

FY2023 MULTIDISCIPLINARY UNIVERSITY RESEARCH INITIATIVE (MURI) - SELECTED PROJECTS

Topic Number	Topic Name	Project Title	Sponsoring Office	Primary University Subaward Universities (1)	University Location (State)	Principal Investigator
1	Integrated Bio-Hybrid Actuators	Self-sustaining sensorized muscle-based biohybrid technologies with integrated control	ARO	Carnegie Mellon University Northwestern University Georgia Institute of Technology	PA IL GA	Victoria Webster-Wood
2	Neuro-Inspired Distributed Deep Learning (NIDDL)	A Framework for Universal Generalization via Memory Based Computation	ARO	Massachusetts Institute of Technology University of California, Berkeley Harvard University	MA CA MA	Pulkit Agrawal
3	Chemical and Microbial Indicators of Permafrost Degradation from Changes in Climate	Synoptic measurement of stream and atmospheric indicators to improve the monitoring and prediction of climate-induced permafrost degradation across Alaska	ARO	University of Colorado Boulder Colorado State University University of Alaska Fairbanks	CO CO AK	Merritt Turetsky
4	Dynamically Tunable and Enhanced Thermal Conductivity in Polymeric Materials	Poly-HEATLINE: Polymer HEAT Transfer by Learned Intermolecular Enhancement	ARO	Carnegie Mellon University University of Florida University of Michigan University of Delaware	PA FL MI DE	Jonathan Malen
5	The Stranger Within: The Ecology of the Brain	Bioengineered 3D Human Brain Tissues and Animal Models to Investigate the Role of the Microbial Ecosystem in Healthy, Injured and Disease States	ARO	Tufts University Massachusetts General Hospital Harvard Medical School University of Pennsylvania	MA MA MA PA	David Kaplan
6	Control Theory for Novel Quantum Error Correction	Quantum Error Correction Under Control	ARO	University of Southern California Massachusetts Institute of Technology Iowa State University	CA MA IA	Daniel Lidar
7	Emergent Refractory Behaviors in Earth and Extraterrestrial Materials	Planetary- and Geologically Inspired Discovery of Refractory Materials	ARO	University of Virginia Arizona State University	VA AZ	Elizabeth Opila
8	Supremacy over Quantum: Efficient Real-World Optimization on Stochastic Binary Networks	OptNet: Optimization with p-bit Networks	ONR	Purdue University University of California, Santa Barbara University of California, Berkeley Cornell University	IN CA CA NY	Supriyo Datta

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9	Identifying the Fundamental Properties of Biological Soft Structures Subjected to High Hydrostatic Pressure that Preserve Structural and Functional Integrity of Deep-Sea Organisms	Bio-Inspired Material Architectures for Deep Sea (BIMADS)	ONR	Georgia Institute of Technology University of Tennessee Providence College Pennsylvania State University University of Pittsburgh	GA TN RI PA PA	Alper Ertuck
10	Advance Mixed-Precision and Deep Learning Algorithms for Computation of Multiscale-Multiphysics and Optimization Models	Data-Driven Closure Models and Constitutive Relations: The Development of Principled Methodologies for Complex Multi-Physics Applications	ONR	California Institute of Technology Harvard University	CA MA	Kaushik Bhattacharya
11	Fundamental Processes in Solid-Fuel Combustion	Combustion of Solid Fuels in High Enthalpy Flow	ONR	Virginia Polytechnic Institute and State University Georgia Institute of Technology Iowa State University Leland Stanford Junior University North Carolina State University Pennsylvania State University University of California, Los Angeles	VA GA IA CA NC PA CA	Gregory Young
12	Climate Change Risk and Decision Superiority	Sea-Level Rise in the Indo-Pacific Region: Building a Framework for Interdependent Resilience	ONR	University of California, San Diego Harvard University Oregon State University Pennsylvania State University	CA MA OR PA	Mark Merrifield
12	Climate Change Risk and Decision Superiority	Decision-Making with Uncertainty for DoD Installations under Climate Change Impacts on Flood Risks	ONR	University of Michigan University of Illinois Urbana-Champaign Boise State University	MI IL ID	Xun Huan
13	Twist on Photonics (TOP): Light-Matter Interactions Defined by Novel Degrees of Freedom	Emergent light-matter interactions through twisted atomic and photonic crystals	ONR	Vanderbilt University University of Minnesota Leland Stanford Junior University University of Iowa	TN MN CA IA	Joshua Caldwell

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14	Building Overall Cognitive Capability through Attention Control	Computational Cognitive Neuroscience Framework for Attentional Control Traits and States	ONR	Washington University in St. Louis Brown University The Regents of the University of California, Irvine	MO RI CA	Todd Braver
14	Building Overall Cognitive Capability through Attention Control	Understanding and Building Overall Cognitive Capability through Attention Control	ONR	Georgia Institute of Technology University of Chicago Massachusetts Institute of Technology Michigan State University Purdue University	GA IL MA MI IN	Randall Engle
15	BIOMIX MURI	Using concurrent in situ measurements of animal movement and turbulent microstructure in the pelagic ocean to quantify the role of biology in ocean mixing	ONR	Stony Brook University University of Rhode Island University of Washington Florida International University University of South Florida	NY RI WA FL FL	Joseph Warren
16	Spatially Programmed Material Properties via Designed Mesostructures	Directed assembly of mesoscale architectures in additive manufacturing	ONR	Massachusetts Institute of Technology University of Wisconsin University of Delaware Northeastern University	MA WI DE MA	John Hart
17	Excited State Chemistry of Preceramic Polymers	Photochemical and Photothermal Additive Manufacturing of Preceramic Polymers	ONR	Pennsylvania State University University of Southern California Massachusetts Institute of Technology	PA CA MA	Michael Hickner
18	Fluid-(Sub-) Surface Material Interactions for Passive Flow Control	Fluid-Metamaterial-Interaction to Revolutionize Passive Control of Aerodynamic Flows	AFOSR	University of Illinois Urbana-Champaign California Institute of Technology University of Pennsylvania Boston University	IL CA PA MA	Kathryn Matlack
19	Quantum Spin Effects in Chiral Matter	Electron Spin Selectivity of Chiral Matter, from Molecules and Supramolecular Assemblies to Life	AFOSR	University of Pittsburgh Ohio State University Duke University University of Illinois Urbana-Champaign University of Minnesota University of Pennsylvania University of Southern California	PA OH NC IL MN PA CA	David Waldeck

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19	Quantum Spin Effects in Chiral Matter	Elucidating Interplays of Chirality and Spin in Chiral Assemblies	AFOSR	North Carolina State University Duke University University of North Carolina at Chapel Hill University of Illinois Urbana-Champaign	NC NC NC IL	Dali Sun
20	Cognitive Security	Cognitive Security and its Mitigation: A Theoretical Framework, Supporting Neurophysiological Studies, and Interactive Deep Learning Models in Sparse and Dense Information Environments	AFOSR	University of Colorado Boulder United States Air Force Academy Texas A&M University	CO CO TX	Leanne Hirshfield
21	Open Hybrid Dynamical Systems: Compositions, Invariants, and Computation	HyDDRA: Hybrid Dynamics - Deconstruction and Aggregation	AFOSR	University of Illinois Urbana-Champaign University of Pennsylvania California Institute of Technology University of California, Los Angeles	IL PA CA CA	Yuliy Baryshnikov
21	Open Hybrid Dynamical Systems: Compositions, Invariants, and Computation	Unified Large-Scale Theoretical and Computational Frameworks for Invariance and Composition of Open Hybrid Dynamical Systems	AFOSR	George Washington University University of Michigan Rutgers University Florida Atlantic University University of Florida	DC MI NJ FL FL	Taeyoung Lee
22	Dislocations as One Dimensional Quantum Matters	Dislocations as Interconnects for Spin Qubit	AFOSR	The Ohio State University University of Chicago	OH IL	Maryam Ghazisaeidi
22	Dislocations as One Dimensional Quantum Matters	Hosting One-Dimensional Topological States with Dislocations	AFOSR	University of Michigan University of Illinois Urbana-Champaign	MI IL	Rachel S. Goldman
23	Quantum Phononics	High Coherence Quantum Phononic Circuits	AFOSR	Yale University University of Chicago Leland Stanford Junior University Cornell University	CT IL CA NY	Thomas (Peter) Rakich

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23	Quantum Phononics	Quantum phononics to advance quantum information processing	AFOSR	University of Colorado Boulder Purdue University Yale University University of Chicago Harvard University University of California, Berkeley	CO IN CT IL MA CA	Konrad Lehnert
24	Cavity Molecular Polaritons	Real-Time Coherent X-ray Imaging of Radiation-Sensitive Materials at Sub-10 nm Resolution	AFOSR	University of California, Los Angeles University of California, Berkeley University of Colorado Boulder Leland Stanford Junior University	CA CA CO CA	Jianwei (John) Maio
24	Cavity Molecular Polaritons	Searching for what's new: the systematic development of dynamic x-ray microscopy	AFOSR	Massachusetts Institute of Technology Northwestern University Stony Brook University	MA IL NY	George Barbastathis

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