# **Research Areas**

The focus of AFOSR is on research areas that offer significant and comprehensive benefits to our national warfighting and peacekeeping capabilities. The dropdown menu shows AFOSR's research areas listed alphabetically. You can find the same information as well as details about applying for grants in our broad agency announcement (BAA).

# • AFOSR Funded Projects

- Centers of Excellence
- <u>-Multidisciplinary Research Program of the University Research Initiative (MURI)</u>
  - -Active AFOSR MURI Grants
    - -2018 MURI Grants
      - Empty State Electronics
      - Fundamentals of Doping and Defects in Ga2O3 for High Breakdown Field
      - Gallium Oxide Materials Science and Engineering GAME
      - <u>Hybrid-Materials Valley Optoelectronics For Photon Spin</u>
         Communication
      - Innovations in Mean-Field Game Theory for Scalable Computation and Diverse Applications
      - Magnet-Free Non-Reciprocal Metamaterials Based on Spatio-Temporal Modulation
      - Molecular Level Studies of Solid-Liquid Interfaces in Electrochemical Processes
      - Piezoenergetics Coupled Piezoelectric and Nanoenergetic
         Materials with Tailorable and Switchable Reactivity
      - Verifiable, Control-Oriented Learning On The Fly
    - -2017 MURI Grants
      - Cross-disciplinary Electronic-ionic Research Enabling Biologically Realistic Autonomous Learning (CEREBRAL)
      - Integrated Measurement and Modeling Characterization of Stratospheric Turbulence
      - Multipactor and breakdown susceptibility and mitigation in spacebased RF systems
      - Multiscale analysis of bioinspired low energy information processing
      - Revolutionary Advances in Correlated Electron Materials: From Strongly Correlated Electrons to Large Scale DFT and Quantum Embedding
      - Scalable Certification of Quantum Computing Devices and Networks
      - Scientific Autonomous Reasoning Agent (SARA): Integrating Materials Theory, Experiment and Computation

 Unraveling the Biology, Chemistry and Nanoscience of Natural and Synthetic Melanins

#### -2016 MURI Grants

- High Speed AttoJoule/Bit Passive and Active Nanophotonic Devices for Computing and Optical Interconnects
- Internal Cooling of Fiber and Disc Lasers by Radiation Balancing and other Optical or Phonon Processes
- Multidisciplinary Approaches to Radiation Balanced LasErs (MARBLE): Rare-Earths and Semiconductors in Disks, Fibers, and Microstructures
- Next Generation Advances in Ionosphere Thermosphere Coupling at Multiple Scales for Environmental Specification and Prediction
- Photonic Quantum Matter
- Ultralow Power, Ultrafast, Integrated Nano-Optoelectronics
- <u>Universal Electromagnetic Surface: Exploiting active electronics</u> and active origami to generate a programmable electromagnetic response

## • -2015 MURI Grants

- A 4D Nanoprinter for Making and Manipulating Macroscopic Materials
- Atomically-Thin Systems that Unfold, Interact and Communicate at the Cellular Scale
- Foldable and Adaptive Two-Dimensional Electronics
- <u>Fundamental Strong-Field Interactions with Ultrafast, Mid-Infrared</u>
   <u>Lasers</u>
- Harnessing Strong-Field Mid-Infrared (IR) Lasers: Designer Beams of Relativistic Particles and THz-to-X-ray Light
- Nanoelectropulse-Induced Electromechanical Signaling and Control of Biological Systems
- Semantics, Formal Reasoning, and Tool Support for Quantum Programming
- <u>Understanding and Controlling the Coupled Electrical, Chemical,</u> and Mechanical Excitable Networks of Living Systems

## -2014 MURI Grants

- A Unified Mathematical and Algorithmic Framework for Managing Multiple Information Sources of Multi-Physics Systems
- Active Metasurfaces for Advanced Wavefront Engineering and Waveguiding
- Convergent Evolution to Engineering: Multiscale Structures and Mechanics in Damage Tolerant Functional Biocomposite and Biomimetic Materials
- Development of Universal Security Theory for Evaluation and Design of Nanoscale Devices
- Homotopy Type Theory: Unified Foundations of Mathematics and Computation

- Integrated Quantum Transduction with Photons, Phonons and Spins
- Plasma-Based Reconfigurable Photonic Crystals and Metamaterials
- Shedding Light on Plasmon-Based Photochemical and Photophysical Processes
- Studying Ultrafast Electron Dynamics in Condensed Matter with Next Gen
- Wiring Quantum Networks with Mechanical Transducers

## -2013 MURI Grants

- Advanced Quantum Materials A New Frontier for Ultracold Atoms
- <u>Electrochemical Imaging and Mechanistic Studies on the Nanometer Scale</u>
- High Power Physics of Ionospheric Modification
- MURI Center for Dynamic Magneto Optics (Dynamo)
- MURI Center for Materials Failure Prediction through Peridynamics
- Optimal Measurements for Scalable Quantum Technologies
- PT-Symmetric Optical Materials and Structures

## Inactive AFOSR MURI Grants

- -2012 MURI Grants
  - Bioprogrammable 1-2-3-Dimensional Materials
  - Innovation use of Metamaterials in Confining, Controlling, and Radiating Intense Microwave Pulses
  - Quantum Metaphotonics and Metamaterials: from Single Emitters to Strongly Correlated Systems
  - Smart, Functional Nanoenergetics Design from the Atomistic/Molecular Scale through the Mesoscale
  - Template-Directed Directionally Solidified Eutectic Metamaterials
  - Wave Optics of Deep Atmospheric Turbulence: from Underlying Physics towards Predictive Modeling, Mitigation, and Exploitation

## -2011 MURI Grants

- Control of Thermal and Electrical Transport in Organic and Composite Materials through Molecular and Nanoscale Structure
- Integrated Hybrid Nanophotonic Circuits
- Nanofabrication of Tunable 3D Nanotube Architectures
- Science of Cyber Security Modeling, Composition, and Measurement
- Synthesis and Characterization of 3D Carbon Nanotube Solid Networks

### -2010 MURI Grants

- Biopaints: Bio-Enabled Particle Adherents for Interrogative Spectroscopy
- Center for Organic Materials for all Optical Switching

- Chase: Control of Heterogeneous and Autonomous Sensors for Situational Awareness
- Cryogenic Peltier Cooling
- Fundamental Processes in High-Temperature Hypersonic Flows
- Inferring Structure and Forecasting Dynamics on Evolving Networks
- <u>MURI: Multi-Layer and Multi-Resolution Networks of Interacting</u> Agents in Adversarial Environments
- Mathematical Modeling and Experimental Validation of Ultrafast Nonlinear Light-Matter Coupling Associated with Filamentation in Transparent Media
- Novel Catalytic Mechanisms for the Chemical Reduction of Carbon Dioxide to Energy-Dense Liquids
- Quantum Preservation, Simulation and Transfer in Oxide Nanostructures

## - -2009 MURI Grants

- <u>Bio-Inspired Intelligent Sensing Materials for Fly-By-Feel</u>
   Autonomous Vehicle
- Bio-Inspired Optics: Offering Physical and Technological Insights in Color and Structure (Biooptics)
- Broad-Based Search for New and Practical Superconductors
- <u>Distributed Learning and Information Dynamics in Networked</u>
   Autonomous Systems
- Hardware, Languages, and Architectures for Defense Against Hostile Operating Systems
- <u>Multi-Functional Light-Matter Interfaces on Neutral Atoms and Solids</u>
- Multi-Scale Fusion of Information for Uncertainty Qualification and Management in Large Scale Simulations
- New Materials Approaches for Future Graphene-Based Devices
- Production, Manipulation, and Applications of Ultracold Polar Molecules
- Robust and Complex On-Chip Nanophotonics
- Synthesis, Characterization and Modeling of Functionally Graded Multifunctional Hybrid Composites for Extreme Environments
  - Towards New and Better High Temperature Superconductors

# -2008 MURI Grants

- A 21st Century Approach to Electronics Device Reliability
- A Framework for Managing the Assured Information Sharing Lifecycle
- Adaptive Intelligent Photonic/Electronic Systems Based on Silicon Nanomembranes
- Collaborative Policies and Assured Information Sharing
- Membrane Technology and 3D Photonic-Crystal Devices

 Three Dimensionally Interconnected Silicon Nanomembrances for Optical Phased Array (OPA) and Optical True Time Delay (TTD) Applications

### • -Research Areas

- Aerospace Composite Materials
- Aerospace Materials for Extreme Environments
- Agile Science of Test and Evaluation
- Atomic & Molecular Physics
- Biophysics
- Cognitive and Computational Neuroscience
- <u>Complex Networks</u>
- +Computational Cognition and Machine Intelligence
- Computational Mathematics
- Condensed Matter Physics
- Dynamic Data and Information Processing
- Dynamic Materials and Interactions
- Dynamical Systems and Control Theory
- <u>Electromagnetics</u>
- Energy, Combustion, and Non-Equilibrium Thermodynamics
- GHz THz Electronics & Materials
- <u>High-Speed Aerodynamics</u>
- Human Performance and Biosystems
- Information Assurance and Cybersecurity
- Laser and Optical Physics
- Mathematical Optimization
- Mechanics of Multifunctional Materials and Microsystems
- Molecular Dynamics and Theoretical Chemistry
- Multiscale Structural Mechanics and Prognosis
- Natural Materials and Systems
- Optoelectronics and Photonics
- Organic Materials Chemistry
- Physics of Sensing
- Plasma and Electro-Energetic Physics
- Propulsion and Power
- Quantum Information Sciences
- Science of Information, Computation, Learning, and Fusion
- Space Science
- Trust and Influence
- Ultrashort Pulse Laser-Matter Interactions
- <u>Unsteady Aerodynamics</u> and Turbulent Flows

#### • -AFOSR Workshops & Reviews

• -Workshops & Reviews - 2021

- 2021 "Fundamental Dynamics of Scientific Discovery" PI Review Meeting
- o 2021 AFOSR Aerospace Composite Materials Program Review
- o 2021 AFOSR Biophysics Program Review
- o 2021 AFOSR Computational Math Program Review
- o 2021 AFOSR Molecular Dynamics and Theoretical Chemistry Program Review
- o 2021 AFOSR Natural Materials and Systems Annual Program Review
- 2021 AFOSR Test and Evaluation Portfolio Review
- o 2021 AFOSR/HVSI/ONR High-Speed Aerodynamics Annual Review
- 2021 AFOSR/NSF Biophysics and Nanomanufacturing Meeting
- 2021 AFOSR/ONR MURI Review
- 2021 AFRL Center of Excellence in Brain-Derived Neuromorphic Computing with Intelligent Materials Proposer's Day
- 2021 Annual Grantees'/Contractors' Meeting for AFOSR Mechanics of Multifunctional Materials and Microsystems (M<sup>4</sup>) Program
- 2021 Annual Review of MURI Program on Full Quantum State Control at Single Molecule Levels
- o 2021 Annual Review of Theoretical Nonlinear Optics
- o 2021 Cognitive & Computational Neuroscience Program Review
- o +2021 Computational Cognition & Machine Intelligence Program Review
- o 2021 Dynamic Data and Information Processing Program Review
- o 2021 Dynamic Materials and Interactions Laboratory Task Review
- o 2021 Dynamical Systems and Control Theory Program Review
- o 2021 EM Annual PI Review
- o 2021 High-Speed Turbulence Workshop
- 2021 Human Performance and Biosystems Review
- o 2021 Hypersonic Materials Forum
- 2021 Interagency Coordination Committee on Ceramics Research and Development (ICCCRD) Meeting
- o 2021 Interfaces and Effects in Composite Energetic Materials (IECEM 2021)
- 2021 Joint Review Meeting for the AFOSR Quantum Information Science and Atomic and Molecular Physics Portfolios
- o 2021 MURI Days
- o 2021 MURI Kickoff Meeting on Ice Nucleation
- 2021 Materials with Extreme Properties and Condensed Matter Physics Joint Review
- 2021 New Research Areas in Hypersonics Workshop
- o 2021 Organic Materials Chemistry virtual Program Review (vPR)
- o 2021 Physics of Sensing Program Review
- 2021 Single Atom (SA) and Small Cluster (SC) Catalysis Workshop for Defense Applications
- o 2021 Space Science Program Review
- o 2021 Trust & Influence Program Review
- 2021 Trusted Distributed Human-Machine Teaming for Safe and Effective Spacebased Missions - Progress Discussion
- o 2021 Trusted Distributed Human-Machine Teaming for Safe and Effective Spacebased Missions Project Kick-off

- 2021 USAF-Taiwan Nanostructured Materials for Sensing and Sustainment Final Program Review
- o 2021 Unsteady Aerodynamics and Turbulent Flows Program Review
- -Workshops & Reviews 2020
  - o 2020 AFOSR Annual Trust and Influence Portfolio Review
  - o 2020 AFOSR Biophysics Program Review
  - o 2020 AFOSR Computational Math Annual Program Review
  - o 2020 AFOSR MURI Review-- 4D Nanoprinter
  - 2020 AFOSR Mathematical Optimization Annual Program Review
  - 2020 AFOSR Molecular Dynamics and Theoretical Chemistry Program Review
  - o 2020 AFOSR Natural Materials and Systems Annual Program Review
  - 2020 AFOSR Quantum Information Science and Atomic and Molecular Physics Program Reviews
  - 2020 AFOSR Unsteady Aerodynamics & Turbulent Flow Program Review
  - 2020 AFOSR/ARO/NSF Basic Combustion Research Review
  - o 2020 AFOSR/NSF Program Review on Materials in Extreme Properties
  - o 2020 AFOSR/ONR/HVSI Hypersonic Aerodynamics Portfolios Review
  - 2020 Aerospace Composite Materials Program Review
  - o 2020 Agile Science of Test and Evaluation
  - 2020 Annual EM Portfolio Review
  - o 2020 Annual Grantees'/Contractors' Meeting for AFOSR M^4 Program
  - 2020 Annual Review MURI: Fundamentals of Doping and Defects in b-Ga2O3
  - 2020 Annual Review of Electromagnetics Portfolio Subarea Theoretical Nonlinear Optics
  - o 2020 Autonomy, Command & Control Portfolio Review
  - o 2020 BOLT II Holden Mission CDR
  - o 2020 BOLT II Holden Mission Pre-CDR
  - 2020 BOLT II, in Memory of Mike Holden, PDR
  - 2020 Beyond Mesophiles: Synthetic Biology for Engineering Understudied Microorganisms
  - o <u>2020 Biophysics Meeting</u>
  - o 2020 Cognitive & Computational Neuroscience Program Review
  - 2020 Computational Cognition and Machine Intelligence Program Review
  - 2020 Condensed Matter Physics Program Annual Review
  - o 2020 Dynamic Data and Information Processing PI Review
  - o 2020 Dynamical Systems and Control Theory Program Review
  - o <u>2020 GHz-THz Electronics Program Review</u>
  - 2020 Human Performance and Biosystems Review
  - o 2020 IAPG RECWG Annual Meeting
  - o 2020 Interfaces in Polymer Composites for the Energetic Materials Community
  - o 2020 JANNAF PSHS/CS Workshop
  - o 2020 Laser and Optical Physics Portfolio Review
  - o 2020 MURI Days
  - o 2020 Melanin MURI Review
  - 2020 Multiscale Structural Mechanics and Prognosis Portfolio Review
  - o 2020 NSF AFOSR Workshop on Processing Science

- 2020 OSD DESI Review
- o 2020 Organic Materials Chemistry Virtual Program Review (vPR)
- o 2020 Physics of Remote Sensing Program Review
- o 2020 Plasma and Electroenergetic Physics Portfolio Review
- o 2020 Propulsion and Power Program Review
- 2020 Smart Sensing Non-classical Biology
- o 2020 T&E Cyber Review Meeting
- o 2020 Tri-Service Biosciences Coordination Meeting
- o 2020 US Korea Cyber Final Review
- o 2020 US/UK Mid-IR MURI Review
- o 2030 AI Information Computation Learning and Fusion
- o <u>Inaugural (virtual) AFOSR USSF Space Sciences Summit</u>
- -Workshops and Reviews 2012
  - 2012 AFOSR PROTEA Remote Sensing and Imaging Program Review
  - 2012 Aerothermodynamics and Turbulence Review
  - o 2012 Mexican Basic Research Initiative Mid-Term Review
  - o 2012 Mexican Centro de Investigación en Materiales Avanzados (CIMAV)
  - o +2012 Molecular Dynamics Contractor's Program Review
  - o 2012 OSD Minerva Meeting
  - o 2012 Space Propulsion and Power Contractors Meeting
  - 2nd Multifunctional Materials for Defense Workshop (Theme '12: Sensing,
     Actuation & Energy Transduction) & Annual Grantees'/Contractors' Meeting for
     AFOSR Program on "Mechanics of Multifunctional Materials and Microsystems"
  - o AFOSR 60th Anniversary Series: Dr. Rajesh Naik
  - o AFOSR 60th Anniversary Speaker Series Featuring Dr. Darryl Sanchez
  - o AFOSR 60th Anniversary Speaker Series Featuring Prof. Edl Schamiloglu
  - +AFOSR Optimization and Discrete Mathematics Program Review
  - o AFOSR-ARO Basic Combustion Research Review Meeting
  - o +AFOSR/ANFF Program Review
  - o Bioenergy Program Review
  - o COSPAR-12: Space Situational Awareness, Space Weather and Space Debris
  - Complex Networks 2012
  - o Computational Mathematics Program Review Meeting
  - o Distributed Intelligence & Information Fusion Program Review
  - o Dynamics & Control Program Review Meeting
  - +Endothermic Fuel BRI Review Meeting
  - Flow Interactions & Control Program Review
  - Foundations of Energy Transfer in Multi-Physics Flow Phenomenon Program Review
  - Information Operations & Security Program Review
  - Joint ONR/AFOSR Graphene MURI Review
  - o Joint Review of National Hypersonic
  - Low Density Materials Program Review
  - Metamaterial FY12 MURI Kick-off
  - Multi-Scale Structural Mechanics and Prognosis Annual Grantees Meeting
  - o Non-Linear Optics

- o Plasma and Electro-Energetic Physics Review
- Software and Systems Program Review
- +Test and Evaluation Program Review
- Test and Evaluation Research Opportunities Workshop 24-26 July 2012 |
   Shalimar, FL
- Test and Evaluation Research Opportunities Workshop 26-28 June 2012 |
   Edwards AFB, CA
- o Transitioning Hypersonic Simulation Tools from Research to Application
- Ultracold and Strongly Coupled Plasmas 2012 Program Review
- Ultrashort Pulse Laser-Matter Interactions Program Review
- -Workshops and Reviews 2013
  - o 2013 AFOSR Taiwan Nanoscience Workshop
  - 2013 Annual Grantees'/Contractors' Meeting for "Mechanics of Multifunctional Materials & Microsystems (M^4)" Program
  - o <u>2013 Complex Networks Program Review</u>
  - 2013 Joint AFOSR/ARO Basic Research Review
  - 2013 Natural Materials and Systems Program Review
  - o 3D Hybrid Circuits
  - o AFOSR PAC MURI Review
  - o AFOSR/Italy Technical Exchange Meeting (2013)
  - AFOSR/NASA UVa NHSRC Review 2013
  - o AFOSR/ONR Joint Graphene Program Review
  - Aerospace Materials for Extreme Environments Program Review
  - Aerothermodynamics and Turbulence Portfolio Review
  - Annual Program Review of the Minerva "Terrorism, Goverance, and <u>Development"</u>
  - Cognition, Decision & Computational Intelligence Program Review
  - Computational Cognition and Robust Decision Making Program Review
  - Computational Math Annual Program Review
  - o DDDAS Program PI Meeting
  - o Dynamic Materials and Interactions Portfolio Review
  - Dynamics and Control Program Review 2013
  - o <u>Electromagnetics Contractors Meeting</u>
  - o Endothermic BRI Review 2013
  - FY13 Structural Mechanics Annual Grantee Meeting
  - Flexible TE Workshop
  - o Flow Interactions and Control Program Review (2013)
  - Human Performance & Biosystems Portfolio Review
  - o Information Operations and Security Annual PI Meeting (2013)
  - o Joint AFOSR/ARO MURI Review
  - o Low Density Materials Program Review (2013)
  - o MACCCR Combustion-Fuel Research Review 2013
  - o MURI: Wave Optics of Deep Atmospheric Turbulence
  - o Magneto Optic Polymers Workshop
  - Meeting on Future Directions in Control Theory

- Multi-Layer and Multi-Resolution Networks of Interacting Agents in Adversarial Environments
- NATO S&T Lecture Series: Munitions Health Management
- o National Hypersonic Science Center Review
- o Natural Materials, Systems and Extremophilles Program Review
- o New Vistas in Solid State High Power Microwaves
- Non Linear Optics Annual Review
- o Optimization and Discrete Math Annual Program Review
- o Plasma and Electroenergetics Annual Portfolio Review
- Review of MURI- High-Power, Low-Loss Artificial Material for Transformation EM
- Sensory Information Systems Portfolio Review
- Space Propulsion and Power Program Review
- Superconducting Semiconductors
- o T&E Annual Program Review 2013
- Trust and Influence Program Review
- -Workshops and Reviews 2014
  - 2014 Electromagnetics Contractors Meeting
  - AFOSR Energy Transfer BRI Review
  - o AFOSR T&E Program Review 2014
  - AFOSR Thermal Sciences Review 2014
  - AFOSR and ARO Basic Combustion Research Review 2014
  - AFOSR/NCI/DARPA Strategic Workshop: Convergence of Physical Sciences for Biomedical Applications Meeting
  - o AFOSR/NIH/CNR Technical Exchange Meeting
  - Aerospace Materials for Extreme Environments Program Review 2014
  - Aerothermodynamics/Turbulence and Transition Program Review 2014
  - Annual Review of Theoretical Nonlinear Optics 2014
  - o BRI Review: Plasma-Surface Interactions in Reactive Environments
  - o Bz Workshop 2014
  - o Complex Networks 2014 Program Review
  - o Computational Cognition and Machine Intelligence Program Review
  - Computational Cognition and Robust Decision Making (CCRDM) Program Review
  - Computational Math 2014
  - DDDAS Program PI Meeting 2014
  - <u>Dynamic Material Interfaces BRI Workshop</u>
  - Energetic Materials Program Managers Meeting
  - Flow Interactions and Control Program Review 2014
  - Human Performance Program Review 2014
  - In-situ Dynamic Mesoscale Measurements of Reacting Energetic Materials
  - Joint AFOSR/ARO MURI Kickoff 2014
  - Joint DARPA/AFOSR Plasma Devices Contracts and Grants Review / 2014
     MURI Kick-Off Meeting
  - o Joint Services & OSD Africa Technical Exchange
  - Laser and Optics Review 2014

- Low Density Materials Program Review 2014
- MACCCR Multi-Agency Coordinating Committee for Combustion Research 2014
- MURI: High Power, Low Loss Artificial Materials for Transformational EM 2014
- o Molecular Dynamics and Theoretical Chemistry Program Review 2014
- o Multiscale Structural Mechanics Program Review 2014
- o NBIT Program Review and Nanoscience Technical Exchange Meeting
- Natural Materials and Systems Program Review
- o Organic Materials Chemistry 2014 Program Review
- o Plasma & Electroenergetics Program Review 2014
- o QMM MURI Review 2014
- o RP21 Steering Committee Meeting
- Remote Sensing and Imaging Physics 2014
- Sensory Information Systems 2014 Program Review
- Superconductivity Program Review 2014
- The 3rd Multifunctional Materials for Defense Workshop; 2014 Annual Review for AFOSR Program on Mechanics of Multifunctional Materials & Microsystems;
   2014 Annual Review for ONR Program on Structural Composites & NDE
- o Trust and Influence Program Review
- o Ultrashort Pulse Laser-Matter Interactions Program Review 2014
- Young Investigators Research Program Annual Meeting 2014
- -Workshops and Reviews 2015
  - o 2012 MURI; Managing the Mosaic of Microstructure 2015
  - 2015 Annual Grantees'/Contractors' Meeting for AFOSR Program on "Mechanics of Multifunctional Materials & Microsystems (M^4)"
  - o 2015 Molecular Dynamics Annual Program Review
  - 2015 NLO Annual Contractor Review
  - o 2D Materials and Devices Beyond Graphene BRI Kick-off 2015
  - o AFOSR International Basic Research Infrastructure Meeting
  - AFOSR Program Review for Space Science 2015
  - o AFOSR/ARO/NSF Basic Combustion Research Review 2015
  - o AFOSR/NIH S&T Strategy Meeting
  - Annual EM Contractor's Review 2015
  - Building the Materials Data Infrastructure: A Materials Community Planning Workshop
  - Combined Biophysics, Joint International Initiative and Human Performance Program Review 2015
  - Computational Mathematics 2015
  - Cybersecurity and Information Science Program Review 2015
  - Discrete Mathematics and Optimization Program Review 2015
  - o DoD/DOE Technical Coordination Group I Spring Meeting 2015
  - Dynamic Materials and Interactions Program Review 2015
  - FY12 Transformational EM MURI Year 3 Review 2015
  - Flow Interactions & Control Program Review 2015
  - Future Directions Workshop #1 2015
  - o GHz-THz Electronics Review 2015

- Hypersonics for CREATE
- Jet/Rocket Fuel Kinetics Experiments and Model Development 2015
- Joint Quantum Electronic Solids/GHz-THz Electronics Program Review 2015
- Laser & Optical Physics Portfolio Annual Review 2015
- o Low Density Materials Program Review 2015
- MACCCR Multi-Agency Coordinating Committee for Combustion Research 2015
- o Materials for Extreme Environments Program Review 2015
- Multi-Scale Structural Mechanics Annual Grantees Meeting
- Multi-agency International S&T Engagement Collaboration (MISTEC) Initiative Workshop 2015
- o Natural Materials and Systems Program Review 2015
- o PT Materials MURI Review
- o Quantum Metaphotonics & Metamaterials MURI 2015
- o Reactive Material (RM) Technical Exchange Meeting
- Remote Sensing and Imaging Physics Program Review 2015
- Science and Technology Emergence Kick-off Meeting 2015
- o Seminar Dr. Benjamin Eggleton, University of Sydney 2015
- Sensory Information Systems Program Review
- o Space Propulsion and Power Program Review 2015
- Systems & Software Program Review 2015
- o T & E Program Review 2015
- Technology Watch and Horizon Scanning (TW/HS) Community of Practice (CoP) Meeting 2015
- The 2015 Aerothermodynamics, Transition and Turbulence, and MURI Review
- Towards Best Practices in Data Management Plans for Materials Research and Development
- Trust and Influence Program Review 2015
- US-Australia Enabling Technologies Technical Exchange Meeting
- Ultrashort Pulse Laser-Matter Interactions Program Review 2015
- o Wave Optics of Deep Atmospheric Turbulence MURI Review 2015
- Young Investigators Research Program (YIP) Annual Meeting 2015
- <u>-Workshops and Reviews 2016</u>
  - 2014 MURI Review: Plasma-based Reconfigurable Photonic Crystals and Metamaterials
  - 2016 3rd Multi-agency International S&T Engagement Collaboration (MISTEC)
     Initiative Workshop
  - 2016 10th MACCCR Annual Fuel and Combustion Research Review
  - 2016 2nd AFRL Workshop on beta-Ga2O3: Synthesis, Characterization, and Applications
  - o 2016 AFOSR Computational Mathematics Program Review
  - 2016 AFOSR High Speed Aerodynamics Portfolio Review and ONR Hypersonics Portfolio Review
  - 2016 AFOSR Life Sciences Review
  - 2016 AFOSR M<sup>4</sup> Program Lab Task Review & STTR Kick-off
  - o 2016 AFOSR Scientific Advisory Board (SAB)

- o 2016 AFOSR Spring Review
- o 2016 AFOSR/AFRL FM Summit
- o 2016 AFOSR/ARO/NSF Basic Combustion Research Review
- o 2016 Aerospace Materials for Extreme Environment Program Review
- o 2016 Biophysics MURI Kick-Off
- 2016 Computational Cognition and Machine Intelligence Program Review
- o 2016 Cyber Security and Information Assurance Program Review
- o 2016 Dynamics and Controls Annual Program Review
- 2016 EM and SSN Contractor Review
- o 2016 FY12 Transformational Electromagnetics MURI Year 4 Review
- 2016 FY16 Radiation Balanced Lasers MURI Kick-OFF
- 2016 Flow Interactions & Control and ARO Fluid Dynamics Annual Contractors Review
- o 2016 GHz-THz Electronics Review
- o 2016 HPM Metamaterials MURI Review
- o 2016 Low Density Materials Program Review
- 2016 MURI Center for Material Failure Prediction through Peridynamics Program Review
- o 2016 MURI Review: Propagation Through Deep Turbulence
- o 2016 Molecular Dynamics and Theoretical Chemistry Program Review
- o 2016 Multi-Scale Structural Mechanics and Prognosis Program Review
- 2016 Multi-agency International S&T Engagement Collaboration (MISTEC)
   Initiative Workshop
- 2016 NSF-AFOSR-ARO-DTRA Workshop on Reproducible Advanced Technologies for Next-Generation Nano/Quantum Devices
- 2016 Nanoelectronics Program Review
- o 2016 Natural Materials and Systems Program Review
- 2016 Nonlinear Optics Contractor Review
- o 2016 Organic Materials Chemistry Contractors/Grantees Review
- o 2016 Plasma & Electro-Energetic Physics Annual Program Review
- o 2016 Plasma Chemistry BRI Annual Program Review
- o 2016 Reconfigurable Electronics Working Group
- 2016 Remote Sensing and Imaging Physics Portfolio Annual Review
- 2016 Science of Information, Computation, Learning and Fusion Program Review
- 2016 Second Technical Exchange on Ultra-Wide Bandgap Semiconductors: Research Opportunities and Directions
- o <u>2016 Superconductivity Program Review</u>
- o 2016 Systems & Software Program Review
- o 2016 TW/HS Grants Year 1 Program Review
- o 2016 Test Science for T & E Program Review
- o 2016 Triservice Metamaterial Review
- o 2016 Trust and Influence Program Review
- o 2016 U.S. Joint Services & OSD Africa Technical Exchange Meeting
- o 2016 Ultrashort Pulse Laser-Matter Interactions Program Review
- 2016 Young Investigators Research Program Annual Meeting
- Annual Review of the AFOSR DDDAS Program

- Future Directions of Quantum Information Processing Workshop
- MURI 15 Kickoff Strong Field Laser Matter Interactions at Mid-Infrared Wavelengths
- o PT Materials MURI Review
- Workshops and Reviews 2017
  - o 14th USAF Taiwan Nanoscience Program Review
  - 2017 AFOSR Fall Review
  - o 2017 AFOSR Molecular Dynamics/Theoretical Chemistry Program Review
  - 2017 AFOSR Unsteady Aerodynamics & Turbulent Flows Portfolio Review
  - 2017 AFOSR/ARO/NSF Basic Combustion Research Review
  - o 2017 Aerospace Materials for Extreme Environments Program Review
  - o 2017 Air Force Annual T2 Meeting
  - 2017 Annual Grantees'/Contractors' Meeting for AFOSR Mechanics of <u>Multifunctional Materials and Microsystems (M^4) Program and The 4th</u> <u>Multifunctional Materials for Defense Workshop</u>
  - 2017 Annual Review for the AFOSR High Speed Aerodynamics Portfolio and the ONR Hypersonics Portfolio
  - o 2017 Annual Review of EM Contractors
  - 2017 Annual Review of Radiation Balanced Lasers MURI
  - o 2017 Annual review of Theoretical NLO Contractors
  - o 2017 Big Data Human Research Regulatory Workshop
  - o 2017 Biophysics MURI Meeting
  - o 2017 Bz Workshop
  - 2017 Computational Mathematics Program Review
  - o 2017 Cyber Security Program Review
  - o 2017 Dynamics and Controls Program Annual Review
  - o 2017 Dynamo MURI Review
  - o 2017 Energy Consequences of Information (ECI)
  - o 2017 GHz-THz Electronics Review
  - o 2017 Human Performance and Biosystems Program
  - o 2017 Investigating Gap Test Modelining and Instrumentation Meeting
  - o 2017 Ionosphere/Thermosphere Coupling MURI Review
  - o 2017 JANNAF Reactive Material Lethality Technical Program Review
  - 2017 Kickoff Meeting Multipactor and Breakdown Susceptibility and Mitigation in Space-based RF Systems (MURI2017)
  - o 2017 Latin America Space Research Workshop
  - 2017 MACCCR (Multi-Agency Combustion Research Coordinate Committee) Fuel and Combustion Research Review
  - o 2017 MOSAIC MURI Review
  - 2017 MURI Final Review-Wave Optics of Deep Atmospheric Turbulence and Exploitation
  - 2017 Multi-agency International S&T Engagement Collaboration (MISTEC)
     Initiative Workshop
  - o 2017 NBIT 10th Year Program Review
  - 2017 Natural Materials and Systems and Extremophiles Annual Program Review
  - o 2017 Organic Materials Chemistry Portfolio Review

- o 2017 Plasma & Electroenergetic Physics Annual Review
- 2017 Radiation Damage Effects in Electronics and MEMS
- o 2017 Remote Sensing Program Review
- o 2017 Review of MURI "PT-Symmetric Optical Materials and Structures
- o 2017 Science of Information, Computation, Learning and Fusion Program Review
- o 2017 Space Power Workshop
- o <u>2017 Space Propulsion and Power Program Review</u>
- o 2017 Space Sciences Annual Program Review
- 2017 TTCP AG-2 Kickoff Meeting for Multimodality Information Fusion
- o 2017 TTCP-ISTAR-TP-3 Annual Meeting
- 2017 Test Science for Test and Evaluation Annual Review
- 2017 The Relationship between Mechanical and Reactive Behavior in Energetic Materials Meeting
- o 2017 Trust and Influence Program Review
- o 2017 US DoD-Republic of Korea Joint Robotics Initiative Program Review
- o 2017 Ultrashort Pulse Laser-Matter Interactions Program Review
- o 2017 Workshop: Computational Challenges in Plasma Physics
- +2017 Workshop: Turbulence in Space and Laboratory Plasma and Impact on High Frequency (HF) Wave Propagation
- o 2017 Young Investigator Research Program (YIP) Meeting
- o Future Directions in Machine Learning Workshop
- NATO SET-RTG 236 Panel Meeting "Compressive Sensing for Radar"
- -Workshops and Reviews 2018
  - o 13th US-Italy Joint Commission Meeting on Science and Technology
  - 2018 AFOSR Additive Manufacturing Workshop
  - 2018 AFOSR Computational Cognition and Machine Intelligence Program Review
  - o 2018 AFOSR Cyber Security Program Review
  - o 2018 AFOSR Dynamic Materials and Interactions Annual Review
  - o 2018 AFOSR Fall Review
  - o 2018 AFOSR M^4 Annual Grantees'/Contractors' Meeting
  - o 2018 AFOSR Molecular Dynamics/Theoretical Chemistry Program Review
  - 2018 AFOSR Natural Materials, Systems, and Extremophiles Annual Program Review
  - 2018 AFOSR Particle Dynamics Parallel Simulator (PDPS) Training Seminar
  - 2018 AFOSR/ARO/NSF Basic Combustion Research Review
  - o 2018 AFOSR/NSF SSA Data Discussion
  - 2018 AFRL Autonomy, Command & Control, & Decision Support PI Portfolio Review
  - 2018 AFRL/AFOSR Workshop- Adaptive Materials and Structures
  - 2018 Additive Manufacturing
  - o 2018 Annual EM Contractor Review
  - o 2018 Annual Review of Plasma & Electroenergetic Physics
  - o 2018 Annual Review of Theoretical NLO Contractors
  - o 2018 BOLT PDR
  - o 2018 Biophysics Program Review

- +2018 Computational Mathematics Program Review
- o 2018 Dynamics and Control Program Review
- o 2018 FY12 AFOSR Transformational Electromagnetics MURI
- o 2018 Human Performance and Biosystems Program Review
- o 2018 Joint AFOSR ARO Attosecond MURI Reviews
- o 2018 Low Density Materials Program Review
- o 2018 MURI Kickoff- Atmospheric Disturbances at High Altitudes
- o 2018 MURI Review Atmospheric Disturbances at High Altitude
- o 2018 Mid-IR MURI Review (FY15 MURI Topic 13)
- o 2018 Multi-Scale Structural Mechanics and Prognosis Program Review
- o 2018 NATO Collaboration Activity Analytical War-Gaming
- o 2018 Optimization and Discrete Math Review
- o 2018 Organic Materials Chemistry Virtual Program Review (vPR)
- 2018 Program Review of Aerospace Materials for Extreme Environments Portfolio
- 2018 Quantum Information Science and Atomic and Molecular Physics Program Reviews
- o 2018 Radiation Balanced Lasers MURI Review
- 2018 Radiation Damage Effects in Electronics and MEMS
- 2018 Renewable Energy Working Group Meeting for the Interagency Advanced Power Group
- o 2018 Review of BOLT Grant
- o 2018 Review of MURI
- 2018 Revolutionary Advances in Computational Quantum Many Body Physics (MURI) - Kickoff Meeting
- o 2018 STTR Phase II Kickoff for Atmospheric Disturbance Measurements
- o 2018 Science of Test and Evaluation Program Review
- o 2018 Space Data Workshop
- o 2018 Space Propulsion and Power Program Review
- o 2018 Trans Cranial Direct Current Stimulation Workshop
- o 2018 US/UK Mid-IR MURI Review (FY15 MURI Topic 13)
- o 2018 Ultrashort Pulse Laser-Matter Interactions Program Review
- o 2018 Unsteady Aerodynamics & Turbulent Flows Program Review
- o 2018 Young Investigator Research Program (YIP) Meeting
- o 2019 "Verifiable, Control-oriented Learning on the Fly" MURI Kickoff
- AFOSR Molecular-Scale Studies of Liquid-Solid Interfaces in Electrochemical Processes Workshop
- JANNAF Technical Information Meetings on Mechanical/Reactive Energetic Material Behavior and Gap Testing
- +Joint AFOSR High-Speed Aerodynamics
- -Workshops and Reviews 2019
  - o 2019 "Fundamental Dynamics of Scientific Discovery" Kickoff Meeting
  - o 2019 2nd Semiannual Government Workshop on 2D Materials
  - o 2019 AFOSR 3D Shock Wave Boundary Layer Transition Workshop
  - o 2019 AFOSR Biophysics Program Review
  - 2019 AFOSR Fall Review

- 2019 AFOSR MURI Review- Convergent Evolution to Engineering: Multiscale Structures and Mechanics in Damage Tolerant Functional Biocomposite and Biomimetic Materials
- o 2019 AFOSR Molecular Dynamics/Theoretical Chemistry Program Review
- o 2019 AFOSR Natural Materials and Systems Annual Program Review
- o 2019 AFOSR/ARO/NSF Basic Combustion Research Review
- 2019 AFOSR/LPS/ARO Quantum Transduction Program Review
- o 2019 AFOSR/ONR/HVSI Hypersonic Aerothermodynamics Portfolios Review
- 2019 AFRL Autonomy, Command & Control, & Decision Support PI Portfolio Review
- o 2019 AFRL FM Summit
- 2019 ARO Fluid Dynamics/AFOSR Unsteady Aerodynamics & Turbulence Portfolio Review Meeting
- o 2019 Agile Science of Test and Evaluation Program Review
- 2019 Annual Review for BRI'16 on "Avian-Inspired Multifunctional Morphing Vehicles"
- o 2019 Annual Review of the Plasma and Electroenergetic Physics Portfolio
- o 2019 Atmospheric Disturbances MURI Review
- o 2019 BOLT II CoDR
- o 2019 Computational Cognition and Machine Intelligence Program Review
- o 2019 Computational Math Program Annual Review
- o 2019 DESI kickoff
- o 2019 Dynamical Systems and Control Theory Program Review
- o 2019 Electromagnetics Portfolio Annual Contractor Review
- o 2019 Electron Transpiration Cooling of Materials
- 2019 GHz-THz Electronics and Materials and Superconductivity Programs Joint Review
- o 2019 Human Performance and Biosystems Portfolio Review
- 2019 Joint AFOSR & NSF Program Review: Quantitative Representation of Microstructure and Aerospace Materials for Extreme Environments
- o 2019 Joint AFOSR ARO Attosecond MURI Reviews
- o 2019 Joint Technology Exchange Meeting (TEM)
- o 2019 Kick-Off Meeting for DESI Program on "Supermaneuvarable Autonomous Pursuit"
- 2019 Low Density Materials Portfolio Review
- 2019 MACCCR Fuel/Combustion Research Review (Multi-Agency Coordinating Committee for Combustion Research)
- o 2019 MURI Review: Gallium Oxide Materials Science and Engineering GAME
- o 2019 Multifunctional Materials for Defense Workshop
- 2019 Multiscale Structural Mechanics and Prognosis Portfolio Review
- o 2019 Non-equilibrium Air Workshop
- o 2019 Optimization and Discrete Math Annual Program Review
- o 2019 Organic Materials Portfolio Review
- 2019 Quantum Information Sciences and Atomic and Molecular Physics Program Review
- o 2019 Radiation Damage Effects in Electronics and MEMS

- o 2019 Radiation-Electron Interaction Workshop
- o 2019 Radiation-PH Interation (TBD) Workshop
- o 2019 Review of EM Portfolio Subarea Theoretical Nonlinear Optics
- o 2019 SOARD Program Review
- o 2019 TCG-I and TCG-XI Spring Review
- o 2019 Ultrashort Pulse Laser-Matter Interactions Program Review
- o 2019 Washington DC Government Workshop on 2D Materials Beyond Graphene
- o 2019 Workshop on High-Pressure Spectrocsopy of HC Combustion
- Workshop and Reviews 2023
  - o 2023 6th US Government Workshop on 2D Materials
  - 2023 AFOSR Biophysics Program Review
  - 2023 AFOSR Computational Math Annual Review
  - 2023 AFOSR Dynamical Systems and Control Theory Review
  - 2023 AFOSR Gas Surface Interaction Workshop
  - o 2023 AFOSR Mathematical Optimization Program Review
  - o 2023 AFOSR Molecular Dynamics and Theoretical Chemistry Program Review
  - o 2023 AFOSR Organic Materials Chemistry Program Review (OMC PR)
  - o 2023 AFOSR/ONR/HVSI Annual High-Speed Aerodynamics Portfolio Review
  - o 2023 AFOSR/Taiwan Nanoscience Initiative Program Review
  - o 2023 Aerospace Composite Materials Program Review
  - 2023 Annual Grantees'/Contractors' Meeting for AFOSR Mechanics of Multifunctional Materials and Microsystems (M<sup>4</sup>) Program
  - 2023 Annual Review of the Program on Uncertainty Quantification for Hypersonic Materials
  - o 2023 Electromagnetics Annual Portfolio Review
  - 2023 Joint Review Meeting for the AFOSR Quantum Information Sciences & Atomic and Molecular Physics Portfolios
  - 2023 Joint Review for Materials with Extreme Properties and Condensed Matter Physics
  - o 2023 Life Sciences in Space Scoping Workshop
  - o 2023 Nanoscale Vacuum Electronics Joint Program Review
  - o 2023 Remote Sensing of Arctic Permafrost Workshop
  - 2023 Review of NLO Basic Research
  - o 2023 Review of Research on 2-D Materials and Manufacturing
  - o <u>2023 Space Science Portfolio Review</u>
  - 2023 Systematic Analysis of Errors and Uncertainty from Materials Modeling & Discovery to Manufacturing: Towards Best Practices Across Scales
  - 2023 Trust and Influence Program Review
  - o 2023 US-Korea Quantum Initiative 2nd Annual Review
  - 2023 Unsteady Aerodynamics Program Review
- -Workshops & Reviews 2022
  - o 2022 AFOSR Biophysics Program Review
  - 2022 AFOSR Computational Mathematics Review
  - o 2022 AFOSR Molecular Dynamics and Theoretical Chemistry Program Review
  - o 2022 AFOSR Organic Materials Chemistry Program Review (OMC PR)
  - o 2022 AFOSR Spring Review

- o 2022 AFOSR-NSF Technical Exchange on Biophysics and Nanomanufacturing
- o <u>2022 AFOSR-RX TD Exchange</u>
- o 2022 AFOSR/ONR MURI Review
- o 2022 AFOSR/ONR/HVSI Annual High-Speed Aerodynamics Portfolio Review
- o 2022 Aerospace Composite Materials Program Review
- o 2022 Annual EM Portfolio Review
- o 2022 Annual Review of Theoretical Nonlinear Optics
- 2022 Best Practices in First-Principles Modeling of Materials: Towards Systematic Analysis of Errors and Uncertainty
- o 2022 Cislunar Astrodynamics and Space Robotics Workshop
- o 2022 Cognitive & Computational Neuroscience Program Review
- 2022 Computational Cognition & Machine Intelligence Program Review
- 2022 Dynamical Systems and Control Theory Program Review
- -2022 Energy Consequences of Information Workshop
  - Topics
  - ECIW Agenda
  - Call for Abstracts
  - Workshop Registration
  - Organizing Committee
  - Invited Speakers
- 2022 GAME MURI β-Ga2O3 as a High-Critical Field Strength Material for Power Systems
- 2022 GHz-THz Electronics Review
- o 2022 Human Performance and Biosystems Program Review
- 2022 Joint Review Meeting for the AFOSR Quantum Information Science and Atomic and Molecular Physics Portfolios
- 2022 Kickoff for FY23 OSD ARAP Advanced Power Electronics and Extreme-RF (APEX) Program
- o 2022 MURI Review: Gallium Oxide as a High-Critical Field Strength Material
- 2022 Materials with Extreme Properties and Condensed Matter Physics Joint Review
- 2022 Mean-Field Games MURI and Research Review
- o 2022 National RDE Council TEM
- 2022 Natural Materials and Systems Annual Program Review
- o 2022 Physics of Sensing Program Review
- 2022 Proposers Day for MURI: Open Hybrid Dynamical Systems: Compositions, Invariants, and Computation
- 2022 Radiation Damage of Electronics Review
- o 2022 Space Science Portfolio Review
- o 2022 Terahertz Spintronics with Antiferromagnetic Insulators
- o 2022 The 6th Multifunctional Materials for Defense Workshop
- o 2022 Topological Plasma Electromagnetics
- 2022 Town Hall FY23 DoD MURI Topic 18: Fluid-(Sub-) Surface Material Interactions for Passive Flow Control
- 2022 Trust & Influence Program Review
- 2022 Unsteady Aerodynamics and Turbulent Flows

- o 2022 WH Orbital Debris Workshop
- -Educational and Special Programs
  - -AFRL/NSF Internship Programs
    - o -AFRL Graduate Summer Internship for NSF GRFP Fellows
      - Cyber Internship
    - -AFRL Technician Training for NSF ATE Students
      - Cyber Technician Training
  - Young Investigator Program (YIP)
- -International Division (Research Areas International Office)
  - European Office of Aerospace Research and Development (EOARD) [London, UK]
  - Asian Office of Aerospace Research and Development (AOARD) [Tokyo, Japan]
  - Southern Office of Aerospace Research and Development (SOARD) [Santiago, Chile]
  - -Overall IO Grants Process
    - o Research (R&D) Grant Proposal
    - o Conference Support Proposal (CSP)
    - o <u>Travel Support (Windows-on-Science)</u>
    - Funding Timeline
    - o Proposal Guidelines
  - Business Office Steps to Submit Proposal to AFOSR International Division
  - Grant Deliverables
  - No Cost Extension (NCE) Request
  - Country Initiatives
    - o AFOSR Taiwan NSTC Novel Materials and Nanostructures
    - o AFOSR DST Australia Autonomy Initiative
    - AFOSR NRF/IITP Korea Quantum Information Science and Technologies
    - Australia-US Directed Energy Program (AUSDEP)
    - o MSIP-AFOSR Korea Cyber Security Basic Research
    - o MSIP-AFOSR Korea Programmable Materials and Next Generation Nanosystems
    - Quantum Information Science and Technologies
  - IO Annual Reports
- 2018 Joint AFOSR High-Speed Aerodynamics and ONR Hypersonics Programs Annual Review
- -Special Events and Lectures
  - -AFRL/AFOSR Chief Scientist Lecture Series
    - A.I. 2040 and Beyond 20211027
    - A.I. 2040 and Beyond 20220202
    - o A.I. 2040 and Beyond 20221108
    - o Chief Scientist Distinguished Lecture Series Featuring Dr. Róisín M. Owens
    - o Chief Scientist Distinguished Lecture Series Featuring Dr. Yann LeCun
    - Chief Scientist Distinguished Lectured Series Featuring Dr. Andrea Alù

- -Horizons Lecture Series
  - o Dr. Burton J. Smith
  - o Dr. Dimitris Metaxas
  - o Dr. Gregory A. Voth
  - o Dr. Hamish L. Fraser
  - o Dr. Jun Ye
  - o Dr. Mark Lewis
  - o Dr. Mica Endsley
  - o Dr. Michael Metcalfe
  - o Dr. Paul Corkum
  - o Dr. Sangtae Kim
- -Special Edition Basic Research Office Forum
  - o Dr. Andrew Lucas
  - o Dr. Robert Lucas
- -Special Events
  - o 2017 AFOSR Mid-Atlantic Student Research Day
  - o AFRL/AFOSR Heritage Open House