Poster Session at Hyatt Hotel
Exhibitor Reception at Hyatt Hotel

Wednesday Morning

Beam Control Conference

Beam Control for Major Systems, Naval Postgraduate School, ME Auditorium

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel - Coffee Service at NPS
- 0810 Airborne Laser Beam Control
- 0900 THEL Beam Control
- 0950 Break
- 1020 Advanced Tactical Laser
- 1110 Aerospace Relay Mirror System
- 1200 Lunch

Wednesday Morning

Employment of DE Weapons Conference

Employment of DE Weapons I, Naval Postgraduate School, Ingersol

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel - Coffee Service at NPS
- 0800 Operational Considerations of DE Weapons
- 0830 DE Weapons in the CAF Strategy
- 0900 DETEC Overview
- 1000 Break
- 1030 Advanced Wargaming Applications of HEL on Airborne Platforms
- 1100 Development of a Joint Munition Effectiveness Tool for Directed Energy
and Non-Lethal Weapons
- 1130 FOOTPRINTS Computer Visualization Tool
- 1200 Lunch

Wednesday Morning

HEL Lethality Conference

Target Vulnerability Assessment, Naval Postgraduate School, Glasgow

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel - Coffee Service at NPS
- 0800 Assessing the Vulnerability of Ballistic Missiles to the Airborne Laser (ABL)
- 0830 Computed Vulnerability of a Solid Fuel Rocket to High Energy Laser Loading
- 0900 Vulnerability Analysis of a Foreign Anti-Ship Cruise Missile to High Energy Lasers
- 0930 Target Vulnerability Analysis
- 1000 Break
- 1030 Vulnerability and Target Response Analysis of a Short Range Ballistic Missile to High Energy Laser
- 1100 Vulnerability Assessment of a Cruise Missile to High Energy Laser (HEL) Irradiation
- 1130 Vulnerability Assessment of a Surface-to-Air Missile
- 1200 Lunch

Wednesday Morning

DE Modeling & Simulation Conference (Unclassified)

HEL Systems, Hyatt Hotel, Pacific Room

Session Chair: Steve Doerr, SAIC

0700 Registration at Hyatt Hotel

Breakfast at Hyatt Hotel

0815 Modeling and Simulation Conference Welcome

Douglas Rigdon, AFRL

0830 The Simulation of Off-Axis Laser Propagation using HELEEOS

Scott Belton, AFIT

0900 Expected Performance of High Energy Lasers Operating Under Geographically and Spectrally Diverse Conditions for Oblique Near Earth Scenarios in the Presence of Common Atmospheric Obscurants

Steven Fiorino, AFIT

0930 Lethal Bomber Defense Performance

Steve Doerr, AFRL

1000 Break

1030 Airborne Laser Performance Assessment Toolkit (ABLPAT)

Craig Kief, Aegis

1100 A Compact, Optically Guided, Megawatt Free-Electron Laser Amplifier for Maritime Propagation

Phillip Sprangle, NRL

1130 On the Next Generation FEL

Mike Hughes, AES

1200 Lunch

Wednesday Afternoon

Beam Control Conference

Tracking for Directed Energy Systems, Naval Postgraduate School, ME Auditorium

- 1200 Classified Poster Session at Naval Postgraduate School
- 1300 Overview of Tracking
- 1320 Optical Signature Measurements for Active Tracking
- 1340 Field Performance of a 3d Laser Radar
- 1400 A Kalman Filter Design to Increase HEL Pointing Accuracy
- 1420 Field Tests from MATRIX
- 1500 Break
- 1530 Recent Active Tracking Experiments at Maui Space Surveillance Site
- 1550 SeaLite Beam Director Aimpoint Tracking System
- 1610 Measurement of the Dynamic Motion of Mobile Surface Targets
- 1730 Social Reception at Hyatt

Wednesday Afternoon

Employment of DE Weapons Conference

Employment of DE Weapons II, Naval Postgraduate School, Ingersol

- 1200 Classified Poster Session at Naval Postgraduate School
- 1330 Operation of an Electrically-Driven Closed-Cycle EC COIL Laser
- 1400 Joint Operating Concept for the High Energy Laser/Tactical Relay Mirror System (HEL/TRMS)
- 1430 The NAGIRA HPM Source For Red on Blue Testing
- 1730 Social Reception at Hyatt Hotel

Wednesday Afternoon

HEL Lethality Conference

Target Vulnerability Assessment, Naval Postgraduate School, Glasgow

- 1200 Classified Poster Session at Naval Postgraduate School
- 1330 Vulnerability Assessment of a AAA Gun System Receiver
- 1400 Vulnerability Assessment of a AAA Gun System Barrel
- 1430 Shot-Line Analysis of Complex Models
- 1500 Break

Material Interaction, Naval Postgraduate School, Glasgow

- 1530 Pulsed HEL Effects for Charring Fiberglass Materials
- 1600 Paint Adhesion on Metals under High Energy Laser Irradiation
- 1630 Real-Time Reflection Scatter Measurement of Thin Films Subjected to High Power Laser Irradiance
- 1700 3-D Thermal Effects in a Laser Irradiated Target
- 1730 Social Reception at Hyatt Hotel

Wednesday Afternoon

DE Modeling & Simulation Conference (Unclassified)

HEL Performance Modeling, Hyatt Hotel, Beach Room

Session Chair: Salvatore Cusumano, AFIT

- 1200 Classified Poster Session at Naval Postgraduate School
- 1300 Climbing the Modeling and Simulation Pyramid
Richard St. John, SAIC
- 1330 Wave Optics Anchoring of Scaling Law for Finite Bandwidth, Closed Loop Adaptive Optics
Eric Magee, MZA
- 1400 3-D Time Dependent Modeling of the Atmospheric Propagation of High Energy Laser Beams
Joseph Peñano, NRL
- 1430 Comparison of HELEEOS Systems Model Results to Analysis of a Maritime HEL Propagation Study Utilizing Several Independent Models and Databases
Steven Fiorino, AFIT
- 1500 Break
- 1530 Power-in-Bucket Climatology for HEL Propagation in the Maritime Environment
Steve Hammel, SPAWAR
- 1600 Comparison of Climatological Optical Turbulence Profiles to Standard, Statistical, and Numerical Models Using HELEEOS
Liesebet Gravley, AFIT
- 1630 Enhancement of Turbulence Propagation Effects by Atmospheric Thermal Blooming
Matthew Whitely, MZA
- 1730 Social Reception at Hyatt Hotel

Wednesday Afternoon

Joint Session of DE Modeling & Simulation and Beam Control Conferences (Unclassified)

Beam Control Modeling & Simulation, Hyatt Hotel, Pacific Room

Session Chair: Matthew Whiteley, MZA

- 1200 Classified Poster Session at Naval Postgraduate School
- 1300 Extended Scaling Laws Analysis of a GBL to RM Uplink
Deborah Fung, SAIC
- 1330 Enhanced Field Conjugation System Simulation Parameter Study
Keith Wojciechowski, SAIC
- 1400 SABERSim: A High-Altitude Relay Mirror Simulator
Jonathan Partee, SAIC
- 1430 Generating Hermite-Gaussian Functions of Very High Orders for the Analysis of IRON-BIRD Stable Resonator
Chun-Ching Shih, Northrop Grumman
- 1500 Break
- 1530 Estimates of Line-of-Sight Coning in a Coude Path Due to Misalignments
Victor Beazel, AFRL
- 1600 Agile Three-Axis Telescope for Acquisition and Tracking
Mason Peck, Cornell University
- 1630 Silhouette-Based Target Orientation (STO) Algorithms to Support HEL Aim Point Selection and Maintenance
Robert Stribl, NASA
- 1730 Social Reception at Hyatt Hotel

Thursday Morning

Beam Control Conference (Unclassified)

Beam Control Technology, Hyatt Hotel, Grove Room

Session Chair: Paul Merritt, AFRL

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel
- 0800 Beam Control Overview
Paul Merritt, AFRL
- 0820 ABL Low Power System Testing
Mark Skouson, ABL SPO
- 0840 Design & Development of a Nano-Radian/Milli-g Vibration Test Environment
Reese Sturdevant, CIGTF, Holloman AFB
- 0900 Continued Vibration Evaluation of Precision Inertial Reference Unit
Brian Spanbauer, AFRL
- 0920 Experimental Adaptive Filter and Disturbance Feed Forward for Flexible Beam Train Control
Leslie Fowler, CSA Engineering
- 0940 Optical Laser Pointing and Jitter Suppression Using Adaptive and Feed Forward Control
Suren Sugathevan, NPS
- 1000 Break
- 1030 ATP of Bifocal Relay Mirror Spacecraft
Brij Agrawal, NPS
- 1050 A Stabilized Operational Sized Fast Steering Mirror
Marty Smith, ATA
- 1110 An Alternate Alignment Beam Approach for Tactical Systems
Dan Herrick, AFRL
- 1130 Variable-Order Adaptive Control of Jitter in Laser Beam Systems
Pawel Orzechowski, UCLA
- 1200 Lunch

Thursday Morning

Beam Control Conference (Unclassified)

Aero-Optics & Atmospheric Measurements, Hyatt Hotel, Beach Room

Session Chair: John Otten, Photon Corp

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel
- 0800 Overview of Aero-Optics
John Otten, Photon Corp
- 0820 Tomographic Reconstruction of a Heated Jet Index of Refraction Field
Dan Duffin, Notre Dame
- 0845 Measurements of Optically Active Structures in a Subsonic Boundry Layer
Donald Wittich, Notre Dame
- 0910 Aperture Effects in Aero-Optical Corrections
John Siegenthaler, Notre Dame
- 0935 Modeling and Analysis of OPD in and Flat Apertures
Rebecca Beauchamp, MZA
- 1000 Break
- 1030 Extinction Measurements Across Zuniga Shoals
Paul Berger, MIT/Lincoln Labs
- 1055 Measurements and Modeling of the Impact of Optical Turbulence on a Maritime HEL Propagation
Paul Frederickson, NPS
- 1120 Ultra High Speed Wavefront Curvature Sensing for Aero-Optics
Paul Harrison, Kestrel
- 1200 Lunch

Thursday Morning

Joint Session of DE Modeling & Simulation and Employment of DE Weapons Conferences

DE Wargaming, Naval Postgraduate School, ME Auditorium

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel
- 0810 Opening Remarks
- 0820 Why Climb the Simulation Pyramid? Push Up Technical Reality, Point Down to Credibility
- 0840 Advanced Concepts Event (ACE) II Wargame Results
- 0900 Advanced Wargaming Applications of High Energy Lasers on Airborne Platforms
- 0920 Real-Time Flight Simulation That Models Future Airborne Tactical Lasers
- 0940 Tactical HEL Engagement Modeling and Simulation
- 1000 Break
- 1030 Direct Incorporation of Laser Power Propagation into Battlefield Simulations for Analysis and Wargaming
- 1110 Automated Aimpoint Selection for DE Wargames
- 1130 Analysis of a High-Energy Laser System in a Battlefield Environment in a Rocket, Artillery, and Mortar Threat Protection Role
- 1200 Lunch

Thursday Morning

HEL Lethality Conference

Material Interaction, Naval Postgraduate School, Glasgow

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel
- 0800 Wavelength Scaling of 1.3 Micron COIL, Laser and 1.07 Micron Fiber Laser
Through Interactions With Various Metals and Composites
- 0830 Data Summaries: High Energy Laser Lethality Testing on Aluminums, Steels,
and Structural Composites

Component Response, Naval Postgraduate School, Glasgow

- 0900 Characterization of the Ability of a High-Energy Laser to Produce Low
Order Reactions in Ordnance
- 0930 Energetic Material Testing Differences in TNT and CompB
- 1000 Break
- 1030 Effects of Radome Charring on Radar Transmission
- 1100 The Response of GaAs Solar Cells to Near IR Laser Radiation
- 1130 Analysis and Testing of a 45 Degree Orthogrid Panel Subjected to Laser
Irradiation and Tensile Loading
- 1200 Lunch

Thursday Morning

DE Modeling & Simulation Conference (Unclassified)

HEL Weapon Integration and Subsystems, Hyatt Hotel, Pacific Room

Session Chair: Ken Yates, AFRL

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel
- 0800 GEMACS Validation: An Initial Assessment
Michael Johnson, Seek Eagle
- 0820 Isomorphic Modeling in tempus
Bob Praus, MZA
- 0840 Theoretical Investigations of a Space-Based, Br Laser Pumped via Solar
Photolysis of IBr
B.Behnken, NPS
- 0900 Impact of Advanced Chemistry on ABL Weight Scaling
Robert Walter, Schafer
- 0920 Fiber Laser HEL Phased Array Beam
Dan Marker, AFRL
- 0940 Effect of Power and Thermal Management Subsystem Designs on the
Performance of a C-130 Tactical Laser Platform
Ryan Miller, Schafer
- 1000 Break
- 1030 Evaluation of Phase-Only Adaptive Optics Efficacy Over a Diverse Range of
Operating Regimes, Part II
Richard Bartell, AFIT
- 1100 Rugged Transparent SPINEL as HEL Window
Ishwar Aggarwal, NRL
- 1200 Lunch

Thursday Afternoon

Beam Control Conference (Unclassified)

Adaptive Optics and Fiber Arrays, Hyatt Hotel, Beach Room

Chair: Russell Butts, MZA

- 1300 An Adaptive Optics Perspective: Past, Present, and Future
Robert Fugate, NM Institute of Mining and Technology
- 1345 Concept for Improving Uplink Efficiency of a Relay Mirror
Vladimir Markov, Metro Laser Inc
- 1405 Atmospheric Turbulence Compensation for HEL Systems
Vladimir Markov, Metro Laser Inc
- 1425 Tilt Anisoplanatism with Finite Bandwidth Adaptive Optics Tilt Comp
Matthew Whiteley, MZA
- 1445 Progress on Compact Low Cost AO Systems for Enhanced Imaging & Laser
Wavefront Control
Justin Mansell, MZA
- 1505 Break
- 1530 Coherent Wavefront Sensing and Beam Control
Joe Marron, Lockheed Martin
- 1550 Enhanced Field Conjugation System Experimental Demonstration System
Test and Performance Evaluation
Jeff Barchers, SAIC
- 1610 Examination of Compensation of Thermal Blooming and Turbulence Using
the Enhanced Field Conjugation System
Jeff Barchers, SAIC
- 1630 Performance and Stability of a Woofer-Tweeter Deformable Mirror Control
Architecture
Terry Brennan, tOSC

Thursday Afternoon

HEL Lethality Conference

Component Response, Naval Postgraduate School, Glasgow

1300 Mechanism Leading to the Circumferential Failure of a Rolling Cylinder

1330 Laser Induced Missile Fuel Combustion

1400 Ignition Temperature of Tonka 250 Propellant Under Laser Heating

1430 Break

EO / IR Sensor System Susceptibility, Naval Postgraduate School, Glasgow

1500 Comparison of FPA Damage by 1.06 and 3.5 μm Short-Pulse Lasers

1530 Damage Thresholds for Silicon Charged Coupled Devices Irradiated by a Free Electron Laser

1600 Gen III Image Intensifier Susceptibility Studies

1630 LAZARUS: The Development of a Laser Threat Simulator for Tactical Sensor and Mission Susceptibility Analysis

1700 Testing of Optoelectric Devices at the Air Force Research Laboratory Electric Laser Facility

Thursday Afternoon

DE Modeling & Simulation Conference (Unclassified)

Computational Fluid Dynamics, Hyatt Hotel, Grove Room

Session Chair: Timothy Madden, AFRL

- 1300 Development of Advanced Ejector COIL Laser
T.T. Yang, Boeing
- 1330 Integrating Airborne Laser Aero-Optic Optical Data into Wave-Optics Models
Brent Strickler, MZA
- 1400 Computed Aero-Optic Characteristics of a Free Shear Layer using the Weakly-Compressible Model
A. Nightingale, Notre Dame
- 1430 Using Large Eddy Simulation to Define Adaptive Optics System Requirements for Aero-Optic Compensation
A. Buckner, Northrop Grumman
- 1500 Break
- 1530 CFD Methods for Advanced Ejector COIL Laser
Y.C. Hsia, Boeing
- 1600 Improving Aero Optics CFD Modeling
Marc Hallada, Schafer
- 1630 The Influence of Fluid Dynamic Unsteadiness on COIL Performance
Timothy Madden, AFRL

Thursday Afternoon

DE Modeling & Simulation Conference (Unclassified)

Future Requirements and VV&A, Hyatt Hotel, Pacific Room

Session Chair: Rusty Graves, ARMY AMRDEC

1300 Technical Panel Discussion

Panel Members Include:

- Richard Bagnell, AFRL
- Jorge Beraun, AFRL
- Rusty Graves, Army AMRDEC
- Linda Lamberson, AFRL
- Timothy Madden, AFRL
- Quentin Saulter, ONR
- Don Seeley, HEL JTO
- Phillip Sprangle, NRL

Friday Morning

Joint Session - All Conference (Unclassified)

Symposium Closing Session, Hyatt Hotel, Beach and Pacific Rooms

Session Chair: Douglas Rigdon, AFRL
Donald Washburn, AFRL
Paul Merritt, AFRL

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel
- 0800 JTO Director
Mark Neice, HEL JTO
- 0830 Integrating Wave-Optics and 5x5 Ray Matrices for More Accurate Optical System Modeling
Justin Mansell, MZA
- 0900 Tactical Relay Mirror System Performance
Jerry Bukley, Boeing SVS
- 0930 Remote Sensing Techniques to Support Beam Control Tests
Gary Gimmestad, GTRI
- 1000 Break
- 1015 Phosphate Athermal Glass for HEL Windows
William Goodman, Schafer
- 1045 Review of Aero-Optical Investigations at Notre Dame
Eric Jumper, Univ of Notre Dame
- 1115 An Overview of the Effectiveness ToolBox (ETB) and the Laser Vulnerability Tool (LVT)
Bryon Knott, NSWC Dahlgren
- 1145 Utilization of the DE Weapon Analysis Tool (DEWAT) Laser Lethality Module for the Assessment of HEL Effects Upon Aerospace Systems
Thomas Stagliano, ITT AES
- 1215 Symposium Adjourns

Friday Morning

HEL Lethality Conference (Unclassified)

Test Facilities, Instrumentation, Diagnostics and Techniques, Hyatt Hotel, Grove Room

Session Chair: David Lyman, SAIC

- 0700 Registration at Hyatt Hotel
Breakfast at Hyatt Hotel - Coffee Service at NPS
- 0800 Airborne Laser High Energy Laser (HEL) Testing
Dave Morris, Northrop Grumman
- 0830 High Energy Laser Ground Target Irradiance/Fluence Measurement
Troy Mazely, SAIC
- 0900 High Energy Laser Target Subsystems Protection
Jay Cossentine, SPARTA, Inc.
- 0930 Laser Effects Test Facilities
LaTravia Robinson, AFRL
- 1000 Break
- 1030 Modeling the Overpressure Shockwave Due to the Burst of a Pressure Vessel
Dale Doering, Ball
- 1100 Recently Implemented Advanced Laser Predictive Avoidance Techniques
Bill Mitchell, Metatech Corporation
- 1130 Transmittance, Reflectance, and Absorptance Measurements (TRAM)
Justin Bartley, AFRL
- 1200 Symposium Adjourns