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ARMY RESEARCH OFFICE BROAD AGENCY ANNOUNCEMENT FOR BASIC AND APPLIED SCIENTIFIC RESEARCH

**a. RESEARCH AREA 1: MECHANICAL SCIENCES**

**1.0 Mechanical Sciences**

**1.1 Fluid Dynamics**

1.1.1 Vortex-Dominated Flows.

1.1.2 Unsteady Aerodynamics

1.1.3 Micro Adaptive Flow Control

**1.2 Solid Mechanics**

1.2.1 Mechanics of Heterogeneous Systems.

1.2.2 Mechanics of Soft Materials & Biologic Systems

**1.3 Complex Dynamics and Systems.**

1.3.1. Dynamics of Nonlinear and Nonconservative Systems

1.3.2 Morphologically Modulated Motion and Underactuation

1.3.3 Force Generation, Work and Power in Nonequilibrium Dynamical Systems

**1.4 Propulsion and Energetics**

1.4.1 Engines

1.4.2 Propellant Combustion Processes.

**b. RESEARCH AREA 2: EARTH SCIENCES**

**2.1 Earth Materials and Processes**

**2.2 Environmental Chemistry**

**c. RESEARCH AREA 3: MATHMATICAL SCIENCES**

**3.1 Modeling of Complex Systems**

3.1.1 Geometric and Topological Modeling

3.1.2 Small-group Social and Sociolinguistic Modeling.

**3.2 Probability and Statistics**

3.2.1 Stochastic Analysis and Control.

3.2.2 Statistical Analysis and Methods

**3.3 Biomathematics**

3.3.1 Fundamental Laws of Biology

3.3.2 Multiscale Modeling/Inverse Problems.

3.3.3 Modeling at Intermediate Timescales

**3.4 Computational Mathematics.**

3.4.1 Problems that are not time-limited,

3.4.2 Rapidly-changing unpredictable and adverse conditions.

**d. RESEARCH AREA 4: ELECTRONICS**

**4.1 Nano- and Bio-Electronics**

**4.2 Optoelectronics**

**4.3 Electronic Sensing.**

**4.4 Electromagnetics and Circuit Integration.**

**e. RESEARCH AREA 5: COMPUTING SCIENCE**

**5.1 Computational Architectures and Visualization**

5.1.1 Computational Architectures.

5.1.2 Visualization

**5.2 Information Processing & Fusion.**

5.2.1 Foundations of Image and Multimodal Data Analysis

5.2.2 Data and Information Fusion

5.2.3 Active and Collaborative Sensing

**5.3 Information and Software Assurance**

5.3.1 Supporting Army Tactical Mission

5.3.2 Foundations for next generation survivable systems

5.3.3 Trusted social computing.

5.3.4 Principles of Moving Target Defense

5.3.5 Hardware Assurance

5.4 Social Informatics.

5.4.1 Quantification and Metrics

5.4.2 Analytical and Computational Models

**f. RESEARCH AREA 6: PHYSICS**

**6.1 Condensed Matter Physics.**

*Strong Correlations and Novel Quantum Phases of Matter*

*Topological Electronic Phases in Condensed Matter*.

*Unique Instrumentation Development*

**6.2 Quantum Information Science.**

*Foundational Quantum Physics*

*Quantum Sensing, Imaging, and Metrology*

*Quantum Computation and Communication*

**6.3 Atomic and Molecular Physics.**

6.3.1 *Advanced Quantum Capabilities*

*Novel Quantum Methods.*

*Novel Quantum Methods*

**6.4 Optical Physics and Fields**

*Extreme Light*

*Non-Electromagnetic Fields*

**g. RESEARCH AREA 7: CHEMICAL SCIENCES**

**7.1 Molecular Structure and Dynamics.**

(i) *Reaction Dynamics* and

(ii) *Computational Modeling*

**7.2 Electrochemistry.**

(i) Reduction-oxidation (Redox) Chemistry and Electrocatalysis,

(ii) Transport of Electroactive Species

**7.3 Polymer Chemistry.**

(i) *Precision Polymeric Materials*

(ii) *Complex Polymer Systems*.

**7.4 Reactive Chemical Systems.**

(i) *Interfacial Activity*

(ii) *Synthetic Molecular Systems*.

**h. RESEARCH AREA 8: LIFE SCIENCES**

**8.1 Biochemistry.**

**8.2 Genetics.**

**8.3 Microbial Physiology and Engineering**

(i) *Microbial Survival Mechanisms*

(ii) *Synthetic Bioengineering of Microbes*. The *Microbial Survival Mechanisms*

**8.4 Neurophysiology of Cognition**

**8.5 Social and Behavioral Science**.

**i. RESEARCH AREA 9: MATERIALS SCIENCE**

**9.1 Materials by Design.**

(i) Directed 3D Self-Assembly of Materials

(ii) Functional Integration of Materials

**9.2 Mechanical Behavior of Materials.**

(i) Force-Activated Materials

(ii) Mechanical Complements in Materials

**9.3 Physical Properties of Materials**

(i) Free-standing 2D Materials

(ii) Defect Science & Engineering

**9.4 Synthesis and Processing of Materials.**

(i) Stability of Nanostructured Materials

(ii) Manufacturing Process Science

**j. RESEARCH AREA 10: NETWORK SCIENCE**

**10.1 Communication and Human Networks**

10.1.1 Wireless Network Theory.

10.1.2 Mobile Ad Hoc and Sensor Networks

10.1.3 Interactions Between Social and Communications Networks

10.1.4 Human Networks

**10.2 Social and Cognitive Networks**

10.2.1 Human Behavior and Interaction

10.2.2 Information and Knowledge Management

10.2.3 Social Network Analysis

**10.3 Intelligent Networks.**

10.3.1 Integrated Intelligence and Theory of Mind.

10.3.2 Robust Reasoning Under Uncertainty

10.3.3 Adversarial Reasoning

10.3.4 Collective Intelligence

10.3.5 Distributed Graph Algorithms

**10.4 Multi-Agent Network Control**

10.4.1 Control and Dynamical Systems Theory for Complex, Co-Evolving Networks

10.4.2 Information Structure, Causality, and Dynamics for Control.

10.4.3 Fundamental Physics of Co-Evolving, Complex Networks

**k. RESEARCH AREA 11: ARO SPECIAL PROGRAMS**

are not open for non US researchers.