

DOD to Award \$167 Million in Research Funding

The Department of Defense (DOD) today announced plans to issue 24 awards totaling \$167 million over the next five years to academic institutions to perform multidisciplinary basic research. The Multidisciplinary University Research Initiative (MURI) program supports research conducted by teams of investigators that intersect more than one traditional science and engineering discipline in order to accelerate research progress.

The Army Research Office, the Air Force Office of Scientific Research, and the Office of Naval Research solicited proposals in 24 topics important to DOD and the military services. Initially, 361 white papers were received, 88 of which were selected for more detailed proposals. The awards were selected based on a merit review by a panel of experts and are subject to successful negotiation between the institution and DOD. The awards announced today are for a five year period subject to availability of appropriations and satisfactory research progress.

The highly competitive MURI program complements other DOD basic research efforts which fund traditional, single-investigator university, industry and department laboratory grants, by supporting multidisciplinary teams with larger and longer-term awards, in carefully chosen research topics identified for their potential for significant and sustained progress. Like single-investigator awards, MURI awards provide strong support for the education and training of graduate students in cutting edge research. Based on the proposals selected in the fiscal 2014 competition, a total of 64 academic institutions are expected to participate in these 24 research efforts.

For more than 25 years, DOD's MURI program has resulted in significant capabilities for our military forces and opened up entirely new lines of research. Examples include advances in laser frequency combs that have become the gold standard in frequency control for precision in navigation and targeting; atomic and molecular self-assembly projects that have opened new possibilities for nano-manufacturing; and the field of spintronics emerged from a MURI award on magnetic materials and devices research.

The list of projects selected for fiscal 2014 funding may be found below.

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| MURI Topic: Attosecond Electron Dynamics | | | | |
| ARO | Post-Born-Oppenheimer Dynamics using Isolated Attosecond Pulses | University of California, Berkeley University of California, Davis University of Arizona University of Central Florida | Stephen Leone | CA CA AZ FL |
| MURI Topic: Force-Activated Synthetic Biology | | | | |
| ARO | Mechanisms of Force Sensing in Adherent Cells as Inspiration for New Materials | University of Chicago Yale University | Margaret Gardel | IL CT |
| MURI Topic: Nonlinear Dynamics of Energy Hypersurfaces Governing Reaction Networks | | | | |
| ARO | New Theoretical and Experimental Methods for Predicting Fundamental Mechanisms of Complex Chemical Processes | University of Missouri - Columbia University of Massachusetts, Boston University of California, Berkeley University of California, Santa Barbara University of California, Merced Northwestern University | Donald Thompson | MO MA CA CA CA IL |
| MURI Topic: Strongly Linked Multiscale Models for Predicting Novel Functional Materials | | | | |
| ARO | Multiscale Mathematical Modeling and Design Realization of Novel 2D Functional Materials | University of Minnesota Harvard University Northeastern University University of Delaware | Mitchell Luskin | MN MA MA DE |

1. Team member institutions are those included in the lead institution's research proposal. They are subject to change at the discretion of the lead institution (e.g., if the final negotiated amount of the award is less than the amount proposed).
2. Team members who are collaborating in a MURI but who are not receiving MURI funds are not listed in this table.

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| MURI Topic: Multistep Catalysis | | | | |
| ARO | Bio-inspired Design of Adaptive Catalysis Cascades | University of Utah University of New Mexico Columbia University Michigan State University University of California, Riverside | Shelley Minteer | UT NM NY MI CA |
| MURI Topic: Innovation in Prokaryotic Evolution | | | | |
| ARO | Mechanisms of Prokaryotic Evolution | Indiana University University of Chicago | Michael Lynch | IN IL |
| MURI Topic: Ultracold Molecular Ion Reactions | | | | |
| ARO | Precision Chemical Dynamics and Quantum Control of Ultracold Molecular Ion Reactions | University of California, Los Angeles Emory University Georgia Institute of Technology Northwestern University Temple University University of Connecticut Wayne State University | Eric Hudson | CA GA GA IL PA CT MI |
| MURI Topic: The Skin-Microbe Interactome | | | | |
| ARO | Understanding the Skin Microbiome through the Integration of Metagenomics, Bioinformatics, Spatial Ecology, and Synthetic Biology | Johns Hopkins University Duke University University of Maryland, College Park | David Karig | MD NC MD |

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| MURI Topic: Time-Resolved Quantum Dynamics of Complex Systems | | | | |
| AFOSR | Studying Ultrafast Electron Dynamics in Condensed Matter with Next Generation Attosecond X-ray Sources | University of Central Florida Ohio State University University of California, Berkeley Georgia State University | Zenghu Chang | FL OH CA GA |
| MURI Topic: Computational Foundation of Mathematics and Information | | | | |
| AFOSR | Homotopy Type Theory: Unified Foundations of Mathematics and Computation | Carnegie Mellon University Wesleyan University University of San Diego Institute of Advanced Study | Steven Awody | PA CT CA NJ |
| MURI Topic: Transport and Utilization of Energy Using Plasmon-induced Processes | | | | |
| AFOSR | Shedding Light on Plasmon-based Photochemical and Photophysical Processes | Rice University Columbia University Princeton University University of Minnesota | Naomi Halas | TX NY NJ MN |
| MURI Topic: Design Rules for Biobased and Bioinspired Materials | | | | |
| AFOSR | Convergent Evolution to Engineering: Multiscale Structures and Mechanics in Damage Tolerant Functional Biocomposite and Biomimetic Materials | University of California, Riverside University of California, Berkeley Purdue University University of California, San Diego Northwestern University | David Kisailus | CA CA IN CA IL |

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| MURI Topic: Control of Coherent Structures in Plasmas for Reconfigurable Metamaterial-Based Devices | | | | |
| AFOSR | Plasma-based Reconfigurable Photonic Crystals and Metamaterials | Stanford University Tufts University Pennsylvania State University University of Texas, Austin University of Washington University of California, Los Angeles | Mark Cappelli | CA MA PA TX WA CA |
| AFOSR Topic: Multifunctional Quantum Transduction of Photons, Electrons, and Phonons | | | | |
| AFOSR | Integrated Quantum Transduction with Photons, Phonons, and Spins | University of Chicago University of California, Santa Barbara Cornell University Yale University California Institute of Technology | David Awschalom | IL CA NY CT CA |
| AFOSR | Wiring Quantum Networks with Mechanical Transducers | University of Colorado, Boulder Yale University University of Maryland, College Park California Institute of Technology | Konrad Lehnert | CO CT MD CA |
| MURI Topic: Control of Light Propagation through Metasurfaces | | | | |
| AFOSR | Active Metasurfaces for Advanced Wavefront Engineering and Waveguiding | Harvard University Columbia University Purdue University Stanford University University of Pennsylvania | Frederico Capasso | MA NY IN CA PA |

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| MURI Topic: Goal-Driven, Multi-Source Algorithms for Complex Resilient Multi-Physics Systems | | | | |
| AFOSR | A Unified and Algorithmic Framework for Managing Multiple Information Sources of Multi-Physics Systems | Massachusetts Institute of Technology Cornell University University of Michigan Arizona State University Texas A&M University | Karen Willcox | MA NY MI AZ TX |
| MURI Topic: Security Theory of Nano-Scale Devices | | | | |
| AFOSR | Development of Universal Security Theory for Evaluation and Design of Nanoscale Devices | University of Connecticut University of Maryland, College Park Rice University | Mark Tehranipoor | CT MD TX |
| MURI Topic: Understanding Energy Harvesting Mechanisms in Polymer-Based Photovoltaics | | | | |
| ONR | Center for Advanced Organic Photovoltaics | Georgia Institute of Technology University of California, Santa Barbara Stanford University | Jean-Luc Bredas | GA CA CA |
| MURI Topic: Role of Bidirectional Computation in Visual Scene Analysis | | | | |
| ONR | Top-Down and Bottom-Up Visual Mechanisms at Multiple Spatial and Temporal Scales: Experimental Investigation and Computational Modeling | Stanford University Massachusetts Institute of Technology University of Illinois, Urbana-Champaign University of Arizona University of California, Berkeley | Fei-Fei Li | CA MA IL AZ CA |

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| MURI Topic: Exploring the Atomic and Electronic Structure of Materials to Predict Functional Material Properties | | | | |
| ONR | Understanding Atomic Scale Structure in Four Dimensions to Design and Control Corrosion Resistant Alloys | Northwestern University University of Akron University of California, Los Angeles University of Wisconsin, Madison Drexel University University of Virginia | Lawrence Marks | IL OH CA WI PA VA |
| MURI Topic: Optical Computing | | | | |
| ONR | Optical and Optoelectronic Computing | University of Arizona University of California, Berkeley University of California, San Diego University of California, Los Angeles | Mark Neifeld | AZ CA CA CA |
| MURI Topic: Quantum Optomechanics | | | | |
| ONR | | No Award is Being Made in this Topic | | |
| MURI Topic: Air-Sea Interaction and RF Propagation in Maritime Atmospheric Boundary Layers | | | | |
| ONR | Coupled Air Sea Processes and EM Ducting Research | Naval Postgraduate School University of Notre Dame University of Minnesota University of California, Irvine Ohio State University Oregon State University | Qing Wang | CA IN MN CA OH OR |

MURI Topic: **Hydrodynamics of Non-Traditional Propulsion**

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| ONR | Bio-inspired Flexible Propulsors for Fast, Efficient Swimming: What Physics Are We Missing? | University of Virginia West Chester University Harvard University Princeton University Lehigh University | Hilary Bart-Smith | VA PA MA NJ PA |
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