



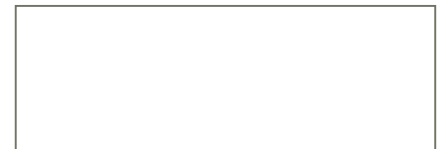
# U.S. ARMY DEVCOM - ATLANTIC

## Basic and Applied Research Collaboration Overview

Dr. Jonathon Brame

Basic and Applied Research Team Lead

DEVCOM Atlantic

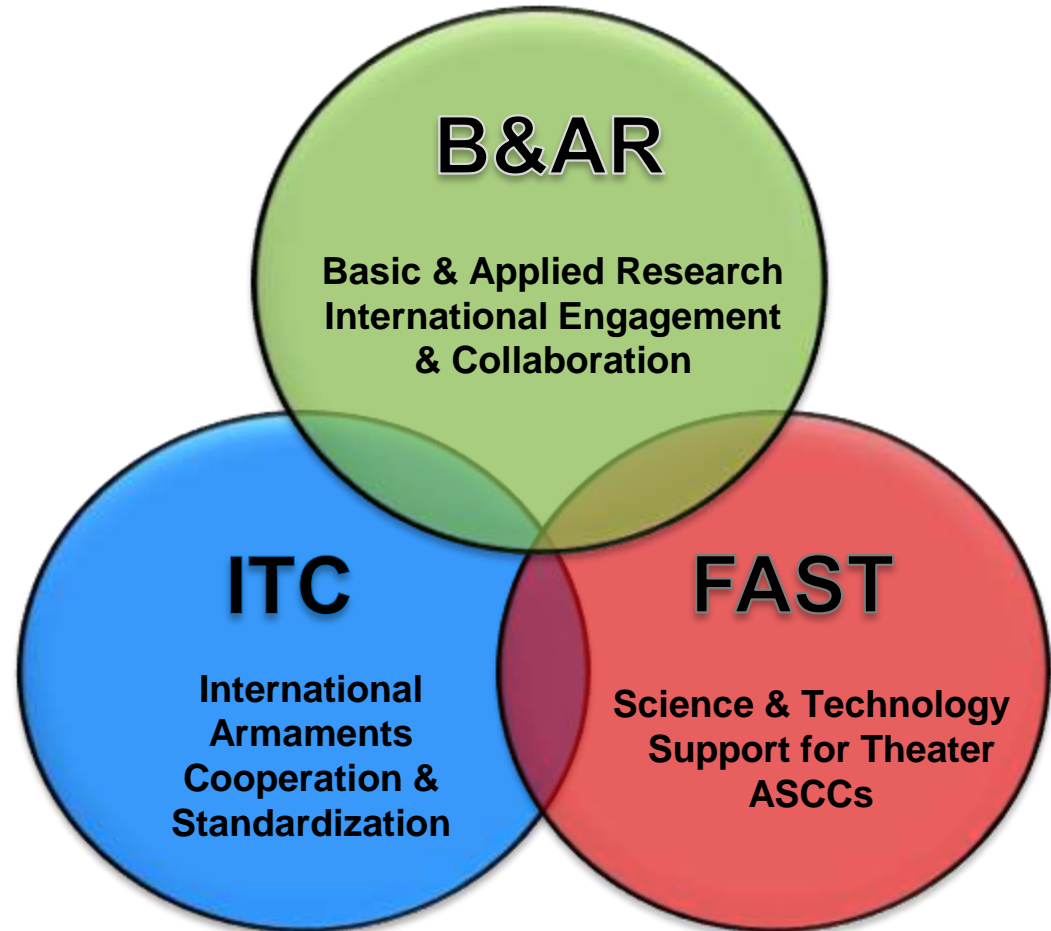




# DEVCOM-ATLANTIC



- DEVCOM is the United States Army's premier organization for science and technology
- DEVCOM's forward elements extend the Army's Science and Technology ecosystem globally to support the Army's global mission, help build partner capacity, and ensure interoperability
- DEVCOM -Atlantic facilitates partnerships and engagements with industry, academia, DoD labs, and our Allies



**Innovation will be the key to our success!**



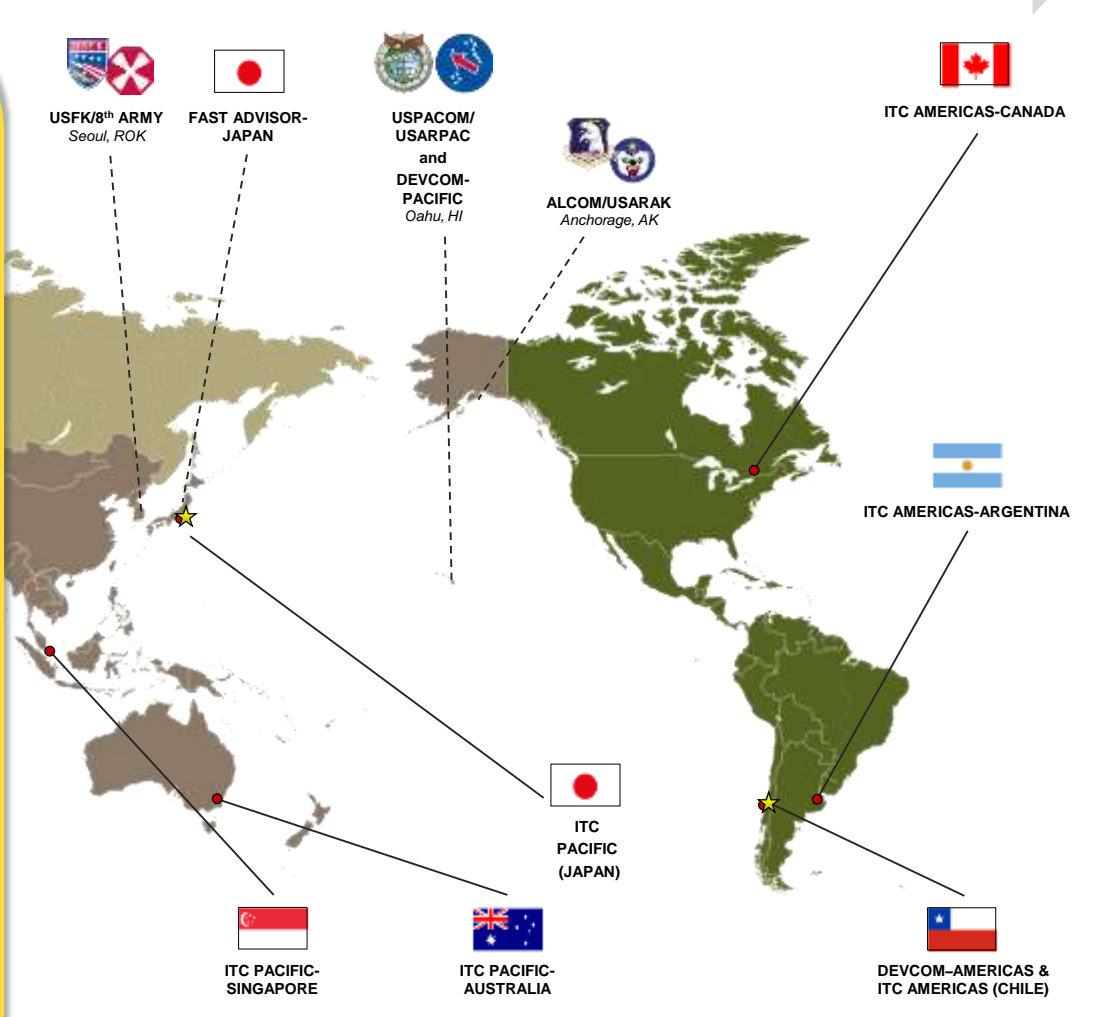
# DEVCOM GLOBAL OPERATIONS



## Technology Search

## Engagement

## Warfighter Support



Driving innovation around the world with our allies and partners



# DEVCOM CENTERS



## Armaments Center

Picatinny Arsenal, NJ

## Army Research Lab

Adelphi, MD

## Aviation & Missile Center

Redstone Arsenal, AL

## Chemical Biological Center

Aberdeen Proving Ground, MD

## C5ISR Center

Aberdeen Proving Ground, MD

## Data & Analysis Center

Aberdeen Proving Ground, MD

## Ground Vehicle Systems Center

Warren, MI

## Soldier Center

Natick, MA

- Munitions Systems & Technologies
- Integrated Weapon Systems
- Energetics, Warheads & Manufacturing
- Guidance, Navigation & Control
- Fuze & Precision Armament Technology
- Cross Domain Fires

- Extramural Basic Research
- Computational Sciences
- Materials Research
- Sciences-for-Maneuver
- Information Sciences
- Sciences for Lethality and Protection
- Human Sciences
- Assessment & Analysis
- Advanced Computing & Big Data
- Agile Manufacturing
- Synthetic Biology

- Airframe Structures
- Rotors & Rotor Systems
- Sensors and Seekers
- Guidance, Navigation, and Control
- Propulsion
- Counter-UAS
- Visualization
- Anti-Access/ Area Denial
- Missile Defense

- Chemistry and Biological Sciences
- CB Agent Handling and Surety
- Operations
- CBRNE Materiel Acquisition
- CBRNE Analysis and Testing
- CBRNE Munitions and Field Operations

- Mission Command
- Tactical and Deployed Power
- Tactical Cyberspace Operations
- Electronic Warfare
- Intelligence, Surveillance, and Targeting
- Reconnaissance and Targeting
- Network
- Prioritize Position Navigation and Timing (PNT)

- Certified Item Level Performance Data
- Models, Simulations, & Tools
- Life-Cycle Systems Analysis
- Vulnerability / Lethality Technical Analysis
- Soldier-Centered Performance Design Analysis

- Ground Vehicle Survivability
- Autonomy-Enabled Systems
- Vehicle Electronic Architecture
- Ground System Software
- Ground Vehicle Power & Mobility
- Robotics/Autonomous Systems
- Combat Vehicles
- Advanced Protection Systems

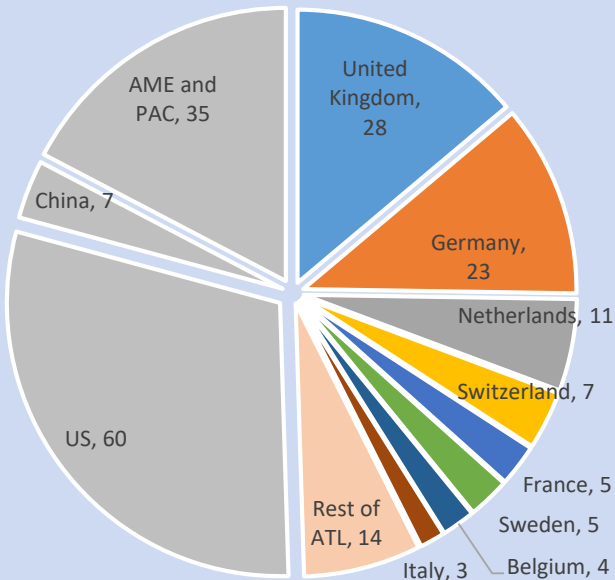
- Advanced/Multifunctional Materials
- Biomechanics
- Cognitive & Behavioral Sciences
- Food Science
- Geographic/Precision Guided Systems
- Soldier Performance Optimization
- Biological Technology
- Neuro-cognition



# BASIC & APPLIED RESEARCH (B&AR)



## Top Universities



Distribution of the world's top 200 universities.  
Source: Times Higher Education, 2020

## B&AR Collaboration Tools

- **Research Projects: Grants & Cooperative Agreements**
  - Seed projects or focused research
  - Collaborative research w/ US Army Labs/Centers
- **Conference/Workshop support**
- **Visiting Scientist Program / Subject Matter Expert Travel**

## DEVCOM ATL B&AR

- Conduct outreach on behalf of the Army S&T enterprise
- Promote awareness of state-of-the-art and newly emerging S&T across the global spectrum
- Identify priority areas and mechanisms for research exchange and collaboration
- Foster relationships and invest to develop opportunities for cooperation

**Awareness**

**Engagement**

**Relationships**



**US Army Corps of Engineers.**

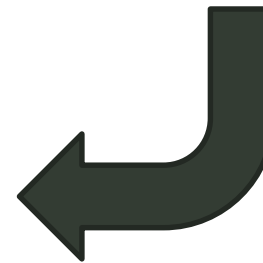




# BROAD AGENCY ANNOUNCEMENTS



<https://www.arl.army.mil/business/broad-agency-announcements/>



Scroll down the  
BAA website to:

<b>ARO Broad Agency Announcement (BAA) for Fundamental Research for 1 April 2017 – 31 March 2022</b> W911NF-17-S-0002	01 April 2017	31 March 2022
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[Amendment 8](#)

<b>ARL Broad Agency Announcement (BAA) for Basic and Applied Scientific Research for Fiscal Years 2017 through 2022</b> W911NF-17-S-0003	01 April 2017	31 March 2022
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[Amendment 9](#)

- ARO BAA : High risk, revolutionary basic research
- ARL BAA: Basic and Applied Army relevant research



# TECHNICAL AREAS OF INTEREST



## ARO Topic Areas

- Physical Sciences
  - Chemistry
  - Physics
  - Life Sciences
- Engineering Sciences
  - Mechanical Sciences
  - Electronics
  - Materials Sciences
  - Earth Sciences
- Information Sciences
  - Computing Sciences
  - Mathematical Sciences
  - Network Sciences
- Human Sciences

## ARL Topic Areas

- Computational Sciences
  - HPC, Data, Modeling/Simulation
- Materials Research
  - Electronics, photonics, AdMan, Quantum, Design/Synth/Proc
- Sciences for Maneuver
  - Autonomy, Energy & Power, Mechanics/Dynamics
- Information Sciences
  - Cyber, Network/Comms, Info, Sensors, AI/ML
- Sciences for Lethality & Projection
  - Armor, Energetics, Ballistics
- Human Sciences
  - Training, Behavior, Augmentation
- Analysis & Assessment



# Collaboration Opportunities



## Research

- Grants
- Cooperative Agreements
- Relevant to BAA technical focus areas

\$25-140k/year  
6 mon - 3 yrs

## Travel Grant

- Visiting Scientist Program
- Travel to a US Army Lab or Center to collaborate/plan

\$1-3k  
Single trip

## Conference Support

- Small, scientifically focused
- Workshops, seminars, conferences

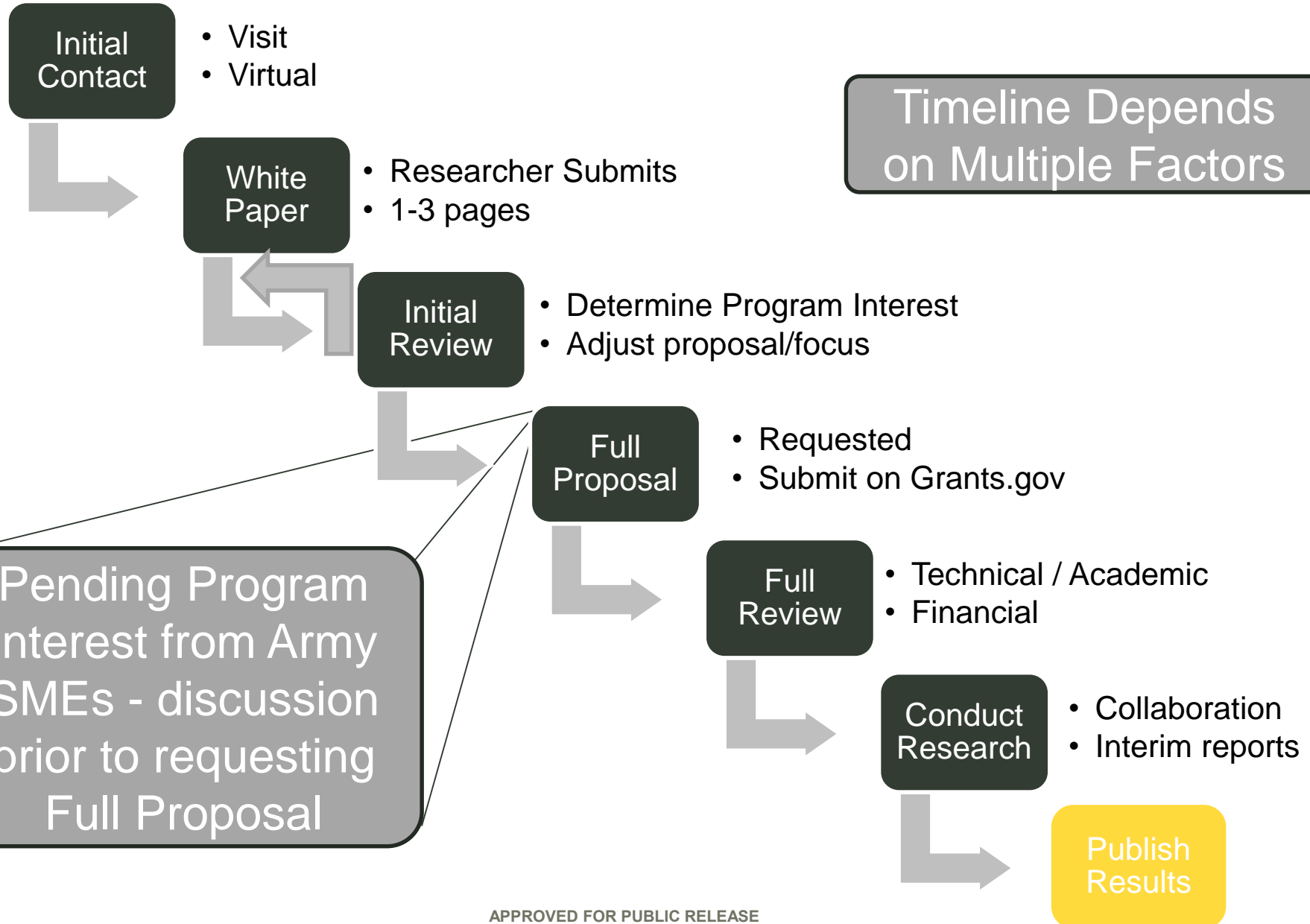
\*\* Support of event, but not food or entertainment

\$3-5k  
Single event





# PROPOSAL PROCESS





# INTELLECTUAL PROPERTY



- **Who retains the Intellectual Property rights?**
  - You, the researcher, and/or University
  - The proposal should identify any sensitive or intellectual property restrictions
- **What does the US Government get from my research?**
  - Government Purpose Rights (non-exclusive/non-commercial use of the IP)
  - International research collaboration
  - New relationships with top researchers in key areas to support U.S. Government priorities and strategies
- **Can the Results be Published?**
  - DEVCOM-Atlantic encourages you to publish your results in an open, peer-reviewed journal, magazine, or other publication
  - The U.S. Government can collaborate throughout the research activities to co-author publications with you



# CONTACT US



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<https://community.apan.org/wg/afosr/w/researchareas/11156/european-office-of-aerospace-research-and-development/>



Office of Naval Research – Global (ONR-G)  
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<https://www.onr.navy.mil/en/Science-Technology/ONR-Global>



Engineer Research & Development Center (ERDC)  
 International Research Office (IRO)  
<http://www.erd.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/9254/Article/476750/international-research-office.aspx>



# WHITEPAPER



Whitepapers should present the effort in sufficient detail to allow evaluation of the concept's scientific merit and its potential contributions of the effort to the Army mission

## **Background**

Briefly describe the research topic, recent scientific advancements, and knowledge gaps. Describe how your research idea will close knowledge gaps.

## **Short Work Statement**

Provide a concise description of what you intend to do if the project is funded including the research aims and a general summary of the intended approach. A detailed methodology is not required.

## **Research Vision**

Include the nature and extent of the anticipated results and, if known, the manner in which the work will contribute to the accomplishment of the Army's mission and how this contribution would be demonstrated.

Estimated cost by year



# BAA EXAMPLES



<b>II. DETAILED INFORMATION ABOUT THE FUNDING OPPORTUNITY</b>		5
A. Program Description		5
1. RESEARCH INTERESTS FOR U.S. INSTITUTIONS		5
a. Physical Sciences		5
i. Chemical Sciences		5
ii. Physics		9
iii. Life Sciences		14
b. Engineering Sciences		19
i. Mechanical Sciences		20
ii. Electronics		26
iii. Materials Sciences		30
iv. Earth Sciences		32
c. Information Sciences		33
i. Computing Sciences		33
ii. Mathematical Sciences		39
iii. Network Sciences		49

*Quantum Sensing, Imaging, and Metrology (QSIM).* This research area seeks to explore, develop, and demonstrate multi-particle coherent systems to enable beyond classical capabilities in imaging, sensing, and metrology. Central to this research area is the exploration of small systems involving a few entangled particles. Topics of interest in this research area include the discovery and exploration of (a) multi-particle quantum states advantageous for imaging, sensing, and metrology, (b) quantum circuits that operate on multi-particle quantum states to enable beyond-classical capabilities, and (c) methods for the readout of quantum states. Other research topics of interest are: theory to explore multi-particle quantum states useful for beyond classical capabilities, quantitative assessment of capabilities and comparison to classical systems, efficient state preparation, quantum circuits for processing these states as quantum bits, readout techniques, decoherence mitigation and error-correction for improved performance, supporting algorithms as a basis for processing circuits, connections between the solution of hard computational problems and overcoming classical limitations in imaging, sensing, and metrology, entanglement as a resource, and suitable physical systems and key demonstration experiments.

TPOC: Dr. Sara Gamble, [sara.j.gamble.civ@mail.mil](mailto:sara.j.gamble.civ@mail.mil), (919) 549-4241

## (1) Solid State Physics (SSP)

The SSP Program strives to drive research that looks beyond the current understanding of natural and designed condensed matter, to lay a foundation for revolutionary technology development for next generation and future generations of warfighters.

*Strong Correlations and Novel Quantum Phases of Matter.* Understanding, predicting, and experimentally demonstrating novel phases of matter in strongly correlated solid state materials will lay a foundation for new technology paradigms for applications ranging from information processing to sensing to novel functional materials. Interest primarily involves strong correlations of electrons, but those of other particles or excitations are not excluded. This thrust also emphasizes dynamically-stabilized electronic states and metastable phases of materials that are not adiabatically accessible from known ground states. The program seeks to foster novel experimental and theoretical research targeting the discovery and rational design of new quantum phases of matter in the solid state, along with exploring how excitations within these phases can be probed and controlled.

*Topologically Non-Trivial Phases in Condensed Matter.* Topologically non-trivial states of matter in solid state materials beyond the quantum Hall phases have shown a remarkable opportunity to advance our understanding of physics as well as provide a foundation for new technologies. This thrust seeks to expand our understanding of both single-particle mean field topological states and those with strong correlations. Magnetic correlations are of particular interest. Discovery as well as engineering of new non-trivial phases, verification of non-trivial topologies and phase transitions between trivial and non-trivial topological states are of interest.

*Unique Instrumentation Development.* Advanced studies of SSP phenomena often require unique experimental techniques with tools that are not readily available. For example, unambiguous experimental verification of predicted topologically non-trivial phases can be beyond the reach of existing techniques. The construction and demonstration of new methods for probing and controlling unique quantum phenomena in solid state materials is of particular interest.

TPOC: Dr. Marc Ulrich, [marc.d.ulrich.civ@mail.mil](mailto:marc.d.ulrich.civ@mail.mil), (919) 549-4319